Commercial Vehicles

Converter guidelines
The new Crafter (from model year 2025 onwards)

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1 Introduction

These Converter guidelines provide body builders with important technical information which must be complied with when planning and manufacturing a body for road safety and operational reliability. The add-on, body, installation or conversion work required for this is referred to below as “body activities”.

Due to the large number of individual conversions and body types in the Converter industry, it is not possible for Volkswagen AG to foresee all possible changes, e.g. in driving behaviour, stability, weight distribution, centre of gravity of the vehicle and its handling characteristics which can occur as a result of work carried out on the body. Therefore, Volkswagen AG does not accept any liability for accidents or injuries arising from modifications of this kind made to its vehicles, especially if the changes have a negative effect on the vehicle as a whole. As a result, Volkswagen AG only accepts liability for its own design, production and instruction services. The Converter itself is obliged to ensure that its body activities are not faulty in themselves, and also that they cannot result in defects or dangers on the vehicle as a whole. The Converter must also ensure the conformity of the body activities with the respective and applicable laws (in particular approval and registration processes). The Converter itself is liable in the event that this obligation is violated.

These Converter guidelines are intended for professional body builders. As a result, these Converter guidelines assume corresponding background knowledge. Note that some work (e.g. welding on load-bearing parts) is only allowed to be performed by appropriately qualified personnel. This requirement exists in order to avoid risks of injury and to achieve the quality needed in the body activities.

1.1 Concept of these guidelines

The following Converter guidelines are divided into 11 chapters so that you can find information rapidly:

1. Introduction
2. General information
3. Planning bodies
4. Technical limit values for planning
5. Prevention of damage
6. Electrical / electronic systems
7. Modifications to base vehicle
8. Industry-specific conversions
9. Calculations
10. Technical data
11. Notes on homologation of equipping and conversions

For more information, see chapters 2.1 “Product and vehicle information for body builders”, 2.2 “Converter guidelines, consulting” and 2.10 “Delivery range”.

The limit values selected in chapter 4 “Technical limit values for planning” shall be complied with without fail, and shall be used as the basis for planning.

Chapters 7 “Modifications to the base vehicle” and 8 “Industry-specific conversions” are the basis for the technical content of the Converter guidelines.

1.2 Means of representation

The following means of representation are used in these Converter guidelines:

Warning note

A danger note draws your attention to possible accident or injury risks to which you or other persons might be exposed.

Environmental note

An environmental note provides you with information about environmental protection.

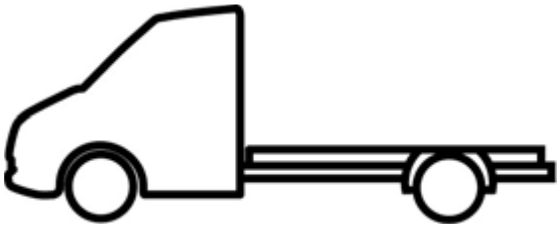
Practical note

This note draws your attention to the risk of possible damage to the vehicle, as well as to regulations and provisions to be observed.

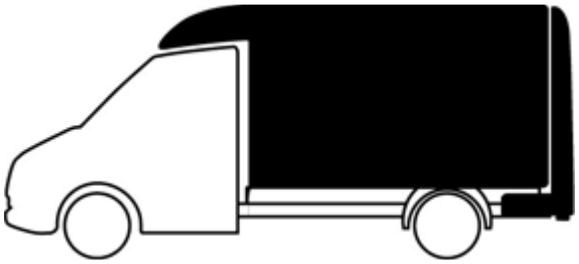
Information

This note indicates additional information.

Under this symbol you will find information about the supplied base vehicle (chassis and panel van):



Under this symbol you will find information about the conversion or the assembly or mounting of the body by the Converter:



1.3 Vehicle safety

Warning note

Before the assembly of external add-ons or mechanical units, it is essential that you read the chapters in these Converter guidelines that are related to assembly, as well as corresponding chapters in the instructions and information for the suppliers' mechanical units and in the detailed operating manual for the base vehicle. Otherwise you will not be able to recognise dangers, and might expose yourself or others to danger.

1.3.1 Notes on vehicle safety

We recommend that you use parts, power units, conversion parts or accessories that have been tested by Volkswagen AG for the corresponding vehicle type.
Have the vehicle's safety checked immediately if non-recommended parts, power units, conversion parts or accessories are used.

Practical note

It is essential that you comply with European vehicle approval or UN R regulations, as well as national registration regulations and also technical vehicle regulations. This is because body activities on the vehicle can alter the vehicle type under registration regulations and the operating permit may be invalidated.

This applies in particular to:

- Modifications which change the vehicle type approved in the operating permit
- modifications which might be expected to endanger road users or
- modifications which impair the exhaust or noise emissions characteristics.

1.4 Operational safety

Warning note

Incorrect interventions in electronic components and their software may result in these no longer functioning. Due to the networking of electronics, systems that were not modified can be affected.

Malfunctions to the electronics can significantly impair the operational safety of the vehicle.

Have work on, or modifications to, electronic components performed by qualified specialist staff that has the necessary specialist knowledge and tools for performing the necessary work.

Volkswagen AG recommends a Volkswagen AG customer service workshop for this purpose.

Service by qualified specialist staff is essential, in particular for safety-relevant work and work on safety-relevant systems.

Some safety systems only operate when the engine is running. Therefore, do not switch the engine off when driving.

1.5 Note on copyright

2 General information

The following pages contain technical guidelines for body builders and equipment fitters designing and mounting bodies.
The Converter guidelines must be strictly adhered to when performing any modifications to the vehicle. The current version of the German edition of the Converter guidelines is the exclusive authority for the most up-to-date information.
This also applies to legal claims. Should the Converter guidelines include references to legal regulations, then no guarantee can be provided for the completeness and correctness of this content, or that it is up-to-date. Country-specific features can vary.

2.1 Product and vehicle information for body builders

2.1.1 Contact in Germany

If you have questions about vehicle models from Volkswagen Commercial Vehicles, you can contact us on the Volkswagen AG internet portals (www.customized-solution.com) or in one of the following ways:

Free hotline (from a German landline)	00-800-2878 66 49 33 (00-800-CUSTOMIZED)
Email	customizedsolution@volkswagen.de
Personal contacts	https://www.customized-solution.com/de/de/service-informationen/kundenbetreuung

2.1.2 International contact

Please contact the body builder's support personnel at the responsible importer for technical advice relating to Volkswagen Commercial Vehicles models and as a point of contact for conversions.
To find the contact person responsible for you, please register on the Volkswagen AG CustomizedSolution portal (https://www.customized-solution.com).
Help is available for the registration option using the "Help" menu option.

International hotline	+800-2878 66 49 33 (+800-CUSTOMIZED)
Email	customizedsolution@volkswagen.de
Personal contacts	https://www.customized-solution.com/de/de/service-informationen/kundenbetreuung

2.1.3 Electronic Repair and Workshop Information from Volkswagen AG (erWin*)

Body builders can access repair and workshop information, e.g.:

- Current flow diagrams
- Workshop manuals
- Maintenance
- Self-study Programmes

by means of the Electronic Repair and Workshop Information System from Volkswagen AG (erWin*):
http://erwin.volkswagen.de/erwin/showHome.do

Body builders with Integrated Partner or Premium Partner status have access to discounted annual licenses, which can be applied for in the Customised Solution portal under my Customised Solution Portal/Requirements/Planning and Development.
Body builders in export with the Partner status receive information in this regard from their point of contact at the importer.

*Information system from Volkswagen AG, subject to payment

2.1.4 Genuine parts online ordering portal*

For the purchase of spare parts and for the research of Volkswagen Genuine Parts, our latest parts catalogues are available on the internet on the “Genuine Parts Online Ordering Portal”:
www.partslink24.com

Body builders with Integrated Partner or Premium Partner status have access to discounted conditions.
All further information regarding direct purchasing of genuine parts can be found in the Customised Solution portal under My Customised Solution Portal/Requirements/Delivery and Customer Service. The offer applies exclusively to the German market.

*Information system from Volkswagen AG, subject to payment

2.1.5 Online Owner’s Manuals

Detailed information about the functions and handling of your vehicle can be found in your Owner's Manual which is enclosed with your vehicle ex-works. In addition to the hard copy of the Owner's Manual, the following link and VIN number of the vehicle can be used to receive the Owner's Manual in electronic form.
https://www.volkswagen-nutzfahrzeuge.de/de/service-und-teile/bordbuch.html

2.1.6 Homologation

2.1.6.1 Amendments to legislation from 1 January 2022
Regulation (EU) 2018/858 EU and national (Art. 44 and Art. 45)

The following applies to complete vehicles ex-works/OEM ZP8:

Complete vehicles that have been modified with add-ons/conversions after ZP8 and before initial registration must resubmit CO2/consumption values for the second stage.
These can be identified using the WLTP calculator in accordance with the available homologations.
Options for calculating weight and/or aerodynamic changes are available.
If individual values are not available for the respective conversion, a type approval can be checked in coordination with the technical service/regulatory authority.

The following applies to incomplete vehicles ex-works/OEM ZP8:

Incomplete vehicles that have been modified with add-ons/conversions after ZP8 and before initial registration must resubmit CO2/consumption values for the second stage.
These can be identified using the WLTP calculator in accordance with the available homologations.
Options for calculating weight and/or aerodynamic changes are available.
If individual values are not available for the respective conversion, the Vehicle High value may no longer be used as an alternative.

For all vehicles / engine-gearbox variants for which no values can currently be generated using the WLTP calculation tool, please contact your responsible technical service and check whether individual approval or multi-stage type approval is possible.

Further information on this topic can be found in chapter 11 “Notes on homologation of modifications and conversions”.

2.1.6.2 European Type Approval (ETA) and EC Certificate of Conformity (CoC)

Regulation (EU) 2018/858 of the European Parliament establishes the standard for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles.

Provisions were also adopted in this directive for the approval of vehicles produced in several stages: the multi-stage approval process. Accordingly, each manufacturer involved in the construction of a vehicle is itself responsible for the approval of modified or added scopes in its production stage.
The manufacturer may choose one of the four following methods:

- EU type approval
- EU type approval for small series
- National small series type approval
- Individual approval

CoC = Certificate of Conformity. A document that verifies the conformity of certain goods – and therefore also of vehicles and bodies – in accordance with the recognised (international) standards. The purpose of this Certificate of Conformity is to facilitate the approval of goods on international markets. As a result, the document is needed above all in import and export as part of the customs clearance procedure.

The manufacturer, the owner of an EU type approval or EU small series type approval, is obliged to provide a Certificate of Conformity with every vehicle which corresponds to an approved type. If you are planning to apply multi-stage type approval, an agreement must be concluded in accordance with the 2018/858/EU regulation.

2.1.6.3 Worldwide Harmonized Light-Duty Vehicles Test Procedure (WLTP)

New consumption values/ranges calculated in accordance with the new WLTP standards apply from September 2017 for new passenger cars entering the market and from September 2018 for new light commercial vehicles entering the market.
As of 1 September 2018, certified WLTP measurements must be available for all newly registered passenger cars. For light commercial vehicles with exhaust emission standard EU6 under Regulation EC 715/2007, the regulation will come into force one year later on 1 September 2019. 28+6 markets in Europe are affected by the WLTP.

WLTP stands for Worldwide Harmonized Light Vehicles Test Procedure. This is a worldwide standardised testing procedure for determining fuel consumption / electric range and exhaust emissions.
It is replacing the NEDC (New European Driving Cycle) test procedure that has been in force since 1992.
Unlike the NEDC, the WLTP takes into account individual special equipment and conversion solutions for weight, aerodynamics, electrical system requirements (no-load current) and rolling resistance which have an impact on the fuel consumption/electric range and exhaust emissions. This includes, in particular, modifications that result in a larger end face, a different radiator inflow area, a higher kerb weight for the vehicle or changes to the tyre size or the rolling resistance. Special equipment that consumes power, such as the air conditioning system or seat heating, still remains switched off for the duration of the test procedure.
Before initial approval, conversions or add-ons where WLTP is relevant can be made if they are approved by way of an individual approval or multi-stage type approval.
The Volkswagen type approval can be used for the multi-stage type approval for vehicles with conversions or add-ons that remain within the ISC parameters/maximum technical specifications for bodies. If the add-on or conversion is outside the ISC parameters*/maximum technical specifications defined by the manufacturer for add-on parts, the Converter must demonstrate compliance with the exhaust gas emissions requirements/electric range.
Information about the ISC parameters/maximum technical specifications for add-on parts can be found on the Volkswagen CustomizedSolution portal. Please ask your technical service/test centre for advice if you have questions about alternatives.

To determine the consumption values of converted new vehicles in compliance with the WLTP procedure and to obtain a WLTP certification, the “WLTP Conversion Calculator” is available to you.
You can find more information as a Registered Converter on the CustomizedSolution portal / WLTP:
Germany/International: https://www.customized-solution.com

2.1.7 Manufacturer’s declaration

We issue a manufacturer’s declaration for the base vehicle for the following scopes:

- Electromagnetic compatibility (EMC)
- Hazardous good transporters ADR 2017 for EX/II (explosive materials) vehicles
  (see also chapter 8.20 “Hazardous goods transport as per ADR”)

Please contact our customer support:
nutzfahrzeuge@volkswagen.de

2.2 Converter guidelines, consulting

The Converter guidelines define the technical requirements for body builders and equipment fitters designing and mounting bodies for base vehicles of the Volkswagen Commercial Vehicles brand. The Converter guidelines must be strictly adhered to when performing any modifications to the vehicle.
The statutory requirements, technical vehicle regulations and guidelines stated in the Directive are not comprehensive. When making modifications to vehicles, all applicable statutory requirements and all technical vehicle regulations and guidelines must be observed. The work safety regulations of the trade association and the Machinery Directive must be observed.
Ensure that no modification adversely affects the functional reliability and safety of the running gear, the body or the electric system. Modifications must only be performed by qualified specialists and in accordance with the generally acknowledged rules of the automotive industry.

Prerequisites for modifications to used vehicles:

- The vehicle shall be in a good overall condition, i.e. structural parts such as longitudinal and cross members, pillars etc. shall not be corroded to such an extent that structural stability might be adversely affected
- Vehicles whose modifications might affect the validity of the general certificate of roadworthiness must be presented to an authorised testing centre for approval. It is recommended to clarify in advance with the relevant authority whether approval is required

When inquiring about planned modifications, please enclose two sets of design drawings of the complete scope of the modification, including weights, centre of gravity and dimensions, which also clearly show how the body is attached to the chassis. Please use the online contact form for this (see chapters 2.1.1 “Contact in Germany” and 2.1.2 “International contact”). Please also provide information about the intended operating conditions of the vehicle.

2.2.1 Letter of non-objection

Volkswagen AG does not issue body approvals for non-Volkswagen bodies. It merely provides body builders with important information and technical specifications for dealing with the product in these guidelines. As a result, Volkswagen AG recommends that all work should be carried out on the base vehicle and the body in accordance with the current Volkswagen Converter guidelines applicable to the vehicle in question.

Volkswagen AG does not recommend body activities that:

- are not conducted according to these Volkswagen Converter guidelines
- exceed the gross vehicle weight rating
- exceed the gross axle weight rating

Volkswagen AG issues letters of non-objection on a voluntary basis, as follows:
The assessment conducted by Volkswagen AG is exclusively based on the documents submitted by the Converter who is carrying out the modifications. The inspection and safety assessment only relate to the expressly designated scope of work, its basic compatibility with the designated chassis and its interfaces or, in the event of chassis modifications, the fundamental admissibility of the design for the designated chassis.

The letter of non-objection relates to the presented overall vehicle, and not to:

- The design of the overall body,
- Its functions or
- The planned use.

Non-objection is only possible if the design, production and assembly are carried out by the Converter performing the modifications in accordance with the current technology and in compliance with the applicable Converter guidelines of Volkswagen AG – and assuming any deviations from these guidelines have been declared to be technically safe. The letter of non-objection does not release the Converter who is performing the modifications from its responsibility for the product, or from its obligation to carry out its own calculations, tests and a trial of the entire vehicle in order to ensure that the operational safety, road safety and driving properties of the overall vehicle it has manufactured are acceptable. Accordingly, it is necessary to ensure that the Converter exclusively accepts its responsibility for ensuring that its body activities are compatible with the base vehicle as well as the operational and road safety of the vehicle. It is expressly stated that the letter of non-objection from Volkswagen AG does not represent a technical approval for the investigated changes.

In the course of assessment of a presented vehicle, an assessment report is written as a means of obtaining a letter of non-objection (LONO report).

The following assessment results are possible:

- Classified as “safe”
  If the whole vehicle is classified as “safe”, the Sales department can subsequently issue the LONO certificate
- Classified as “not safe”
  Classification as “not safe” in the individual categories:
  + Basic vehicle configuration
  + Impairment of the basic vehicle and possibly
  + Sole body item

  leads to a corresponding classification of the whole vehicle. This means no LONO certificate can be issued initially.

In order for a not-safe classification to be resolved, the LONO report states the necessary change for each item in question. In order for the letter of non-objection to be obtained, these points will have to be addressed by the Converter and documented in a clearly comprehensible manner in a report along the same lines as the LONO report. On the basis of this detailed report, it is possible for the desk-review assessment to be completed with a positive result.
Depending on the defective points, it may be necessary not only to provide documentation of the defect resolution but also for the vehicle from the first inspection to be presented again. The first report indicates if it will be necessary for a new assessment to be carried out on the vehicle.

The assessment report may also contain “notes/recommendations”.
Notes/recommendations are technical remarks which do not have any effect on the final result of a letter of non-objection. They should be regarded as advice and suggestions for further consideration to support the continuous improvement of the final product for the customer.

In addition, “notes/recommendations solely relating to the conversion” can also be formulated. The information and recommendations stated as “solely relating to the body/conversion” must be dealt with and documented before the vehicle can be included in the CustomizedSolution portal.

Practical note

Country-specific laws, directives and approval regulations shall be observed!

2.2.2 Application for a letter of non-objection

Before starting any work on the vehicle, verifiable technical documentation and drawings must be submitted to the responsible department as part of the letter of non-objection evaluation (see chapter 2.1 “Product and vehicle information for body builders”).

Speedy handling of the request requires:

- Documents preferably in standardised digital formats (e.g. PDF, DXF, STEP)
- Technical data and documentation should be complete

The following details must be included:

- Vehicle type
  - Vehicle equipment (chassis, panel van etc.)
  - Wheelbase
  - Frame overhang
- Vehicle identification number (if already available)
- Any deviations from these Converter guidelines must be indicated on all documentation.
- Axle load calculation
- All data about dimensions, weight and centre of gravity (weighing certificate)
- Special operating conditions (e.g. poor road conditions, extreme dust, high altitude, or ambient temperature extremes)
- Certificates (e-registration, seat tensile test)
- Attachment of the body on the vehicle
- Subframe:
  - Material and profiles
  - Dimensions
  - Type of profile
  - Features of the subframe construction (profile modifications, additional reinforcements, offsets, etc.)
- Type of fixation for the body or add-ons to the vehicle frame (e.g. bolted connections)
  - Position (in relation to vehicle chassis)
  - Type
  - Size
  - Number
  - Property class

All fixation brackets on the vehicle frame must be used for bolted connections to the subframe, or body.

- Type of fixation for the body or add-ons to the vehicle frame (bolting, bonding, welding)
- Photographic documentation of the conversion
- All documents must clearly correlate with the conversion (e.g. drawings marked with allocated numbers)
- General (functional) description of deviations from the production vehicle, or added components
- Electric wiring diagram

  Details of the consumption of additional electrical equipment.

Complete documentation avoids the need for clarification queries and accelerates the processing.

2.2.3 Legal entitlements

- There is no legal entitlement for a letter of non-objection to be issued
- Due to ongoing technical development and the information derived from this, Volkswagen AG is entitled to refuse a letter of non-objection even if a comparable certificate had been issued formerly
- The letter of non-objection can be restricted to individual vehicles
- The subsequent issue of a letter of non-objection may be refused for vehicles that have already been completed or delivered
- The Converter is solely responsible for:
  - The function and compatibility of its body activities with the basic vehicle
  - Road safety and operational reliability
  - All body building activities and installed parts

2.3 Warranty and product liability of the Converter

UN ECE Regulation No. 155 for vehicle cyber security and UN ECE Regulation No. 156 for vehicle software updates apply to all new vehicle types from the middle of 2022 and to all new vehicle registrations from the middle of 2024; these contain new requirements for automotive cyber security and updates.
Insofar as modifications are made to the vehicle, the Converter shall also ensure that these regulations are applied and complied with.
The body builder's or equipment fitter's warranty conditions apply to the body builder's or equipment fitter's scope of supply.
Therefore, warranty claims associated with complaints to this scope of supply cannot be made under the warranty conditions applicable to Volkswagen Commercial Vehicles.

Defects of bodies, installations and equipping provided by third parties as well as defects of the vehicle caused by the said bodies, installations or conversions are excluded from the Volkswagen warranty and also from the Volkswagen paint and body warranty. This also applies to accessories which were not installed and/or supplied by the vehicle manufacturer.
The Converter or equipment fitter is solely responsible for the design and assembly of bodies and the execution of conversions.
All modifications must be documented by the Converter or equipment fitter.
The Converter is responsible for ensuring that all modifications it performs comply with the technical vehicle regulations, specifications and standards that apply in the countries of registration.
Due to the multitude of modifications and diversity of operating conditions, the information provided by Volkswagen AG is subject to the reservation that modified vehicles are not tested by Volkswagen AG. Modifications may affect the properties of the vehicle.
For reasons of liability, the body builders/equipment fitters must provide the following information in writing to their customers:
"Due to the modifications* to your Volkswagen Commercial Vehicles basic vehicle, the properties of your basic vehicle may have changed. Please understand that Volkswagen AG does not assume any liability for any negative effects resulting from the modifications* to the vehicle."

In individual cases, Volkswagen AG reserves the right to demand evidence of the information being passed on to the customer.
No general legal entitlement for the approval of a body modification exists, even if such approval was previously granted.
If bodies comply with the present guidelines, no additional approval by Volkswagen AG is required for the presentation of the vehicle at the relevant authority examining roadworthiness.

* At this point, the term "modification" may be substituted by a more precise description of the work performed, e.g. by "camping equipment installation" or "wheelbase extension".

2.4 Ensuring traceability

Body dangers only detected after delivery can mean that subsequent measures in the market will be necessary (customer information, warning, call-back). To make these measures as efficient as possible, it is necessary to be able to trace the product after delivery. For this purpose, and in order to be able to use the central vehicle register (CVR) operated by the Federal Motor Transport Authority or comparable registers abroad in order to trace the affected vehicle owners, we strongly recommend that Converter should store the serial number/identification number of their body linked to the vehicle identification number of the base vehicle in their databases. For this purpose, it is also recommended that customers' addresses are stored and that subsequent owners are provided with a means of registration.

2.5 Trademarks

Volkswagen badges and Volkswagen emblems are trademarks of Volkswagen AG.
Volkswagen badges and Volkswagen emblems are not allowed to be removed without authorisation, or to be attached in a different location.

2.5.1 Positions on rear of the vehicle

VW badges and VW emblems which are also supplied shall be fitted in the location intended by Volkswagen.

2.5.2 Appearance of overall vehicle

If the vehicle does not correspond to the appearance and the quality requirements set by Volkswagen AG, then Volkswagen AG reserves the right to request removal of the Volkswagen AG trademarks.

2.5.3 Non-Volkswagen trademarks

Non-Volkswagen badges are not allowed to be attached next to Volkswagen badges.

2.6 Recommendations for vehicle storage

2.6.1 General information

Extended storage times cannot always be avoided. The following measures are recommended to ensure that vehicle quality is not affected by long-term storage:

Carry out the following when the vehicle is delivered:

- Check on a weekly basis for aggressive deposits (e.g. bird droppings, industrial deposits) and clean if necessary.
- 12-V battery: Determine the SOC* and, if necessary, complete the battery care programme (see the instructions “Carry out no later than every three months”).
- High-voltage battery: Read the state of charge in the instrument cluster.
- If the charging indicator is in the red area. This means: ≤10% or <1/4 or <50 km (depending on the display).
- Charge the high-voltage battery until the display shows a maximum of half full.
- Set the tyre pressure to 3.4 bar (not the spare wheel).
- Open all front air outlets in the dash panel, set the blower to maximum and run for one minute.
- Remove any paper and other objects from the storage compartments and surfaces in the vehicle interior (dash panel, seats, luggage space) except for items that serve to protect the surfaces.
- If fitted, roll in the luggage compartment cover and the sun blinds.
- In addition, for new vehicles: Correct the position of the transport protective hoods if necessary.
- Record the date of delivery as a reference for all vehicle care measures.

*State of Charge

Carry out after no longer than six weeks:

- For vehicles stored without a solar panel:
- Battery care programme (see “Carry out after no longer than three months”).

  Do not disconnect the battery to do so!

Carry out after no longer than three months:

- Carry out braking to remove disc rust.
- When storing vehicles without solar panels: Complete the battery care programme.
- Do not disconnect the battery to do so!
- No battery status display in the dash panel insert:
- Measure the open-circuit voltage of the 12 V battery two hours after the last electrical equipment was active.
- a) At an open-circuit voltage between 11.6 V and 12.5 V: Fully charge immediately.
- b) If the open-circuit voltage is <11.6 V: Mark and fully charge the defective battery.
- The totally discharged battery must be replaced before the vehicle is handed over to the customer.

Practical note

To determine the exact residual capacity of the 12 V battery, please proceed in accordance with the test conditions in the Workshop Manual.

Carry out after no longer than six months:

- For vehicles stored with a solar panel:
- Carry out the battery maintenance programme (see “Carry out after no longer than three months”).
- Do not disconnect the battery!

Practical note

When connecting the battery charger, the following connection specification must be observed under all circumstances:

- Positive: always connect to jump-start connection point, if fitted, otherwise to positive battery terminal
- Negative: always at the body earth provided for charging, as the direct connection of a battery charger to the negative terminal of the battery in some vehicles can lead to falsification of the battery status recording by the on-board electronics

Practical note

Charging the battery when it is installed is recommended. Series and parallel charging of batteries is unauthorised.

For more information on the battery, see chapter 6.3 “Battery”.

Information

You can find further information about vehicle storage in the following documents:

- Owner’s Manual (see chapter 2.1.5 “Online Owner’s Manual”)
- Vehicle care programme

2.7 Compliance with environmental rules and regulations

Environmental note

The following principles of environmentally friendly design and material selection should be followed right from the planning stage of add-ons or bodies, and the statutory requirements in the EU Directive on End-of-Life Vehicles 2000/53/EC should also be taken into account.

The Converter is responsible for ensuring that all modifications it performs comply with the environmental regulations, specifications and standards that apply in the countries of registration and sale. These may go beyond the existing prerequisites of the base vehicle and are the responsibility of the Converter.
The Converter must ensure that add-ons and bodies (conversions) comply with all applicable environmental rules and regulations, especially, but not only, EU directive 2000/53/EC concerning end-of-life vehicles and the REACH Regulation (EC) 1907/2006 relating to restrictions on the marketing and use of certain dangerous substances and preparations (“low flammability” and certain flame-retardant agents).

The registered keeper must keep all assembly documentation concerning the modification and hand it over together with the vehicle to the dismantler. This ensures that modified vehicles are processed in compliance with environmental rules and regulations at the end of their life cycle.
Materials which represent a potential risk such as halogen additives, heavy metals, asbestos, CFCs and chlorinated hydrocarbons shall be avoided.

Under environmental law, the Converter must also ensure the following aspects. Please note that the following list merely contains examples and is not exhaustive:

- EU Directive 2000/53/EC must be adhered to
- Preferably, materials which allow valuable substance recycling and closed material cycles shall be used
- The material and production process shall be selected so that only low amounts of easily recyclable waste are generated
- Plastics shall only be used where these offer advantages in terms of cost, function or weight
- In the case of plastics, especially composite materials, only mutually compatible substances from one material family may be used
- With regard to components that are relevant for recycling, the number of plastic types used shall be kept as low as possible
- It is necessary to check whether a component can be manufactured from recycled material or with recycled additives
- Care shall be taken to ensure that recyclable components can be removed easily, e.g. by means of snap-lock connections, predetermined breaking points, good accessibility, use of standard tools
- Simple, environmentally friendly removal of the fluids shall be ensured by means of drain plugs etc.
- Wherever possible, the components shall not be painted or coated; instead, dyed plastic parts shall be used
- Components in areas at risk of accident shall be designed to be tolerant of damage, repairable and easy to exchange
- All plastic parts shall be identified according to the VDA material sheet 260 (“Components of motor vehicles; Identification of materials”), e.g. “PP-GF30R”

2.8 Recommendations for inspection, maintenance and repair

Maintenance instructions or service schedules outlining inspection and servicing work should be provided for the modifications performed by the Converter or equipment fitter. These instructions or schedules must include the maintenance and inspection intervals as well as the required operating fluids and materials and the spare parts. It is also important to specify parts and components with a limited service life which are to be checked at regular intervals in order to ensure service reliability and timely replacement where required.

This should be supported by a Workshop Manual including tightening torque, settings and tolerances as well as other relevant specifications. Special tools, including their source of supply, must also be stated.

The manual shall also state which type of work has to be performed only by the body builders and accessories fitters or their authorised workshops.

If the body builder's or accessory fitter's scope of supply includes electric, electronic or mechatronic, hydraulic or pneumatic systems, circuit diagrams and diagnosis routines or similar documentation facilitating a systematic search for faults shall be provided.

Please observe the Volkswagen AG Owner's Manuals for the inspection, maintenance and repair of base vehicles. Please only use brake fluids and engine oils approved by Volkswagen for your vehicle.

More detailed information on brake fluids and engine oils can be found in the Owner’s Manual for your vehicle, see also chapter 2.1.5 “Online Owner’s Manuals”.

2.9 Accident prevention

Body builders shall ensure that the bodies comply with applicable legal rules and regulations as well as all regulations regarding work safety and accident prevention. All safety rules and the information material provided by accident insurance providers shall be observed.
All technically feasible measures must be taken to prevent unsafe operation.
Country-specific laws, directives and approval regulations must be observed.
The Converter is responsible for the compliance with these laws, rules and regulations.
For further information about commercial freight traffic in the Federal Republic of Germany please contact:

P.O. box address	Berufsgenossenschaft für Fahrzeughaltungen Fachausschuss “Verkehr” Sachgebiet “Fahrzeuge” Ottenser Hauptstrasse 54 D-22765 Hamburg
Telephone	+49 (0) 40 39 80 – 0
Fax	+49 (0) 40 39 80-19 99
Email	info@bgf.de
Home page	http://www.bgf.de

2.10 Delivery range

2.10.1 Model overview

Derivative	Designation
	Panel van
	Double cab Platform
	Single cab Platform
	Panel van/glazed

2.10.2 Variant dimensions

	2 wheelbases: – Wheelbase L3: 3,640 mm – Wheelbase L4/L5**: 4490 mm
	2 rear overhangs – Overhang (L3/L4)1: 1,345 mm – Overhang (L5**): 1900 mm
	3 vehicle heights* – Roof height H2: 2,355 mm – 2390 mm – Roof height H3: 2590 mm – 2637 mm – Roof height H4: 2798 mm – 2835 mm
	2 cab lengths (single cab/double cab) – Single cab – Double cab
	3 platform lengths Double cab: – Platform length L3 (double cab): 2700 mm – Platform length L4 (double cab): 3,500 mm Single cab: – Platform length L3 (single cab): 3,500 mm – Platform length L4 (single cab): 4300 mm – Platform length L5** (single cab): 4700 mm

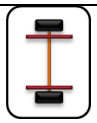
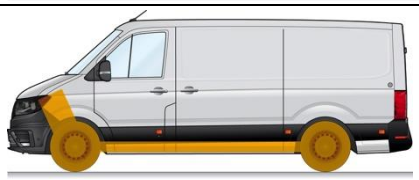
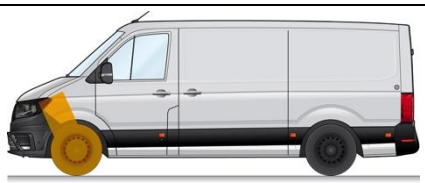
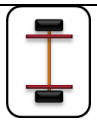
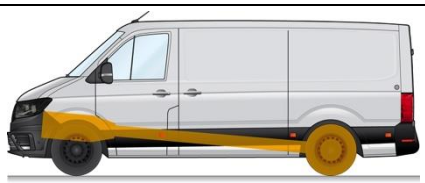
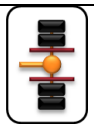
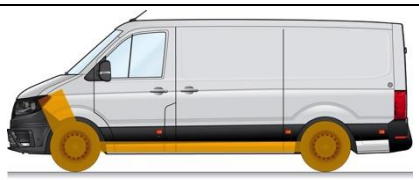
*Measuring load 1 = unladen. The different height details result from the drive (front or rear-wheel drive) and the tyres (single or twin tyres)

**L5 = long wheelbase plus long overhang

Information

For information about the availability of individual combinations of gross vehicle weight rating, engine, gearbox and body variants, as well as information about consumption levels, CO_2 emissions and energy efficiency classes, refer to the sales documents and the Configurator on the Volkswagen AG website:
www.volkswagen-nutzfahrzeuge.de

2.10.3 Drive variants

Drive		
Front-wheel drive manual gearbox		
4Motion drive manual gearbox		
Front-wheel drive Automatic gearbox		
Rear-wheel drive, twin tyres, manual gearbox		
Rear-wheel drive, single tyres, manual gearbox		
4Motion drive automatic gearbox		
Rear-wheel drive Automatic gearbox		

2.11 Quality system

Worldwide competition, increased quality requirements placed on the overall product by customers, national and international product liability legislation, new forms of organisation and increasing pressure on costs are demanding effective quality assurance systems in all areas of the automotive industry.
The requirements of a quality management system of this kind are described in DIN EN ISO 9001.

For the reasons stated above, Volkswagen AG strongly recommends that all body builders should set up and maintain a quality management system with the following minimum requirements:

- Definition of responsibilities and authorisations including organisation plan
- Description of the processes and procedures
- Appointment of quality management representative
- Performing contract and build feasibility checks
- Performing product checks based on specified procedures in test instructions
- Regulating the handling of faulty products
- Documentation and archiving of test results
- Ensuring the quality records of employees are up to date
- Systematic monitoring of test equipment
- Systematic material and parts identification
- Performing quality assurance measures at the suppliers
- Ensuring the availability of process, working and test instructions, and that they are up to date, in the departments and in the workplace

3 Planning bodies

When planning body work, the selection of a suitable basic vehicle or chassis depends on the particular application conditions of the vehicle when it is complete.

The following shall be noted:

- Vehicle or chassis configuration in accordance with requirements
- Body variant
- Standard equipment and optional equipment

For orientation during planning, also use the identification plate, type designation and vehicle identification number (VIN), (see chapter 3.4 “Vehicle identification data”).
You can obtain more information on the available chassis and body versions from your Volkswagen dealership.
Please contact us (see chapter 2.1.1 “Contact in Germany” and 2.1.2 “International contact”).

Practical note

During the planning of bodies, the right choice of materials and thus the observance of corrosion protection measures are important in addition to a user and maintenance-friendly design (see chapter 5.3 “Corrosion protection measures”).

3.1 Selecting the base vehicle

The base vehicle needs to be selected carefully to ensure safe usage in the respective field.

When planning, please consider the following for the use in question:

- Wheelbase
- Engine/gearbox
- Approval process
- Final drive ratio
- Gross vehicle weight rating
- Centre of gravity
- Electric scopes (e.g. interior lighting, battery, e-interface for special vehicles, customer-specific functional control unit (CFCU*)). See chapter 6 “Electrics/electronics”)
- Power take-off systems

Practical note

Before carrying out body building or conversion work, the supplied base vehicle should be checked with regard to the fulfilment of applicable requirements.

- Please select an electrical interface suitable for the planned use of the vehicle (see chapter 6.4. “Interfaces”)
- Preparation IP4 is mandatory for possible retrofitting of the customer-specific functional control unit (CFCU) (see chapter 6.4. “Interfaces”)

You will find more information on the available chassis and body versions in chapters:
2.10 “Delivery range” or from the responsible department (see 2.1 “Product and vehicle information for body builders”).

Information

On the Volkswagen AG homepage, you can put together your vehicle using the configurator and view the special equipment available:
https://www.volkswagen-nutzfahrzeuge.de/de/modelle.html

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

3.1.1 Preparation for optional equipment

Preparations for retrofitting **optional extras can be** ordered ex works for the following scopes.

PR number	Description	For clarification see
9LN/9LX	Preparation for rotating light	Chapter 6.5.2 “Fitting auxiliary lights/special signal systems”
6S2	Preparation of side marker lights for wind baffle	Chapter 6.5.4.3 “Preparation for side marker lights”
3S4	Preparation for roof rails	Chapter 7.6.4 “Preparation for roof rails”
5BB/5BJ	Preparation of universal floor longitudinal rails/transverse rails	Chapter 8.4.3 “Preparation for functional floor”
3UI/4C5	Preparation for panel van+ 3-seater bench/4-seater bench	Chapter 8.21 “Preparation for the Panel Van Plus/Crew Cab conversion”

3.2 Vehicle modifications

Before starting work on the body, the Converter should check whether

- the vehicle is suitable for the planned body.
- the chassis type and the equipment also correspond with the operating conditions after the conversion.
- the type of approval is still valid after the changes (weight change or change to aerodynamics). See also chapter 2.1.6.3 “Worldwide Harmonized Light Vehicles Test Procedure (WLTP)”.

If a box body is planned on a chassis, observe in particular chapter 8.7 “Box bodies (dry freight boxes and refrigerated boxes)”.
Build dimension drawings, product information and technical data can be requested from the responsible department or via the communication system for the planning of bodies (see 2.1 “Product and vehicle information for body builders”).
Furthermore, the special equipment available from the factory should be noted (see chapter 3.9 “Special equipment”).
Vehicles delivered from the factory comply with European, national and international regulations (except for some vehicles for countries outside Europe).
The vehicles also need to meet the European directives and the national laws after the modifications have been made.

Information

Please note that a majority of the EC directives announced to date have been annulled by Regulation (EC) 661/2009 “General Safety”. The EC directives have been replaced by new EU directives or UNECE regulations with the same corresponding content.

Practical note

Sufficient space must be provided in order to guarantee the function and operating safety of the power units.

Warning note

Do not modify the steering or brake system!

Modifications to the steering and brake system can result in these systems no longer working correctly and failing.

Furthermore, driver assistance system functions could be negatively affected.

This may result in the driver losing control of the vehicle and causing an accident.

Practical note

No modifications to the noise encapsulation are permitted.

3.2.1 Vehicle acceptance

The Converter must notify the officially recognised appraiser or tester about modifications to the chassis. .

Practical note

Country-specific laws, directives and approval regulations shall be observed!

3.3 Dimensions and weights

Changes to the vehicle width, vehicle height and vehicle length that are below the current Converter guidelines are not allowed. Dimensions and weights can be found in the “build dimension drawings” (see 10.5 “Build dimension drawings”), vehicle dimensions (see 10.4 “Vehicle dimensions”), Weights (see 10.3 “Weights (masses) and the Technical limit values (see chapter 4 “Technical limit values for planning”). These refer to the standard vehicle equipment. Optional equipment is not taken into consideration. Weight tolerances of +/– 5% in production must be taken into account (in Germany in accordance with DIN 70020).
The gross axle weight rating and the gross vehicle weight rating shall not be exceeded.

Information

You will find information on gross axle weight ratings, weights and gross vehicle weight rating in the online document “Technical Data” at: https://www.volkswagen-nutzfahrzeuge.de/de/modelle.html

Please choose the respective model when on the page (e.g. Crafter panel van). Technical data and prices can be found under the heading “Further information” (at the very bottom of the page).

Warning note

The tyre load rating for the vehicle is not allowed to be exceeded by overloading and exceeding the gross axle weight rating. The tyres could otherwise overheat and be damaged. This may result in the driver losing control of the vehicle and causing an accident. The braking distance can be increased considerably if the vehicle is overloaded. Information about permitted weights can be found in the vehicle identification data on the vehicle (see chapter 3.4 “Vehicle identification data”) and in the vehicle documents (see 10.3 “Weights (masses)”).

Warning note

The gross axle weight ratings must be observed. If the gross axle weight ratings are exceeded, the ESC system in vehicles with ESC will no longer be able to function correctly. This may result in the driver losing control of the vehicle and causing an accident.

The permitted number of vehicle occupants and sufficient room for the payload shall be observed. The weight of optional equipment shall be taken into account in the calculation. The national regulations and directives apply.

3.3.1 Payload increases and reductions

A manufacturer certificate from Volkswagen AG is required for a payload increase.

In the case of any questions regarding vehicle payload increases and reduction, please contact us (see chapter 2.1 “Product and vehicle information for body builders”).

3.4 Vehicle identification data

Vehicle identification number (VIN) and identification plate on the vehicle are not allowed to be changed or fitted in a different position.
The vehicle identification number is found embossed on right in engine compartment, near the hinge for the bonnet.
The identification plate with the vehicle identification number and the figures for the permitted weights is located on the vehicle B-pillar, which is on the left in the direction of travel.

Please obtain any further information about the vehicle identification data from the Owner's Manual for your vehicle.

3.5 Vehicle stability

According to UNECE-R 13 (brake system), the acceptance procedure for the vehicle with body must include determination of the centre of gravity height when the vehicle is loaded.
Refer to chapter 4 “Technical limit values for planning” for the permitted centre of gravity heights.

Volkswagen does not make any statement about:

- Driving behaviour
- Braking behaviour
- Steering response and
- ESC control response

in bodies for loads with an unfavourably positioned centre of gravity (e.g. rear, high and side loads), because these aspects are significantly influenced by body activities and consequently can only be assessed by the Converter.

Warning note

ESC shall be deactivated if necessary in vehicles that have extreme centres of gravity due to bodies, superstructures, installed components or conversions. The responsible department will provide information (see chapter 2.2 “Body builder guidelines, consulting”).

If the ESC has been deactivated, you will need to adapt your driving style accordingly (reduced cornering speed, avoiding jolting steering movements). At the dynamic limits, the vehicle behaves like a vehicle without ESC. The permitted axle loads, gross weights and centre of gravity positions shall be observed.

Please note that when ESC is deactivated, driver assistance systems such as ACC (Adaptive Cruise Control) are also deactivated.

Whether for conversions and installation, and also in the ready-to-drive condition, the gross wheel and axle weight ratings as well as the gross vehicle weight ratings of the vehicle are not allowed to be exceeded under any circumstances.

Warning note

The gross axle weight ratings must be observed. If the gross axle weight ratings are exceeded, the ESC system in vehicles with ESC will no longer be able to function correctly. Driver assistance system functions could be affected. This may result in the driver losing control of the vehicle and causing an accident. Further figures for the permitted weights can be found in the vehicle identification data on the vehicle (see chapter 3.4 “Vehicle identification data”).

3.6 Tyres

The Converter must ensure:

- That the spacing between the tyre and the wing or wheel housing is sufficient even when snow or anti-skid chains are fitted and with full compression (even with axle distortion).
  + Information related to this (see chapter 7.2.8 “Wings and wheel housings”) must be observed.
- That only approved tyre sizes (see vehicle papers, offer drawings or the following table) are used.
- That only approved wheels are used

3.6.1 Overview of approved wheels/tyre overview

Drive type	Gross vehicle weight rating	Tyres	Load index**	Wheel
Front-wheel drive	3.0 – 3.5 t	205/75 R16*	113/111	6.5Jx16
		235/65 R16	115/113	6.5Jx16
		235/60 R17	117/115	6.5Jx17
	3.88 – 4.0 t	235/65 R16	121/119	6.5Jx16
		235/60 R17	117/115	6.5Jx17
Front-wheel drive (eCrafter)	3.5 t	235/65 R16	115/113	6.5Jx16
All-wheel drive	3.0 t	205/75 R16	113/111	6.5Jx16
		235/65 R16	115/113	6.5Jx16
		235/60 R17	117/115	6.5Jx17
	3.5 t	235/65 R16*	115/113	6.5Jx16
		235/60 R17	117/115	6.5Jx17
	3.88[1] – 4.0 t	235/65 R16	121/119	6.5Jx16
		235/60 R17*	117/115	6.5Jx17
Rear-wheel drive	3.5t	235/65 R16	115/113	6.5Jx16
Rear-wheel drive – twin tyres	3.5 – 5.0 t	205/75 R16*	113/111	5.5Jx16
	5.5 t	205/70 R17	115/113	5.5Jx17
Rear-wheel drive – SuperSingle tyres	4.8 – 5.0 t	285/55 R16	126/124	8.5Jx16

[1] Load applied to vehicle

*For “All Season tyres”, only use snow chains that do not add more than 20 mm.

**Load index:

The load index (LI) is a code that specifies the maximum permissible load for vehicle tyres according to the specified speed. The index is marked on the sidewall. A table can then be used to determine the maximum permissible load per tyre in kilogrammes.

The load index (LI) is in the vehicle registration document for every vehicle. The value on the vehicle registration document must be the same as the value on the tyre. A higher value on the tyres is permissible. Truck and transporter tyres have two load indexes. The first number specifies the load bearing capacity for single tyres and the second for twin tyres.

Warning note

Exceeding the specified tyre load rating or maximum tyre speed can lead to tyre damage or tyre failure. You could lose control of your vehicle as a result and injure yourself or other persons. Only use tyre types and tyre sizes approved for your vehicle type and observe the tyre load rating and speed index required for your vehicle.

Also observe in particular the national approval regulations for tyres. In some cases, these regulations specify a certain tyre type for your vehicle or prohibit certain tyre types that are permitted in other countries.

If other wheels are fitted:

- the wheel brakes or running gear parts could be damaged.
- the free movement of the wheels and tyres is no longer guaranteed.
- the wheel brakes or running gear parts can no longer work correctly.
- The function of driver assistance systems such as the Tyre Pressure Monitoring System could be impaired.

Information

You can obtain further information about wheels/tyres from any Volkswagen customer service department, or by consulting chapter 3.9 “Optional equipment”.

3.6.2 Spare wheel

The Crafter is equipped with a breakdown set (Tyre Fit) as standard equipment. Country-specific equipment or optional equipment can include a spare wheel (PR number 1G2).

When securing the spare wheel, please observe the following:

- Easy to access and use
- Depending on the country of registration, a second, separate system to secure the spare wheel may be prescribed.

For vehicles with a long wheelbase and overhang (L5, with spare wheel) without factory fitted body, care must be taken to ensure that the bowden cable (1) of the spare wheel jack is contained (secured) in the middle with a retaining strap (see fig. 2).
Otherwise, the bowden cable of the spare wheel just sags and may result in damage occurring.
The retaining strap has to be fixed on the finished vehicle in the correct manner by the Converter.

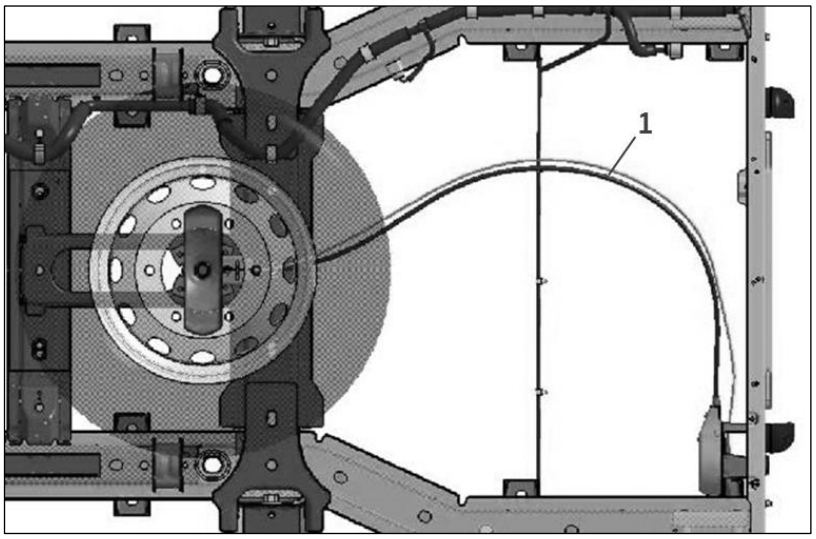


Fig. 1: View of spare wheel with bowden cable (1)

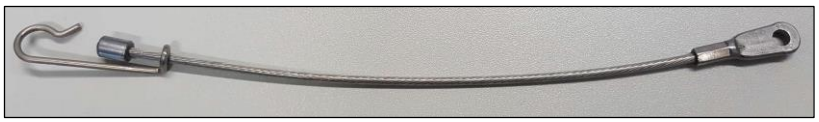


Fig. 2: Retaining strap (part number 2N0.609.623)

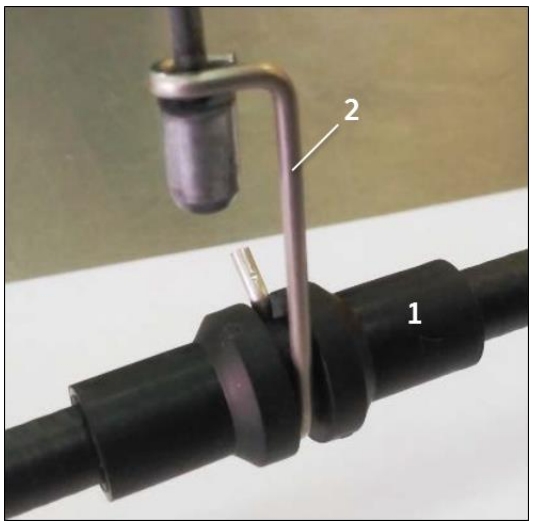


Fig. 3: Fixation retaining strap (2) on the bowden cable (1)

3.7 Bolted, welded and bonded joints

3.7.1 Bolted connections

If series-production bolts/nuts have to be renewed, it is only permitted for bolts/nuts to be used which have the:

- Same diameter
- Same strength
- Same bolt standard or bolt type
- Same surface coating (corrosion protection, coefficient of friction)
- Same thread pitch
- Same underhead bearings

We recommend Volkswagen standard parts.

Warning note

No safety-relevant bolted connections, e.g. for wheel guidance, steering and brake functions, may be modified. Otherwise the designated function may be impaired. This may result in the driver losing control of the vehicle and causing an accident.

The new assembly is to be carried out according to VW Customer Service instructions, using suitable standard parts. We recommend the use of Volkswagen genuine parts.

- Comply with VDI guideline 2862 during all assemblies.
- Reducing the free clamping length, conversion to waisted shank and use of bolts with a shorter free thread proportion are not permitted.
- Furthermore, take the settling behaviour of bolted connections into account.
- Use of Volkswagen tightening torques assumes that the total coefficient of friction is in the range μ_{tot}=0.08 to 0.14 for the particular items being bolted together.
- If bolts are tightened by torque and final tightening angle at Volkswagen, no change of design is possible.
- With the aid of the workshop manual from Volkswagen AG (see chapter 2.1.3 “Electronic Repair and Workshop Information of Volkswagen AG (erWin)*”) determine whether the bolts and nuts of running gear components shall only be tightened after full assembly.
- Body components that are additionally clamped shall have the same or a higher strength than the previous clamped combination.

Information

Information about Volkswagen customer service instructions can be provided by any Volkswagen Customer Service.

Warning note

Bolts or nuts with locking teeth, micro-encapsulated screws and self-locking nut shall always be replaced after a single use. Before you screw in new micro-encapsulated screws, the receiving thread shall be re-tapped or the nut replaced in order to remove the remains of the old screw locking material. Then the re-cut thread through holes and tapped blind holes need to be blown clean because any glue residue in the thread will prevent the screws being tightened correctly.

If this is not observed, bending forces could act on the screw due to the incorrect screw tensioning and result in the screw breaking. This may result in the driver losing control of the vehicle and causing an accident.

Warning note

When micro-encapsulated screws are loosened, there is a risk of injury due to the sudden loosening of the screws. Therefore when loosening micro-encapsulated screws ensure that there is sufficient space for movement.

Information

Regarding special screw connections, refer to the Electronic Repair and Workshop Information System from Volkswagen AG (erWin*) (see 2.1 “Product and vehicle information for body builders”).

*Information system from Volkswagen AG, subject to payment

Drilling must not be performed in the following areas:

- On the A and B-pillars
- On the upper and lower chords of the frame longitudinal member
- In the area of the load application points (e.g. spring blocks)
- In the area of supporting parts for the front or rear axles
- In the area of airbags

3.7.2 Welded connections

3.7.2.1 General

In order to maintain the high quality of welding work demanded by Volkswagen, the persons assigned to perform the welding work shall have the corresponding qualifications.

In order to achieve high-quality weld seams, the following basic recommendations are given:

- Thoroughly clean the areas to be welded.
- Apply several short weld beads (>15 mm), rather than one long one.
- Make symmetrical beads, in order to limit shrinkage.
- Avoid making more than three weld seams at any one point.
- Avoid welding in work-hardened areas.
- Avoid welding in hot-formed steel.

Practical note

Disconnect the battery prior to starting welding work. Airbags, the airbag control unit, airbag sensors and seat belts shall be protected against weld spatter, and removed if necessary.

3.7.2.2 Selection of welding process

The mechanical properties of weld seams depend on which welding process is selected, and on the geometry of the parts to be connected.
If welding overlapping metal panels, select the welding process according to the accessibility of the sides:

Accessible sides	**1**	Shielding gas plug welding
	2	Resistance spot welding

Practical note

Welding work on bonded body parts may damage existing bonded joints and impair their function.

Please observe chapter 3.7 “Bolted, welded and bonded joints”, and the Workshop Manuals issued by Volkswagen AG.

3.7.2.3 Resistance spot welding

Resistance spot welding is used for overlapping parts with access on both sides. Avoid spot welding of more than two layers of metal panels.

Distance between spot welds:

In order to avoid shunt effects, the specified distances between the spot welds shall be maintained (d = 10 e + 10 mm).

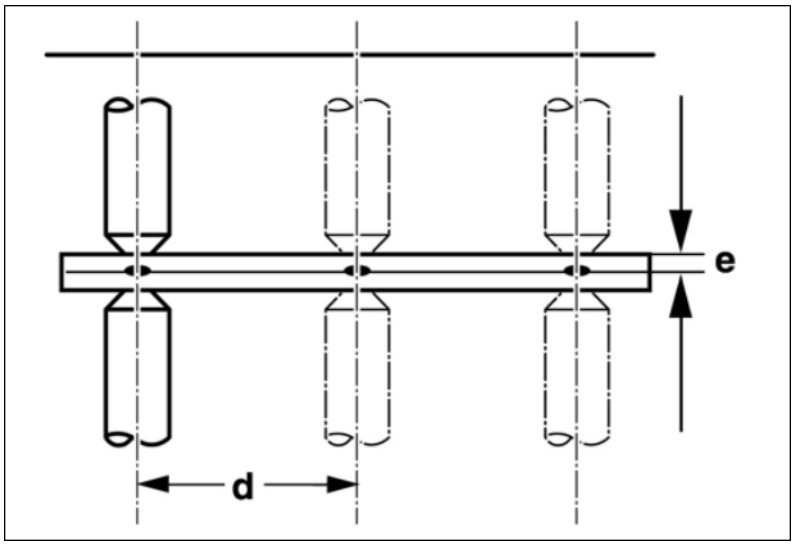


Fig. 1: Ratio between panel thickness and distance between welds

d Distance between spot welds

e Panel thickness

Distance from the edge of the panel:

In order to avoid damage to the molten core, the specified distances from the edge of the panel shall be maintained (L = 3 e + 2 mm).

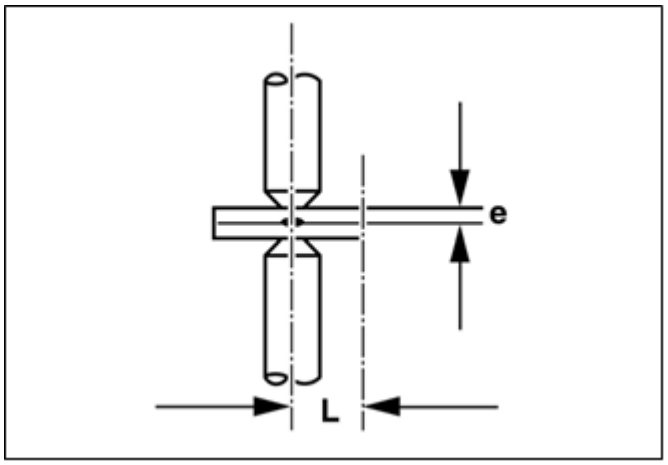


Fig. 2: Ratio between panel thickness and distance from edge

e Panel thickness

L Distance from the edge of the panel

3.7.2.4 Shielding gas hole spot welding

If overlapping panels can only be accessed from one side, the weld shall be made by shielding gas hole spot welding or tacking.
If the connection is achieved by punching or drilling and then spot welding the hole, the drilling area must be deburred before welding is carried out.

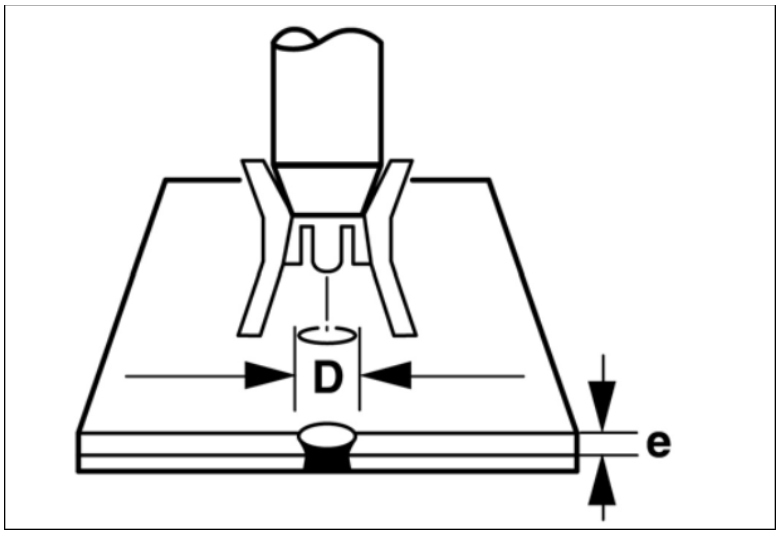


Fig. 1: Ratio between panel thickness and hole diameter

Hole diameter D [mm]	4.5	5	5.5	6	6.5	7
Sheet thickness e [mm]	0.6	0.7	1	1.25	1.5	2

If welding work is to be carried out on the longitudinal member, please observe chapter 7.2.5.3 “Reinforcement of frame cutting areas”.
The mechanical quality can additionally be improved by using “slots” (l = 2 × b).

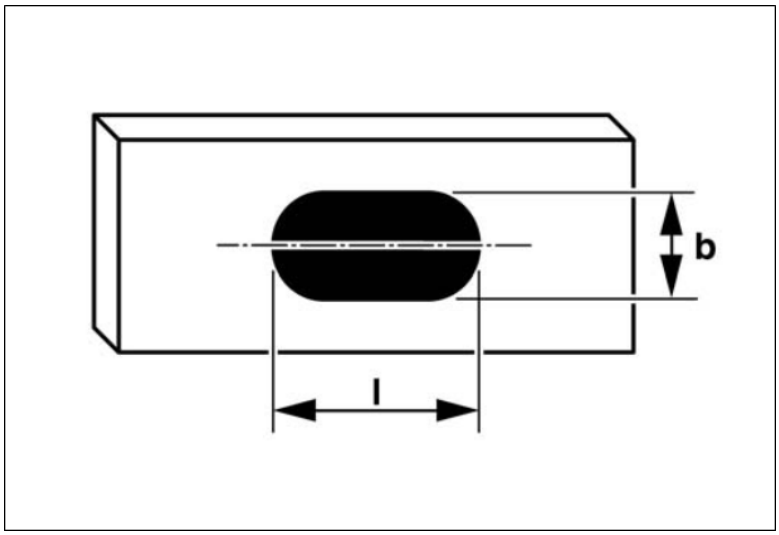


Fig. 2: Ratio between width and length of slots

b Width of slot

I Length of slot

3.7.2.5 Tacking

If panels are > 2 mm thick, overlapping panels can also be connected by tacking (30 mm < L < 40 × e; d > 2 L).

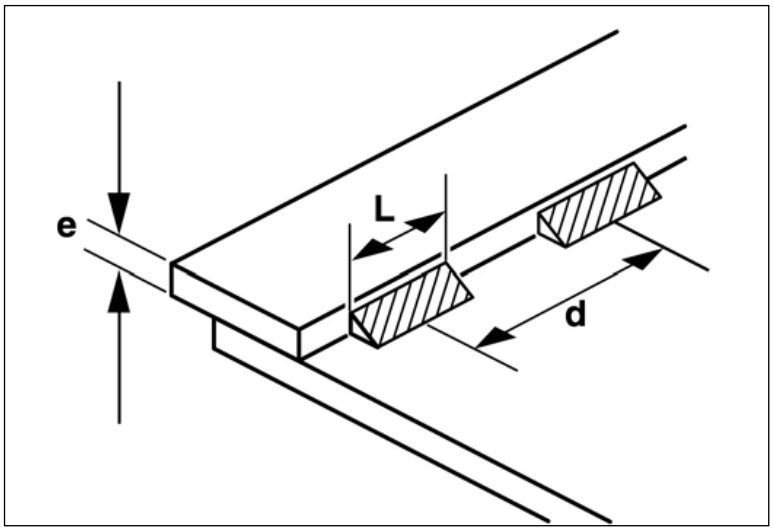


Fig. 1: Dimensions for tack welding

d Distance between tack welds

e Panel thickness

L Length of tack weld

3.7.2.6 Areas that must not be welded

Welding is not allowed:

1. On the A and B-pillars
2. In bend radii
3. In the area of airbags
4. On mechanical units such as the engine, gearbox, axles etc.
5. On the upper and lower chords of the frame
6. Plug welding is only permitted in the vertical webs of the frame longitudinal member.
7. On the chassis frame, except on the frame longitudinal members for wheelbase or overhang modifications
8. In areas made from high-strength steels, from 22MnB5 (see figure showing high-strength steels):
   - Side member (1)
   - Front longitudinal member area (2)
   - Cross member footwell area (3)
   - Wheel housing area (4)
   - End plate area (5)
   - Side member area (6)
   - A-pillar area (7)
   - D-pillar area, top (8)

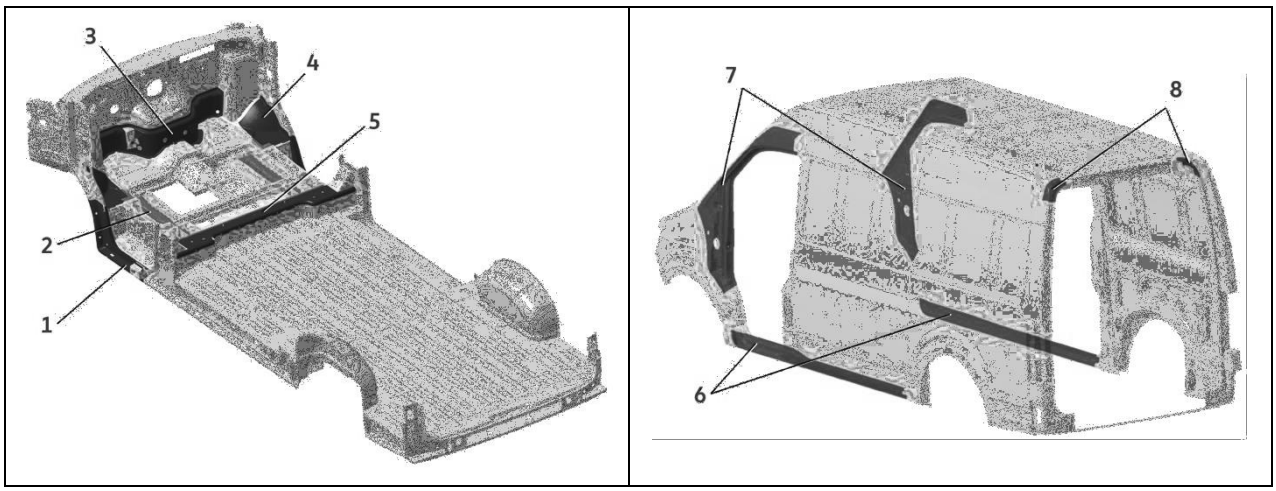


Fig. 2: Areas of high-strength steels

1. In areas with bonded joints:
   a. Panel van
   + B-pillar end plate
   + Front longitudinal member
   + Footwell cross member
   + Front wheel housing
   + Front step
   + Front frame
   + Vehicle front end
   + Rear longitudinal member wheel housing

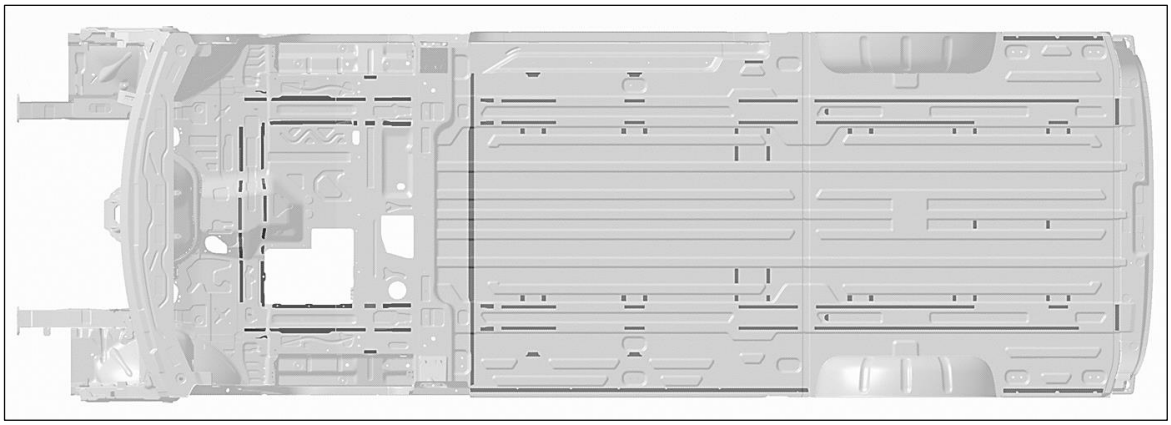


Fig. 3: Panel van bonded joints (e.g. short wheelbase 3,640 mm)

   b. Chassis with single cab
   + Rear longitudinal member wheel housing
   + Front vehicle floor
   + Rear frame
   + Floor frame

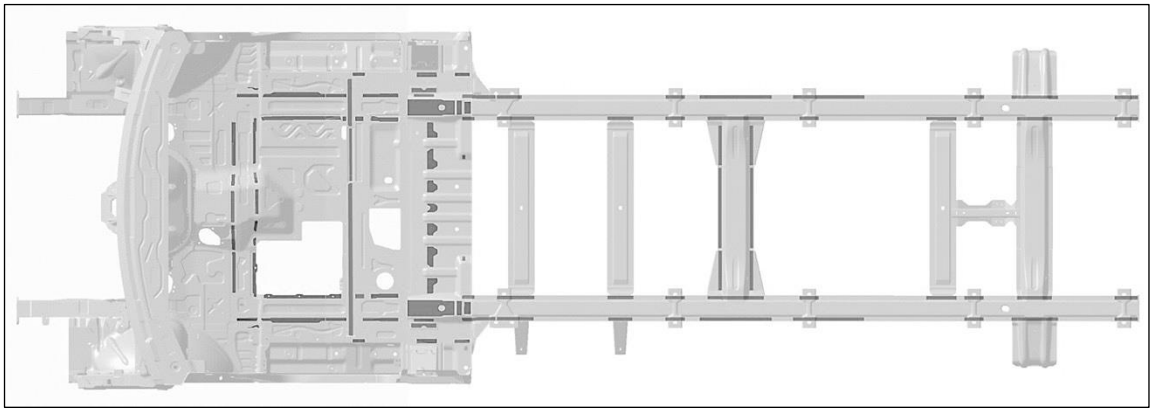


Fig. 4: Single cab bonded joints (e.g. short wheelbase 3,640 mm)

Information

You can find further information in the chapters 4 “Technical limit values in planning” and 5 “Prevention of damage” as well as section 7.2.1 “General information on body-in-white/bodywork” and the “Electronic Repair and Workshop Information” (erWin)* issued by Volkswagen AG

*Information system from Volkswagen AG, subject to payment

3.7.2.7 Corrosion protection after welding

After all welding work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Practical note

The information listed under chapters 5.2 “Welding work” and chapter 7 “Modifications to the base vehicle” shall be observed.

3.8 Noise insulation

If changes are made to noise-related parts like, for example:

- Engine
- Exhaust system
- Air intake system
- Tyres etc.

then noise measurements shall be performed.

The national regulations and directives apply.
In the Federal Republic of Germany, the following shall be observed:

- UNECE-R 51
- Section 49.3 of the German Road Traffic Act (StVZO) (low-noise)

Components for sound insulation that are installed as standard are not allowed to be removed or modified.
The interior noise situation is not allowed to be worsened.

Practical note

For all modifications to the vehicle, the external noise of the vehicle defined according to UNECE Regulation UNECE-R 51 must be observed.

Practical note

In order to prevent the noise level of the vehicle being affected by modifications, attention should be paid to the minimisation of interior noise during the planning of bodies (see chapter 7.4.4 “Reducing interior noise”).

3.9 Special equipment

We recommend using the optional equipment from Volkswagen AG that can be obtained with a PR no. for optimum adaptation of the body to the vehicle.
You can obtain information on the optional equipment provided by Volkswagen under PR numbers from your Volkswagen Customer Service or in advice for body builders (see chapter 2.1 “Product and vehicle information for body builders”)

Information

On the Volkswagen AG homepage, you can put together your vehicle using the configurator and view the special equipment available:
http://www.volkswagen-nutzfahrzeuge.de/de/cc5.html

Special equipment (e.g. reinforced springs, frame reinforcements, anti-roll bars etc.) or equipment fitted later increase the kerb weight of the vehicle.
The actual vehicle weight and the axle loads should be determined by weighing before and after the conversion.
Not all additional equipment can be installed into every vehicle without problems. This applies in particular if it is fitted later on.

4 Technical limit values for planning

4.1 Limit values of base vehicle

Practical note

This chapter contains the most important technical limit values for the base vehicle that are required for planning. Also see chapter 10, "Technical data". Furthermore, the other chapters of the present Converter guidelines must also be observed.

4.1.1 Steerability – minimum front axle load

When loaded (ML3*), the front axle load must, as a minimum, correspond to the following proportions of the gross vehicle weight rating:

Front-wheel drive (M1, N1)	At least 40 % of the gross vehicle weight
Front-wheel drive with optional all-wheel drive (M1, N1)	At least 33 % of the gross vehicle weight
Rear-wheel drive (M1, N1)	At least 33 % of the gross vehicle weight
Rear-wheel drive (N2)	At least 25 % of the gross vehicle weight

*Measurement load 3 = loading onto gross vehicle weight and simultaneously gross rear axle weight rating

The gross axle weight ratings must be observed in all loading situations (see 10.3 "Weight (masses)").

4.1.2 Maximum permitted height of centre of gravity

If the conversion of the vehicle results in an overall centre of gravity higher than **1,000 mm above the road for the rear/longitudinal variant with twin tyres** and 910 mm above the road for the **rear/longitudinal single/4-motion and front transverse drive version**, the ESC parameters must be adjusted. If there is no letter of non-objection for the conversion, the converted vehicle must be presented to Volkswagen Commercial Vehicles for assessment. Please contact Volkswagen Customer Care to do so. (Chapter 2.1 "Product and vehicle information for body builders").

Drive version: front/transverse

Centre of gravity height over road [mm]	Additional PR number for chassis components	Gross vehicle weight rating [kg]			ESP Coding	Aftersales PR number
		3,500	3880	4000		
920 < H ≤ 1050	2MR	X			Medium-high_105	OR8
980 < H ≤ 1050	2MR		X	X	Medium-high_105	OR8
1,050 < H ≤ 1,160	2MT	X	X	X	High_116	OR1
Wheelbase [mm]	3640 (medium long, L3) + 4490 (long L4)					

Drive variant: rear/longitudinal twin

Centre of gravity height over road [mm]	Additional PR number for chassis components	Gross vehicle weight rating [kg]					ESP Coding	Aftersales PR number
		3,500	3880	4000	5,000	5,500		
1000 < H ≤ 1100	2MG	X	X	X	X	X	Medium high_105	OR8
1100 < H ≤ 1200	2MT	-	-	X	X	X	Extra high_130	OR9
1200 < H ≤ 1300	2MT	-	-	X	X	X	Extra high_130	OR9
Wheelbase [mm]	3640 (medium long, L3) + 4490 (long L4)							

Drive version: rear/longitudinal single/4motion

Centre of gravity height over road [mm]	Additional PR number for chassis components	Gross vehicle weight rating [kg]			ESP Coding	Aftersales PR number
		3,500	3880	4000		
910 < H ≤ 1050	2MR	-	X	X	Medium high_105	OR8
920 < H ≤ 1050	2MR	X	-	-	Medium high_105	OR8
1,050 < H ≤ 1,160	2Mt	X	X	X	high_116	OR1
Wheelbase [mm]	3640 (medium long, L3) + 4490 (long L4)					

Practical note

The ESC regulation is optimised with regard to a reduction in the vehicle's tendency to tip up to a height of the centre of gravity of 910 or 1,000 mm. If the centre of gravity is higher, the tip-stabilising function is still available, but the risk of tipping is physically increased.

Please ensure that the chassis components necessary for the centre of gravity heights are selected when configuring the vehicle (see table).

4.1.3 Vehicle dimensions

4.1.3.1 Vehicle width

Statutory limits in accordance with Regulation (EU) No 1230/2012	
General (vehicle classes M and N)	2550 millimeters
Body with insulated walls	2600 millimeters

Width limit on Crafter via standard headlights	
Halogen headlights	2400 millimeters
Headlight main LED headlight	2400 millimeters

Width limit on Crafter due to end-outline marker lamps	
Lamp above windscreen PR number 6S3	2,330 mm

Information

Conversion widths above 2,400 mm may require technical changes and should be coordinated with the technical service in the planning phase.

If body widths above 2,330 mm are implemented, additional end-outline marker lamps must be provided on the body.

Width limit on Crafter due to exterior mirrors (indirect view)	
Outside mirror (series) (PR number 5RB, 5SB)	2160 millimeters
Bracket-mounted exterior mirror (PR number 3AQ, 3BL)	>2160–2400 mm

Practical note

The driver assistance system functions (Lane Assist) are only guaranteed up to a width of 2,400 mm.

4.1.3.2 Vehicle height

When planning the body, it is necessary to take account of the technical limit values of the vehicle with regard to the centre of gravity acc. to chapter 4.1.2 “Maximum permitted centre of gravity”.
Furthermore, statutory road traffic regulations in accordance with Regulation (EU) No.1230/2012 and any other specific regulations of the country of registration are also to be observed.

In accordance with Regulation (EU) No.1230/2012
4000 millimeters

4.1.3.3 Vehicle length

When planning the body, it is necessary to take account of the technical limit values of the vehicle with regard to the max. overhangs acc. to chapter 4.3.5 “Vehicle overhang”. Furthermore, statutory road traffic regulations in accordance with Regulation (EU) No.1230/2012 and any other specific regulations of the country of registration are also to be observed.

In accordance with Regulation (EU) No. 1230/2012	
Vehicle classes M1, N	12000 millimeters
Vehicle classes M2, M3	
– two-axle	13,500 mm
– min. three-axle	15,000 mm

4.1.3.4 Frame heights

For the frame heights, please see the current build dimension drawings on the Conversion Portal.

Practical note

Please note that the frame heights are theoretically calculated reference values. They are not allowed to be used as the sole basis for designing bodies. The actual dimensions on the vehicle might deviate from the heights specified, due to production tolerances. Before the conversion starts, check the actual height dimensions on the chassis!

Practical note

Holes in the frame longitudinal member are the result of the production process and are not suitable for all body building work. Use of holes from the production process is not allowed otherwise damage to the frame could result.

Further information can be found in chapter 3.7 “Bolted, welded and bonded joints”.

4.1.4 One-sided weight distribution

Warning note

Under no circumstances may the following weights be exceeded: gross vehicle weight rating, gross front axle weight rating and gross rear axle weight rating (see 10.3 “Weights (masses)”).

When planning bodies/additions, make sure that one-sided weight distribution is avoided – in particular involving permanently secured add-ons. The maximum permissible wheel loads and tyre load ratings must be observed.

The front axle load must not be less than the minimum permitted load in order to ensure adequate steerability of the vehicle and satisfactory driving behaviour under all loading conditions (see chapter 4.1.1 “Steerability – minimum front axle load”).

4.2 Limit values for running gear

4.2.1 General information

Several running gear variants are available from the factory. A suitable running gear variant shall be selected depending on the planned body.

4.2.2 Description of PR no. families

The standard running gear is adjusted in terms of its components to the ordered vehicle and is designed for the specific gross vehicle weight rating. In addition to the standard running gear, additional running gear packages are available which have been adapted to the respective industry requirements in accordance with gross vehicle weight rating and the type of drive. The reinforced front axle is installed as standard in vehicles with a gross vehicle weight rating of 4.0 t or more. For vehicles up to 4.0 t, the reinforced front axle is available as an optional extra.

Single drive running gear
packages: front transverse, front transverse 4x4, rear longitudinal

Overview of the PR numbers offered:

Standard running gear:

1BA Basic suspension/damping + Basic stabilisation
Basic suspension/damping + Basic stabilisation, front and rear
As series-production running gear, this is primarily intended for use on paved roads and routes.

2MF Basic suspension/damping + Reinforced stabilisation version 1
Basic suspension/damping + Reinforced stabilisation, front/rear
The front/rear reinforced stabilisation 1 improves driving characteristics for vehicles with raised centres of gravity when loaded.
The equipment has a positive effect on:
Lateral inclination, roll stability, susceptibility to side winds

Reinforced running gear:

1BJ Reinforced suspension/damping + Basic stabilisation
Reinforced suspension/damping, front/rear + Basic stabilisation, front and rear
The reinforced suspension/damping retaining the basic stabilisation is designed for vehicles with larger empty loads and for frequent operation at maximum loading.
This equipment has a positive effect on:
Driving characteristics when used on poor road surfaces.

2MG Reinforced suspension/damping + Reinforced stabilisation version 1
Reinforced suspension/damping, front/rear + Reinforced stabilisation, front/rear
The reinforced suspension/damping with reinforced front/rear stabilisation 1 is designed for vehicles with larger empty loads and for frequent operation at maximum loading combined with a raised centre of gravity when loaded.
This equipment has a positive effect on:
Driving characteristics when used on poor road surfaces, lateral inclination, roll stability and susceptibility to side winds.

2MR Reinforced suspension/damping + Reinforced stabilisation version 2

Reinforced suspension/damping, front/rear + Reinforced stabilisation, front/rear

The reinforced suspension/damping with reinforced front/rear stabilisation 2 should only be used for special installations with larger empty loads and for frequent operation at maximum loading combined with a high centre of gravity when loaded.

The equipment has a positive effect on:

Driving characteristics when used on poor road surfaces, lateral inclination, roll stability, susceptibility to side winds

2MT Reinforced suspension/damping + Reinforced stabilisation version 3

Reinforced suspension/damping, front/rear + Reinforced stabilisation, front/rear

The reinforced suspension/damping with maximum front/rear stabilisation 3 should only be used for special installations with larger empty loads and for frequent operation at maximum loading combined with a high centre of gravity when loaded.

The equipment has a positive effect on:

Driving characteristics when used on poor road surfaces, lateral inclination, roll stability, susceptibility to side winds

VV8 Reinforced front axle, gross front axle weight rating increased to 2,100 kg.

Suitable for use with front-heavy bodies.

This PR number can be selected as an option for each running gear package.

Information

The optional 2MF, 1BJ and 2MG running gear packages have a positive influence on the running gear properties in terms of lateral inclination, roll stability and side wind sensitivity, even when used on poor road surfaces or when operating with a high load. For vehicles in which the overall centre of gravity has been raised after installation and conversion, it must be checked whether the standard parameters of the ESC tuning are still sufficient. For more information, please refer to chapter 4.1.2 “Maximum permissible centre of gravity height”.

Running gear packages twin tyres + SuperSingle
Drive: Rear longitudinal

Standard running gear:

1BA Basic suspension/damping + Basic stabilisation

Basic suspension/damping + Basic stabilisation, front and rear

As series-production running gear, this is primarily intended for use on paved roads and routes.

2MF Basic suspension/damping + Reinforced stabilisation version

Basic suspension/damping + Reinforced stabilisation, front/rear

The front/rear reinforced stabilisation improves driving characteristics for vehicles with high centres of gravity when loaded.

The equipment has a positive effect on:

Lateral inclination, roll stability, susceptibility to side winds

2MR Basic suspension/damping + Maximum reinforced stabilisation

Basic suspension/damping + Maximum reinforced stabilisation, front/rear

This maximum reinforced front/rear stabilisation should only be installed on special installations with very high centres of gravity when loaded.

The equipment has a positive effect on:

Lateral inclination, roll stability, susceptibility to side winds

Reinforced running gear:

1BJ Reinforced suspension/damping + Basic stabilisation

Reinforced suspension/damping, front/rear + Basic stabilisation

The reinforced suspension/damping retaining the basic stabilisation is designed for vehicles with larger empty loads and for frequent operation at maximum loading.

This equipment has a positive effect on: driving characteristics when used on poor road surfaces.

2MG Reinforced suspension/damping + Reinforced stabilisation

Reinforced suspension/damping, front/rear + Reinforced stabilisation, front/rear

The reinforced suspension/damping with reinforced front/rear stabilisation is designed for vehicles with larger empty loads and for frequent operation at maximum loading combined with a high centre of gravity when loaded.

This equipment has a positive effect on:

Driving characteristics when used on poor road surfaces, lateral inclination, roll stability and susceptibility to side winds.

2MT Reinforced suspension/damping + Maximum reinforced stabilisation

Reinforced suspension/damping, front/rear + Maximum reinforced stabilisation, front/rear

The reinforced suspension/damping with maximum front/rear stabilisation should only be used for special installations with larger empty loads and for frequent operation at maximum loading combined with a high centre of gravity when loaded.

The equipment has a positive effect on:

Driving characteristics when used on poor road surfaces, lateral inclination, roll stability, susceptibility to side winds

4.2.3 Industry-specific offer structure

4.2.3.1 Closed bodies (panel van)

Standard running gear:

1BA Basic suspension/damping + Basic stabilisation

Reinforced running gear:

1BJ Reinforced suspension/damping + Basic stabilisation

2MF Basic suspension/damping + Reinforced stabilisation version 1 (single running gear package)
Basic suspension/damping + Reinforced stabilisation (twin super single running gear packages)

2MG Reinforced suspension/damping + Reinforced stabilisation version 1 (single running gear package)
Reinforced suspension/damping + Reinforced stabilisation (twin super single running gear packages)

2MR Reinforced suspension/damping + Reinforced stabilisation version 2 (single running gear package)
Basic suspension/damping + maximum stabilisation (twin super single chassis packages)

2MT Reinforced suspension/damping + Reinforced stabilisation version 3 (single running gear package)
Reinforced suspension/damping + maximum stabilisation (twin super single chassis packages)

4.2.3.2 Open bodies (chassis, platform van)

Standard running gear:

1BA Basic suspension/damping + Basic stabilisation

Reinforced running gear:

1BJ Reinforced suspension/damping + Basic stabilisation

2MF Basic suspension/damping + Reinforced stabilisation version 1 (single running gear package)
Basic suspension/damping + Reinforced stabilisation (twin super single running gear packages)

2MG Reinforced suspension/damping + Reinforced stabilisation version 1 (single running gear package)
Reinforced suspension/damping + Reinforced stabilisation (twin super single running gear packages)

2MR Reinforced suspension/damping + Reinforced stabilisation version 2 (single running gear package)
Basic suspension/damping + maximum stabilisation (twin super single chassis packages)

2MT Reinforced suspension/damping + Reinforced stabilisation version 3 (single running gear package)
Reinforced suspension/damping + maximum stabilisation (twin super single chassis packages)

4.2.4 Gross axle weight ratings

See 10.3 “Weights (masses)”.

Warning note

The gross axle weight ratings must be observed. If the gross axle weight ratings are exceeded, the ESC system in vehicles with ESC will no longer be able to function correctly. This could affect driver assistance system functions. Furthermore, the overload can lead to damage to the running gear and load-bearing parts.

This may result in the driver losing control of the vehicle and causing an accident. Information on the axle load and maximum gross vehicle weight rating of the Crafter can be found in the sales documentation on the internet or in the vehicle configurator.

4.2.5 Turning circle

See:

- European Union: Regulation (EU) No. 1230/2012
- European Union: 96/53/EC

Wheelbase [mm]	Turning circle [m]
3640	13.9
4490	16.9

4.2.6 Modifications to axles

Modifications to the running gear and the axles are not permitted (see chapter 7.1 “Running gear”).

4.2.7 Modifications to the steering system

Modifications to the steering system are not permitted (see chapter 7.1 “Running gear”).

4.2.8 Changes to the brake system and brake control system ESC*

Modifications to the brake system are not permitted.
Modifications to the air supply and air outlet of disc brakes are not permitted (see chapter 7.1.3 “Brake system”).
For vehicles with a gross vehicle weight rating of >4 tonnes, use of a wheel chock, at the least, is prescribed in accordance with section 41(14) of the StVZO.

4.2.9 Electronic Stability Control (ESC)

Warning note

The location, position and fastenings of the ESC yaw rate sensor cannot be modified. Modifications to wiring and ESC components are not permitted. Otherwise the ESC system might no longer function correctly.

Correct function of the driver assistance system could be affected. There is a greater risk of accidents particularly if you are driving at the limit.

4.2.10 Modification of springs, suspension mounting, shock absorbers

Modifications to springs and shock absorbers can only be made by configuring the front and rear together. The combinations specified at the factory shall be used.
More information and, if necessary, corresponding letters of non-objection can be obtained from the responsible department (see 2.2 “Converter guidelines, consulting”).
The use of springs and shock absorbers that do not correspond with the properties of the standard parts or the parts available as optional equipment is not permitted. We recommend using Volkswagen standard parts.
Modifications to the suspension mounting are not permitted (see chapter 7.1 “Running gear”).

4.2.11 Wheel alignment settings

Changes to the steering geometry or wheel alignment parameters are not permitted (see chapter 7.1 “Running gear”).
Comply with the information in chapter 7.1.1. “General information on the running gear” if the body or equipment appertaining to the vehicle and permanently carried on it result in a higher kerb weight, or if the vehicle is predominantly used when fully laden. This might be the case, for example, with recovery vehicles, fire brigade vehicles, ambulances, rescue vehicles, semi-trailer tractors, workshop vehicles or campers.

4.2.12 Modifications to camera and radar systems

No changes shall be made to the position and surroundings of camera and radar systems. Otherwise, the correct function of the driver assistance systems cannot be guaranteed. (see chapter 6.8 “Driver assistance systems”).

4.3 Limit values for body-in-white

4.3.1 Modifications to the body-in-white

See chapter 7 “Modifications to base vehicle” and chapter 7.2 “Body-in-white/body”.

- Interventions in the cross-member structure from the front end to the rear of the B-pillar are not allowed.
- Modifications on the rear gate and in the roof area are not allowed (see chapter 7.2.7 “Side wall, windows, doors and lids”).
- If modifications are made to the supporting structure, the replacement rigidity of the structure fitted by the Converter shall correspond overall with at least that of the production vehicle.
- The clearances for the fuel filler neck as well as for the tank and fuel lines shall be maintained.
- Neither drilling nor welding is permitted on the A and B-pillars.
- If modifications are made to the side panel on the panel van, replacement rigidity corresponding with the base vehicle shall be provided.
- If superstructures are fitted on the cab of base vehicles, a tank sender protector will be necessary depending on the body. See chapter 7.3.1 “Fuel system”.

4.3.2 Vehicle frame limit values

If the wheelbase is modified and the frame is lengthened, the material of the extension piece shall correspond with the production chassis frame in terms of quality and dimensions (see chapter 8.1 “Assembly frame”).

Vehicle name	Approve	Material	Yield strength Rp [N/mm2]	Tensile strength Rm [N/mm²]
Crafter	Chassis (single tyres)	CR330Y590T	330-430	590-700

4.3.3 Lowering of rear wheel housing/panel van

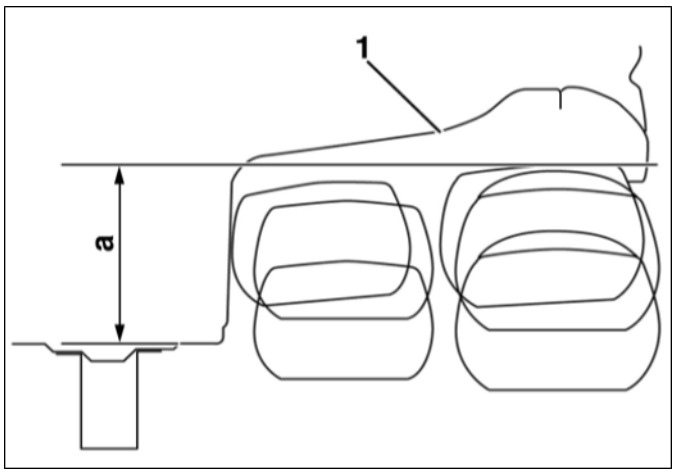
It is possible to lower the wheel housings if the following prerequisites and limit values are met:

- Components or sharp edges (e.g. folds) shall not protrude into the wheel housing.
- The measurement for the maximum permitted lowering is not allowed to be exceeded by any component in the wheel housing.
- Unrestricted use of snow chains is not possible: The entry “snow chain usage only possible to limited extent” needs to be made in the vehicle documents.

Practical note

If the use of snow chains is necessary, then fine-link snow chains must be used.

Please note that contact can occur in the wheel housing. After using snow chains, please check the vehicle body for damage and apply anti-corrosion material to the damaged areas.



Clearance requirements

1 Contour of production wheel housing of panel van

a minimum distance from frame flange to wheel housing contour

Information

The minimum distance of the wheel housing is measured from the floor of the panel van to the lowest point on the wheel housing contour.

Drive type	Design	Gross vehicle weight rating [t]	Tyres	Dimension a [mm]
Front-wheel drive	Low floor Single tyres Straight frame longitudinal member	3.0-4.0 t	205/75 R16 235/65 R16 235/60 R17	330
	High floor Single tyres Straight frame longitudinal member	3.5t 3.0-4.0 t	205/75 R16 235/65 R16 235/60 R17	230
All-wheel drive	Single tyres Straight frame longitudinal member	3.0-4.0 t	205/75 R16 235/65 R16 235/60 R17	230
Rear-wheel drive	Single tyres Straight frame longitudinal member	3.5-4.0 t	235/65 R16 235/60 R17	270 / 240*
	Single tyres (Super Single) Frame longitudinal members with indentation	5.0 t	285/55 R16	235*
	Double tyres Frame longitudinal members with indentation	3.5-5.5 t	2x 205/75 R16 2x 205/70 R17	280 / 250*

* Cannot be used with snow chains.

Information

Further information can be found in chapter 7.2.8 “Wings and wheel housings”.

4.3.4 Minimum dimensions for rear wheel housing/chassis

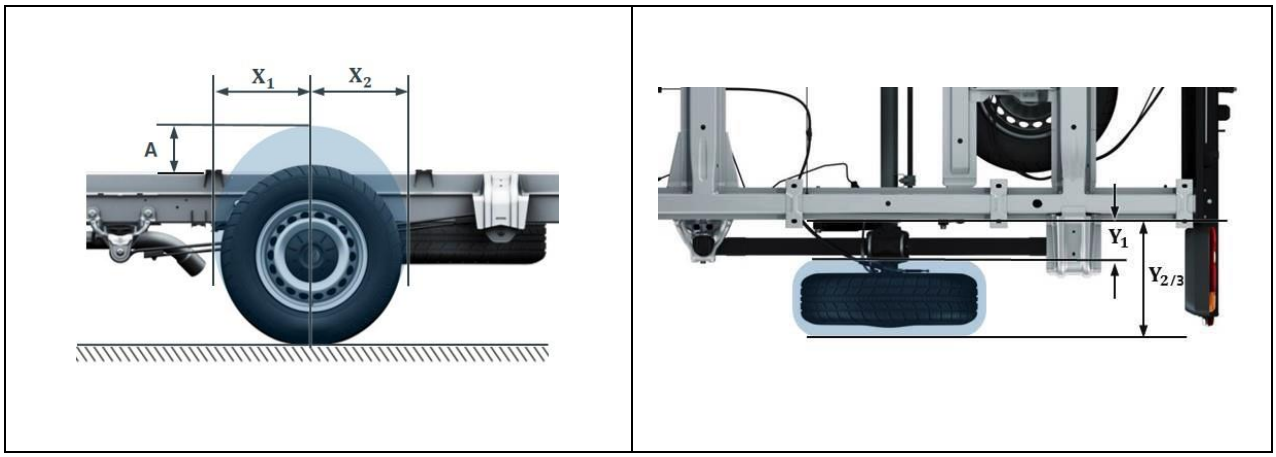


Fig. 1: Limit values for wheel housing clearance requirements

Drive type	Design	perm. Total mass [t]	Tyres	Dimension [mm]					
				X1	X2	Y1	Y2**	Y3	A***
Front	Single tyres straight frame longitudinal member	3.5-4.0 t	205/75 R16 235/65 R16 235/60 R17	≥415*	≥375*	≤ 175*	≥505*	450	≥150*
All-wheel drive	Single tyres Straight frame longitudinal member	3.5-4.0 t	205/75 R16 235/65 R16 235/60 R17	≥415*	≥375*	≤ 175*	≥505*	450	≥150*
Rear	Single tyres Straight frame longitudinal member	3.5-4.0 t	235/65 R16 235/60 R17	≥455 ≥415*	≥415 ≥375*	≤155 ≤175*	≥525 ≥505*	450	≥185 ≥155*
	Double tyres**** Frame longitudinal members with indentation	3.5-5.5 t	2x 205/75 R16 2x 205/70 R17	≥455 ≥415*	≥430 ≥390*	≤ 80	≥645 ≥625*	590	≥155 ≥125*

* Cannot be used with snow chains.

** Minimum wheel housing width with overlaps to centre of axle, measured up to the frame longitudinal member. see Fig. 4

*** Minimum distance A: upper edge of frame longitudinal member to wheel housing contour.

**** With twin tyres, Y1 is used for the inside of the inner wheel and Y2 for the outside of the outer wheel.

Y3: Wheel housing/part cover (series platform) see Fig. 3

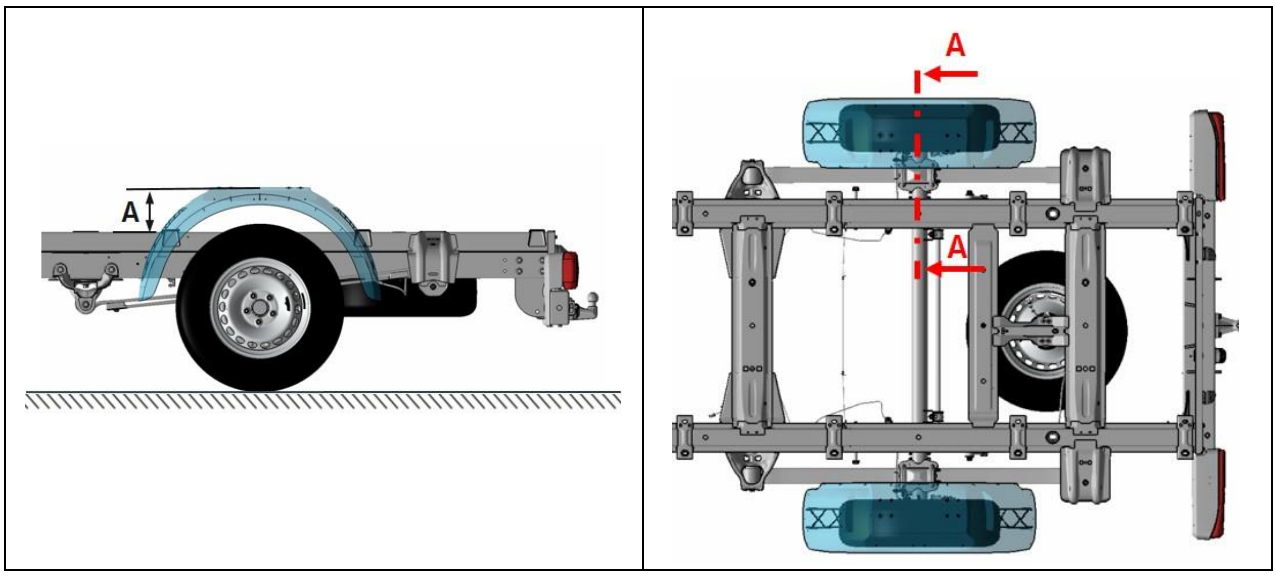


Fig. 2: Dimensions for wheel housing/partial cover (example: side platform wheel housing)

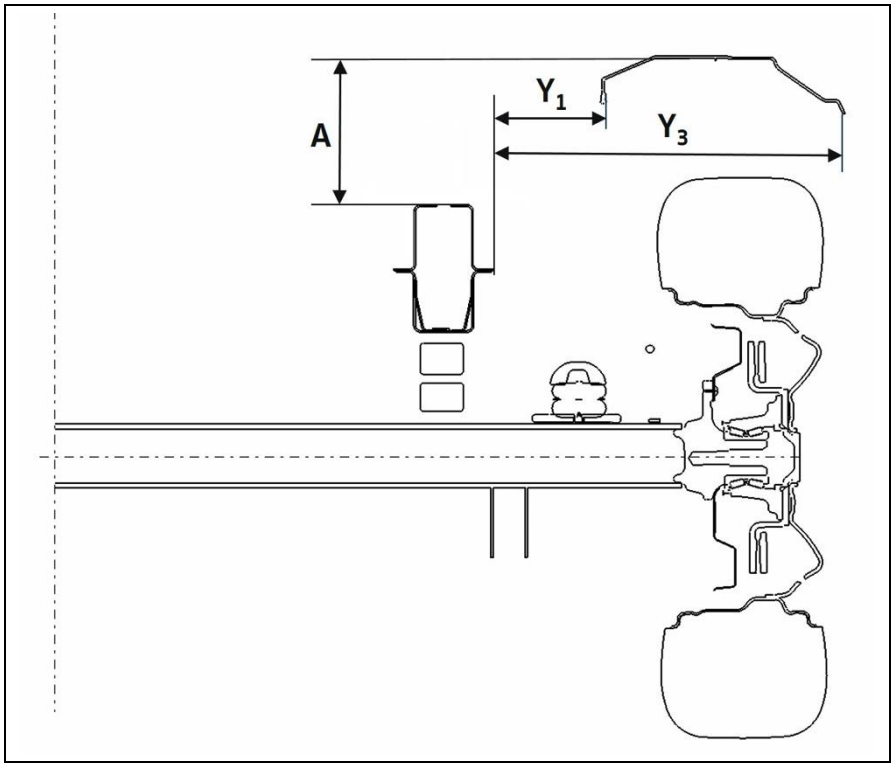


Fig. 3: A-A cross-section, wheel clearance for wheel housing with partial cover (example: side platform)

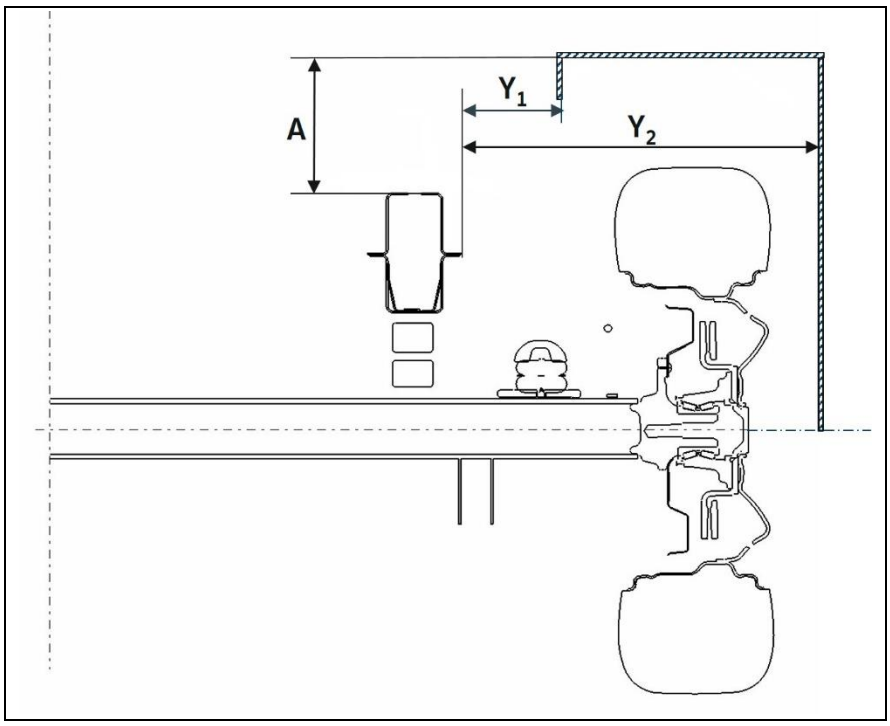


Fig. 4: A-A cross-section, wheel clearance for max. wheel housing trim up to wheel centre

The minimum distance A of the wheel housing is measured from the upper edge of the frame longitudinal member to the lowest point on the wheel housing contour.
Dimensions Y_1, Y_2 and Y_3 are measured from the outside edge of the frame flange on the frame longitudinal member.
Regulation (EU) No 109/2011 (mudguards, spray-suppression) must be taken into account.

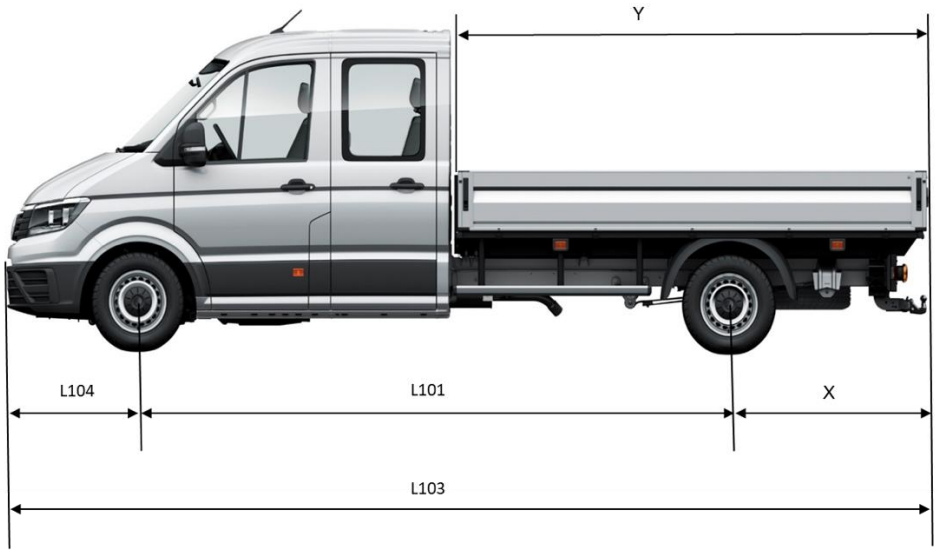
Information

Further information can be found in chapter 7.2.8 “Wings and wheel housings”.

Information

Important information on minimum dimensions for the rear wheel housing/flat frame can be found in chapter 8.5.2 “Flat frame chassis with cowl panel”).

4.3.5 Vehicle overhang



Front overhand (L104) – wheelbase (L101) – maximum rear overhand (X) – maximum vehicle length (L103) – resulting maximum body length (Y)

Possible overhang extensions for chassis and vehicles with open boxes (platform):

Vehicles with a mid-length wheelbase (3,640 mm)

- For vehicles with a mid-length wheelbase (3,640 mm), the possibility of having an overhang extension is heavily dependent on the kerb weight of the base vehicle. For light base vehicles, with a low level of equipment and high payload, an overhang extension of any significance is not possible. For heavy base vehicles, with more equipment and a lower payload, an overhang extension is possible.
- For unfinished vehicles (chassis), the maximum possible vehicle length and overhang can be taken from the CoC documentation (field 5.1, or 12.1). However, this value only takes the variant and the version of the vehicle into consideration and not any additional weight from optional equipment.
- In this case, an axle load calculation using the actual weight data of the base vehicle used must be carried out. The total overhang may constitute a maximum of 50% of the wheelbase (1,820 mm).
- Cowl panel flat frame: maximum possible total overhang: 1800 mm (=6440-3,640-1,000)

The values specified in the tables below are orientation values. On incomplete vehicles, the values for the maximum vehicle length are stated in the COC papers. The rear overhang can be calculated as follows from the vehicle length:

Medium wheelbase (L3) = 3,640 mm
Long wheelbase (L4/L5) = 4,490 mm
Front overhang (L104) = 1,000 mm (all versions)

The specified series overhangs and possible extensions are each based on the plant platform.

Type	Wheelbase (L101)	Maximum rear overhang (X)	% of wheelbase	Resulting maximum body length (Y)	Maximum vehicle length (L103)
L3EK L3 Cowl panel flat frame	3640 millimeters	1800 millimeters	50%	3,805 millimeters	6,440 millimeters

Vehicles with a long wheelbase (4,490 mm)

- Single cab: maximum possible total overhang: 2,694 mm (60% of wheelbase)
- Double cab: maximum possible total overhang: 2,245 mm (50% of wheelbase)
- Cowl panel flat frame: maximum possible total overhang: 2,694 mm (60% of wheelbase)

The values specified in the tables below are orientation values. On incomplete vehicles, the values for the maximum vehicle length are stated in the COC papers. The rear overhang can be calculated as follows from the vehicle length:

Rear overhang (L105) = Maximum vehicle length (L103) – Wheelbase (L101) – Front overhang (L104)

Medium wheelbase (L3) = 3,640 mm
Long wheelbase (L4/L5) = 4,490 mm
Front overhang (L104) = 1,000 mm (all versions)

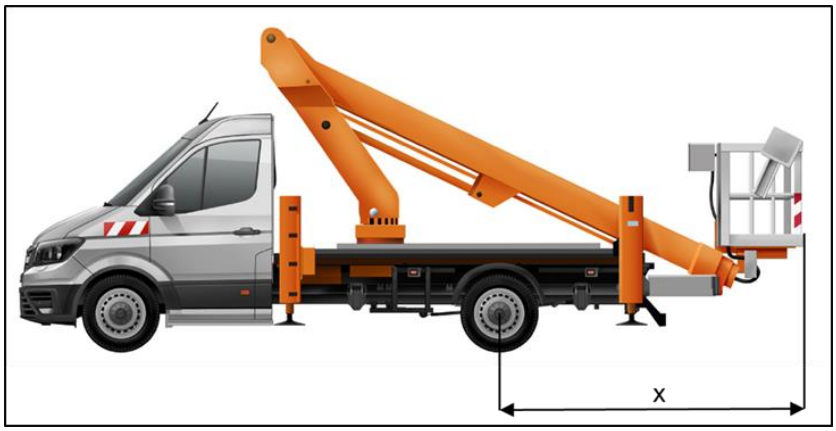
The specified series overhangs and possible extensions are each based on the plant platform.

Type	Wheelbase (L101)	Maximum rear overhang (X)	% of wheelbase	Resulting maximum body length** (Y)	Maximum vehicle length (L103)
L4DK	4,490 mm	2245 millimeters	50%	4301 millimeters	7,735 millimeters
L4EK L4 Cowl panel flat frame	4490 millimeters	2694 millimeters	60%	5549 millimeters	8,184 millimeters
L5EK*	4,490 mm	2694 millimeters	60%	5549 millimeters	8,184 millimeters

*Only rear-wheel drive with twin tyres

These are theoretical maximum values for base vehicles with minimal equipment. The values vary considerably due to equipment-related differences in the unladen weight and the gross (axle) weight ratings of the base vehicle.
It is therefore essential to perform a load distribution calculation in order to check that the individual conversion complies with the following requirements:

- Compliance with the permissible rear axle load with even distribution of weight on the loading platform (water load)
- Compliance with the minimum front axle load, as per the table in chapter 4.1.1, for the relevant vehicle category and drive type, for gross vehicle weight rating and unladen rear axle
- Compliance with the rear ramp angle if there are requirements concerning this
- Depending on the intended country of registration, additional requirements may exist



Maximum overhang length (shown using example of elevated work platform) x vehicle overhang

Possible overhang extensions for panel vans:
The specified overhang extensions are also possible in principle for vehicles with closed bodies (panel van)
session.

As a result, the same prerequisites and vehicle-related conditions apply with regard to the minimum front axle load and compliance with the gross axle weight ratings in accordance with the respective vehicle categories and drive concepts.

With regard to vehicles for goods transit (vehicle category N), an equal distribution of the payload on the loading platform (water load) is assumed for the axle load calculation.

With regard to vehicles for the carriage of passengers (vehicle category M), including in particular buses (M2, M3), the values from the relevant provisions must be set with regard to the loading assumptions for passengers, areas available for standing passengers, wheelchair spaces and luggage compartments. The provisions applicable within the EU are the currently valid versions of Regulation (EU) 1230/2012 and/or UNECE R 107. Individual national regulations may differ.

With regard to any overhang extension, a rear overhang angle suitable to the intended use of the vehicle must be retained in every instance.

Practical note

All considerations currently apply to vehicles without trailer couplings. The overhangs specified refer to the rear edge of the **body**, not the chassis frame itself.

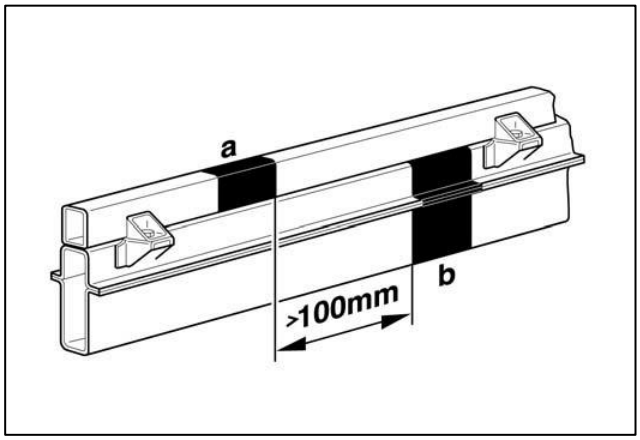
Please also comply with the following chapters:
- 4.1.1 “Steerability”
- 4.1.2 “Maximum permitted height of centre of gravity”
- 10.3 “Weights (masses)“
- 10.4 “Vehicle dimensions (basic data)”

4.3.6 Attachment to the frame

- Frame attachment shall be carried out according to chapter 7.2.2 “Attachment to the frame”.
- The body shall be attached to the base vehicle via the body brackets fitted at the factory or via additional body brackets (see chapter 8.1.4 “Attachment to the frame”).
- All the bolts (M12, property class 10.9) on the body bracket must be used for the attachment.
- The last body bracket must sit as close to the end of the frame as possible.
- The distance between the retrofitted brackets should not be greater than 500 mm.
- For overhang extensions, the subframe may project a maximum of 400 mm further than the main frame.

4.3.7 Wheelbase modifications – free body lengths

- With all drive variants, wheelbase changes are permitted to a limited extent.
- In the event of modifications to the wheelbase, the axle connection must not be changed.
- Modifications to the frame shall be made according to chapter 7.2 “Body-in-white/bodywork”.
- The information and notes listed under chapter 7.2.5 “Wheelbase modifications” must be observed.
- Country-specific laws and regulations are to be observed!
- Frame cuts shall be avoided in the vicinity of frame inserts. (see 7.2.5.2 “Recommended frame cutting areas”).
- The offset between the cuts in the assembly frame and the cutting area on the longitudinal member must be > 100 mm.
- The end of the exhaust pipe shall not be directed against vehicle components (e.g tyres) after wheelbase modifications.



Overhang extension vehicle frame with assembly frame

a – Extension of assembly frame

b – Extension of frame

4.3.8 Vehicle roof/roof load

Maximum roof loads [kg]				
Normal roof (Sheet steel) H2*	**High roof (Sheet steel) H3***	**Extra-high roof (Plastic) H4***	**High roof camper basic (Plastic) H5/L3 and H4/L4 *** **	**Double cab/single cab normal roof (sheet steel) H2***
300	150	0	0***	0**

Roof cross struts or weight-bearing parts are not allowed to be removed without replacement, and must not be damaged.
The connection between the cross strut and the side panel shall be flexurally rigid (see chapter 7.2.10.3 “Number of roof cross struts”).

* For roof heights, please refer to chapter 10.4 “Vehicle dimensions (basic data)”

**For permissible deviations to roof loads for roof spoilers/wind baffles, sleeper cabs and special signal systems, please refer to chapters 7.6.1 “Wind baffles/roof spoilers”, 7.6.2 “Roof sleeper cabs” and 6.5.2 “Attaching auxiliary lights/special signal systems”.

*** These roof variants are part of the camper base vehicle. For more information, see the following practical note.

Practical note

The permissible static and dynamic roof load depends on installations in the interior/load compartment and reinforcements in the roof area. The Converter is responsible for additional bodies and roof loads on the camper roofs. The strength and durability must be checked and approved by the Converter.

4.4 SCR system

4.4.1 SCR system

To meet EURO VI/Euro 6 emissions regulations for diesel engines, different engine versions are available ex-works with the SCR system. The SCR (Selective Catalytic Reduction) catalytic converter is installed in Blue TDI models amongst others, and has the function of converting nitrous oxide (NOx) constituents of the exhaust into nitrogen and water. This conversion is undertaken using AdBlue®, a synthetically manufactured, aqueous reducing agent. AdBlue® additive comprises 32.5 percent high-purity urea and demineralised water. AdBlue® is not mixed with the fuel, but carried in a separate fuel tank.
From there, it is injected continuously into the exhaust gas line in front of the SCR catalytic converter. It reacts with the nitrous oxides in the SCR catalytic converter and is split into nitrogen and water. The dose depends on the exhaust gas mass flow; the engine management system is sent information by an NOx sensor behind the SCR catalytic converter and ensures precise dosing. The aqueous additive AdBlue® is non-poisonous, odourless and water-soluble.

4.4.1.1 Installation position of the SCR tank in the vehicle

In both open bodies (platform, chassis) and closed bodies (panel van), and all wheelbases, the SCR fuel tank is fitted uniformly at the left below the cab when viewed in the direction of travel.
The SCR tank and fuel tank are installed in the same position on all vehicle versions.
The capacity of the SCR tank is approx. 35 litres.

Information

Due to the increased requirements for reducing emissions, the SCR tank volume has been increased to approx. 35 litres.

During the planning phase, please check the construction status of the vehicle to be converted with regard to the size of the SCR tank. The following views of the vehicles from below can be helpful.

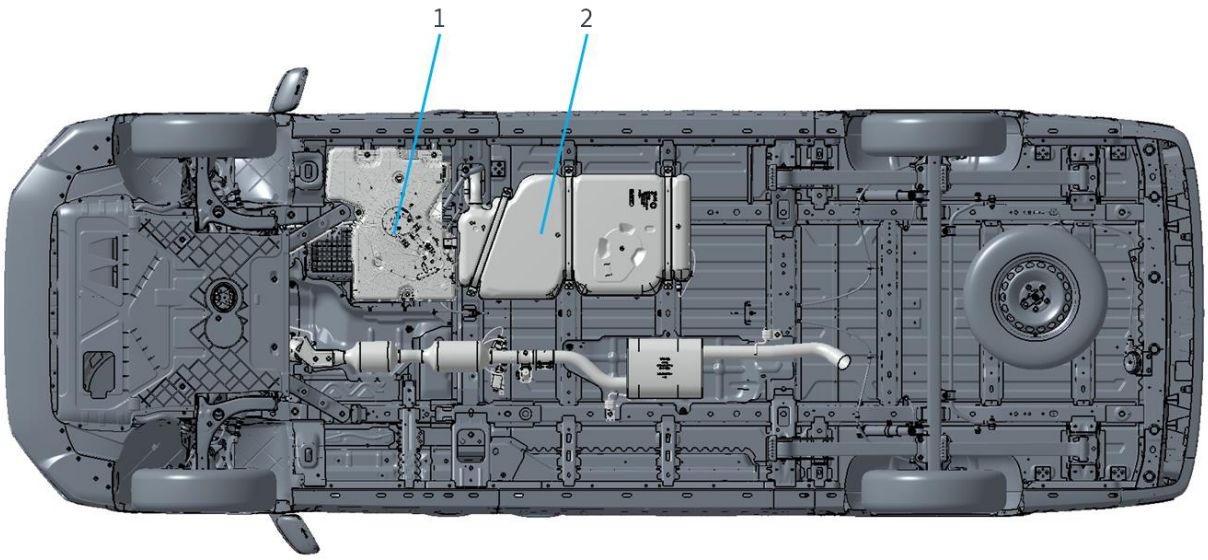


Fig. 1: Installation position of the SCR tank in the vehicle (schematic diagram, vehicle with front-wheel drive)

1 – SCR tank

2 – Fuel tank

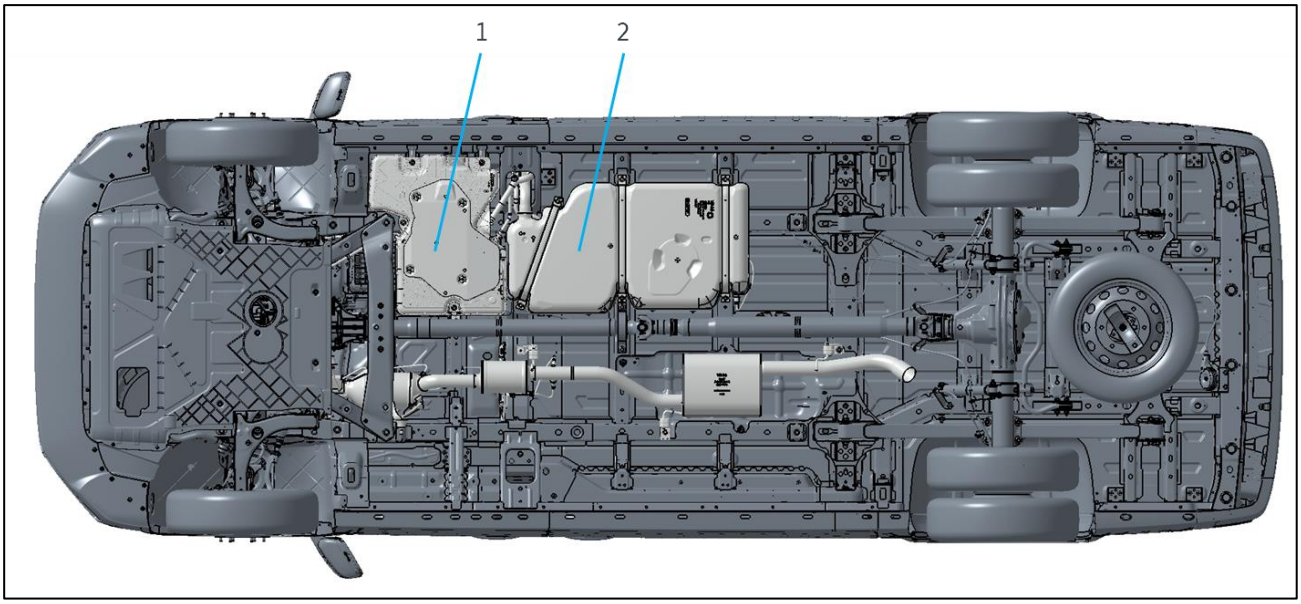


Fig 2: Installation position of the SCR tank in the vehicle (schematic diagram, vehicle with rear-wheel drive), enlarged SCR tank.

1 – SCR tank

2 – Fuel tank

The SCR system consists of an SCR fuel tank, lines and a metering valve and forms an optimised electrical-hydraulic unit. The position of the SCR tank, the heated metering line and their relative position to the vehicle shall not be changed (see chapter 7.3.2. “Exhaust system”). If a modification to the exhaust system with SCR system due to body design, removal or conversion is nevertheless required, this may have consequences relevant to registration. Please contact the body builder’s support team in advance regarding the extent of your conversion so that we can advise you.

– The following views of the vehicles from below can be helpful

Information

More information and safety instructions for the SCR system can be found in the Owner's Manual for your vehicle and the Workshop Manuals of Volkswagen AG on the Internet:
http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

4.5 Limit values for engine peripherals/powertrain

4.5.1 Modifications to engine/powertrain components/exhaust system

- No modifications to the engine air intake system are permitted.
- Modifications to the drive shaft lengths shall be performed by a company qualified in drive shaft manufacture.
- Subsequent solutions for engine speed regulation other than those available as optional equipment are not possible.
- Modifications to the exhaust system, in particular in the area of the components for exhaust gas treatment (diesel particulate filter, catalytic converter, lambda probe etc.), are not permitted. (see chapter 4.4 “SCR system”).

4.5.2 Engine cooling

Modifications to the cooling system (radiator, radiator grille, air ducts etc.) are not permitted (see chapter 7.3.3 “Engine cooling system”). Keep the cross-sections of the cooling air intakes clear.

4.6 Limit values for interior

4.6.1 Modifications in the area of airbags and belt tensioners

Warning note

Modifications to the airbag system and the belt tensioner system are not permitted.

Modifications or incorrectly performed work on a restraint system (seat belt and seat belt anchors, belt tensioners or airbags) or its wiring could lead to the child restraint system no longer working correctly. This means that, for example, airbags or belt tensioners could be deployed inadvertently or fail in accidents even though the delay required for deployment has passed.

- Modifications on and in the area of airbag components and the airbag sensors are not permitted.
- Later modifications to the headliner or its fastenings are permitted if the vehicle is equipped with a window bag.
- The interior fittings shall be designed so that the airbag deployment areas are left unobstructed (see chapter 7.4.2 “Safety equipment”).
- Modifications in the area of the airbag control unit are not permitted (see chapter 7.4.2.1 “Airbag control unit and sensors”).

Further information can be found under “Modifications to the base vehicle” (see chapter 7.4.2 “Safety equipment”).

4.7 Limit values for electrics/electronics

See chapter 6 “Electrics/electronics”.

4.7.1 Vehicle marker and side marker lights

Please note that the completed (converted) vehicle must comply with the add-on regulations and dimensions for all technical lighting equipment acc. to UNECE R 48 (see following table).
According to this, end-outline marker lamps and parking lights are specified for vehicles wider than 2.10 m and, in addition, side marker lights for vehicles longer than 6.00 m.

Applicable to all vehicle types:

ECE regulation	Lighting equipment	Vehicle dimensions	Comment
UNECE-R 48, 6.13	End-outline marker lights	Permitted for vehicles with a width ≥ 1,800 mm and ≤ 2,100 mm Prescribed for vehicles with a width > 2100 mm	Applies for all vehicles.
UNECE R 48, 6.18	Side marker lights	Prescribed for vehicles with a length > 6000 mm	Permitted for other vehicles.

4.7.2 Retrofitting electrical devices

All installed electrical devices must be checked in accordance with the UNECE regulation UNECE-R 10 and shall bear the ‘e’ mark.

4.7.3 Mobile communication systems

1. Mobile phones

Commercially available mobile phones may be operated in the vehicle interior. Observe the respective national regulations for the transmission powers during use. Information about the radio bands can be found in the current vehicle-related manufacturer's declaration.
An installation set with external aerial is recommended for an optimum transmission and reception quality and to connect to wireless networks outside of the vehicle. The appropriate interface is available for the mobile phone ex-works as special equipment.

2. Mobile phones for authorities and organisations with security tasks

Two-way radios complying with the technical guidelines of authorities and organisations with security tasks may be installed and operated in the vehicle with the appropriate installation set (according to the vehicle-specific manufacturer’s declaration).

Information

You can find more information on the operation of mobile devices in the CustomizedSolution portal.

You must register on the CustomizedSolution portal in order to access this.

4.7.4 CAN bus

Warning note

Interventions in the CAN bus and connected components are unauthorised.

The CAN bus must not be modified due to the networking and internal monitoring of electrical equipment (e.g. by interrupting, extending or “tapping”, and reading and writing). Any modification to the wiring harness in terms of length, cross-section or resistance could cause failure of safety-relevant components or result in a loss of comfort.

Internal and external vehicle diagnosis is possible via the OBD diagnostic connection (SAE 1962). Each control unit is self-diagnosis capable and has a event memory.
Communication with the control unit can be carried out using ODIS (Offboard Diagnostic Information System) and the software that has been developed for this purpose.

Practical note

The Converter can use the open CAN bus interfaces on the CFCU to exchange predefined data with the data bus system of the base vehicle (CIA 447 or J1939).

Outside of these interfaces and predefined data strings, no data may be exchanged with the internal data bus of the base vehicle. Furthermore, no online interfaces may be connected to the above CAN BUS interfaces (an online interface is an interface that can potentially be connected to the Internet, such as *Wi-Fi, Bluetooth, *NFC, *NAD, etc.).

In case of non-compliance, the Converter is required to have a new system test performed according to UN ECE R 155.

To prevent outside intervention in the vehicle control system, the vehicle manufacturers (OEM) are constantly implementing the UNECE regulations on cyber security (CS) and software update management system (SUMS).

If vehicles are modified or supplemented by body builders following delivery by the vehicle manufacturer, the specifications from the UNECE regulations must also be observed and implemented.

* WLAN = wireless local area network

*NFC= near field communication (contactless data transmission using radio frequency identification (RFID) technology),

*NAD= network access device (telephone module)

Information

Your Volkswagen customer service department can provide you with further information.

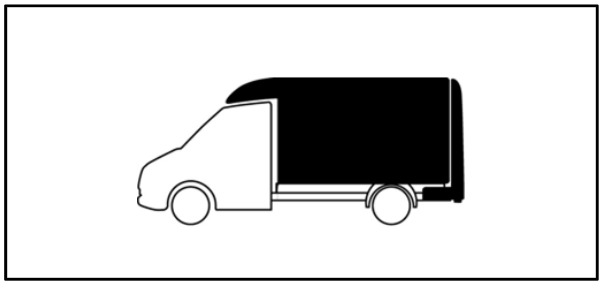
4.8 Limit values of ancillaries

Only the ancillaries offered ex-works, for example an additional air conditioner compressor and additional alternator, may be used.
See chapter 7.5 “Ancillaries”.

4.9 Limit values of add-ons

- For vehicles in vehicle class N2, side protection equipment is prescribed, in accordance with UNECE Regulation No 73.
- Separate underbody guard equipment in accordance with UNECE-R 58 is required if the ground clearance at the rear of the unladen vehicle amounts to more than 550 mm in sections or over the entire width.
- Vehicle classes M and N1:
  ground clearance in the rear area must be maintained and must finish a maximum of 450 mm before the rear of the car.
- Vehicle class N2:
  in addition to the geometric criteria, the mechanical resistance properties of the underbody guard equipment must be verified.
- Specifications on the maximum lifting capacity can be found in chapter 7.7.3 “Tail lift mounting”. Attachment in accordance with chapter 7.7 “Tail lift” is required in this case.

4.10 Body limit values



See chapter 8 “Industry-specific conversions”.

Practical note

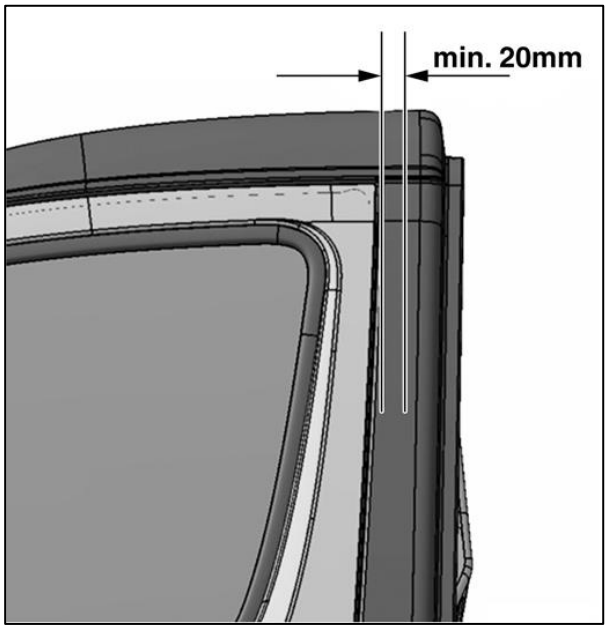
The standard tank cap is not allowed to be removed or covered with a part that creates a “block”. (see chapter 8.12 “Campers”).

Practical note

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

Practical note

The minimum distance between the rear edge of the door and integrated body shall be >20 mm. Otherwise, in an accident, the rear edge of the door and the body could come into contact and in extreme cases result in the door being jammed.



Minimum distance between rear edge of door and integrated body

5 Prevention of damage

Practical note

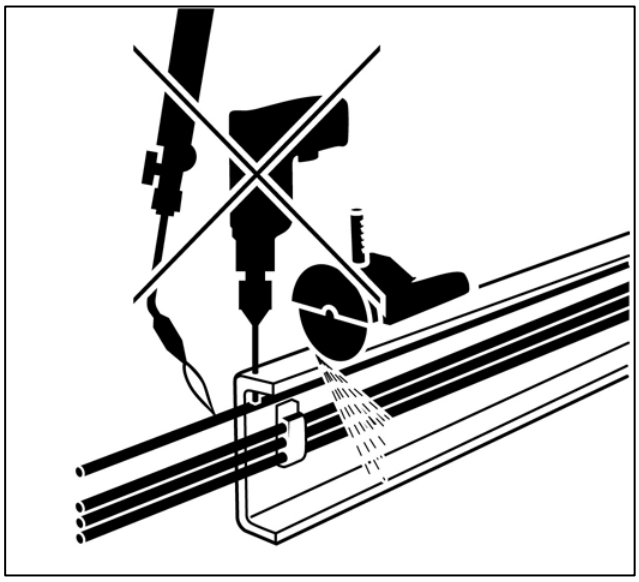
The prevention of accident regulations shall be observed during work on the vehicle.

Practical note

The country-specific guidelines and laws shall be observed.

5.1 Brake hoses/cables and lines

Plastic lines, brake hoses and brake cables shall be covered and, if necessary, removed before welding, drilling, sanding and working with cutting discs.



After fitting compressed-air lines and hydraulic lines, the system shall be checked for pressure loss and leaks.
No other lines are allowed to be fastened to brake hoses.
Lines shall be protected against heat with suitable insulation.

Warning note

Work performed improperly on brake hoses and cables can impair their function. This can lead to a failure of components or safety-relevant parts.

5.2 Welding work

Warning note

Welding in the area of the child restraint systems (airbag or belts) can lead to these systems ceasing to function properly. Welding in the area of child restraint systems is therefore prohibited.

Warning note

Incorrectly undertaken welding work can lead to a failure of safety-relevant components, and thus cause accidents. Therefore, the following safety measures must be complied with when welding work is performed.

- Welding work on the chassis is only allowed to be carried out by specialist personnel.
- Before starting welding work, it is necessary to remove components which might contain gases posing a fire or explosion hazard, e.g. fuel system, or else to protect them with a fireproof cover against airborne sparks. Gas containers which could be damaged by airborne sparks during welding work must be removed.
- For welding work near seat belts, airbag sensors or the airbag control unit, these components must be removed before work begins and for the duration of the work. See chapter 7.4 “Interior”. for important information on handling, transporting and storing airbag units.
- Before starting welding work, cover the springs and spring bellows to protect them against welding beads. Springs are not allowed to be touched with welding electrodes or welding tongs.
- No welding is allowed on mechanical units such as the engine, gearbox, axles.
- Remove and cover the battery positive and negative terminal clamps.
- Directly connect the earth clamp of the welding machine to the part to be welded. The earth clamp is not allowed to be connected to power units such as the engine, gearbox, axles.
- The housings of electronic components (e.g. control units) and electrical wiring are not allowed to be touched with the welding electrode or earth clamp of the welding machine.
- The electrodes are only allowed to be used with direct current via the positive terminal for welding. Always weld from bottom towards the top.
- The current rating is allowed to be a maximum of 40 A per mm of electrode diameter.
- Only use well dried electrodes (diameter 2.5 mm) with lime-based sheath.
- Shielding gas welding is permitted.
- Only welding wire with a thickness of between 1 and 1.2 mm is allowed to be used.
- The welding material shall have at least the same yield strength and tensile strength as the material to be welded.
- Plug welding is only permitted in the vertical webs of the frame longitudinal member.
  In order to avoid notch effects due to fusion penetration, weld seams shall be ground and reinforced with angle brackets.
- Weld seams in bend radii shall be avoided.
- The distance of weld seams from outer edges shall be at least 15 mm.

Information

You will find further information on welding work in the chapters 3.7 “Bolted, welded and bonded joints”, 7 “Modifications to the base vehicle”, 7.2.1 “General information on body-in-white/bodywork” and the “Electronic Repair and Workshop Information” (erWin)* issued by Volkswagen AG.

*Information system from Volkswagen AG, subject to payment

5.3 Corrosion protection measures

Following conversion and installation work on the vehicle, surface and corrosion protection shall be applied to the affected points.

Practical note

Only the corrosion protection agents tested and approved by Volkswagen are allowed to be used for all corrosion protection measures.

5.3.1 Planning measures

Corrosion protection should be taken into account in the planning and design in the form of a suitable material selection and component design.

Information

If two different metallic materials are connected together by an electrolyte (e.g. moisture from the air) then this will give rise to a galvanic connection. The result will be electrochemical corrosion, and the less noble metal will suffer damage. The electrochemical corrosion will be all the greater the further apart the metals in question are in the electrochemical series. Therefore, the components must have a suitable treatment or insulation applied to them in order to prevent electrochemical corrosion, or the corrosion must be kept at a low level by a suitable choice of materials.

Avoidance of contact corrosion by electrical insulation

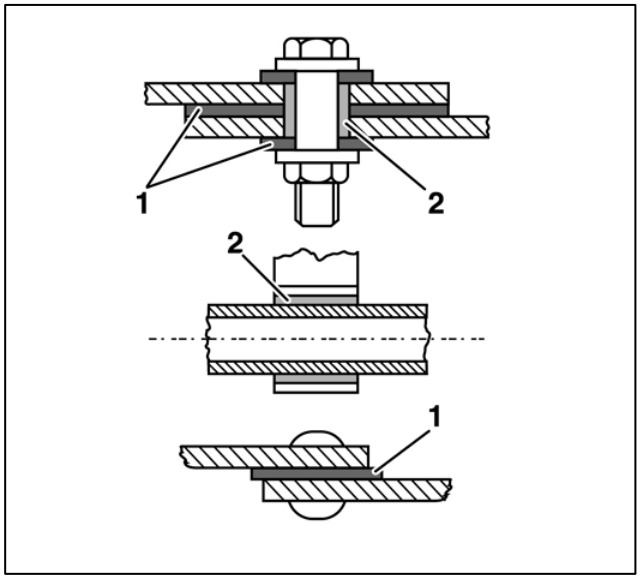


Fig. 1: Prevention of contact corrosion

1 – Insulating washer

2 – Insulating sleeve

Contact corrosion can be avoided by using electrical insulation such as washers, sleeves or tubes.
Avoid welding work on inaccessible cavities.

5.3.2 Component design measures

Design measures, in particular in the design of connections between the same or different materials, can be used for providing corrosion protection:
Corners, edges, beads and folds represent locations where dirt and moisture can collect.
Suitable surfaces, drains and the avoidance of gaps at component connections represent means by which corrosion can be counteracted by design measures.

Gaps at welded connections as a feature of the design, and how to avoid them

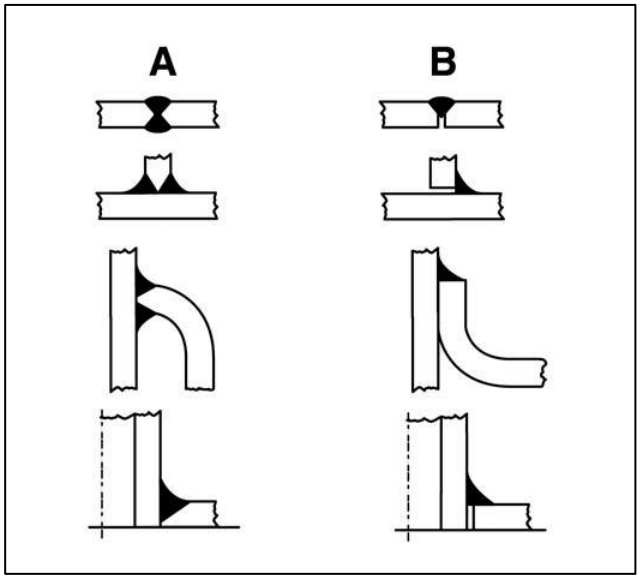


Fig. 1: Application examples of welded connections

A = Favourable (welded-through)	B = Unfavourable (gap)

5.3.3 Coating measures

By applying protective coatings (e.g. galvanizing, painting or high-temperature zinc application), it is possible to protect the vehicle against corrosion (see chapter 5.4 “Paint work/corrosion protection measures”).

5.3.4 After all work on the vehicle

- Remove drilling chips
- Deburr edges
- Remove scorched paint and thoroughly prepare the surfaces for painting
- Apply a primer to all bare metal parts, and paint them
- Apply a wax-based corrosion protection agent to cavities
- Carry out corrosion protection measures on the underbody and frame components

5.4 Painting/corrosion prevention

Practical note

The permitted object temperature for paint drying is maximum 60 °C, and the drying time is 30 minutes. Higher temperatures could cause damage to the control units or other components.

Any damage to paintwork or corrosion protection caused by the Converter shall be repaired by the Converter. The following shall be noted:

- The quality requirements of Volkswagen for the first paint coat and repair paint shall be observed.
- Only the materials tested and approved by Volkswagen or equivalent suitable materials are allowed to be used for all painting and corrosion protection work.
- The coat thicknesses specified at the factory for the individual paint coats shall be observed by the Converter.
- When painting over existing paintwork, the paints shall be compatible.

Information

Any Volkswagen customer service department can provide information on the paint materials, coat thicknesses and Volkswagen colour codes used at the factory.

The following areas shall be covered before painting:

- Disc brakes
- Brake hoses
- Transfer unit of the handbrake
- Contact surfaces between the wheel rims and wheel hubs
- Contact surfaces of the wheel nuts/wheel bolts
- Brake fluid reservoir
- Bleeder connections on gearbox, axles etc.
- Sealing surfaces
- Windows
- Door locks
- Door arresters in the hinges of the rear pivoting door
- Door arresters and opening stops in the centre guide rails
- Contact surfaces in the guide rails for the sliding doors
- Moving parts of the sliding door carriages
- Airbags and seat belts
- Sensors for area monitoring (see chapter 6.8 “Driver assistance systems”)

Information

You will find further information on painting and corrosion-protection work in the “Paintwork manual” at https://erwin.volkswagen.de/.

5.5 Tow-starting and towing

Practical note

Before tow-starting or towing, read the “Towing” chapter in the detailed Owner’s Manual (see chapter 2.1.5 “Online Owner’s Manual”).

5.6 Storage and delivery of the vehicle

5.6.1 Storage

To prevent damage during storage of vehicles, we recommend servicing and storing them according to the manufacturer's specifications.

5.6.2 Delivery

To avoid damage to the vehicle and rectify any existing damage, we recommend checking the vehicle before delivery to ensure it is functioning properly and in perfect condition.

6 Electrics/electronics

6.1 General information

Warning note

Incorrect interventions in electronic components and their software may result in these no longer functioning as intended. Due to the networking of electronics, systems that were not modified can be affected.

Malfunctions to the electronics can significantly impair the operational safety of your vehicle.

Have work on or modifications to electronic components performed by a qualified specialist workshop which has the necessary specialist knowledge and tools for performing the necessary work.

Volkswagen recommends Volkswagen customer services for this purpose. Service by a qualified specialist workshop is essential, in particular for work on safety-relevant systems.

Some safety systems only operate when the engine is running. Therefore, do not switch the engine off when driving.

Practical note

If additional electrical equipment is installed, a positive overall charging balance must be ensured (see chapter 6.4.9 “Retrofitting electrical devices”).

When the engine is running, the terminals on the batteries are not allowed to be loosened or disconnected.

Batteries are only allowed to be charged with a quick charger if the positive and negative terminals are disconnected from the vehicle electrical system.

- Electrical and electronic components shall fulfil the test requirements in accordance with ISO 16750.
- If additional batteries are installed, observe the information under chapter 6.3 “Battery”.
- Cables that are laid near to exhaust systems require sleeves that are resistant to high temperatures (see chapter 7.1.3.2 “Line routing”).
- Cables shall be routed so that there are no areas of abrasion (see chapter 7.1.3.2 “Line routing”).
- The batteries shall be disconnected if the vehicle is left standing for longer periods (>20 days). When re-commissioning the vehicle, make sure that the batteries are charged sufficiently.
- The Owner’s Manual must be observed (see chapter 2.1.5 “Online Owner’s Manual”).

6.2 Electromagnetic compatibility (EMC)

Electromagnetic compatibility is the property of an electrical system to remain neutral whilst maintaining full functions in the presence of other systems. Active systems in the surrounding area are not disrupted nor is the system itself impaired.
Electrical interference in motor vehicle electrical systems is caused by the different consumers. At Volkswagen, the factory-fitted electric and electronic components have been checked for their electromagnetic compatibility in the vehicle. If modifications are made later on, reductions in comfort (e.g. radio noise) can occur in some cases.
When electrical or electronic systems are retrofitted, their electromagnetic compatibility needs to be checked and certified.
The devices shall possess a type approval acc. to EU Directive 72/245/EEC in the current version, and shall bear the “e” mark.

The following standards/regulations provide information on this:

- CISPR 12
- CISPR 25
- DIN EN 55012
- DIN EN 55025
- ISO 7637
- ISO 10605
- ISO 11451
- ISO 11452
- MBN 10284
- UNECE-R 10

6.3 Battery

The main battery is installed in the floor area on the left in front of the driver seat.
Battery capacities are 70 Ah for EFB+*, and 92 Ah for AGM** battery types.

PR number	Designation	Battery capacity	Dimensions (Length × height × width) [mm]	Max. weight [kg]
J0V	EFB+*	70 Ah/420 A	278 x 190 x 175	21
J0B	AGM battery (glass mat)	92 Ah / 520 A	278 x 190 x 175	27.5

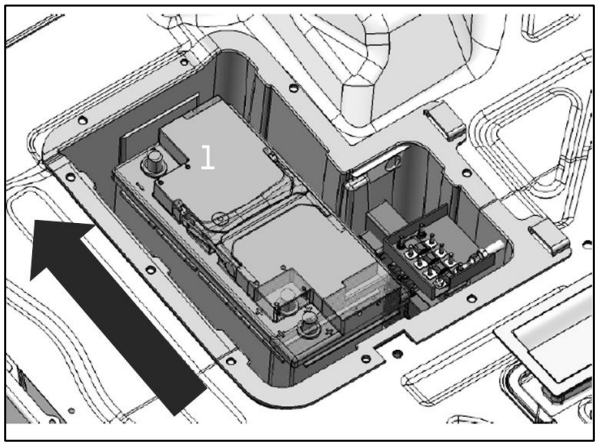


Fig. 1: Main battery installation position, on left in footwell

1 main battery, arrow in direction of travel

A heavy duty alternator with heavy duty battery is to be used when the engine is running and there is an increase in power requirements (PR No. NY4)
In the event of increased power requirements, when the engine is stationary or for very high power requirements, a second battery shall be used (see chapter 6.3.2 “Installation of a second battery”).

Information

For straightforward power supply from the second battery, a connection point (fuse box) is provided in the driver seat box. It is therefore not necessary to route additional wiring from the vehicle interior (body builder's consumer) to the second battery in the engine compartment.

*EFB+: Enhanced Flooded Battery

*AGM- Absorbent-Glass-Mat-Battery

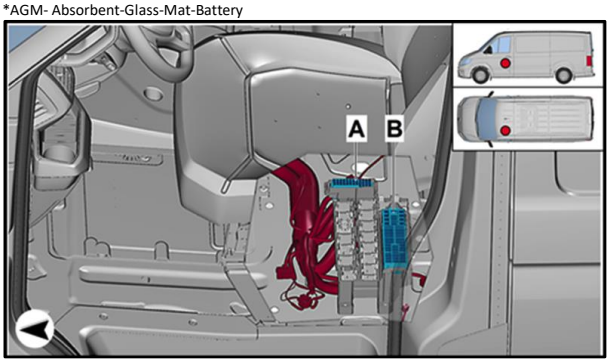


Fig. 2: Installation location of fuse holder in the driver’s seat (source: Crafter wiring diagram)

Fig. 3: Detail A: Fuse holder – Connection point for second battery

Information

You will find further information on fuses and fuse assignments in the Crafter wiring diagram, sheet no. 802/1-29, on the Internet at **erWin*** (**E**lectronic **R**epair and **W**orkshop Information from Volkswagen AG): http://erwin.volkswagen.de/erwin/showHome.do

6.3.1 Subsequent installation of a battery master switch

You can obtain more information on optional equipment from your Volkswagen customer service, the responsible department (see chapter 2.1 “Product and vehicle information for body builders” or chapter 3.9 “Optional equipment”).

6.3.2 Installation of a second battery

6.3.2.1 Second battery general information

The use of various electrical consumers means a second battery is necessary in commercial vehicles such as:

- Police and public authority vehicles
- Ambulance and emergency medical vehicles
- Cherry pickers
- Delivery vehicles with a tail lift
- Workshop vehicles
- Camping vehicles

To enable safe and reliable operation of the connected electrical consumers, the second battery must be monitored, and charging controlled.

Battery without second battery monitoring:

Monitoring of the second battery by the Converter is required.

It is not possible to influence the voltage supply when the engine is running in order to charge the second battery as needed and to optimally supply the body builder’s equipment. (Applies to EU 6 vehicles).

Advantages of second batteries with monitoring as opposed to second batteries without monitoring:

EM-P* – standard configuration of the CFCU, which is available ex works when a monitored second battery is ordered

CFCU inputs/outputs	Plug/pin	CFCU standard configuration as of SW 503	Functional description
Input **MFE 9** Digital Low active (Connect earth)	3/23	EM-P charging button (momentary)	Control of the supply / second battery charge depends on the charge level of the second battery (max. alternator voltage and engine start/stop veto)
Input **MFE 19** Digital High active (Connect +12 V)	3/8	Internal battery charger active (switching)	With intelligent external charging control with low-power charging sources, the isolation relay remains closed. During activity, an instrument cluster message appears if terminal 15 is on: Charging connector inserted
Output **MFA_07** plus switching 5 A from terminal 30_2	2 / 1	Function check of EMP charging rate selector button active	Display of the active charging button function

*Energy management parallel (for second battery control

- Control of the supply and charge of the second battery is dependant upon the charge level of the second battery (max. alternator voltage, engine start/stop veto)
- Intelligent external charging control (both batteries can be charged using a battery charger by closing the battery isolation relay when the battery charger is connected to the second battery)
- Automatic recharging of the starter battery from the second battery via the isolation relay if the starter battery has a very low charge level (up to three times per stationary phase)
- Information about the starter and second battery charge level on body system (warning and deactivation levels in the CFCU signal pool)
- Customer input as regards battery charging possible (maximum alternator voltage for a driving cycle can be chosen by retrospective installation of a charging button)
- EM-P* default configuration
- Operation of additional equipment on the second battery possible (factory fitted auxiliary air heater and second alternator, 230 V inverter possible)

Practical note

The CFCU and its programmable interface make it technically possible to temporarily deactivate the engine start/stop system, limit the brake energy recovery, or increase the idling speed. Permanent deactivation of the start/stop functions and brake energy recuperation is unauthorised.

Practical note

The second battery is operated at an optimal charge level in EU 6 vehicles for reasons of efficiency. This is why the full charge capacity is not always available.

Practical note

Avoid totally discharging the battery. Totally discharging the battery may cause permanent damage to the battery.

The battery voltage must be higher than 12.25 V.

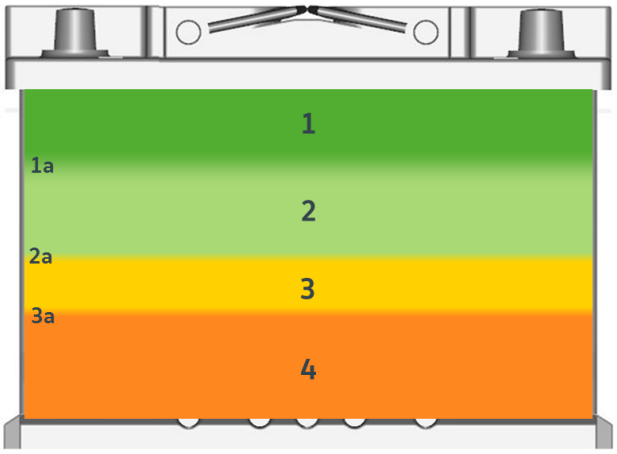
The battery voltage under load must never fall below 11.9 V. If necessary, an idle phase (electrical equipment off) must be implemented until the open-circuit voltage increases to 12.25 V.

We therefore recommend that you order the second battery from the factory, as second battery monitoring is stored in the CFCU (8FK, 8FE, 8FH). With second battery monitoring, the alternator voltage is adjusted to the charge level of the second battery.
For second batteries with PR numbers 8FD, 8FK, 8FB and 8FE, up to 60 A can be taken continuously, and 190 A for a short period (up to 15 minutes), and with PR numbers 8FG and 8FH, up to 200 A can be taken continuously and 250 A for a short period (up to 15 minutes). (See the second battery overview table.)

PR no.	Designation	Battery capacity	Continuous current drain	Current drain Short term (max. 15 minutes)	Dimensions (Length × height × width) [mm]	Max. weight [kg]
8FK	Second battery, wet cell with second battery monitoring	95 Ah 450 A	60 A	190A	353 x 190 x 175	25
8FE	Second battery stable cycle with second battery monitoring	92 Ah 520 A, AGM	60 A	190A	353 x 190 x 175	27.5
8FH	Second battery stable cycle with high performance isolation relay and second battery monitoring	92 Ah 520 A, AGM	200 A	250A	353 x 190 x 175	27.5

*** CFCU: customer-specific functional control unit, see also chapter 6.4.3.

6.3.2.2 Parameterised* reactions on reaching certain second battery charge levels with second battery monitoring



Second battery charge level

Second battery with continuous consumers up to 60 A (8FE/8FK) and up to 200 A (8FH):

Charge level		Second battery charge condition	CFCU*** signal pool	Vehicle reaction
1	Optimal charge level			
1a	Boundary between charge levels (1) and (2)	Slight recharge required		Alternator voltage 14 V
2	Diminished charge level	Recharge required		Engine start/stop prohibited Idling speed boost Max. alternator voltage**
2a	Boundary between charge levels (1) and (2)		1. Warning level	
3	Low charge level		2. Warning level	Message on the display: “Second battery charge level too low”
3a	Boundary between charge levels (3) and (4)		Shut-off stage	
4	Charge level too low	Only limited battery use possible		

* Parameters can be adjusted according to customer's wish.

Driver may choose maximum alternator voltage (and increased idle speed only for 8FH) at any time via retrofitted charge button on the CFCU*.

*** CFCU: customer-specific functional control unit, see also chapter 6.4.3.

Information

The warning and shut-off stage of the second battery has no effect on the base vehicle. It must be made available for the connected additional electrical equipment using customised calibration of the CFCU.

6.3.2.3 Intelligent external charging control

If a battery charger (3) is connected to the second battery (2) when the engine is off, the energy management in the CFCU* (customer-specific control unit) recognises external charging and, upon qualification, instructs the isolation relay to close (2). The isolation relay does not close when the charge level of the second battery is very low, unless the starter battery cannot be started. In this case, the relay does close and both batteries are charged in parallel.

The relay opens immediately upon switching on ignition (KL15), or upon calling for an engine start (KL50) to avoid taking starter power from the second battery.

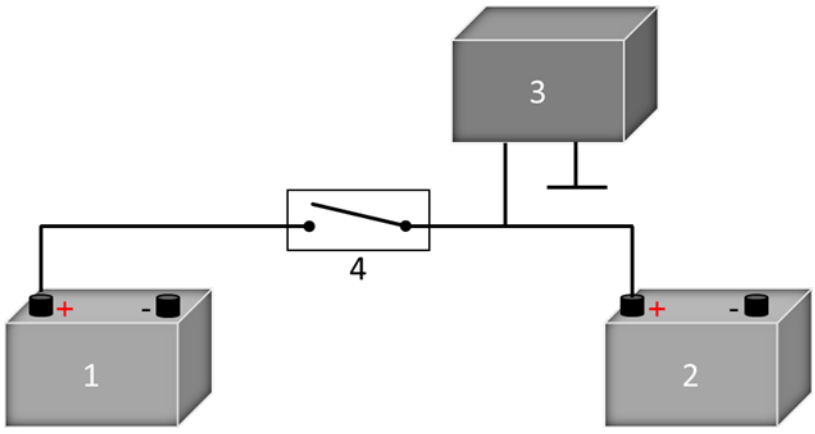
If the ignition remains on without engine start, with a connected charging device, the isolation relay closes again after a new qualification period.

Note that the charger used must be able to charge two batteries simultaneously. A capacity of at least 30A is recommended. When using a battery charger that is not powerful enough or in the event of prolonged trickle charging, the automatic external charging detection may be deactivated for the current stationary phase. For this reason, we recommend the “Battery charger active” +12-V control input* on the CFCU for a permanently installed battery charger.

*See *See chapter 6.4.3: Customer-specific functional control unit (CFCU)

Information

When a permanently installed battery charger is connected to the “Internal battery charger active” control input on the CFCU, the isolating relay to the first battery is opened after one week during a continuous charging process if no further vehicle activities are detected. Vehicle activities might be, e.g. opening the door, CFCU active or current consumption on the second battery. If the charge level of the first battery is too low, or if an activity is detected, the opened relay is automatically closed again.



Schematic diagram: external charging control

1 – Starter battery

2 – Second battery

3 – Charging device

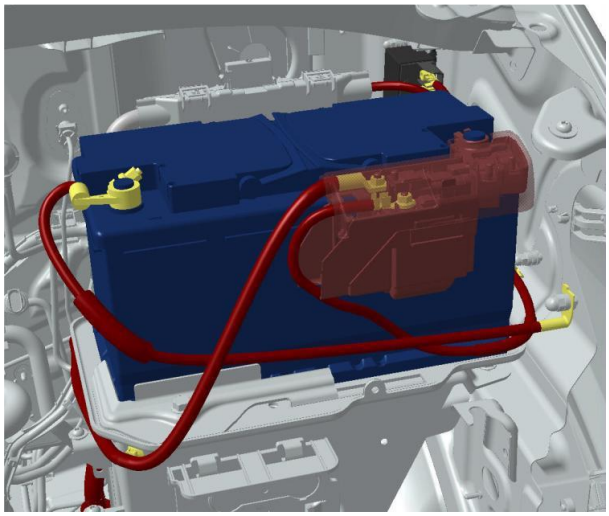
4 – Isolation relay

Practical note

The earth connection on a battery charger must always be connected to an earth point on the vehicle.

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

6.3.2.4 Retrofitting a second battery



Second battery installation position, on left in engine compartment when viewed in direction of travel

The battery (housing size H6 to H8) can be mounted on the original battery console (engine compartment, left).
A second battery is connected to the vehicle electrical system by using a suitable isolation relay and corresponding fuse. If the second battery is housed in the passenger compartment, sufficiently dimensioned ventilation must be provided by a central degassing hose to the outside.
The second battery is only intended for additional electrical equipment such as the auxiliary heating and body builder's consumers (e.g. preparation for tail lift, 3-way tipper).

Practical note

When installing second batteries, please note that this may only be done in combination with a battery isolation relay.

The second battery may only be used for your specific additional electrical equipment. Additional electrical equipment can include, for example: cooling units, auxiliary heaters etc. If a second battery is installed in the passenger compartment, it is necessary to provide sufficient ventilation.

If a stable-cycle second battery is retrofitted, a stable-cycle starter battery must also be used.

6.3.2.5 Further additional batteries

Practical note

If one or more second batteries are used, a positive overall charge balance must be ensured by choosing an appropriate, large alternator (NY3).

A letter of non-objection from the relevant department is required for the subsequent installation of further additional batteries (see 2.2 “Converter guidelines, consulting”).

6.3.2.6 Conversion to 2nd or 2nd and 3rd Lithium-ion battery system

Prerequisites for conversion to a Li-ion (LiFePo4) * battery system:

- Monitored 2nd battery PR no. 8FE or 8FH.
- Exchange of the isolating relay for a DC/DC converter suitable for a lithium-ion battery system.
- Deactivation of external charge detection.
- Adaptations of the warning and shut-off stages to Li-ion technology.

* Lithium iron phosphate rechargeable battery

Warning note

As thermal damage can occur, the use of a lithium-ion battery in the engine compartment is not permitted.

Practical note

The battery system can only function properly with integrated lithium-ion batteries. Connecting an unintegrated lithium-ion battery (without a charge manager) is not permitted and, depending on the charge level, can lead to excessive charging currents and thus damage to the batteries.

Information

If a lithium-ion battery system is retrofitted in the vehicle, a special measures code must be added to the vehicle control system using the following after sales PR numbers:

a) O1A Retrofitting 2nd battery (lithium-ion)

b) O1B Retrofitting 2nd and 3rd battery (Li-ion)

The PR numbers can be requested via the Volkswagen Commercial Vehicles partner or directly via the Volkswagen Commercial Vehicle Service Centre (NSC.Convert@volkswagen.de).

In the case of integrated batteries, the removable charge of the additional batteries can be shown via an additional display.

For more information on suitable integrated lithium-ion battery systems, please contact Volkswagen Commercial Vehicles (see 2.1.1 “Contact in Germany” and 2.1.2 “International contact”).

6.3.3 Maintenance and storage of battery

Batteries shall – even when removed – be checked on a regular basis for voltage drop (self-discharge). Low-maintenance batteries do not require the fluid level to be checked (see chapter 2.6 “Recommendations for vehicle storage”).

6.4 Interfaces

6.4.1 Electrical interface for special vehicles

In principle, there are two interfaces for external use in special vehicles and by body builders:

1. connectors with selected vehicle electrical system potentials (see also chapter 6.4.2 “Electrical terminal strip (IS1)”).
2. Customer-specific functional control unit (referred to as CFCU in the following): control unit with access to the vehicle's CAN network.

The interfaces can be ordered using the following equipment numbers (PR numbers):

PR number	Description
IS0	Without an interface for external use (without an electrical terminal strip), series issue
IS1	Interface for external use (without CFCU, with electrical terminal strip – without preparation for mobile telephone)
IP4	Electrical terminal strip and preparation for CFCU 1) Installation location: Electrical terminal strip: A-pillar footwell (passenger side) CFCU: footwell (passenger side) behind the glove compartment of the dash panel 2) Connectors: - Connector for electrical terminal strip: 8-pin connector: 1J0.972.784, 8-pin mating connector: 1J0.972.774 - Connector for CFCU: 6-pin connector, blue: 4F0.972.706, 12-pin connector, white: 7C0.973.712, 40-pin connector, black: 4H0.906.231, 20-pin connector, black: 8W0.972.420 - Connector with mating connector already in place. 3) Further information: See erWin**, in circuit diagrams, under Search for: “Special vehicle control unit J608”
IS2	Interface for external use (CFCU with Converter programming, with electrical terminal strip – without preparation for telematics)
IS3	Interface for external use (CFCU with Converter programming, with electrical terminal strip – with preparation for telematics)
IS5	Interface for external use (CFCU without Converter programming, without electrical terminal strip – with preparation for telematics)
9Z3	230 V socket (300 W), with charging function, left seat box, right side for left-hand drive vehicles only, operation also possible when engine is not running (power supply when the engine is switched off possible approx. 10 min.)

PR number	Description
9H2	Additional electrical provision for roof mounted turn signals 1) Installation location: Longitudinal member in the rear axle area 2) Connectors: - 2-pin connector: 1J0.972.923 (component) - 2-pin mating connector: 1J0.972.712 (vehicle electrical system) 3) Further information: See erWin*, current flow diagram, section no. 52/18 Electrical terminal strip and preparation for CFCU Basic or Max 1) Installation location: Electrical terminal strip: A-pillar passenger footwell CFCU: Front passenger footwell behind glove compartment of the dash panel 2) Connectors: - Electrical terminal strip connector: 8-pin connector: 1J0.972.784, 8-pin mating connector: 1J0.972.774 - CFCU connector: 6-pin blue connector: 4F0.972.706, 12-pin white connector: 7C0.973.712, 40-pin black connector: 4H0.906.231, 20-pin black connector: 8W0.972.420 - Connector with mating connector already in place. 3) Further information: See erWin**, in current flow diagrams, under Search for: “Rotating light”
---	Fuse box supply point (contained in PR number 8FD/second battery)

*The functional control unit (CFCU) installed in these options safeguards the functions of the ordered options and cannot be programmed further. If necessary, programmability can be enabled subsequently; this involves additional costs.

**Information system from Volkswagen AG, fee required

For options IS1 to IS5, and IP5, a keypad for retrofitting switches is installed underneath the lighting switch in the dash panel. Depending on the other equipment, up to six blind caps are installed (see also chapter 6.4.8 “Operation buttons”).

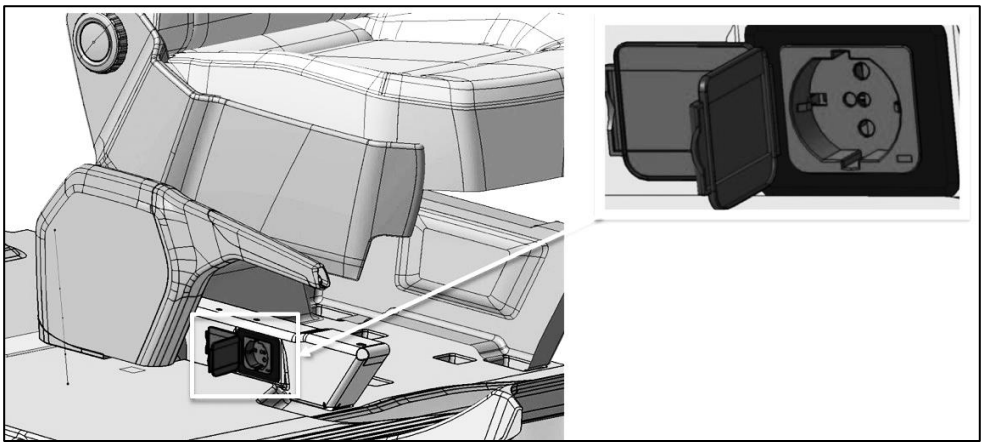


Fig. 1: 230V socket (9Z3)

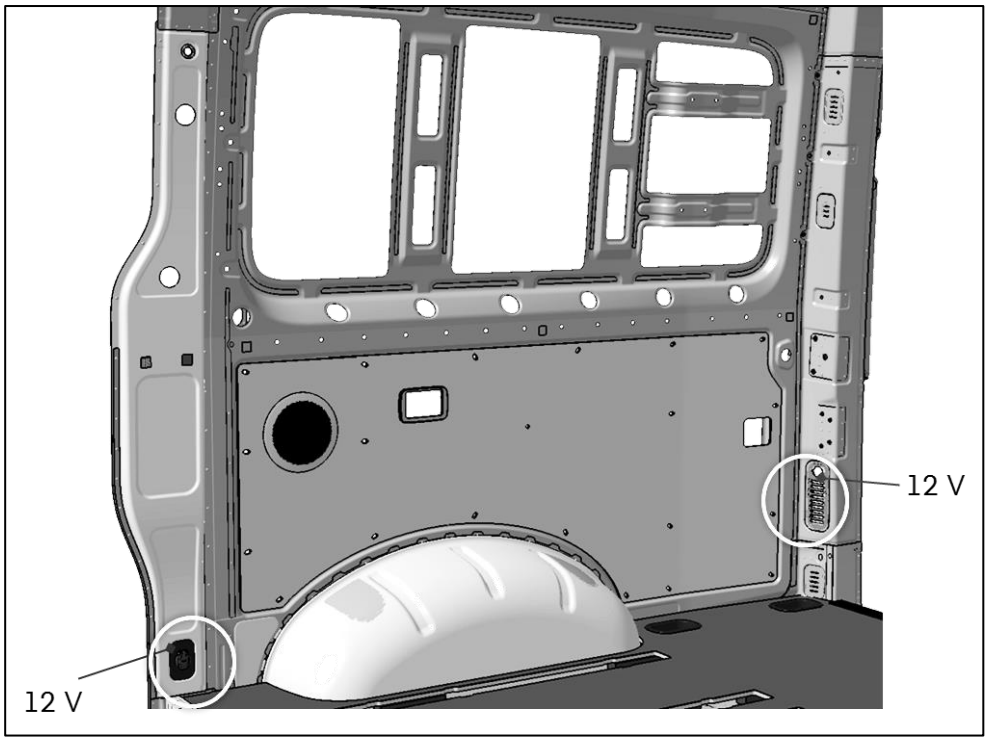


Fig. 2: 12-V sockets in the luggage compartment (PR no. 7B3)

6.4.2 Electrical terminal strip (IS1)

Additional electrical consumers must be connected using the terminal strip for auxiliary consumers (PR number IS1) that is available ex-works, or a second battery (see chapter 6.3 “Battery”).
The terminal strip incl. mating connector is attached behind the lower A-pillar trim (at the front right in direction of travel) and features two connections. (2 × 4 voltages terminal 30 and terminal 15).

Terminal 30	12 V / 25 A
Terminal 15	12 V / 15 A

Terminal strip (IS1) behind A-pillar trim, at the bottom

6.4.3 Customer-specific functional control unit (CFCU*)

The functional control unit enables close integration of the base vehicle and the body. It makes it possible to provide almost 3,000 different signals from the base vehicle that, when required, are used to activate the body functions or are also connected in logic blocks. Depending on the scope of equipment, the functional control unit also provides a standardised interface for the connection of a telematics system.

In order to adjust the functional control unit to the individual functional requirements of body builders/customers, use the following description and the additional documents and instructions in the login area of the CustomizedSolution portal under Technical Information/The Crafter/Functional Control Unit.

The CFCU* (customer-specific functional control unit) includes:
- Programmable and configurable inputs and outputs (e.g. engine speed control)
- ASIL-B Ready (functional safety ISO 26262)
- Second battery monitoring

Digital inputs	16
Analogue inputs	8
Outputs	24

Information

All inputs and outputs can be loaded up to the respective specified rated values.

Corresponding technical rated values can be found in the technical customer documentation for the CFCU*.

Overloading can result in damage to the control unit, or even its destruction.

*CFCU: customer-specific functional control unit

Practical note

If additional electrical equipment is installed, in particular factory-fitted optional equipment that uses the second battery (fuse box in driver seat box), a positive overall charging balance shall be ensured by the Converter.

Practical note

The Converter can use what is known as the Converter CAN* (also called J1939 or FMS** CAN) and the CAN open-CAN (also called CIA447) of the CFCU as an external CAN bus to communicate with the basic vehicle (for read access to the CAN and in some cases also for write access).

To prevent outside intervention in the vehicle control system, the vehicle manufacturers (OEM) implemented the UNECE regulations on cyber security (CS) and software update management system (SUMS). If vehicles are modified or supplemented by body builders following delivery by the vehicle manufacturer, the specifications from the UNECE regulations must also be observed and implemented.

It must therefore be technically ensured that no unauthorised messages are written to the respective vehicle CAN bus via external interfaces or online. External messages on the CAN can affect the basic vehicle's vehicle control system.

The Converter must ensure that no online control units may be connected to the CFCU, in order to minimise this risk.

CAN* Controller Area Network

FMS** Fleet Management System

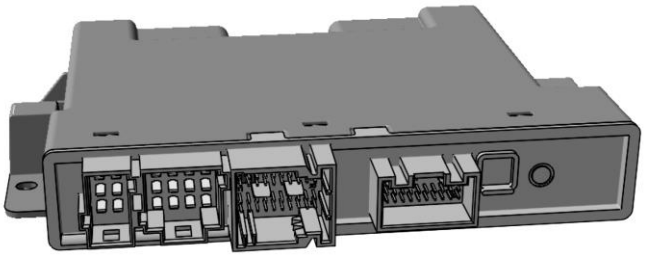


Fig.: View of customer-specific functional control unit

Interfaces

- CIA447
- J1939

Practical note

Please note: the specified basic functions may already be part of the “ex works functions” and could limit a required configuration and also previously unassigned inputs and outputs.

It is therefore important to clarify in advance whether the required additional CFCU functions are available and therefore usable!

Information

If you have any questions about the content of the configuration of the functional control unit (CFCU), please use the following email address:
config-cs@volkswagen.de

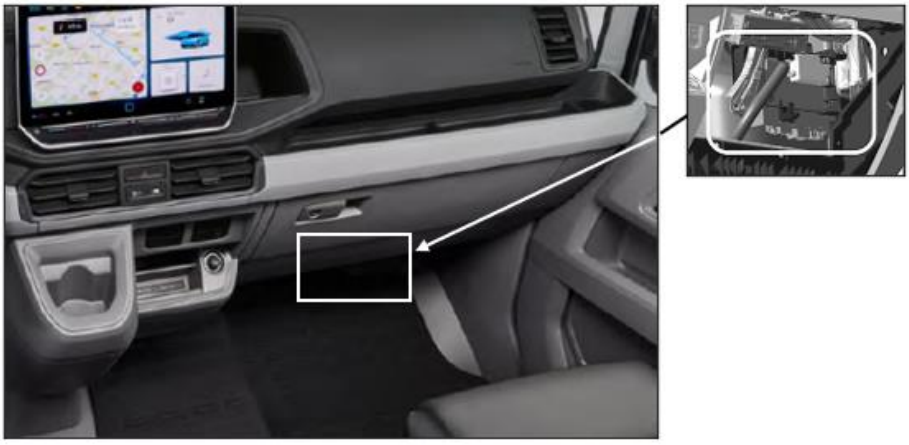
Information

Technical documentation on the CFCU and further information regarding the requesting and processing procedure can be found on the CustomizedSolution portal via the link:
https://www.customized-solution.com/de/de/technische-produktinformationen/kfg/technische-information

You must register on the CustomizedSolution portal in order to access this. The configuration of the customer-specific functional control unit (CFCU) can be ordered via the CS portal.

6.4.3.1 Installation position in the vehicle

The customer-specific functional control unit (referred to as CFCU in the following) is installed on the lower dash panel behind the glove compartment.
The plug connections are accessible from below without removal of the glove compartment.



Installation position of the CFCU on the lower dash panel, behind the glove compartment

6.4.3.2 Interface for telematics control unit

Volkswagen AG offers preparation for telematics and an FMS fleet management interface as an option
(PR number: IS3).

Equipment:
If ordered, the telematics interface is active ex works and transmits 250 kBaud. If you wish to use the telematics control units with another baud rate, please contact config-cs@volkswagen.de

Supported baud rates are 150, 250 and 500 kBaud.
The connector plug (12 pin) is on the passenger side, behind the glove compartment, in front of the CFCU control unit.
See also chapter 6.4.3.1 “Installation position in the vehicle”.

You can get further information on assignment of the 12-pin connector and the CAN messages available for the FMS interface from the body builder’s support team (contact see chapter 2.1 “Product and vehicle information for body builders”).

The advantages:
- Non-proprietary interface for telematics systems
- Provision of standardized vehicle data for heavy commercial vehicles
- Compatible with all current telematics systems in the medium to large fleet segment
- Easy integration into existing telematics applications and fleet management systems
- Easy adaptation to existing systems increases flexibility and makes it possible to use a preferred telematics provider
- Using the FMS, for example, it is possible to analyse driving behaviour, keep an electronic logbook or plan the next service visit.

6.4.4 CAN bus and networking

Warning note

Interventions in the CAN bus and connected components are unauthorised.

The CAN bus must not be modified due to the networking and internal monitoring of electrical equipment (e.g. by interrupting, extending or “tapping”, and reading and writing). Any modification to the wiring harness in terms of length, cross-section or resistance could cause failure of safety-relevant components or result in a loss of comfort.

For more information on the CAN bus, please refer to chapter 4.7.4 “CAN bus”.

6.4.5 Electrical cables/fuses

The following points shall be complied with if routing modifications are required:

- Specifications according to DIN 72551 or ISO 6722-3 must be complied with
- Avoid routing over sharp edges
- Avoid routing inside excessively narrow cavities and close to moving parts
- No additional lines are must be fastened to brake hoses and brake lines
- Additional lines must remain at a sufficient distance from brake hoses and brake lines under all operating conditions, and must not touch or chafe against such brake hoses/lines under any circumstances
- Only lead-free PVC jacketed cables with an insulation limit temperature >105°C are allowed to be used.
- Connections must be made professionally and must be water-tight
- The cable shall be dimensioned according to the current drawn and protected by fuses

Max. continuous current [A]	Rated current of fuse [A]	Wire cross-section [mm²]
0 – 4	5*	0.35
4.1 – 8	10*	0.5
8.1 – 12	15*	1
12.1 – 16	20*	1.5
16.1 – 24	30*	2.5
24.1 – 32	40**	4
32.1 – 40	50**	6
40.1 – 80	100	10
80.1 – 100	125	16
100.1 – 140	175	25
140.1 – 180	225	35
180.1 – 240	300	50

* Shape C; DIN 72581 flat connector

** Shape E; DIN 72581 flat connector

Warning note

Incorrect intervention or installations in the vehicle electrics/vehicle electronics can impair their function. This can lead to a failure of components/functions (S) or safety-relevant parts and consequently to accidents or damage to the vehicle.

6.4.6 Cable extension

If cables are extended (e.g. as part of a wheelbase extension), the same or a greater wire cross-section shall be used. We recommend using cables in accordance with DIN 72551 or ISO 6722-3. The protective effect of fuse elements shall not be impaired.

All connections shall be made professionally and water-tight in accordance with IP 69k (high-pressure wash safe).
Cables to the ABS sensors on the rear axle are allowed to be extended by max. 2.7 m. The added lines are to be twisted for each sensor with a pitch of 40–58 mm.

6.4.7 Additional circuits

If additional circuits are installed, they shall be safeguarded against the main circuit by means of suitable fuses.
The cables used shall be dimensioned according to the load, and protected against pulling off and the effects of impacts and heat.

For body builders of bodies with electromagnetic switching mechanisms (such as relays, magnetic switches, contactors and solenoid valves), these components must be equipped with integrated protective diodes (free-wheel diodes/anti-surge diodes) in order to exclude interference voltage peaks from the vehicle electrical system and the control units. If no protective diodes are integrated, these must be retrofitted antiparallel to the switch coil.

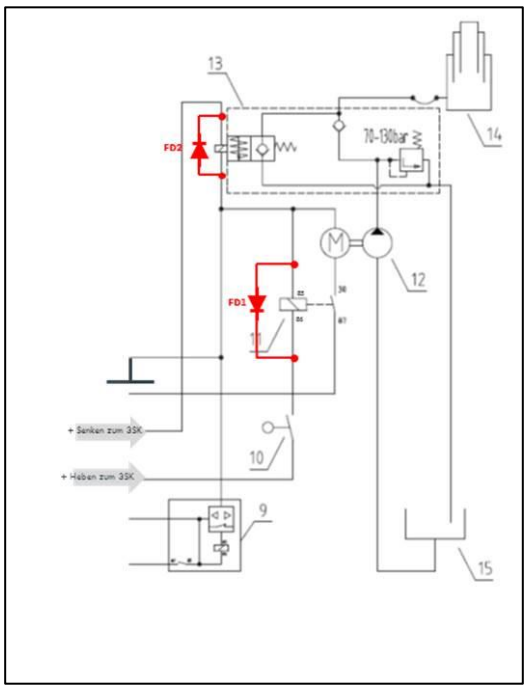


Fig. 1: Tipping control circuit

11 – Electro-hydraulic tipping valve

12 – Hydraulic pump with motor

13 – Motor relay (lifting tipper bed)

FD1 – Free-wheeling diode for motor relay

FD2 – Free-wheeling diode tipping valve

Practical note

For subsequent bodies and conversions for vehicles, it is essential to make sure there are no voltage spikes >150 V in the vehicle electrical system. For conversions, suitable measures must be taken to ensure this (e.g. by using protection diodes).

6.4.8 Operation buttons

For buttons for operating additional add-ons, there are two additional keypads available on the dash panel (see fig. 1: Available blank button modules):

– Keypads are assigned depending on the optional extras. See the table below for information on the symbols for the available optional extras. The free keypads are masked with covers. An additional two-button module can be installed at these positions.

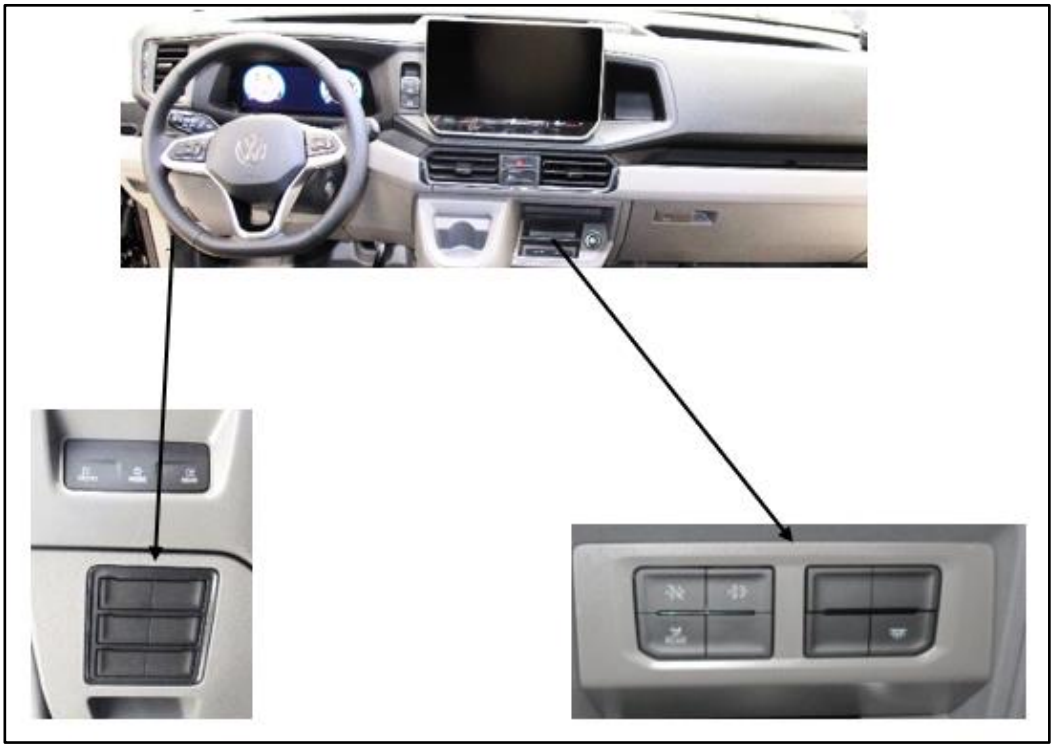


Fig. 1: 3x2 keypad at the bottom left without optional extras; Fig. 2: 4x2 keypad centre dash panel with optional extras.

Symbol	Meaning
	3-way tipper up
	3-way tipper down
	Engine speed boost on/off
	Power take-off system on/off
	Engine remote start/stop
	Reverse warning beeper off
	Rotating roof light
	Continued engine running function
	Dropside
	Load compartment lighting

Key

When retrofitting additional functions, we recommend using the original buttons.

The components required (double button module blank, flat contact housing, Q push-on contacts) can be obtained from authorised repairers or from the company Eugen Kurz KG.

In addition, you have the option of ordering buttons adapted specifically to your application, with text or a symbol, from Eugen Kurz KG. To save costs, we recommend providing the desired text or symbol as a DXF file. However, you can also have Eugen Kurz KG perform this work. You can then procure the button module directly from Eugen Kurz KG. You will still have to order the additional components (flat contact housing, Q push-on contacts) from your Volkswagen dealership.

Designation	Part number	Number	Source of supply
Double button module blank	7C0.927.202.AB	1	Eugen Kurz KG or Volkswagen dealership
Double button module blank	7C0.927.143M	1	Eugen Kurz KG or Volkswagen dealership
Double button module blank	7C0.927.212T	1	Eugen Kurz KG or Volkswagen dealership
Flat contact housing (10-pin)	6R0.972.930.A	1	Volkswagen dealership
Q push-on contact	N.907.649.01	6	Volkswagen dealership

<u>For personalised button (7C0.927.202AB) contact:</u>

Eugen Kurz KG

D-89073 Ulm, Rebengasse 12

Tel. +49 731 66535

Fax +49 731 601283

info@stempel-kurz.de

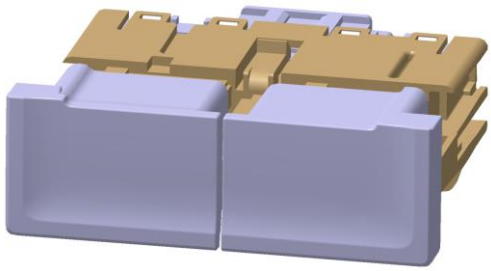
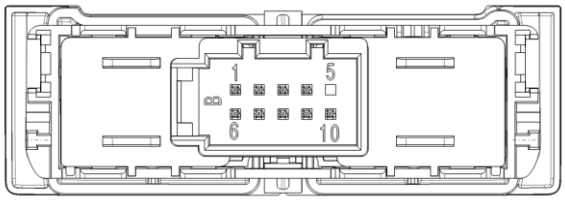
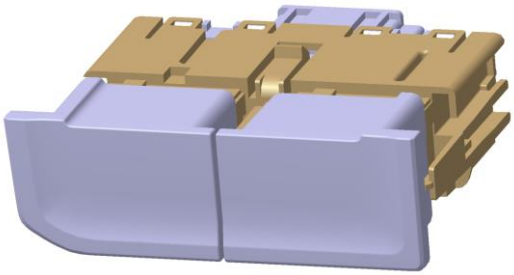
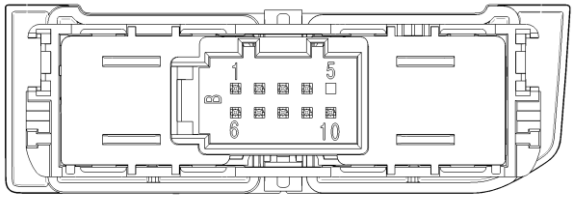
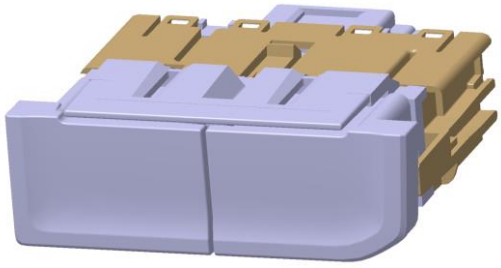
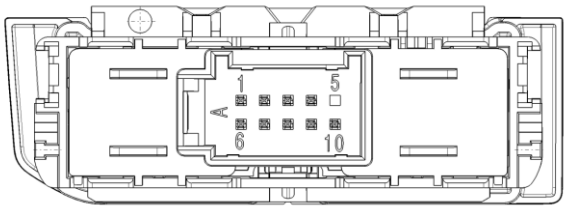
	
7C0.927.202AB	
	
7C0.927.143M	
	
7C0.927.212T	

Fig. 2: Available blank button modules, front view and rear view with connections

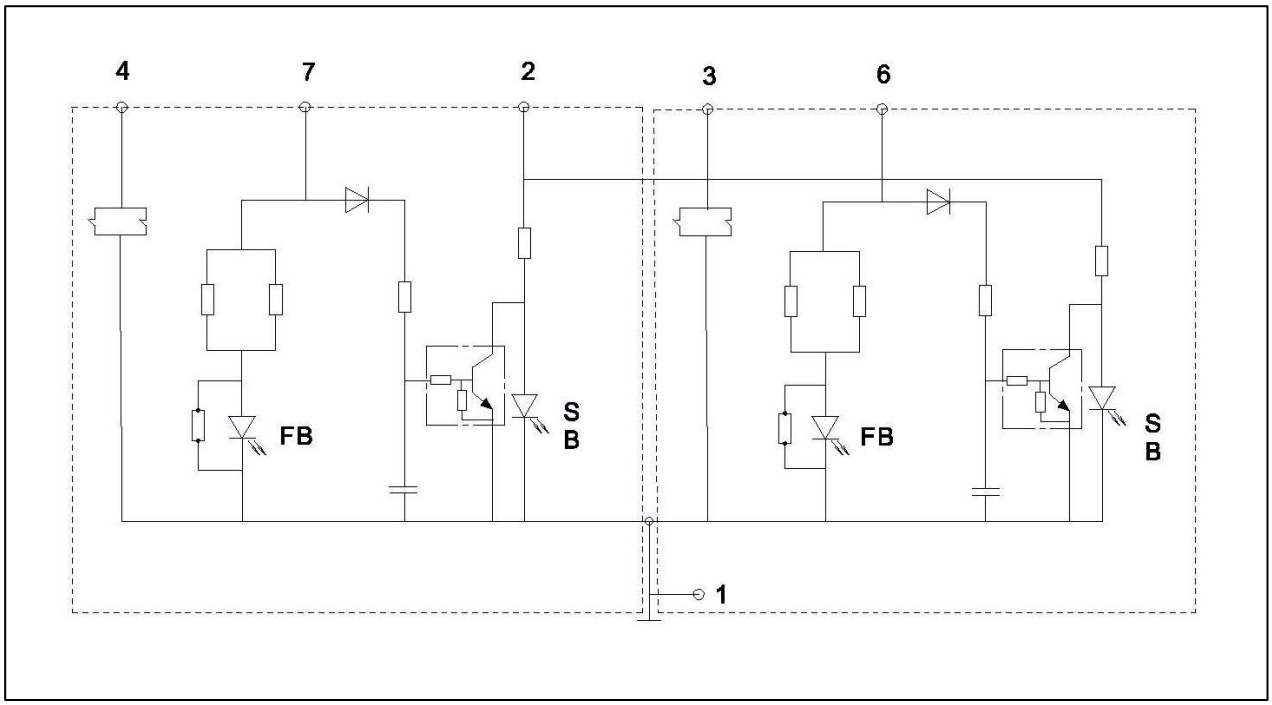


Figure 3: Internal switch button 7C0.927.202.AB

Pin	Function (7C0.927.202.AB)
1	Terminal 31 (GND)
2	Search Illumination
3	Function–Pos.1
4	Function–Pos.2
5	n.c.
6	Function–illu-Pos.1
7	Function–illu-Pos.2
8	n.c.
9	n.c.
10	n.c.

Electrical characteristics of button module	
NC contact/NO contact	Momentary make-contact switch to earth
Switch/button technology	Pressure sensitive mat with carbon pill on chemical NiAu printed circuit
Permissible switching voltage	Max. 15 V (limited capacitive/inductive loads)
Permissible switching current	Max. 20 mA (seat heating switch SK37 max. 2.5 mA)
Voltage drops max.: XX at connector (female)	100 mV at closed contact at 3.3 mA
PWM pulse/pulse off time	Min. pulse: 0.167 ms, max. pulse off time 9.5 ms (follows from the switch-off mechanism for the white orientation light, e.g. in VW 370)
C/L load	Resistive load
Max. bounce time	5 ms
Minimum contact forces for spring-loaded contact system	3.5 N
Operating voltage of orientation light	Min. 9 V, max. 15 V, nominal voltage 13 V
Operating current of search lighting	Max. 35 mA per symbol
Operating voltage of function lighting	Min. 9 V, max. 15 V, nominal voltage 13 V
Operating current of function lighting	Max. 70 mA per symbol

6.4.9 Retrofitting electrical devices

Note the following for retrofitting additional electrical equipment:

- The no-load current of the basic vehicle is optimised at 20 mA. Additional electrical equipment (e.g. data loggers) which is permanently connected to the permanent positive terminal 30 reduces the time after which the vehicle engine can be reliably started by discharging the starter battery.
  Even 100 mA of additional no-load current takes 2.4 Ah per day from the battery. It is advisable to power this additional electrical equipment with permanent no-load current from the second battery, because this is not connected to the starter battery when the vehicle is parked, see chapter 6.3.2.1 “Second battery general information”.
- If the electrical power requirement is higher, the alternators approved by Volkswagen for the vehicle must be used.
- Do not connect any additional electrical equipment to fuses already in use.
- No additional cables are allowed to be connected to existing cables (e.g. with insulation-piercing terminals).
- Fuse consumers adequately by means of additional fuses.

All installed electrical devices must be checked in accordance with UNECE-R 10, and shall bear the E-mark.
Additional electrical consumers must be connected using the terminal strip for auxiliary consumers (PR number IS1) that is available ex-works. See chapter 6.4.2 “Terminal strip (IS1)” for more information.

Warning note

Incorrect intervention or installations in the vehicle electrics/vehicle electronics can impair their function. This can lead to a failure of components or safety-relevant parts and consequently to accidents or damage to the vehicle.

Practical note

The negative terminal of electrical consumers must always be located at the intended body earth and not at the negative battery terminal, as this can lead to falsification of the battery status detection by the on-board electronics.

Information

Interventions in the vehicle electrical system / vehicle electronics can result in invalidation of the warranty/operating permit.

6.4.10 Retrofitting alternator

If additional electrical equipment is retrofitted, the increased power requirement can be met by using more powerful alternators.

The following alternators are available from the factory with PR numbers as optional equipment:

PR number	Nominal voltage U of alternator [V]	Nominal current I [A]
8GU	14	140
8 GV	14	180
9G0	14	230

If ancillaries are used, the factory-fitted power take-off system should be used (see chapter 7.5.3.2 “Additional alternator”).
If other alternators are to be retrofitted, the following points should be observed:

- Vehicle parts and their function should not be impaired by the installation of a generator.
- The capacity of the battery and power supplied by the alternator shall be dimensioned sufficiently (see chapter 6.4.10 “Retrofitting alternator”).
- The alternator circuit must be equipped with additional fusing (see chapter 6.4.5 “Electrical cables/fuses”).
- The cable cross-section must be dimensioned according to the current rating (see chapter 6.4.5 “Electrical cables/fuses”).
- The higher power requirement can make it necessary to replace the starter/alternator warning harness. We recommend Volkswagen genuine parts for this.
- Ensure that electrical wiring is routed correctly (see chapter 6.4.5 “Electrical cables/fuses”).
- The accessibility of the ancillaries installed and simple maintenance possibilities may not be impaired.
- The necessary air supply and the engine cooling shall not be impaired (see chapter 7.3.3 “Engine cooling”).
- The guidelines of the equipment manufacturer for the compatibility with the base vehicle should be observed.
- The Owner's Manual and the maintenance manual for the ancillaries should be handed over when the vehicle is delivered.

6.4.11 Electronic tachograph

This chapter is currently being revised.

6.4.12 Central protector (ZAS) for second battery

The central protector (ZAS) for second battery is the consumption point for additional electrical equipment (e.g. tail lift, 3-way tipper). The electrical equipment connected to the second battery is protected by means of the fuses integrated in the ZAS.

For further information see chapter 6.3."Battery".

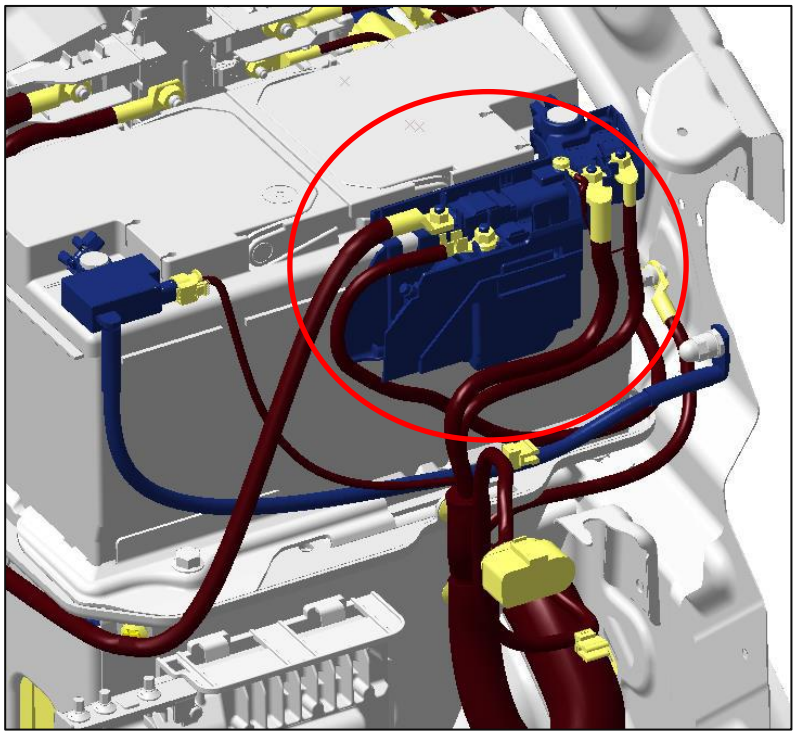


Fig. 1: Central protection (ZAS)

Information

For further information about fuse values, refer to the Internet under erWin* (Electronic Repair and Workshop Information of Volkswagen AG):
http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

6.4.13 Speed signal

A speed signal is part of the CFCU standard configuration to be tapped at multifunction display 14 (connector 3 pin 13).

Information

If you have any questions about the content of the configuration of the functional control unit (CFCU), please use the following email address:
config-cs@volkswagen.de

Information

Technical documentation on the CFCU and further information regarding the requesting and processing procedure can be found on the CustomizedSolution portal via the link:
https://www.customized-solution.com/de/de/technische-produktinformationen/kfg/technische-information

You must register on the CustomizedSolution portal in order to access this. The configuration of the customer-specific functional control unit (CFCU) can be ordered via the CS portal.

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

6.4.14 Earth points

Use the earth points provided by Volkswagen for subsequent electrical add-ons or installations to ensure an optimum earth connection to the base vehicle.

Warning note

The use of other earth points can lead to malfunctions in safety systems. This can lead to a failure of components or safety-relevant parts and to fault messages in the instrument cluster.

- A maximum of 4 terminals are allowed to be screwed to an earth point.
- The earth points of the safety systems are not allowed to be used for bodies.

Information

A general overview of as well as more detailed information about earth points can be found in the current wiring diagram no. 801/1.

Volkswagen AG Workshop Manuals and workshop information can be downloaded from the Internet at **erWin*** (**E**lectronic **R**epair and **W**orkshop **In**formation from Volkswagen AG):
http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

If there are further requirements, please consult the responsible department (see chapter 2.1 “Product and vehicle information for body builders”).

6.4.15 Preparation for reversing camera for open bodies

In the case of open bodies, the reversing camera is used as preparation PR number KA8 without guide lines in the display for incomplete vehicles. The 10 m long wiring harness is wound up and located in the right seat box.
The camera is connected and does not require any further activation. The camera module can be disconnected and connected via the coupling station. If PR number KA8 is ordered, the vehicle is incomplete and requires separate type approval. The Converter must select a position for the reversing camera that guarantees proper function and complies with the specifications of the approval regulations.

The modules are tested according to the following protection classes:

- The camera body: IP6K7
- The camera lens: IP6K9K
- The coupling station 5WA.973,708 has a housing seal and a single wire seal and meets the “PG23 watertightness”, but is **not** suitable according to the IP X9K protection class (steam jet test)

Practical note

For the wiring harness and the coupling station to the camera module, protection against weather conditions, humidity and mechanical stress is recommended when used outdoors.

Information

More information about retrofitting a camera can be found in the Volkswagen AG repair information/Maintenance Manual on the internet:
http://erwin.volkswagen.de/erwin/showHome.do

6.4.16 Retrofitting a toll collection system

Information

With effect from 1 July 2024, there is a toll duty in the Federal Republic of Germany for vehicles whose gross vehicle weight rating is at least 3.5 tonnes (see BFStrMG).

The Crafter vehicle class N2 is affected.

The following points must be borne in mind for installation of a toll collection system:

- Installation by trained experts and authorised workshops
- Installation in accordance with the fitting instructions of the respective device manufacturer.
- During installation and removal of vehicle components, the Workshop Manuals of Volkswagen AG must be observed.
- A DIN slot is to be used for the installation (e.g. centre console, roof panelling in the driving cab with DIN slot (PR No. 7N4)).
- Power supply (terminal 15, terminal 30): Additional electrical consumers shall be connected using the terminal strip for auxiliary consumers (PR number IS1) that is available ex-works as described in chapter 6.4.2 “Terminal strip”.
- Earth connection terminal (terminal 31) can be made on the earth point behind the right lower A-pillar lining, right next to the electrical terminal strip (IS1).
- Pick-up V signal (see chapter 6.4.13 “Speed signal”) requires the CFCU (PR number IS2, includes PR number IS1, see chapter 6.4.3 “Customer-specific control unit (CFCU)”).
- During assembly of the GSM/GPS aerial on the roof, please observe chapter 6.6.2 “Connection of and laying of cables for aerial”.

6.5 Lighting

6.5.1 Headlight adjustment

The country-specific registration provisions apply.
The basic setting for the headlights must be put into effect and must be included in the configuration of the new construction status (e.g. fixed installations or add-ons or modifications to running gear components) of the vehicle.
It must be ensured that the adjustment range of the headlight range control complies with potential load levels.
For springs that deviate from the base vehicle and for settings for the headlight range control potentiometer (LWR Poti) that deviate from the vehicle wallet, these must be documented with regard to load levels, and must be attached to the vehicle wallet.

Information

More information about adjustment of the headlights can be found in the Volkswagen AG repair information/Maintenance Manual on the internet: http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

6.5.2 Fitting auxiliary lights/special signal systems

The Crafter is available ex-works with the equipment variant Preparation for rotating light (PR no. 9LN/9LX) (see chapter 6.5.2.1 “Preparation for rotating light, yellow light (PR no. 9LN/9LX)”).
If it is planned to retrofit additional turn signals on the rear roof, it is recommended to order the Preparation for roof turn signals PR number 9H2.

The following points must be observed when attaching special signal systems, such as light bars:

1) Panel van:

- The special signal system must preferably be attached to the roof rail system.
- The maximum permissible roof loads must be observed (see 4.3.8 “Vehicle roof/roof load”).
- Maximum permissible front axle loads must be observed (see 10.3 “Weights (masses)”)
- Corrosion protection measures must be executed after drilling holes into the vehicle.
  (See chapter 5.3 “Corrosion protection measures”; chapter 3.7 “Bolted, welded and bonded joints”)
- Comply with country-specific registration conditions.

2) Chassis with single/double cab:

- Assuming that adhesive is used over the entire surface, the addition of a special signal system on the roof is permitted. The special signal system must be mounted in a manner to ensure that even if the adhesive is insufficient, it remains firmly attached to the vehicle by other fixation means, e.g. bolts or rivets.
- The maximum weight of the special signal system must not exceed 50 kg.
- Maximum permissible front axle loads must be observed (see 10.3 “Weights (masses)”).
- Corrosion protection measures must be executed after drilling holes into the vehicle.
  (See chapter 5.3 “Corrosion protection measures”; chapter 3.7 “Bolted, welded and bonded joints”)
- Comply with country-specific registration conditions.

If a lighting system is covered by moving vehicle parts by more than 50 % during operation, the vehicle shall be secured accordingly.
An indication of this shall be clearly visible for the vehicle driver .

Practical note

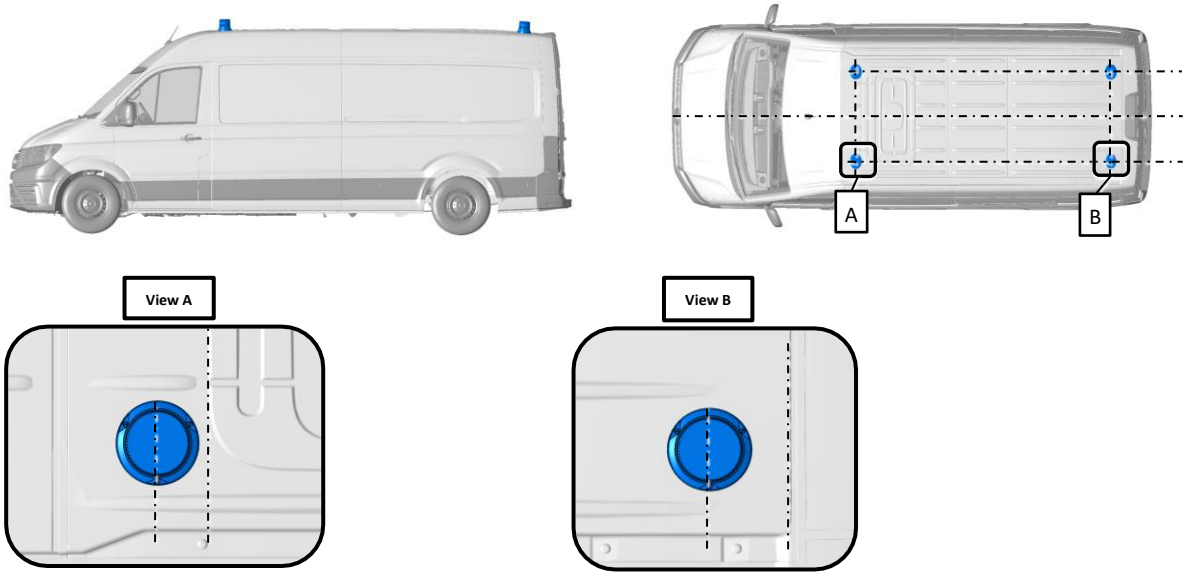
Please note that since 1 November 2013, lighting systems according to the requirements of UNECE-R 48 are compulsory. As a consequence, a third brake light for M1 and N1 vehicles is required with a closed structure (such as a chassis with a closed structure by the Converter).

The country-specific registration provisions apply.

6.5.2.1 Preparation for rotating light, yellow light (PR no. 9LN/9LX)

When retrofitting vehicles with a rotating light, it is recommended to order the base vehicle with the optional equipment “Preparation for rotating light” (PR no. 9LN for panel van and 9LX for single and double cab).

Preparation of rotating light for panel van



Views A/B show suitable areas on the roof of the vehicle.
PR number 9LN – “Preparation for rotating light” for panel vans includes the following features:

- A coupling point at the front and rear
- The front coupling point is located in the front roof area (see Fig. 1).
  The connector is fixed to the body using adhesive pads.
- The rear coupling point is located on the roof cross member (see Fig. 2)
  The connector is routed in the roof cross member. The coupling point is described at the end of this chapter.
- Operation buttons on the dash panel (see also chapter 6.4.8 “Operation buttons”).

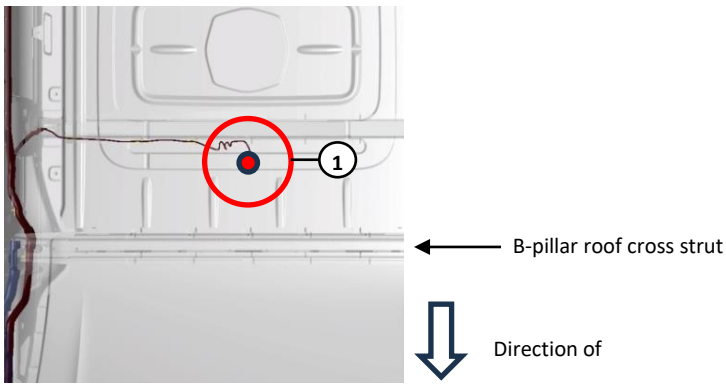


Fig. 1: Close-up view of the coupling station for connection of panel van rotating light (L3H3, L4H3, L5H3).
1 – Coupling point on roof secured to roof panel with binding clip

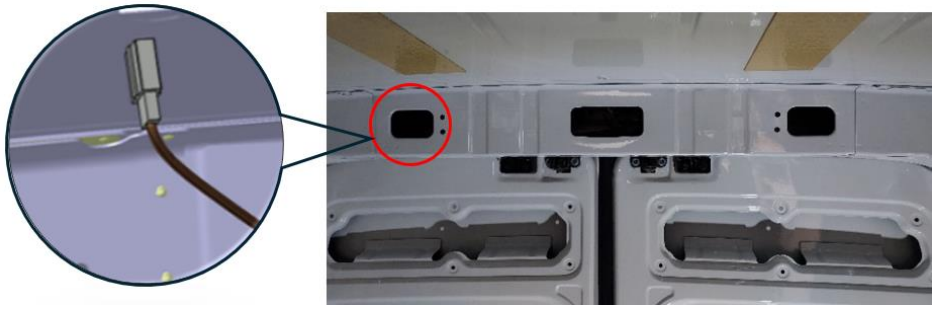
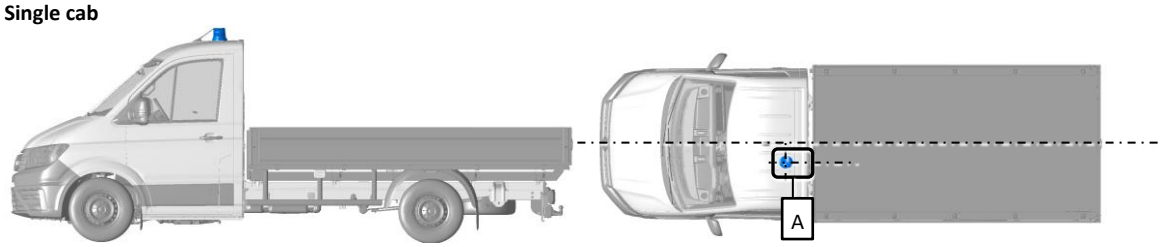
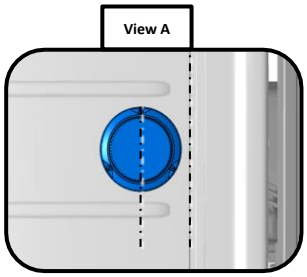


Fig. 2: Rear coupling point, roof rear cross member

Preparation of rotating light for single cabin/double cabin

Single cab





View A shows a suitable area on the roof of the vehicle.

PR number 9LX – “Preparation for rotating lights” includes the following features:

- A coupling point in the roof area at the rear of the cabin, in the middle of the vehicle (see Fig. 3).
  The connector is attached to the body using adhesive pads under the roof lining. The coupling point is described at the end of this chapter.
- Operation buttons on the dash panel (see also chapter 6.4.8 “Operation buttons”).

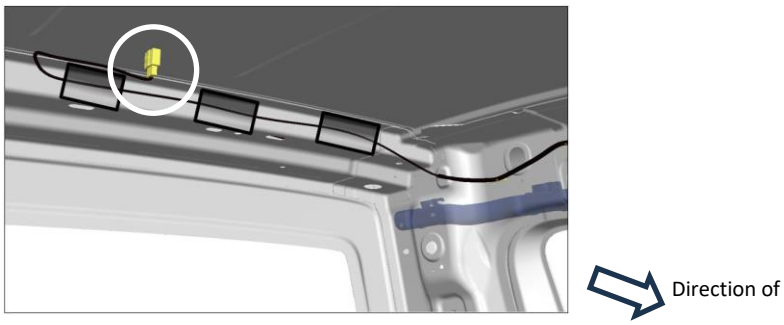
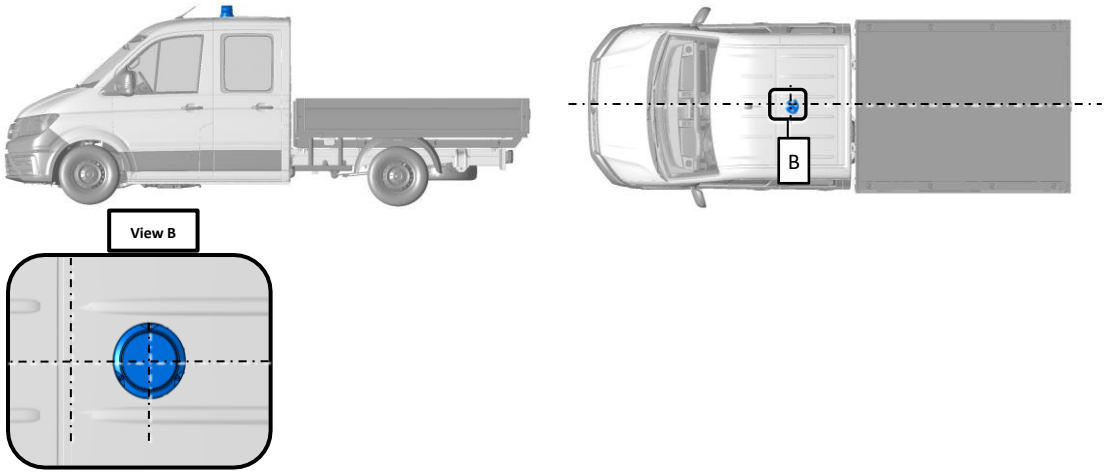


Figure 3: Position of the coupling point for the rotating light with PR number. 9LX for the single cab

Double cab



View B shows a suitable area on the roof of the vehicle.

PR number 9LX – “Preparation for rotating lights” includes the following features:

- A coupling point is located in the roof area on the passenger compartment centre interior light (see Fig. 4).
  The connector is located on the interior light. The coupling point is described at the end of this chapter.
- Operation buttons on the dash panel (see also chapter 6.4.8 “Operation buttons”).

Fig. 4: Position of coupling point for roof, for the rotating light on the double cab

1 – Connector on interior light

2 – Interior lights

Please also comply with the following chapters during the conversion:

- Chapter 2.1 “Product and vehicle information for body builders”
- Chapter 6.3 “Battery”
- Chapter 7.2 “Body-in-white/bodywork”

Information

Comply with the country-specific registration provisions when installing special lights. The positions of the rotating lights must be specified by the Converter.

The coupling station on the vehicle electrical system side of the aforementioned preparations for rotating lights (PR no. 9LN/9LX) has the part number: 3B0.972.712.

Fig. 5: Coupling station on the vehicle electrical system side for Preparation for rotating lights with contact

The mating connector for the vehicle electrical system side coupling station (3B0.972.712) has the part number: 1K0.972.702.
A set of individual wires, each with 2 contacts, in a bag of 5 pieces, can be obtained under part number 000,979,025.E.

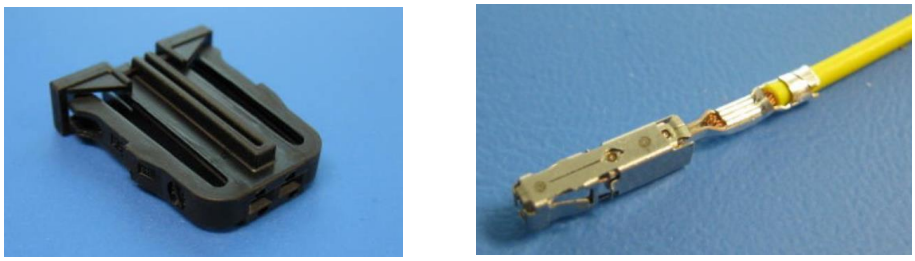


Fig. 6: Mating connector “Coupling point preparation for rotating light” with single wire and contacts

Alternatively, the rotating light adapter wire with part number 7C0.971.166.B can also be used to connect the rotating lights.

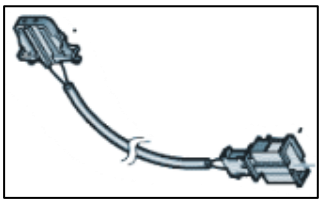


Fig. 7: Mating connector for coupling point preparation for rotating light with single wire and contacts

6.5.3 Tail light clusters

The following optional equipment is available under PR numbers from the factory for subsequent modifications to the vehicle tail light clusters (open bodies):

PR number	Name of optional equipment	Comment
8SA	Tail light cluster lights, normal version	Wire length = vehicle length, standard version
8SE	Tail light cluster lights with extended wiring	Wire length = vehicle length + 1.5 m
8SY	Preparation for tail light cluster, with extended wiring	Wire length = vehicle length L5 + 1.5 m 1) Installation location: - Rear axle longitudinal member 2) Connectors: - 7-pin round connector: 7C0.973.707 - 7-pin round mating connector: 7C0.973.701.A 3) Further information: Please see erWin*, wiring diagram, section no. 58/1 – 58/6 and no. 52/2 (left tail light cluster) and 52/3 (right tail light cluster)
8SX	Preparation for tail light cluster with LED technology with extended wiring	Wire length = vehicle length L5 + 1.5 m 1) Installation location: - Rear axle longitudinal member 2) Connectors: - 7-pin round connector: 7C0.973.707 - 7-pin round mating connector: 7C0.973.701.A 3) Further information: Please see erWin*, wiring diagram, section no. 52/1 - 52/25 and no. 52/16 (left tail light cluster) and 52/17 (right tail light cluster) - Rear axle longitudinal member 2) Connectors: - 7-pin round connector: 7C0.973.707 - 7-pin round mating connector: 7C0.973.701.A 3) Further information: Please see erWin*, wiring diagram, section no. 58/1 – 58/6 and no. 52/2 (left tail light cluster) and 52/3 (right tail light cluster)

*Information system from Volkswagen AG, subject to payment

Please note:

- No LED tail light clusters are supplied from the factory by Volkswagen for the preparation for tail light cluster with LED technology (PR no. 8SW and 8SX). Tail light clusters with LED technology can be purchased externally as an accessory.
- Any subsequent conversion of the preparation for LED tail light clusters (8SW, 8SX) to a preparation for standard tail light clusters (8SZ, 8SY), and vice versa, is permitted at any time following consultation with the Commercial Vehicles Service Centre.
  In order to do this, please let us know your vehicle's VIN and your change request, e.g switching from 8SX to 8SY, via email.
  Please contact the Volkswagen Commercial Vehicles Service Centre (NSC.Convert@volkswagen.de).

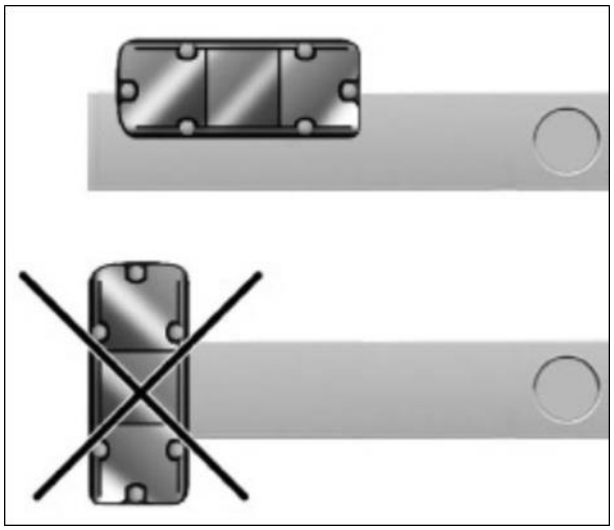
Warning note

The brake light bulb failure monitor must be ensured for the Autonomous Emergency Braking and the ACC functions.

Only use tail light clusters which are approved for the factory-fitted rear light cluster fittings and which ensure the bulb failure monitor function.

The country-specific registration provisions apply for all lighting and flashing units.

Series tail light position (normal version)



Practical note

The standard tail light clusters shall be fitted in horizontal position. Otherwise water can enter through ventilation holes, the standard tail light clusters could fail and there could be faults in the electronics!

If tail light clusters are to be fitted differently, the body builder shall use its own suitable tail light clusters.

The bulb failure monitor must be ensured for the brake lights.

6.5.4 Marking lights

6.5.4.1 Side marking lights

To increase the passive safety, all complete vehicles with a total length over six metres shall be equipped with side marking lights in accordance with UNECE R 48.
The PR no. 8F1 “Side marker lights” is available for all prototypes. On chassis with cab and double cab, the marker lights are mounted on the left and right of the frame longitudinal member (the lights and holder are delivered as accessories). If equipped with PR number 8F1, subsequent parametrisation/activation with a vehicle diagnostic tester is not necessary.

6.5.4.2 End-outline marker lamps / vehicle marker lights

End-outline marker lamps increase the passive safety and are required for vehicles with widths greater than 2.10 m. They may be attached to vehicles that are at least 1.80 m wide (UNECE R 48).

Two different PR numbers are available ex works for the use of the the end-outline marker lamps on the roof:

1. 6S3 “Elevated side light on the roof” (incl. rear end-outline marker lamp with tail light cluster lights).
   Note: If the shape of the wind baffle or roof structure is between the position of the standard marker lights, it is recommended to use PR number 6S3 “Side marker light on the roof”.
2. 6S2 “Preparation for side marker light for wind baffle”.
   Note: If the wind baffle or roof structure covers the entire roof area and the standard front marker lights cannot be used, it is recommended to use the PR no. 6S2 “Preparation for side marker light for wind baffle”. The end-outline marker lamps are then mounted on the roof or box body. You will find more detailed explanations in the following chapter 6.5.4.3.

6.5.4.3 Preparation for side marker lights (PR no. 6S2)

For subsequent installation of side marker lights, for example in a wind baffle, a roof cab or a box body, it is recommended to order the base vehicle with the optional equipment “Preparation for side marker light” with PR number 6S2.

In accordance with the directives of the European Union according to ECE R48, vehicles with a width of more than 2,100 mm must be equipped with side marker lights. The side marker lights make the vehicle more visible to other road users in the dark.

The preparation for side marker lights is available for the following variants with a normal H2 roof:

K4F chassis with cab
K4Z chassis with cab – cowl panel, flat frame
K4N chassis with cab – cowl panel

In the front roof area on the left and right between the A-pillar and B-pillar, there are coupling points with connectors for connecting/retrofitting side marker lights on the vehicle roof or the wind baffle roof structure. Original Volkswagen components must be used as mating connectors. See Fig. 4 and Fig. 5

Information

You will find further information in the Volkswagen Repair Manual on the internet under **erWin*** (**E**lectronic **R**epair and **W**orkshop **In**formation from Volkswagen AG):
http://erwin.volkswagen.de/erwin/showHome.do

An opening is provided in the roof area to feed through the connector with wiring harness. The hole (18 mm) is available from series production and is masked off and painted with an ALU pad (see Fig. 1).

Remove the plastic section that has been additionally glued on for protection before mounting and opening the ALU pad. The ALU pad must be pierced with a tool to feed the connector and cable.

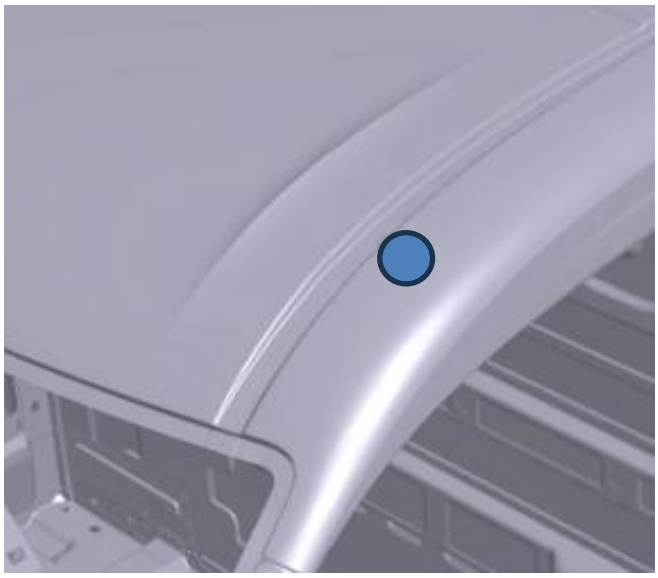


Fig. 1: Preparation of cable entry for side marker lights – opening in the roof area (shown here on the left side)

Practical note

The ALU pads glued to the roof frame are not durable for an extended period of time. They can be affected by environmental factors. To avoid leaks and corrosion of the body, it is necessary to permanently cover the taped-over openings in the roof area by installing side marker lights or roof structures.

Coupling point with connector

The coupling point is located left/right in the area under the ceiling lining/roof storage compartment.

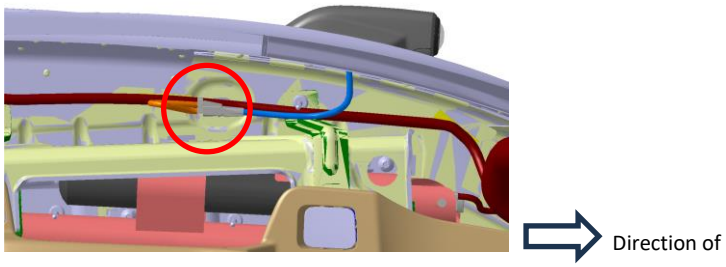


Fig. 2: Position of coupling point with connector. Representation with side marker light mounted on the vehicle (side marker lights are not part of the preparation)

Information

The original side marker lights on the right and left with part number 7C0 941 061 C (see Fig. 3) can be connected directly to the vehicle electrical system coupling stations.

Information

An extension cable, if required, can be manufactured using the mating connector for side marker light part number 8W0 971 832 and set of individual wires with contacts, part number: 000 979 009 E (Fig. 4) as well as the mating connector for vehicle electrical system coupling connector part number: 8W0 972 575 and set of individual wires with contacts, part number: 000 979 012 E (Fig. 5).

Information

When installing alternative side marker lights, the required connecting cable can be manufactured from the mating connectors for the onboard supply connector, part number: 8W0 972 575 and the set of single wires with contacts, part number: 000 979 012 E (Fig. 5).

Fig. 3: Right and left side marker lights, part number: 7C0 941 061 C

Fig. 4: Mating connector for side marker light, part number: 8W0 971 832 and set of individual wires with contacts, part number: 000 979 009 E.

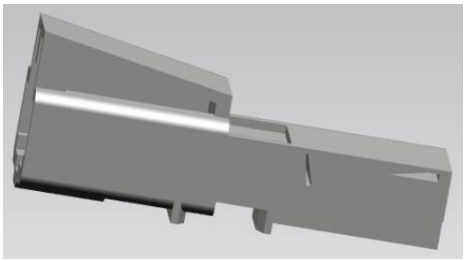


Fig. 5: Mating connector for onboard supply connector coupling station, part number: 8W0 972 575 and set of individual wires with contacts, part number: 000 979 012 E

Information

Comply with the country-specific registration provisions when installing special lights.

Please also comply with the following chapters during the conversion:

- Chapter 2.1 “Product and vehicle information for body builders”
- Chapter 7.2 “Body-in-white/bodywork”

6.5.5 Exterior lights

Practical note

To ensure that the series bulb failure monitor functions, we provide it ex-works as different versions of the tail light cluster lights. See overview table in chapter 6.5.3.

6.5.5.1 Lamp monitoring

All outputs are monitored for *open load* (broken wires) and short-circuits by the onboard supply control unit (BCM). If a lamp is not connected or has too much power, a fault entry is made in the memory of the onboard supply control unit. The vehicle owner or the driver must be informed; we recommend making an entry in the service schedule. The entry in event memory must be taken into account when reading out with the VAS tester in the event of a service.

6.5.5.2 Retrofitting the 3rd brake light

A preparation for the 3rd brake light (PR no. 8R6) is available from the factory for the purpose of retrofitting a 3rd brake light.

PR number	Designation
8R6	Preparing the 3rd brake light Installation location: the wiring harness (containing two cables, earth and brake light signal) is found on the longitudinal member to the left behind the cab. Connectors: 3C0.973.119.C (green, 2-pin) Component: 7C0.945.087.C or D Further information: please see erWin*, wiring diagram, section no.52/18

*Information system from Volkswagen AG, subject to payment

Practical note

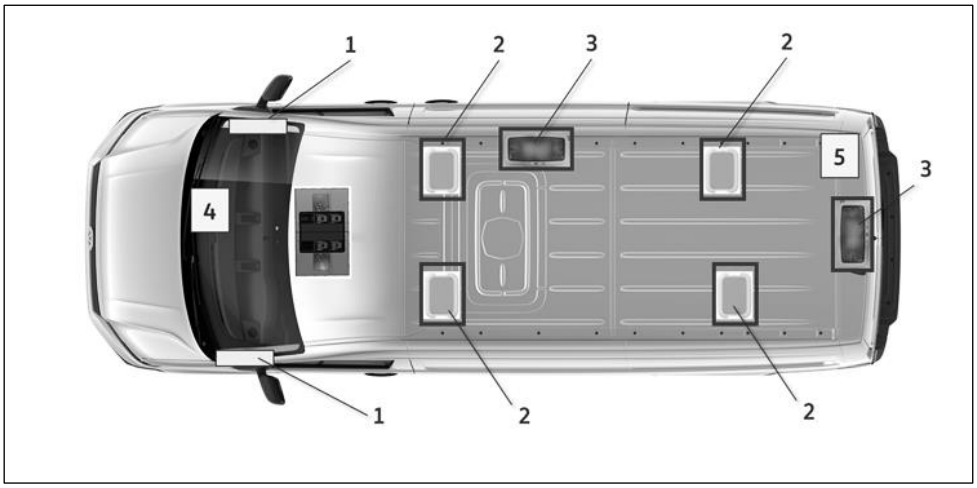
The third brake light uses approx. 1.8 W LEDs and cannot be replaced with a bulb-type light.

Practical note

A warning buzzer can optionally be connected in parallel to the reversing light. The current rating of the warning buzzer is allowed to be a maximum of 50 mA. We recommend using a warning buzzer with piezo technology.

6.5.6 Interior lights

The following luggage compartment lighting packages are available ex-works for this purpose:



Interior lights

1 – Step light (2x), optional

2 – LED interior lights (4x), switchable, optional

3 – Standard interior lights (2x)

4 – Front switch

5 – Rear switch

PR number	Name of optional equipment	Comment
9CA	Without interior light in the passenger compartment/luggage compartment	
9CC	2 standard interior lights in the passenger compartment/luggage compartment	Standard version, conventional
9CW	LED interior light concept in the passenger compartment/luggage compartment	4 LED lights, switchable Optional for the panel van only
9CX	Preparation for luggage compartment lighting	1) Panel van: a) Installation location: left driver's seat box - b) Connectors - 2-pin connector:-4F0.973.702 -> 4H0.973.702.A - 2-pin mating connector: 5Q0.973.802 2) Chassis/platform: a) Installation location: longitudinal member to the left behind the driver's cab. b) Connectors: - 2-pin connector: 4F0.973.702 -> 4H0.973.702.A - 2-pin mating connector: 5Q0.973.802 3) Further information: please see erWin*, current flow diagram, section no. 101/1 – 101/3 4) The preparation for load area lighting can be loaded with a current of up to 5 A.
9N2	Entry light	Optional

*Information system from Volkswagen AG, subject to payment

All interior lights can be replaced with different Converter-specific lights, as long as the power consumption for the series lights is complied with.

6.6 Mobile communication systems

If mobile communication systems (e.g. telephone, CB radio) are retrofitted, the following requirements shall be met to avoid vehicle faults later on (see chapter 4.7.2 “Retrofitting electrical devices”):

- All installed electronic devices require type approval in accordance with UNECE R 10, and must bear the E-mark.

6.6.1 Devices

The maximum transmission power (PEAK) at the base of the aerial can be found in the EMC manufacturer certificate (see chapter 4.7.3 “Mobile communication systems”).
Country specific laws on maximum legitimate transmission powers shall be observed.

The mobile communication systems and holders shall not be positioned in the deployment zone of the airbags (see 7.4.2.3 “Frontal airbag”).

- The devices shall be permanently installed. Mobile devices within the cab are only allowed to be operated via an external aerial installed in such a way as to eliminate reflections.
- The transmitter must be installed in a separate place from the vehicle electronics.
- The device shall be protected against moisture and severe mechanical shocks; comply with the permitted operating temperature.

6.6.2 Connection of and laying cables for aerial (radio)

- The manufacturer's instructions and installation guidelines shall be observed.
- The installation of an aerial is possible on the whole of the vehicle roof. The maximum transmission power is not allowed to be exceeded.
- The connection shall be made directly on terminal 30 via an additional fuse. The device shall be disconnected from the electrical system before jump starting.
- Cables shall be kept as short as possible, shall be entwined and shall be shielded (coaxial cable).
  Abrasive areas shall be avoided.
- Ensure good earth connections to body (aerial and device).
- The aerial and connecting wires between the transmitter, receiver and controls shall be routed separately from the vehicle wiring harness in the area of the body earth.
- The aerial wire is not allowed to be kinked or crushed.
- GGVSEB and ADR guidelines shall be observed.

6.6.3 Installation of aerials for the serial radio and navigation system on non-metallic sections of the roof e.g. alcoves, sleeping cabs, cowl panels, platforms etc.

To guarantee an optimal function in the event of retrofitting aerial systems for the Volkswagen infotainment system, the following must be observed:

- Volkswagen Commercial Vehicles recommends the exclusive use of the appropriate Volkswagen genuine aerials and the corresponding fastening components.
- The addition of a metallic radiating surface, such as a copper foil, with a minimum size of 700 mm × 500 mm. This foil must be affixed to the inside of the roof surface.
- A reliable earth connection for the foil using the aerial base and shielding braid of the aerial wire to the infotainment system.
- Damage to the foil due to fastening elements must be prevented by using an intermediate layer of sheet metal.

6.7 Central locking/subsequent integration of doors

Additional doors for the body builder's body can be integrated into the central locking function by means of the CFCU (see chapter 6.4.3 “Customer-specific functional control unit (CFCU)”).
Depending on the vehicle equipment, the Converter has the option of integrating doors added to the body into the central locking system of the chassis. It is operated with the vehicle key for the base vehicle.

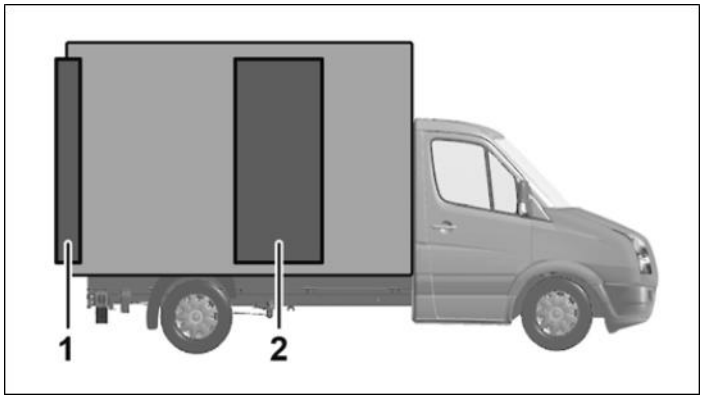


Figure 1: Example of Converter doors

1 – Rear pivoting door

2 – Side door

Information

Technical documentation on the CFCU and further information regarding the requesting and processing procedure can be found on the CustomizedSolution portal via the link:
https://www.customized-solution.com/de/de/technische-produktinformationen/kfg/technische-information

You must register on the CustomizedSolution portal in order to access this. The configuration of the customer-specific functional control unit (CFCU) can be ordered via the CS portal.

6.8 Driver assist systems

Warning note

Please note: Improper interventions in, or installations in, vehicle systems, safety-relevant components or driver assist systems can impair their function. This can result in failure or malfunctions of components or safety-relevant components. Accidents or damage to the vehicle may occur as a result. In the case of semi-automated driving assistance systems that are part of the type approval, intervention in these systems will invalidate the type approval.

To ensure the correct function if the driver assist systems, it is imperative that the physical limitations of the vehicle described in chapter 4.1 “Limit values of base vehicle” are observed.

Practical note

The assist systems of panel vans and platform conversions ex works are calibrated for the parameters specified in the Certificate of Conformity. If a vehicle is converted within these parameters, calibration is not mandatory.
In particular, the following conditions are required:

- No change in wheelbase.
- No elevation (lowering)
- “Fields of view” and positions of the sensors must not be altered.
- Sensors and their covers must not be taped over/painted
- Axle loads and GVWR in accordance with COC are complied with.

To ensure correct functioning, however, we recommend that the sensors of the driver assist system (nano radars, cameras, front radar) are calibrated by an authorised qualified workshop after the conversion.

If the sensors are removed (this also includes the removal of elements in which the sensors are installed; for example, removing the bumper in the case of the front radar), the systems must be calibrated by an authorised qualified workshop.

Practical note

Please note that incomplete chassis with driver assist systems are delivered without calibration and headlight adjustment. The additional weight introduced by the body would otherwise falsify the calibration.

Flawless function of the front camera for driver assist systems and the radars would not be ensured. Once a body has been built or conversion made, a calibration of the driver assist systems installed must therefore be carried out by an authorised specialist workshop.

Information

Further information concerning the installation and removal of assist systems, such as the radars and front camera for driver assist systems, can be found in the workshop manuals (repair group 44 Wheels, tyres, wheel alignment) on the Internet at **erWin*** (**E**lectronic **R**epair and **W**orkshop Information from Volkswagen AG): http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

6.8.1 General overview

A variety of active and passive driver assist systems and safety systems are available ex-works (see chapter 6.8.1.1 “Overview of driver assist systems”).

The driver assist systems are based on the area monitoring system sensors.

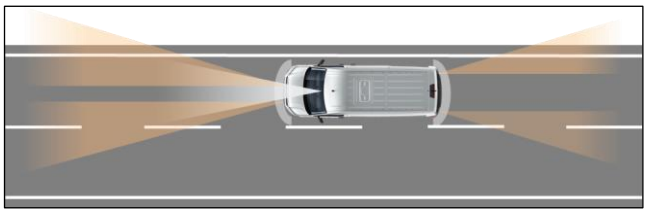


Fig. 1:

The Crafter features several radar and camera sensors that record the area around the vehicle and analyse it based on intelligent algorithms:

- Front and rear radar sensors
  + The vehicle is fitted with radar sensors at the front and rear.
  + The sensor in the middle of the front is used for adaptive cruise control (ACC) and for the Front Assist.
  + Additional sensors at the front corners are used for the start-up warning/Moving Off Information System (MOIS).
  + Additional sensors in the driver and front passenger door are used for the Blind Spot Information System (BSIS).
  + Two further radar sensors at the rear record the traffic situation behind. They form the basis of the lane change system “Side Assist” incl. “Blind Spot Monitor”, whose signals are also used by ACC and Front Assist.
  They are also used for the Rear Cross Traffic Alert.
  + Lane change assist is only available when the body is closed.
- The multifunctional front camera is located in the area of the interior mirror and is used:
  + For vehicle detection (redundancy for radar)
  + During standstill for monitoring the area in front of the vehicle (automatic restarting of ACC)
  + For lane information for the lane departure warning (Lane Assist).
  + For detecting vehicles and other illuminated objects at night for the advanced main-beam control (Dynamic Light Assist).
- Rear camera
  The reversing camera improves the view behind when reversing. In vehicles with closed bodies, it is attached on the roof above the rear doors and supplies a real video image of the area behind the vehicle. The reversing camera can be combined with the following radio or navigation systems: Composition Media and Discover Media.
  Information on the preparation for the “Rear View” reversing camera incl. reversing camera as accessory kit (KA8) can be found in chapter 6.4.15.
- Ultrasound sensors
  For parking assistance, the vehicle is fitted with up to 12 ultrasonic sensors. The information from the ultrasonic sensors is also included in the ACC regulation.

6.8.1.1 Overview of driver assist systems

		Assist systems	PR number
		Cross Wind Assist Standard, can optionally be deselected for the panel van. Can be retrofitted for open bodies, see chapter 6.8.1.2.	KJ1
		Hill Start Assist (standard, can optionally be deselected)	UG1
		Hill Start Assist and Hill Descent Control (optional)	UG5
		“Lane Assist” lane departure warning (standard)	6I1
		“Travel Assist” semi-automated driving assistance including “Lane Assist” lane departure warning (optional)	6I2
		“Travel Assist” semi-automated driving assistance including “Lane Assist” lane departure warning and “Emergency Assist” (optional)	6I6
		“Light Assist” main-beam control (optional)	8G1
		Traffic sign recognition (standard)	QR9
		Front Assist with warnings and braking on detection of vehicles, pedestrians and cyclists (standard)	8J3
		Turn Assist (optional)	4G2
		“Side Assist” lane change assist including Blind Spot Detection (optional for Crafter panel van) (includes Rear Traffic Alert (RCTA))	7Y1
		Cruise control system (CCS) electronic (standard)	8T2
		Adaptive Cruise Control with Stop & Go (optional)	8T3
		Speed limiter (standard)	LT1
		Speed limiter and “Intelligent Speed Assist” (optional)	LT2
		“Park Assist” and parking aid in the front and rear areas incl. side protection (optional)	7X5
		Parking aid at the front and rear. (Can optionally be deselected for incomplete vehicles)	7X2
		Distraction warning and Driver Alert System (standard)	EM2
		Tyre pressure monitoring system (direct measurement) (standard)	
		Intermittent wiper control with light and rain sensor (standard)	8N6

		Assist systems	PR number
		Blind spot warning on both sides and start-up warning/Blind Spot Information System (BSIS) on both sides incl. Moving Off Information System (MOIS) (for panel van only) (optional for N1, BR3, BR4 or BR5 mandatory for N2 and M2 incomplete)	BR3
		Blind spot warning, left-hand side, and start-up warning/Blind Spot Information System (BSIS), left-hand side (right-hand drive vehicles) incl. Moving Off Information System (MOIS) (only for right-hand drive vehicles) (optional for N1, BR3, BR4 or BR5 mandatory for N2 and M2 incomplete)	BR4
		Blind spot warning, right-hand side, and start-up warning/Blind Spot Information System (BSIS), right-hand side (left-hand drive vehicles) incl. Moving Off Information System (MOIS) (only for left-hand-drive vehicles) (optional for N1, BR3, BR4 or BR5 mandatory for N2 and M2 incomplete)	BR5

Key

6.8.1.2 Cross Wind Assist for open bodies

Cross Wind Assist is also available as a retrofit solution for open bodies (7CP) with retrofitted large bodies such as box bodies and bodies for emergency vehicles. The maximum permitted side surface is limited. See “Body forms and sizes” section. The corresponding software is coded and the function is enabled in the ESC control unit in an after sales process.

Prerequisites for retrofitting the Cross Wind Assist function

An endorsed application for assignment of the ESC data set for the Cross Wind Assist must be in place for the planned conversion. If no assignment is in place for the conversion, the vehicle concept with complete description and drawing must be presented to Volkswagen Commercial Vehicles for assessment. Depending on the type of conversion, a vehicle presentation may also be necessary. Please contact Volkswagen Customer Care (chapter 2.1 “Product and vehicle information for body builders”).

Required software of the ESC control unit:

Retrofitting of the function is possible from the software version 0870 of the ESC control unit.
If the vehicle still has an earlier software version, an update to version 0870 is required.

Suitable vehicle configurations and body forms:

Engine/gearbox: all engine/gearbox combinations.
Drive: all combustion engine versions.
Body versions: all single/double cab with standard wheelbase.

Body forms and sizes:

The retrofitted body must not exceed the following dimensions:

Body form	Max. vehicle height [mm]*	Max. body length [mm]**
Single cab	3000	4700
Double cab	3000	3900

* measured from road surface to upper edge of body.

** measured from cab rear wall to end of body.

The minimum distance between the cab rear wall and the body must be observed (see also chapter 4.10 “Limit values for body”).

Roof moulds with an alcove that protrudes the cabin forwards are not permissible in this case. Deviations from the standard running gear, special body and roof designs, extended overhangs and different wheelbases must be applied for separately and are then assessed in the context of the presentation.

6.8.2 Electromechanical power steering

The electromechanical power steering has many advantages compared with a hydraulic steering system. It assists the driver and relieves the physical and mental burden for the driver. It works on demand, i.e. only when the driver requires steering assistance. The power steering depends on the vehicle speed, the steering torque and the steering angle which are recorded by sensors and evaluated in the power steering control unit.
In addition, electromechanical power steering enables numerous driver assist systems in which a steering intervention is performed, such as the Park Assist, side-wind compensation and the Trailer Assist.

Warning note

No modifications may be made to the steering rack, the associated components or the control units!

Modifications can result in these systems no longer working correctly and failing. This may result in the driver losing control of the vehicle and causing an accident.

6.8.3 Electronic Stability Control (ESC)

ESC is a driving dynamics regulation system that actively regulates both the longitudinal and lateral dynamics.
An extensive system of sensors that constantly compare the actual course of the vehicle with the target course set by the driver allows greater driving stability with ESC.
In all driving situations, ESC contributes to the stability of the vehicle – during acceleration, braking, coasting, driving straight ahead and in corners.
In interaction with the signals from other sensors, a computer checks that the vehicle follows the course set by the driver.
If the vehicle deviates from the target course (understeer or oversteer), a stabilising counter force is applied by braking an individual wheel.

Warning note

The following modifications are not permitted on vehicles with ESC:

- Changing the gross vehicle weight rating
- Wheelbase modifications outside the approved ranges (see chapter 7.2.5 “Wheelbase modifications”)
- Modifications to the sensors (steering angle sensor, yaw rate sensor, wheel speed sensor)
- Changing the vibration behaviour at the installation location in the area of the yaw rate sensor by modifying the body
- Modifying the position of components
- Modifications to the chassis
- Modifications to the wheels and tyres
- Modifications to the engine
- Modifications to the steering system
- Modifications to the brake system
- Conversion into tractor unit

Modifications to vehicles with ESC can lead to this system no longer working correctly and to system shut-down and incorrect regulation. This may result in the driver losing control of the vehicle and causing an accident.

6.8.4 Tyre pressure monitoring system (TPMS)

The TPMS function monitors the tyre pressure in the road tyres using electronic sensors in the tyres, and warns the driver if the pressure falls a certain amount below the vehicle-specific target pressure.
The driver is also warned if a malfunction is detected.
Target pressures for the specific vehicle are stored in the TPMS control unit.

The TPMS system consists of the following main components:

- 4 /(6 for twin tyres) tyre pressure sensors
- TPMS control unit with built-in aerial, installed in an optimal location on the vehicle for reception
- Display with operation in the instrument cluster/HeadUnit

The Tyre Pressure Monitoring System control unit is located in the lower area of the right-hand B-pillar in the vehicle interior. A malfunction due to impairment of the reception is indicated by the system control display in the dash panel insert.

Warning note

The position of the TPMS control unit must not be modified. Otherwise there could be a malfunction. As a result the driver may not recognise a loss of tyre pressure and cause an accident. Furthermore the vehicle can in some cases no longer meet the registration requirements.

Warning note

The values published by the vehicle manufacturer in the tyre pressure table must be observed. See the Owner's Manual for your vehicle. The values for the permissible tyre pressures for the different tyre combinations are also shown on a plate on the body. The maximum cold tyre pressure of 5.1 bar must not be exceeded for certain wheel/tyre combinations in conjunction with the TPMS Tyre Pressure Monitoring System.

If tyre dimensions that deviate from the series dimensions are fitted as part of a vehicle conversion, the Converter is responsible for informing the customer about the deviating values for the tyre pressures.

6.8.5 Multifunction camera

The multifunction front camera is built into the mirror base.

Fig. 1: Position of multifunction camera in vehicle

The camera operates multiple interfaces in the vehicle. It provides image information with different ranges for the following driver assist systems:

- Front Assist with warnings and braking on detection of vehicles, pedestrians and cyclists
- Lane departure warning “Lane Assist”
- Light Assist main-beam control
- Dynamic Road Sign Display

Practical note

The view range of the camera shown must not be obscured, see fig. 2.

Please observe the notes in chapter 6.8.

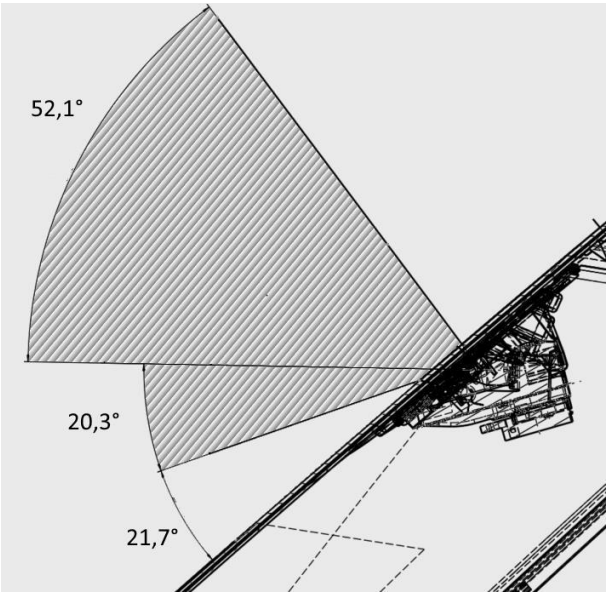


Fig. 2: Limit for add-ons to vehicles with a front camera

Warning note

The position of the camera and its surrounds (e.g. changes to standard windscreen or its inclination, add-on parts within the camera's field of view) must not be modified. Otherwise the camera can no longer function correctly and may fail.

6.8.6 Rain and light sensor

Practical note

Functional impairments may occur on vehicles with add-ons that protrude into the sensor cone of the rain and light sensor, or obscure it (e.g. mobile homes with alcove add-ons). The specifications defined in UNECE-R 48 must be observed.

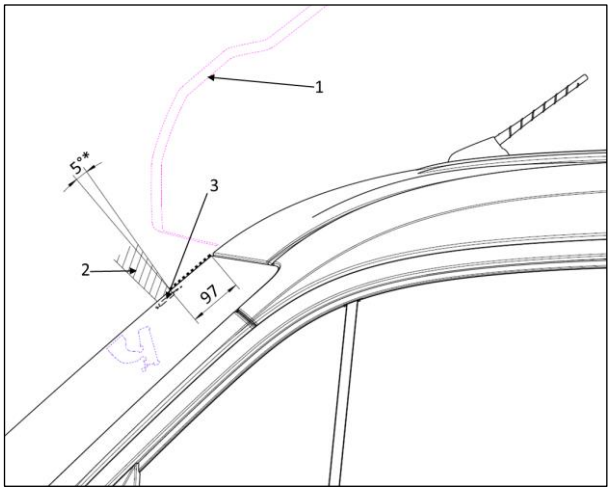


Fig. 1: Limit for add-ons to vehicles with a rain and light sensor

1 – Add-on (e.g. alcoves, sleeping cabs etc.)

2 – Area to be kept clear

3 – Rain and light sensor

* all-round

Practical note

The position of the rain/light sensor and its surrounds (e.g. changes to standard windscreen) are not allowed to be modified. Otherwise the rain/light sensor can no longer function correctly.

The rain and light sensor (PR number 8N6) is only allowed to be fitted with the standard windscreens or with windscreens available as optional equipment. Otherwise there could be a malfunction. The roof control unit shall also be installed in each case (contains the interface).

6.8.7 Parking aids

The following optional assistance systems are available to help with parking:

- Park Distance Control at the front and rear 7X2
- “Park Assist” and Park Distance Control in the front and rear areas including side protection 7X5

At Volkswagen, the parking aid ensures compliance with UN R 158 (reverse travel equipment). For this reason, each vehicle is always fitted with Park Distance Control ex works. Only incomplete vehicles could be ordered without Park Distance Control.

These systems monitor their surroundings using up to 12 ultrasound sensors, known as PDC sensors.
These are installed on the rear, the sides and the front of the vehicle (see figures).

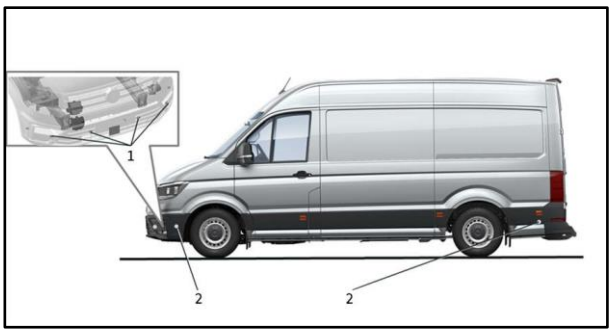


Fig. 1: Position of PDC and PLA sensors

1 – PDC sensor

2 – Park Assist sensor

Fig. 2: Position of ultrasound sensors

1 – PDC sensor

In the event of superstructures and modifications:

- Add-on parts in the detecting range of the ultrasound sensors can impair the function of the parking aids (e.g. towing bracket, overhanging parts of bodies, hub carrier, steps or bumper guard). In the event of add-on parts or conversions, make sure that the ultrasound sensors are not covered by the attachments.

– If the bumper is painted subsequently, this must not be done with the ParkPilot ultrasound sensors installed.
  The coat of paint will impair the transmission and reception of the ultrasound signals.
– If approved add-on parts are retrofitted, the parameter set suitable for the ParkPilot must be coded by your Volkswagen dealership.

Additional information for open bodies

The function of the distance warning system has been tested and approved in the standard equipment for all available versions and equipment of the factory-fitted platform body. Specifically, this also includes compliance with UN R 158.

Practical note

In principle, the width and rear overhang of the plant platform must not be exceeded. Also, no components (such as hydraulic cylinders) may protrude into the visible area of the sensor under the platform base frame. See Figures 3 and 4, the function of the Park Distance Control can be negatively influenced by additional installations and conversions, and this makes it possible to issue false warning messages.

Information

For every geometric change (body dimensions, location of the sensors, wheelbase, overhang, changed axle position, road position etc.), compliance with UN R 158, which is part of the type approval, must be verified by the Converter in direct agreement with the technical service.

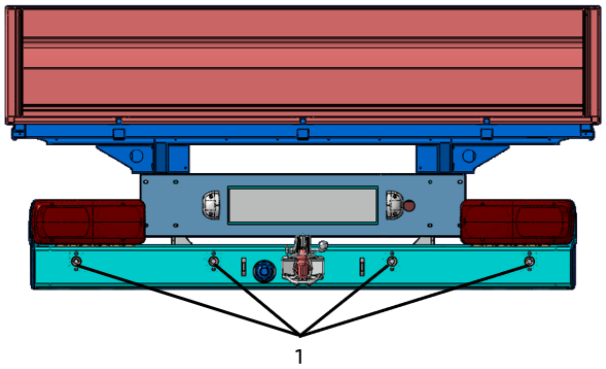


Fig. 3: Position of ultrasound sensors in open bodies

1 – PDC sensor

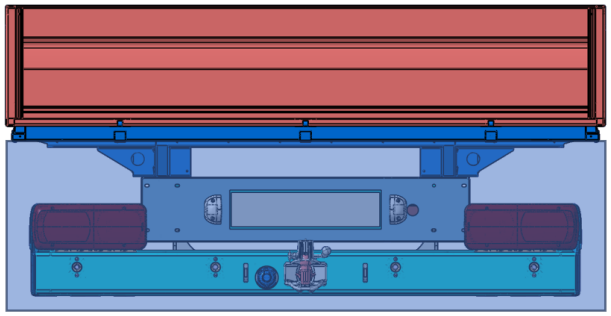


Fig. 4: Detection range of ultrasonic sensors (highlighted in light blue)

Practical note

Sensors that have already been painted are not allowed to be repainted. Unpainted sensors shall be painted before installation – in order to guarantee the function of the sensors over their service life.

You can obtain unpainted and painted sensors in various colours from your authorised repairer.

The coat thickness of the whole painted surface on the membrane is not allowed to exceed 120 µm so that the sensor function is not impaired. This also applies to multiple paint systems and the cathodic dip coating (CDP coating). The thickness of the cathodic dip coating is between 12 µm and 25 µm.

Therefore the coat thickness shall be checked on random samples to ensure perfect function of the sensors.

During painting, make sure that not only the membrane, but also the cylindrical sensor membrane edge is coated evenly with paint at least 2 mm all-round.

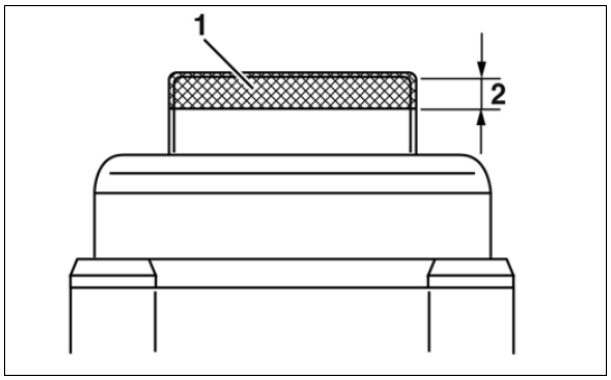


Fig. 5: Painting area of cylindrical sensor membrane edge

1 – Painting area

2 – Paint coat thickness max 120 µm

Practical note

The paint coat is not allowed to be sanded off mechanically. This could damage the chrome or CDP coat or the sensor membrane.

Practical note

During the CDP primer process, the paint is not allowed to be removed chemically. This could damage the CDP coat and it can no longer be applied later on. Chemical or mechanical reworking is also not permitted.

6.8.8 Lane departure warning (Lane Assist)

The “Lane Assist” lane departure warning uses a camera in the vicinity of the interior mirror to record the lane markings. If there is at least one lane marking, the function is automatically activated from 65 km/h, even in darkness and fog. As soon as the vehicle seems to be leaving the lane, the system emits a visual and haptic (vibration) warning and actively performs compensating steering manoeuvres, within its technical possibilities.

Practical note

Please observe the notes in chapter 6.8 and chapter 6.8.5.

Information

For more information on calibration of the camera for the lane departure warning system, see the Repair and Workshop Information System (erWin*) operated by Volkswagen AG:
http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

6.8.9 Lane change assist (Side Assist including Blind Spot Detection)

The system functions by means of radar sensors. These are installed on the left and right behind the rear bumper and are not visible from the outside. They record an area of about 20 metres behind the vehicle, as well as the driver's blind spots on the right and left sides of the vehicle. The area to the sides of the vehicle is about the width of a lane.

The width of the lane is not detected individually, it is predefined in the system. The display may therefore be incorrect if the lanes are narrow or the driver is driving in the middle of two lanes. It is also possible for vehicles in the next lane but one or for fixed objects, such as guardrails, to be detected, triggering an incorrect message.

Fig. 1: Position of the radar sensors in the rear bumper

Practical note

The radar sensors in the rear bumper may be displaced or damaged by collisions, e.g. when driving into or out of a parking space. This can result in the system switching itself off or becoming impaired.

To ensure that the radar sensors function properly, the rear bumper sections must be kept free of snow and ice and must not be glued, painted or covered.

6.8.9.1 Rear Cross Traffic Alert (RCTA)

The Rear Cross Traffic Alert (RCTA) assist system is part of the lane change assist. It warns the driver of objects moving behind the vehicle in cross traffic. To enable this, radar sensors are installed behind the bumper cover on the left and right. The warning function is activated when reverse gear is engaged. Visual and acoustic warnings are issued when the vehicle is stationary and at speeds below 10 km/h.

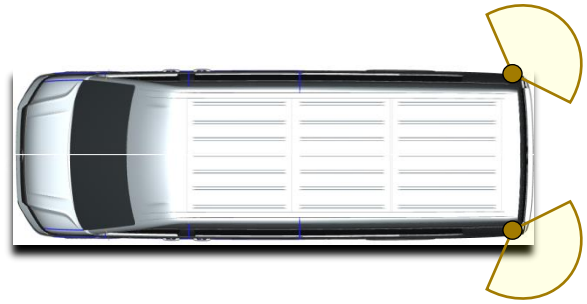


Fig. 1: Position of radar sensors principle representation

Fig. 2: Radiation range of nano radar

Fig. 3: Position of the radar sensors behind the bumper cover on the left and right

Information

The Rear Cross Traffic Alert (RCTA) is available for closed bodies.

Practical note

The radar sensors in the rear bumper may be displaced or damaged by collisions, e.g. when driving into or out of a parking space. This can result in the system switching itself off or becoming impaired.

To ensure that the radar sensors function properly, the rear bumper sections must be kept free of snow and ice and must not be glued, painted or covered.

6.8.10 Front Assist with warnings and braking on detection of vehicles, pedestrians and cyclists

The “Front Assist” area monitoring system monitors the distance to the vehicle in front by means of a radar sensor installed on the front of the vehicle, and it detects critical distance situations.
If an impending collision with a vehicle or a static object is detected, a visual and acoustic warning is given and a short brake jolt triggered. In addition, the brake system may be primed and the parameters of the hydraulic brake assist system reprogrammed.
The function effects automatic braking if an unavoidable risk of collision is detected and there is no brake response by the driver. If the driver brakes heavily when a danger is detected, they are supported in the avoidance of the collision by the brake request being reinforced so far that rear-end collision is, if possible, avoided.

Fig. 1: Front radar

1 radar sensor

In the case of incomplete vehicles, the front radar must be calibrated in a specialist VW workshop after the vehicle is completed.

Information

If, for example, a mounting plate for additional devices is to be installed in front of the radar sensor, please contact Volkswagen Customer Care in the planning phase (see 2.1 “Product and vehicle information for body builders”). The road traffic regulations in the countries of registration must be observed and coordinated with the responsible test centre or technical service.

Required control units for the ACC function and Front Assist:

Control units	**ACC**	**BAS (brake assist system)**
Front radar	X	X
Brake control unit (complete ESC)	X	X
Onboard supply control unit (incl. brake light diagnosis)	X	X
Trailer connection ECU	Optional	Optional
Multifunction steering wheel	X	
Instrument cluster ECU	X	X
Power steering ECU	X	X
Engine control unit	X	X
Head Unit (MIB Gen2)	X	X
Gateway	X	X
Door ECU (central locking)	X	
Airbag ECU	X	X
Gearbox ECU	X (only for automatic)	X (only for automatic)
Front sensor camera		X (N2, N3, M2, M3 only) Optional (N1, M1 only)
Park Assist/Part Distance Control	Optional	

X – only required for ACC function.

Warning note

Please note: improper interference or installations in vehicle systems, safety-relevant components or driver assist systems (e.g. brakes, wheelbase, track width, springs and shock absorbers, engine management system and ESC) could have an adverse effect on their function and could void system approval. This can also result in failure or malfunctions of components or safety-relevant components. Accidents or damage to the vehicle may occur as a result.

6.8.11 Blind spot information system BSIS

The blind spot warning detects moving cyclists who are next to and behind the vehicle and provides a visual and acoustic warning of a collision. The radar sensor is mounted in the door on the front passenger side. The position differs between right-hand and left-hand drive vehicles.

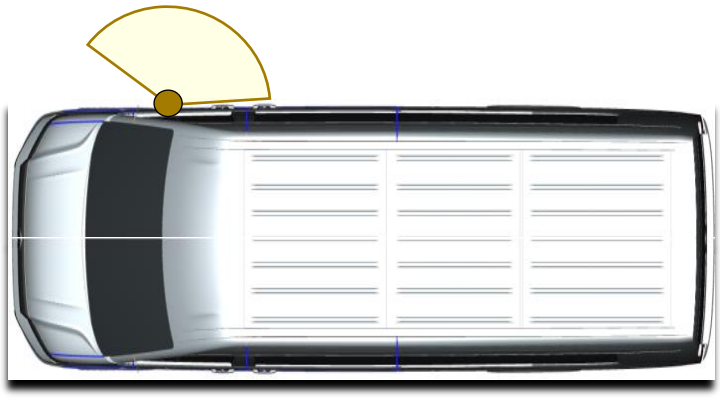


Fig. 1: Position of radar sensors, schematic diagram

Fig. 2: Nano radar coverage range

Fig. 3: Position of the radar sensors in the door

Practical note

To ensure that the radar sensors in the doors function properly, the area must be kept free of snow and ice. The plastic panelling must not be glued, painted or covered. This can impair the proper functioning of the radar. If the sheet metal surface of the doors is to be coated, it must be ensured that the radar emissions are not affected. The function of the radar is designed, checked and approved ex works for the panel van and platform and chassis versions. In the case of incomplete vehicles equipped with an additional body, the correct functioning of the blind spot warning system must be checked by a technical service.

Information

The blind spot warning is available for open and closed bodies. Depending on the equipment selected, radars are fitted in the front passenger door or in the driver and passenger doors.

6.8.12 Start-up warning (Moving Off Information System MOIS)

The start-up warning is only available in conjunction with the blind spot warning.
The system detects pedestrians and cyclists riding in front, as well as crossing objects, and provides visual and acoustic warnings of a collision. Radar sensors are mounted behind the front bumper cover.

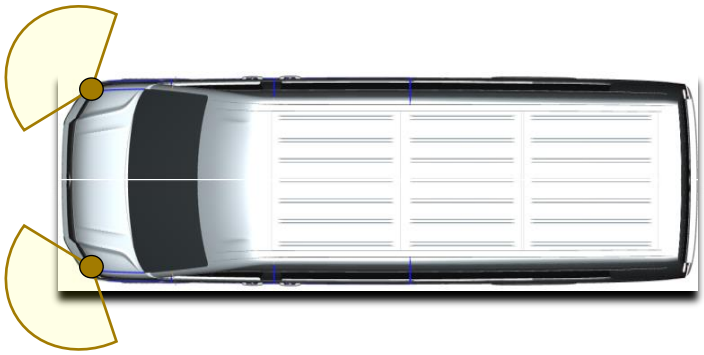


Fig. 1: Position of the radar sensors, schematic diagram.

Fig. 2: Nano radar coverage range

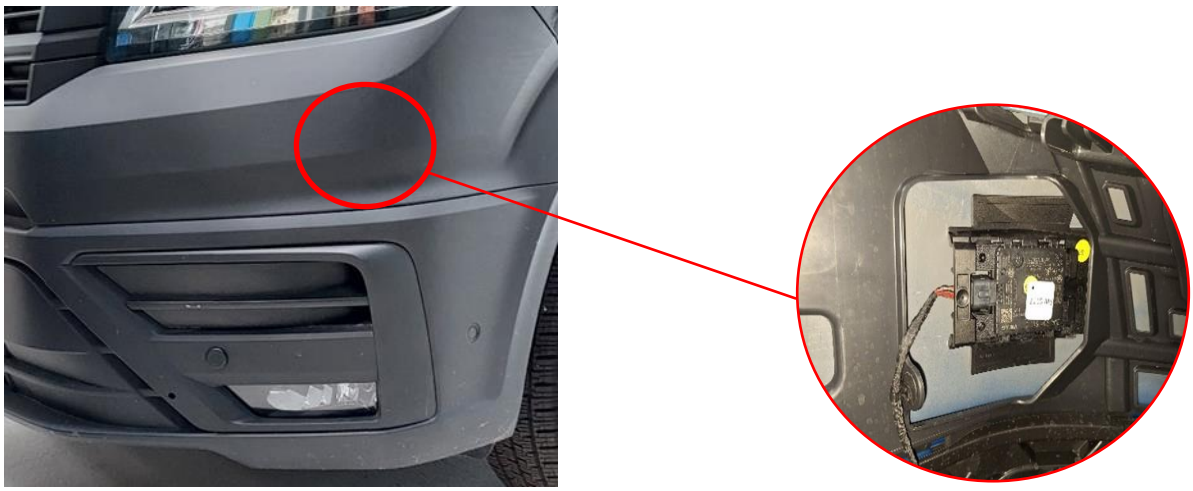


Fig. 3: Position of the radar sensors behind the front bumper cover

Practical note

The radar sensors in the bumper may be displaced or damaged by collisions, e.g. when driving into or out of a parking space. This can result in the system switching itself off or becoming impaired.

To ensure that the radar sensors function properly, the front bumper cover must be kept free of snow and ice and must not be glued, painted or covered in the detection range of the sensors.

Information

Available for open and closed bodies.

6.9 Preparing the tail lift

Special equipment (PR no. 5S4) “Preparation for electric tail lift”, and (PR no. 5S8) “Preparation for mechanical and electric tail lift”, include the following (as per the VDHH requirements):

- Control current preparation
- On/off switch** in the cab that closes and opens the control circuit of the tail lift
- Main current preparation
- Earth wire 25 mm, fixed to the vehicle frame, tail lift side with a blue 1-pole ITT Cannon high-current connector
- 25 mm positive cable on the vehicle’s second battery, central fuse protection with 200 A fuse, and on the tail lift a red 1-pin ITT Cannon high current plug
- Both wires have an overhang of 1,000 mm beyond the end of the right-hand longitudinal member. The free wire lengths are tied back in the left-hand longitudinal member.
- Narrow bolted rear cross member (only 5S8)

PR number	Description
5S4/5S8	Preparation for electric dropside (PR number 5S4), preparation for mechanical and electric dropside (PR number 5S8) Installation location: rear axle longitudinal member Connectors: 7-pin round connector: 7C0.973.707 For more information: see erWin*, circuit diagram section 34/1–34/4, as well as “Additional technical information” on the conversion portal.

*Information system from Volkswagen AG, subject to payment

** The tail lift is released using the button on the lower part of the touch control in the middle section of the dash panel. The tail lift operates regardless of the switch status of terminal 15.

Control logic of the tail lift button

Tail lift button	Outputs
Not activated/button variable = 0	Outputs A2 and A4 are not energised, tail lift is locked
Not activated/button variable = 1	Outputs A2 and A4 are energised, tail lift is released

Control logic of the function light

Release of the tail lift	Feedback from LB + (pin 5)	Feedback from LB - (pin 6)	Function light
Released (button variant = 1)	Active	Inactive	On
Released (button variant = 1)	Inactive	Active	On
Release status irrelevant (button variant = 0 or 1)	Active	Active	Flashing signal
Not released (button variant = 0)	Active	Inactive	Off
Not released (button variant = 0)	Inactive	Active	Off

Practical note

When mounting an electro hydraulic tail lift, an alternator, a high-power battery and a second battery must be used.

For the mechanical connection, see chapter 7.2.2 “Attachment to the frame” and chapter 7.7 “Tail lift”.

6.10 Engine run-on circuit (MWS)

6.10.1 Ignition bypass circuit ex works

The ignition bypass circuit (PR number 7U4) for special signal vehicles such as police or rescue vehicles is available ex works.

Information

Selecting PR no. 7U4 (ignition bypass) automatically means that the vehicle no longer fully complies with the EC type approval and is therefore delivered without an EC Certificate of Conformity. Additional acceptance testing is required before initial registration. If the vehicle is reused but not as an emergency vehicle as intended, the ignition bypass function must be deactivated and the vehicle must be re-registered.

Functional description of the ignition bypass circuit

The ignition bypass circuit is an electrical circuit for commercial vehicles that allows the vehicle to leave and the engine remains in operation.

If the ignition bypass circuit with PR number 7U4 is chosen, the query for the switching status of the special signal system is programmed in the customer-specific control unit (CFCU*). If this is not desired, a change to the programming must be requested.

Activation conditions (ignition bypass)

The following conditions must be met before the ignition bypass system is activated:

Vehicle-based

- The automatic selector lever position is in the “P” position or the gear selector lever is in the “neutral” position
- The electromechanical parking brake (EPB) is active
- The pedals are not actuated.
- The engine speed is within a range of up to 1,200 rpm.
- There are no error messages in the vehicle electronics.

Body-based

- To activate the ex-works ignition bypass function, the special signal system on the vehicle body must be connected to the customer-specific functional control unit (CFCU*).
- Here, “special signal system on” is requested on the multifunction input MFE_21 (see illustration of pin assignment for CFCU* connector 3). Only then can the continued engine running function be activated.

Failure to comply with “one” of these conditions will result in termination of the “ignition bypass” function.

Activating the function

To activate the function, press the “Ignition bypass” button for 1–3 seconds.

For more information, refer to the Owner’s Manual for your vehicle.

Information

Please note that the equipment scopes for working speed control and ignition bypass control can influence each other's functions. If the engine speed is set to a value above 1,200 rpm, a previously activated ignition bypass switch is automatically deactivated again.

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

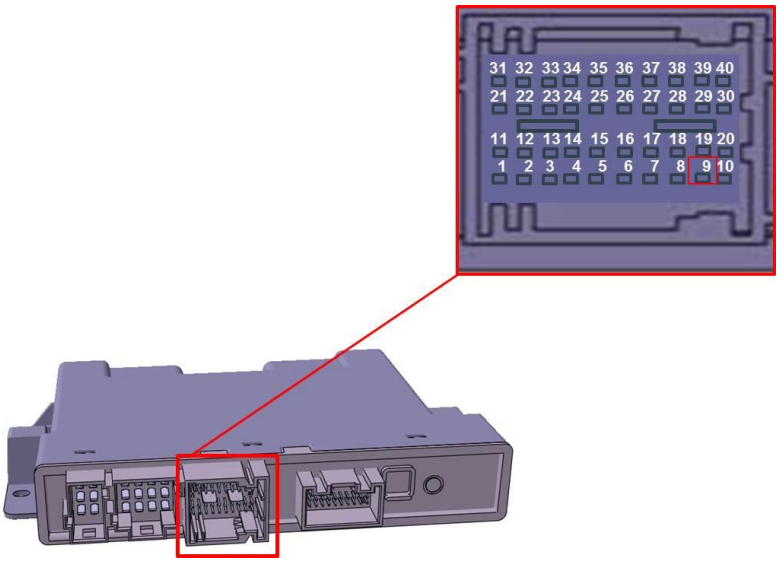


Fig. 1: Pin assignment for CFCU connector 3

Pin assignment (CFCU 3, pin 09):

– MFE_21: -Input, high-side, wakeup-capable, digital

Practical note

The "Convenience opening and closing" function is not available on vehicles with activated ignition bypass function. Before getting out of the vehicle, make sure that all windows are securely closed (anti-theft protection). The anti-theft alarm system is disabled when the ignition bypass function is active.

6.10.2 Retrofitting the ignition bypass system

Information

Information about retrofitting for importers can be found in ServiceNet, while body builders should contact their VW dealership or their importer.

Retrofitting requires a measures code, among other requirements, which can be obtained from the Volkswagen Commercial Vehicle Service Centre (NSC.Convert@volkswagen.de).

6.11 Current flow diagrams

Information

Circuit diagrams are available on the Internet via the Electronic Repair and Workshop Information (erWin*) operated by Volkswagen AG at:
https://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

6.12 Preparation for taxis and private hire cars

6.12.1 Preparation for taxis and private hire cars ex works

The following preparations are available ex works with PR number:

- Taxi preparation F4E
- Private hire car preparation F5P

This includes the sub-functions:

- Taxi roof sign control system (only for taxi preparation PR number F4E)
- Emergency alarm control system for taxi and rental car
- Interior lighting control
- Connected power supply for two-way radios and peripherals
- Provision of data for the taximeter (e.g. output of a distance signal)

In addition to the Preparation for taxis and private hire cars PR number F4E/F5P, the rear axle differential lock option (1Y4) is selected, which affects the assignment at the outputs of the control unit. See the assignment at connector 2 and the description of the functions.

6.12.1.1 Pin assignment on CFCU* (input and output assignment/pins on CFCU*)

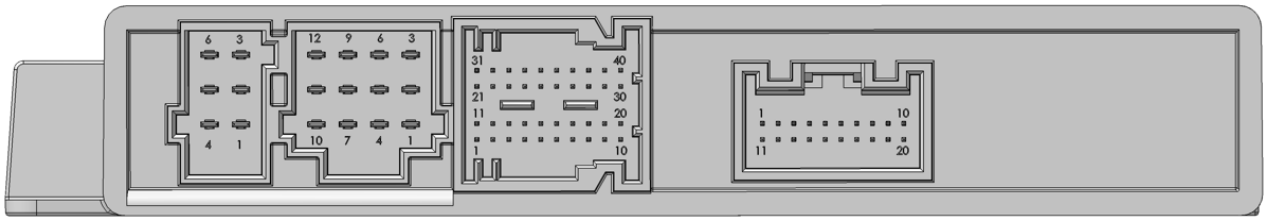


Fig. 1: “CFCU” view

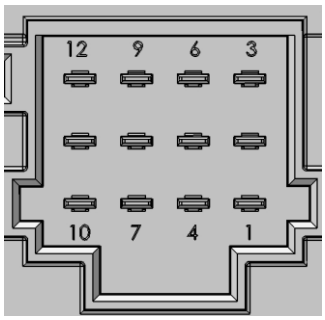


Fig. 2: Connector 2

Plug 2				
Pin no.	12	9	6	3
Signal	MFA_2	MFA_19	MFA_1	MFA_6
Pin no.	11	8	5	2
Signal	MFA_21	MFA_20	MFA_4	MFA_5
Pin no.	10	7	4	1
Signal	MFA_22	MFA_3	MFA_8	MFA_7

Only with rear differential lock

Plug 2				
Pin no.	12	9	6	3
Signal	MFA_2	MFA_19	MFA_1	MFA_6
Pin no.	11	8	5	2
Signal	MFA_21	MFA_20	MFA_4	MFA_5
Pin no.	10	7	4	1
Signal	MFA_22	MFA_3	MFA_8	MFA_7

CFCU pin assignment: Taxi and private hire cars (without rear-axle differential lock) CFCU pin assignment: Taxis and private hire cars (with rear-axle differential lock)

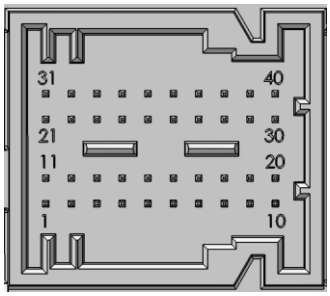


Fig. 3: Connector 3

Connector 3										
Pin no.	31	32	33	34	35	36	37	38	39	40
Signal	MFA_9	MFA_10	MFE_10	MFE_12	MFE_14	MFE_16	MFE_2	MFE_4	MFE_6	MFE_8
Pin no.	21	22	23	24	25	26	27	28	29	30
Signal	MFA_11	MFA_12	MFE_9	MFE_11	MFE_13	MFE_15	MFE_1	MFE_3	MFE_5	MFE_7
Pin no.	11	12	13	14	15	16	17	18	19	20
Signal	MFA_17	MFA_18	MFA_14	Rel2_no	Rel2_com	REL2_nc	MFE_18	MFE_20	MFE_22	MFE_24
Pin no.	1	2	3	4	5	6	7	8	9	10
Signal	MFA_15	MFA_16	MFA_13	Rel1_no	Rel1_com	REL1_nc	MFE_17	MFE_19	MFE_21	MFE_23

CFCU pin assignment: Taxis and private hire cars

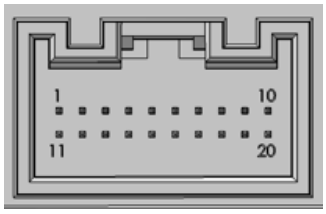


Fig. 4: Connector 4

Plug 4										
Pin no.	1	2	3	4	5	6	7	8	9	10
Signal										
Pin no.	11	12	13	14	15	16	17	18	19	20
Signal	CAN_H:	CAN_L:								

CFCU pin assignment: Taxis and private hire cars

Inputs:

- MFE_01: Activation button for silent/passive alarm
- MFE_02: Activation button for loud alarm
- MFE_03: Deactivation button (emergency alarm)
- MFE_04: Activation button for the interior lighting
- MFE_05: Taxi roof sign button (only for taxi preparation PR number F4E)
- MFE_21: Signal from taximeter: Roof sign control (only for taxi preparation PR no. F4E)
- MFE_23: Signal from end device: fare

Outputs:

- MFA_01: Switched power supply (5 A) for connecting peripheral devices/two-way radio
- MFA_04: Switched power supply (10 A) for the connection of peripheral devices/two-way radio
- MFA_10: Seat recognition signal (when the seat is occupied, except for the driver seat if the vehicle has seat recognition as standard)
- MFA_11: Taxi roof sign function feedback (active/inactive) (only for taxi preparation PR number F4E)
- MFA_12: Interior lighting function feedback (active / inactive)
- MFA_13: Loud or quiet alarm function feedback (active/inactive)
- MFA_14: Distance signal (1)
- MFA_19/MFA_20: Connection for taxi roof sign
- **Only with rear differential lock:** MFA_21/MFA_22: Connection for taxi roof sign)
- MFA_21: Switched power supply (5 A) for connecting peripheral devices/two-way radio
- **Only with rear differential lock:** MFA_06 Switched power supply (5 A) for connecting peripheral devices/two-way radio

(1) For stable and good signal quality, the additional use of a pull-up resistor is recommended (for example via an electrical connection to the MFE_06 input of the CFCU)

Information

Technical documentation on the CFCU and further information regarding the requesting and processing procedure can be found on the CustomizedSolution portal via the link:
https://www.customized-solution.com/de/de/technische-produktinformationen/kfg/technische-information

You must register on the CustomizedSolution portal in order to access this. The configuration of the customer-specific functional control unit (CFCU) can be ordered via the CS portal.

Information from the vehicle manufacturer on the conformity assessment can be obtained from your direct service partner or Converter support team (see 2.1.1 “Contact in Germany” and 2.1.2 “International contact”). You will also find information on this in the Owner’s Manual for your vehicle, on the Volkswagen Commercial Vehicles homepage under “Industry Solutions and Commercial Customers/Industry Solutions/Commercial Vehicles Passenger Transport/Taxi” or at your Volkswagen Commercial Vehicles Partner.

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

6.12.1.2 Function description

Taxi roof sign (only for taxi preparation PR number F4E)

- MFE_05 for deactivating/activating the taxi roof sign (additional information on changing the automatic roof sign control and further information can be found in the owner’s manual for your vehicle).
- MFA_19 and MFA_20 activation (positive polarity)
- **Only with rear differential lock:** Activation of MFA_21/MFA_22 (positive pole direction) (with rear differential lock)
- Activation of MFA_11 for feedback to driver in the roof sign button

Interior lighting

- The interior lighting is activated automatically while the fare is being paid (depending on the taximeter signal, reset when changing taximeter status to “free”)
- MFE_04 for activating/deactivating the interior lighting when the doors are closed
- Activation of MFA_12 for feedback to driver in the interior lighting button

Information

When leaving the vehicle with the vehicle key, the interior light is switched on after 30 minutes at the latest to reduce power consumption.

(When leaving the vehicle with the vehicle key, an activated roof sign is switched off after 30 minutes at the latest to reduce power consumption.)

Emergency alarm (silent alarm)

- MFE_01 activates the silent alarm
- Activation of MFA_19 and MFA_20 for red warning LEDS in the taxi roof sign (this function depends on the design of the roof sign system)
- **Only with axle differential lock:** Activation of MFA_21 and MFA_22 for red warning LEDS in the taxi roof sign (this function depends on the design of the roof sign system)
- Activation of MFA_13 for feedback to driver in the loud alarm button

Emergency alarm (loud alarm)

- MFE_02 activates the loud alarm
- Activation of intermittent main beam
- Activation of hazard warning lights
- Activation of interior lighting
- Activation of intermittent vehicle horn
- Activation of MFA_19 and MFA_20 for red warning LEDS in the taxi roof sign (this function depends on the design of the roof sign system)
- **Only with axle differential lock:** Activation of MFA_21 and MFA_22 for red warning LEDS in the taxi roof sign (this function depends on the design of the roof sign system)
- Activation of MFA_13 for feedback to driver in the loud alarm button

Taxi alarm deactivation

- MFE_03 deactivates the taxi alarm (e.g. button installed in the engine compartment)

Voltage supply for taximeter and two-way radio

- MFA_01 Switched power supply (5 A) for connecting peripheral devices/ two-way radio
- MFA_04 Switched power supply (10 A) for the connection of peripheral devices/ two-way radio
- MFA_21 Switched power supply (5 A) for connecting peripheral devices/ two-way radio
- **Only with rear differential lock:** MFA_06 Switched power supply (5 A) for connecting peripheral devices/ two-way radio
- Time-controlled switching off the voltage supply and at low charge level of the battery

Provision of data for the taximeter

– Output of a distance signal via the MFA 14 output

6.12.2 Programming according to customer requirements

In addition, the programmable CFCU* provides an option for subsequently adjusting the configuration. (example: adding supplementary signals).

Information

Technical documentation on the CFCU and further information regarding the requesting and processing procedure can be found on the CustomizedSolution portal via the link:
https://www.customized-solution.com/de/de/technische-produktinformationen/kfg/technische-information

You must register on the CustomizedSolution portal in order to access this. The configuration of the customer-specific functional control unit (CFCU) can be ordered via the CS portal.

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

7 Modifications to the base vehicle

7.1 Running gear

7.1.1 General information on the running gear

No additional add-ons are allowed to be fitted to the bolting points on the front axle and rear axle.

Warning note

Modifications to the running gear components can lead to an impairment in the driving properties and unstable driving behaviour. This may result in the driver losing control of the vehicle and causing an accident.

Information

If modifications to the running gear are necessary due to the planned conversion, please contact us (see chapter 2.1 “Product and vehicle information for body builders”).

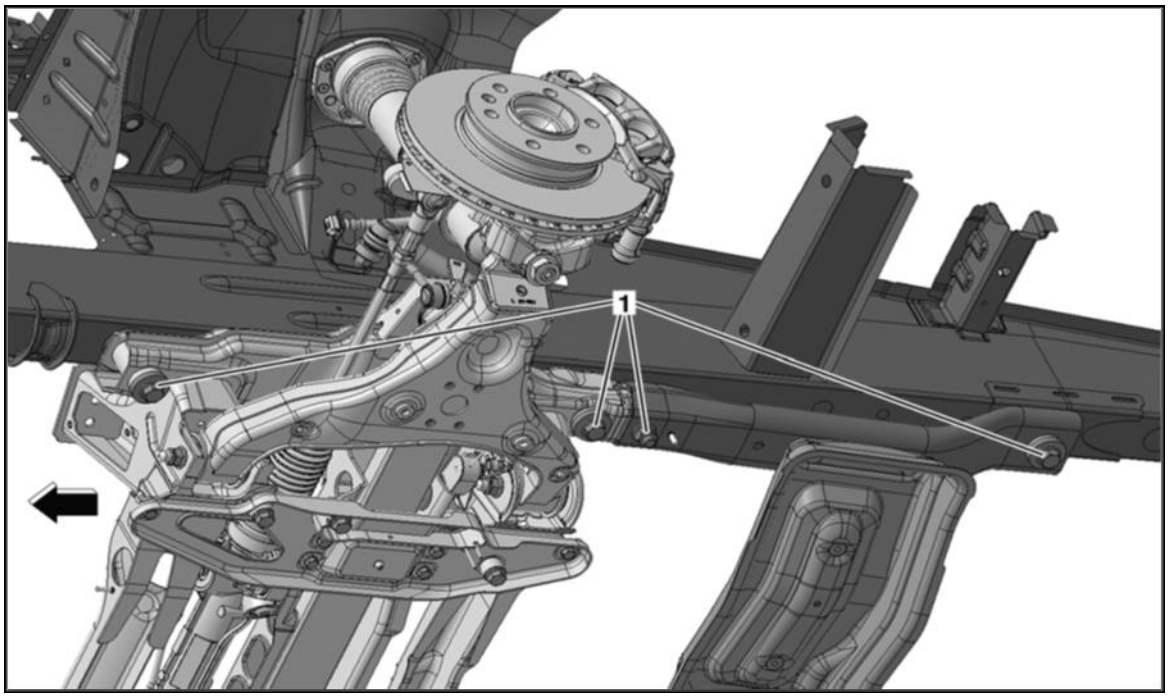


Fig. 1: Front axle and rear axle (schematic diagram)

1 – Bolting points on front axle

Arrow direction of travel

The following must be observed near the axles:

- Front transverse links: Changes to wheel alignment parameters are not permitted.
- The front axle shall not be used for attaching ancillaries or other modifications.
- Rigid axle at rear: modifications are not permitted.
- Brakes: modifications are not permitted.
- Units, sensors, wiring for ESC / ABS: modifications are not permitted.
- New bolts must be used when assembling the front axle. All bolts and bolted connections shall be tightened to the torques specified by Volkswagen. Your Volkswagen customer service department can provide you with information on this.
- Comply with VDI guideline 2862 during all installations, particularly the section *Safety-related bolted connections*.
- Shortening the free clamping length, changing over to waisted shank and use of bolts with a shorter free thread proportion cannot generally be permitted.
- Furthermore, take the settling behaviour of bolted connections into account.

Components that are additionally clamped as well shall have the same or a higher strength than the previous clamped combination. We recommend Volkswagen standard parts.

7.1.2 Springs / shock absorbers / anti-roll bars

7.1.2.1 General

Several running gear variants are available from the factory. A suitable running gear version shall be selected depending on the planned body, see chapter 4.2 “Limit values for running gear” or chapter 2.10 “Delivery range”.

Modifications can only be made to springs, shock absorbers and anti-roll bars in the combinations on the front and rear axle specified by Volkswagen. A letter of non-objection is not required in this case. Further modifications must be coordinated on the front and rear axle.

More information and, if necessary, corresponding letters of non-objection can be obtained from the responsible department.

- We recommend Volkswagen genuine springs.
- During assembly work, care shall be taken not to damage the surface and corrosion protection of the springs.
- Before starting welding work, cover springs to protect them against weld spatter.
- Springs are not allowed to be touched with welding electrodes or welding tongs.

The use of springs and shock absorbers that do not correspond with the properties of the standard parts or the parts available as optional equipment is not permitted. We recommend using Volkswagen standard parts.

Warning note

The use of springs and shock absorbers that do not correspond with the properties of the standard parts or the parts available as optional equipment is not permitted. Otherwise the ESC system in vehicles with ESC will no longer function correctly and will fail. This may result in the driver losing control of the vehicle and causing an accident.

7.1.3 Brake system

Warning note

Work performed improperly on brake hoses, lines and cables can impair their function. This can lead to a failure of components or safety-relevant parts. Have work on brake hoses, lines and cables performed only by a qualified specialist workshop.

The brake system shall be checked for perfect functioning after completion of the work. We recommend inspection by a technical test centre.
If wiring needs to be re-routed, avoid laying across sharp edges and routing inside excessively narrow cavities and close to moving parts.

7.1.3.1 Hydraulic brake system

- Hydraulic brake lines shall be replaced with approved 4.75 mm × 0.7 mm or 6 mm × 0.7 mm wound piping.
- The bend radius shall be >17.5 mm.
- Lines are only allowed to be shaped in a bending tool. The cross-section is not allowed to be reduced.
- Put male inverted nut M 10 × 1 (see figure with design of male inverted nut) and female union nut M 10 × 1 (see figure with design of female union nut) onto the cable ends and execute flange form F according to DIN/ISO 74234.
- The inside of the lines shall be cleaned before installation.
- The brake fluid shall be changed every two years.
- If you do not know how long a vehicle with hydraulic brake system has been standing, the brake fluid shall be changed.
- When laying a brake line between two components that move in relation to each other, a flexible line (hose, steel braided etc.) shall be used.

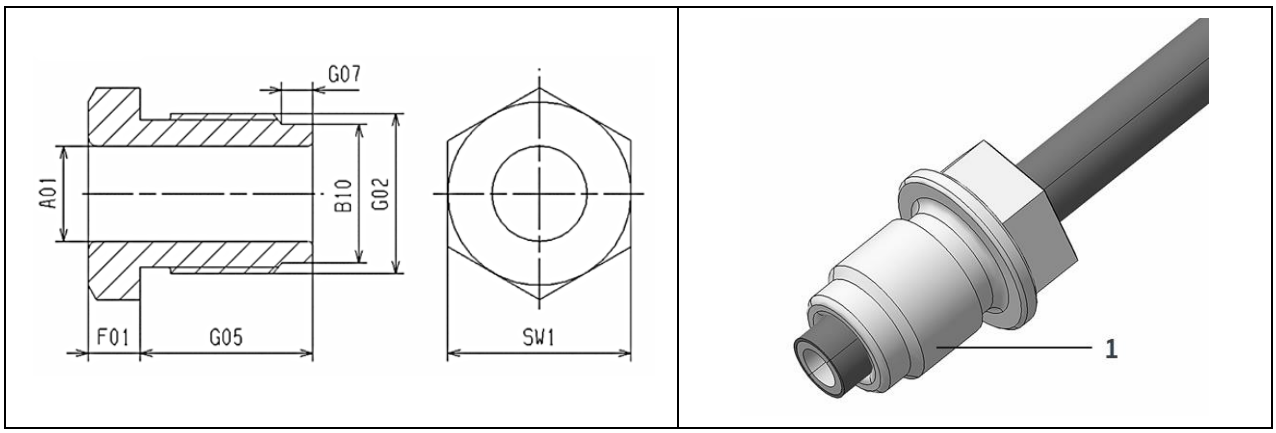


Fig. 1: Version with union screw (WHT.007,636)

Identifier	Property	Value [mm}
G02	Nominal thread diameter	M 10 × 1
G05	Length to head	11.50
F01	Head height	6.00
G07	Part length	2.5
A01	Interior diameter	5.32
B10	Exterior diameter	8.6
SW1	Width across flats	11
L22	Optional material	17B2

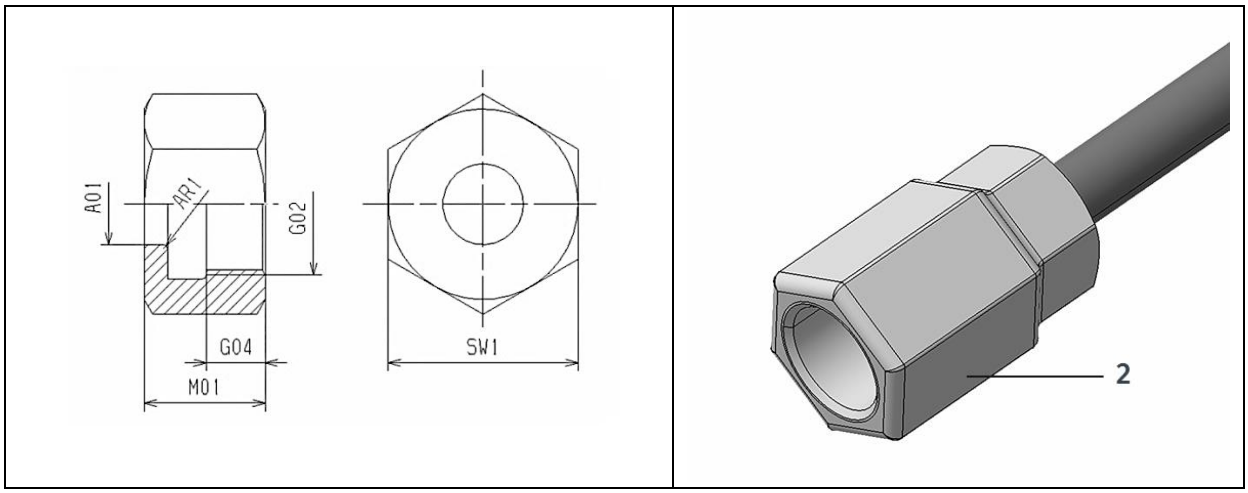


Fig. 2: Version with union nut (WHT.000.004)

Identifier	Property	Value [mm}
G02	Nominal thread diameter	M 10 × 1
G04	Thread length	10.00
A01	Interior diameter	5.32
AR1	System radius	0.60
M01	Total nut height	22.00
SW1	Width across flats	13
L22	Optional material	16B3 tempered over 800+200N/mm², QSt36-3

7.1.3.2 Line routing

Warning note

Sufficient spacing between the brake lines and heat sources, sharp edges and moving parts shall be ensured. Otherwise the impairment and total failure of the brake system could result due to the formation of bubbles in the brake fluid or abrasion on the brake line.

- We recommend genuine brake line fasteners from Volkswagen for clipping in the brake line.
- The spacing from fastener to fastener is not allowed to exceed 500 mm.
- The handbrake cable shall be routed without kinks.
- Changes in angle at the ends of the handbrake cable sleeve (loose wire strands) are not permitted.

7.1.3.3 Routing additional lines along the brake hoses/brake lines

No additional lines are allowed to be fastened to brake hoses and brake lines.
Additional lines must remain at a sufficient distance from brake hoses and brake lines under all operating conditions, and are not allowed to touch or chafe against such brake hoses/lines under any circumstances.

7.1.3.4 Cable for handbrake/changing the length of the handbrake cable

If a new cable is required for the handbrake, the new length of the cable shall be measured and a new suitable cable obtained.
The handbrake cable fasteners are moment-optimised, and modification is not permitted.

Please note that the brake cable of the parking brake (FBA) as well as its cable support bracket are safety-relevant parts, and form part of the type approval for the brake system. Any modification will require a new approval process.

7.1.3.5 Disc brakes

Cooling is not allowed to be impaired by spoilers under the bumper, additional wheel trim covers or brake disc covers etc.

Warning note

Modifications to the air supply and air outlet of the brake system are not permitted. Modifications to the steering and brake system can result in these systems no longer working correctly and failing. This may result in the driver losing control of the vehicle and causing an accident. Overheating of the brake system can result in tyre damage in addition to reduced braking performance. Therefore a sufficient supply of cooling air shall always be ensured.

Warning note

Modifications to brake components (e.g. brake callipers, discs etc.) and sensors are not permitted. Modifications to brake components can result in these systems no longer working correctly and failing. This may result in the driver losing control of the vehicle and causing an accident.

7.1.4 Pneumatic suspension

Warning note

The use of springs and shock absorbers that do not correspond with the properties of the standard parts or parts with letters of non-objection or the parts available as optional equipment is not permitted. Otherwise the ESC system in vehicles with ESC will no longer function correctly and will fail. This may result in the driver losing control of the vehicle and causing an accident. It is not permitted to install pneumatic suspension on the front axle later on.

Practical note

Make sure the pneumatic suspension is ready for operation before you start to drive. The driver shall comply with the information in the operating instructions from the system supplier of the pneumatic suspension.

7.2 Body-in-white/bodywork

7.2.1 General information on body-in-white/ bodywork

Changes to the body are not allowed to impair the function and strength of power units and operating devices of the vehicle, neither may they reduce the strength of weight-bearing parts.
During vehicle conversions and assembly of bodies, it is not permitted to make any modifications which impair the function and freedom of movement of the suspension (e.g. for maintenance and inspection work) or the accessibility to the same.

Please observe the following instructions:

- With 4x2 vehicles (rear-wheel drive) and all-wheel drive vehicles, limited modifications to the wheelbase are permitted under certain circumstances.
- In the event of modifications to the wheelbase, configuration of the properties of the ESC is required (see chapter 7.2.5 “Wheelbase modifications”).
- The function of the tyre pressure monitoring system (TPMS) can be impaired by modifications in the direct vicinity of the aerials and wheels.
- Interventions in the cross-member structure from the front end to the rear of the B-pillar are not allowed.
- Modifications to the rear gate are not permitted.
- The clearance for the fuel filler neck as well as for the fuel tank and fuel lines shall be maintained (see chapter 7.3.1 “Fuel system”).
- Avoid corners with sharp edges.
- If additional equipment is attached to frame longitudinal and cross members, brackets (hole welding) must be used and a letter of non-objection is required (see 2.2 “Converter guidelines, consulting”).
- Neither drilling nor welding is permitted on the A and B-pillars in crash-relevant areas.
- The A, B C and D-pillars (rear gate) must not be cut, including the corresponding roof cross struts, with the exception of the escape hatch.
- The gross axle weight ratings must not be exceeded.
- The function of trailer connections shall be checked.
- If a towing bracket is fitted, the necessary reinforcements shall be present (see chapter 7.8 “Towing bracket”).
- Holes in the frame longitudinal member are the result of the production process and are not suitable for attaching add-ons, bodies, installations and conversions; otherwise, the frame may be damaged.
- If superstructures are fitted on the chassis of base vehicles, a tank sender protector will be necessary depending on the body. See chapter 7.3.1 “Fuel system”.

7.2.1.1 Frame longitudinal member profile dimensions

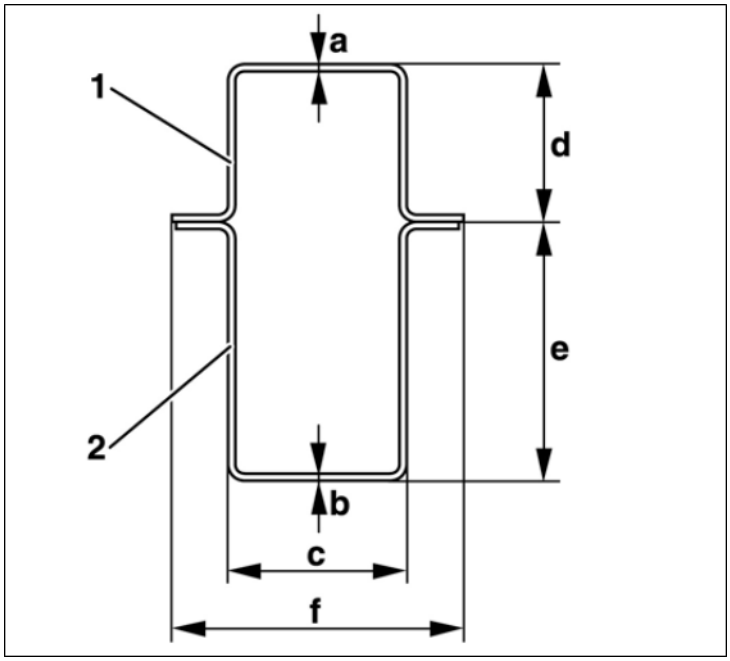


Fig. 1: Dimensions of upper chord and lower chord

1 Upper chord

2 Lower chord

Gross vehicle weight rating [t]	a	b	c	d	e	f
3.5, 3.88, 4.0 Chassis	2.3	2.3	78	85	114.5 80[1]	139
5 Chassis	3.0	3.0	78	85	114.5	133
3.5 Panel van	-	1.5	78	-	114.5 80[1]	120
5 Panel van	-	3	78	-	114.5	120

[1] In area of rear axle

Frame longitudinal member 3.5 t

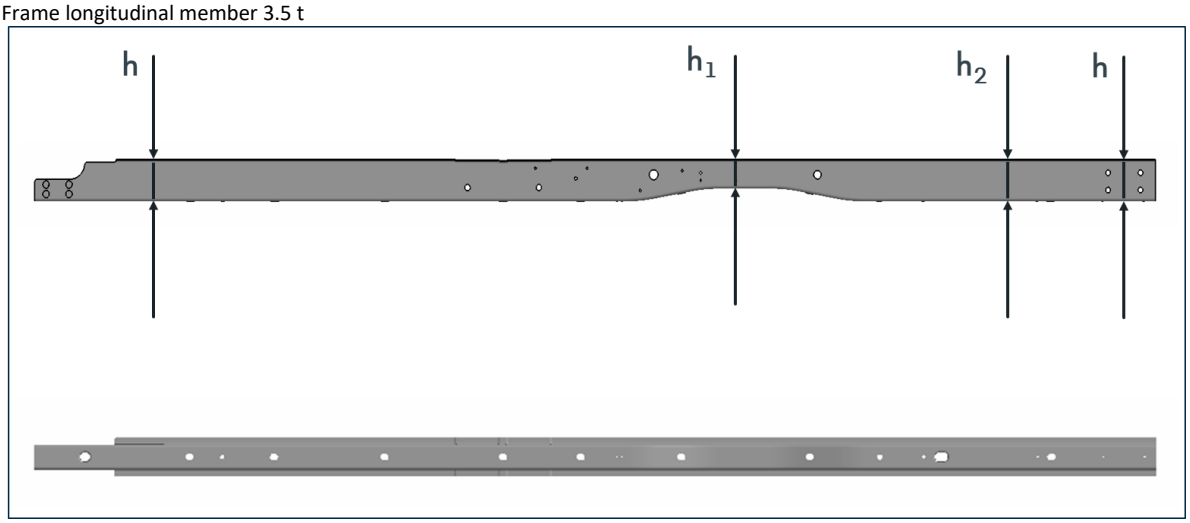


Fig. 2: Frame longitudinal member 3.5 t.

Dimensioning of frame longitudinal member lower chord

h	114.5 mm
h1	80 mm
h2	114.5 mm

Frame longitudinal member 5 t

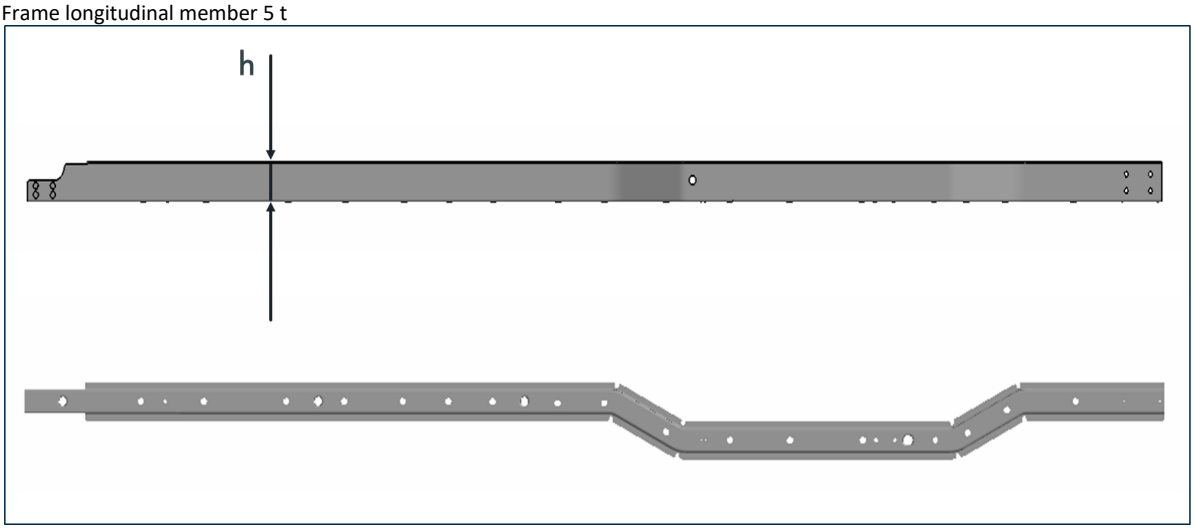


Fig. 3: Frame longitudinal member 5 t

Dimensioning of frame longitudinal member lower chord

h	114.5mm

7.2.1.2 Welding on the frame

Welding work is only allowed to be carried out by specialist personnel.

Information

You will find further information on welding work in the chapters 3 “Planning bodies”, 5 “Damage prevention” as well as 7.2.1 “General information on body-in-white/bodywork” and the “Electronic Repair and Workshop Information” (erWin)* operated by Volkswagen AG.

* Information system from Volkswagen AG, fee required

Welding work is not permitted on the upper and lower chord of the chassis frame.
Plug welding is only permitted in the vertical webs of the frame longitudinal member.
Welding is not allowed in bending radii.

Warning note

Unauthorised drilling or welding in the vicinity of the airbags can cause the airbag units to no longer function correctly (e.g. unintended ignition during operation; complete failure), see chapter 7.4.2.3 “Frontal airbag”. Welding in the area of airbags is therefore prohibited.

Handling, transporting and storage of airbag units are subject to the laws on potentially explosive substances.

7.2.1.3 Drilling on the frame

Practical note

Existing holes on the frame longitudinal member result from the production process and are only allowed to be used with a letter of non-objection from the responsible department (see 2.2 “Converter guidelines, consulting”).

Holes are only allowed to be drilled into the web of the longitudinal member according to the illustration below and in conjunction with spacer bushes that are welded onto the longitudinal member.

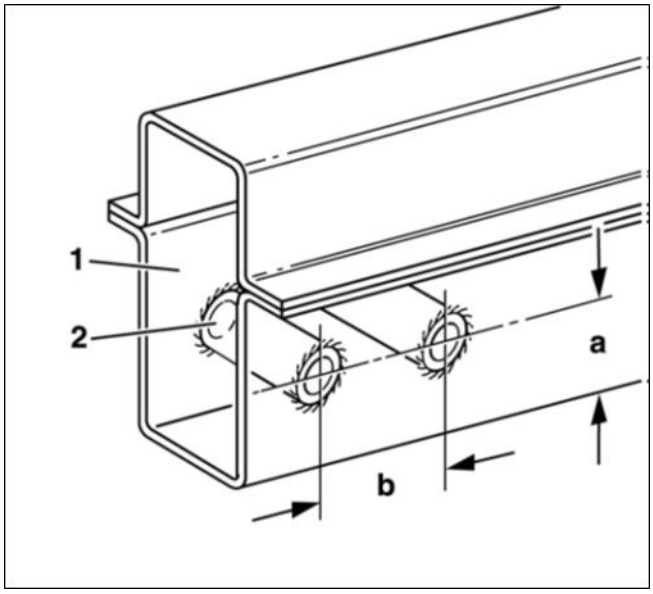


Fig. 1: Holes on the frame longitudinal member

1 – Chassis frame

2 – Spacer bushes

A – Distance is at least 20% of the frame height

B – Hole distance at least 50 mm

After drilling, deburr and grind all holes, remove chips from the frame and inject cavity sealant through the holes.

Practical note

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Drilling is not allowed:

- On the upper and lower chords of the frame (except for holes at the rear end of the frame).
- In the area of supporting parts for the rear axle and on parts attached to the frame.
- On load application points (e. g. spring hangers, brackets etc.).

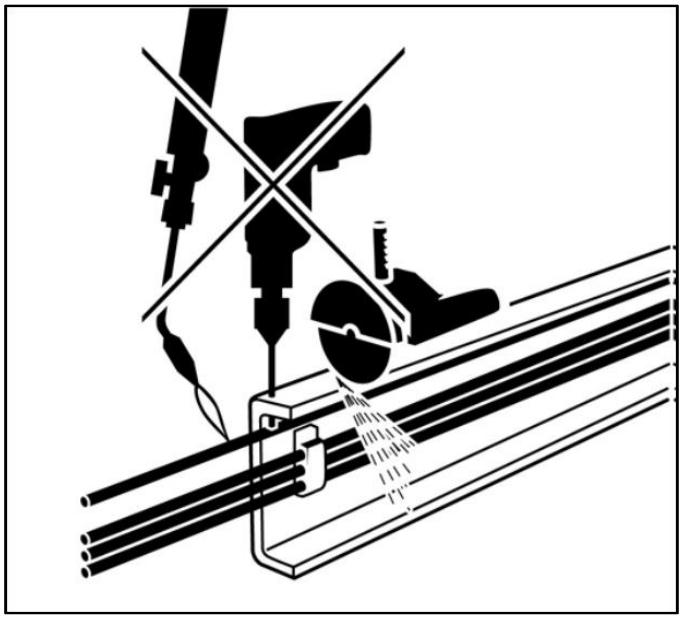


Fig. 2

Warning note

Unauthorised drilling in the vicinity of the airbags can cause the airbag units in the standard vehicle to no longer function correctly (see chapter 7.4.2.3 “Frontal airbag”). Drilling in the area of airbags is therefore prohibited.

Handling, transporting and storage of airbag units are subject to the laws on potentially explosive substances.

7.2.2 Attachment to the frame

7.2.2.1 Attachment to front frame

The attachment of assemblies, bows etc. in the area of the front body and the front axle is not permitted since the structure required for passive safety can be impaired.

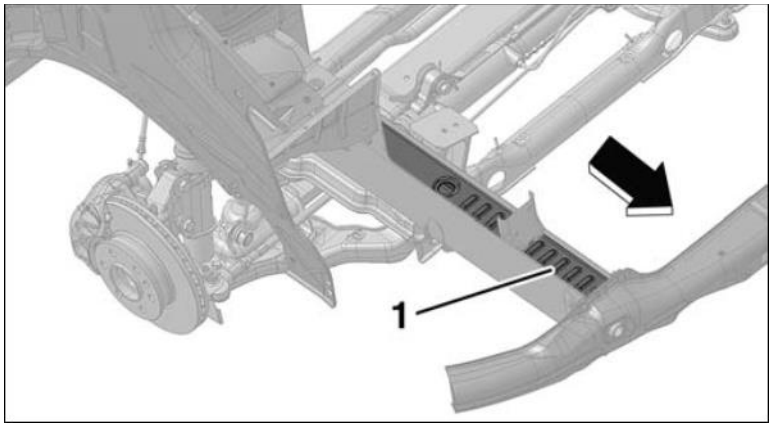


Fig. 1: Structure for passive safety (schematic diagram)

1 – Crumple zone on subframe

Arrow direction of travel

Warning note

If add-on parts are fitted to the front frame, the function of the front crash structure, the airbag units and the radar system may be impaired.
If the crash structure is changed, it might become necessary to deactivate the airbag units. Attachments on the front frame are therefore only possible after consultation with the responsible department.

Practical note

Ease of repair of the standard vehicle shall be retained.

7.2.2.2 Attachment to rear frame

To attach ancillaries or add-ons to the frame at the rear, an attachment shall be created like the towing bracket that is available as optional equipment (see figure).

For the application of higher forces and torques, an additional support shall be added on the frame end cross member for torque support.

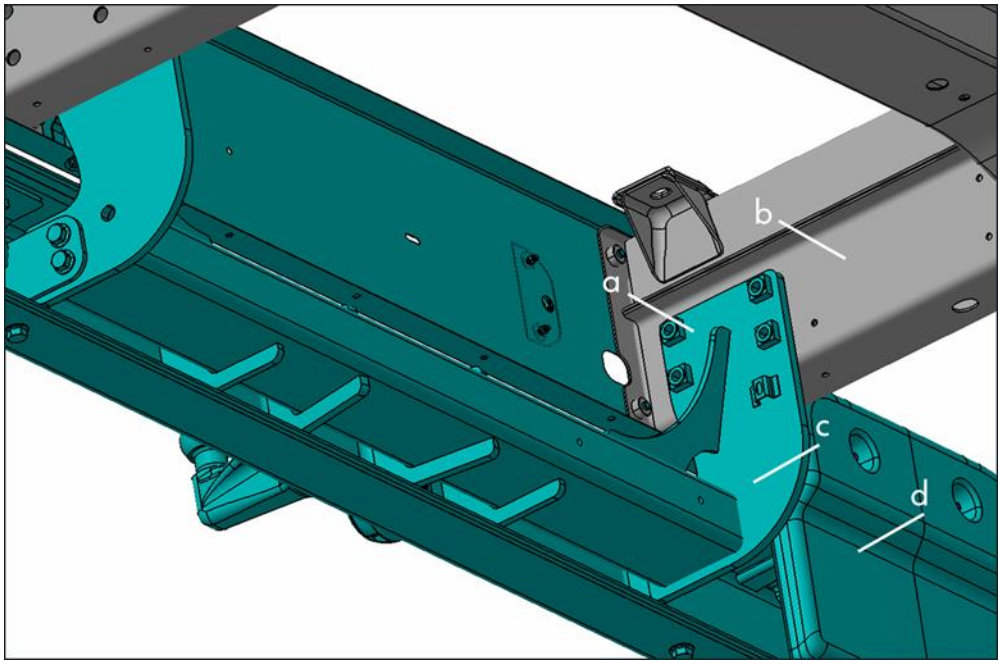


Fig. 1: Installation of towing bracket on the frame longitudinal member (view from below right)

a – Attaching the assembly stand to the frame longitudinal member

b – Frame longitudinal member lower chord

c – Towing bracket assembly stand

d – Frame end cross member

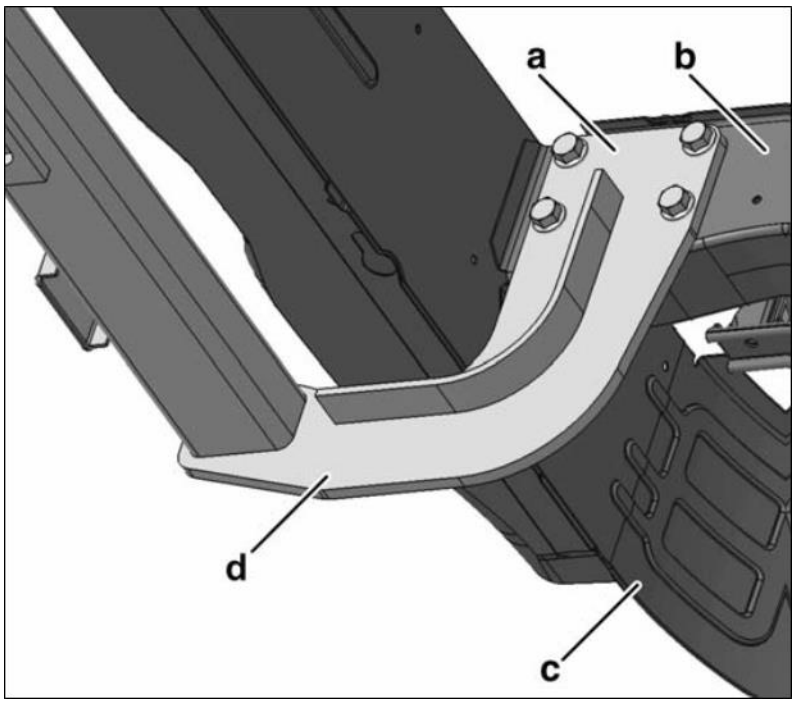


Fig. 2: End cross member on right frame longitudinal member from inside

a – Attaching the assembly stand to the frame longitudinal member

b – Frame longitudinal member lower chord

c – Frame end cross member

d – Towing bracket assembly stand

A letter of non-objection from the responsible department is required.

You will find further information on hole patterns for the different towing bracket versions in chapter 10.2 “Hole patterns for towing bracket”.

7.2.2.3 Attachment with body brackets

All of the body brackets provided at the factory are to be used for securing superstructures to the vehicle frame. Further information is available in chapter 8.1.4 “Attachment to the frame”.

7.2.3 Material for chassis frame

If the wheelbase is modified and the frame is lengthened, the material of the extension piece shall correspond with the production chassis frame in terms of quality and dimensions.

Material	Yield strength Re [N/mm2]	Tensile strength Rm [N/mm²]
H240LA	240-310	≥ 340
S235JRG2	>235	360-510

7.2.4 Frame modification behind the rear axle

If the vehicle overhang is to be modified, this is possible in principal if the permitted axle loads and the minimum front axle load are taken into account.
On vehicles with closed body (panel van), an overhang extension is only permitted after consultation with the responsible department (see 2.2 “Converter guidelines, consulting”).

- If the frame is extended more than 350 mm, additional cross members must be installed.
- Additional frame cross members shall have the function of a standard cross member.
- Standard body brackets shall be used at the end of the frame.
- The body brackets/bolting points removed by frame shortening must be replaced again.
- The distance between the body brackets must not be greater than 500 mm.
- If the frame overhang is extended, the function of the trailer stabilisation and the maximum trailer weight specified in the vehicle papers shall be checked and, if necessary, reduced to zero, see chapter 4.3.5 “Vehicle overhang”.
- The frame overhang shall be reinforced accordingly.
- The gross axle weight ratings must be observed.
- The permitted centres of gravity shall be observed.
- The minimum front axle load shall be observed in all load states (see chapter 4.1.1 “Steerability”).

Frame cuts are not permitted in the following areas:
- Load application points (e.g. spring hangers)
- Axle guides, axle suspension
- Profile modifications (offset frame, tapered frame)
- Bores

You can find more information about max. overhang lengths in chapter 4.3.5 “Vehicle overhang”.

Information

The overhang length of the vehicle includes the total overhang related to the rear axle including the frame overhang extension and superstructures and add-ons.

Information

You will find information on profile dimensions for the frame longitudinal member in chapter 8.1.3 “Profile dimensions/dimensioning”.

If an extended overhang means the underbody guard has to be moved, the modified underbody guard, together with the frame extension, must meet the requirements of UNECE-R 58 (see 7.9 “Underbody guard”).

3.0 t and 3.5 t vehicles

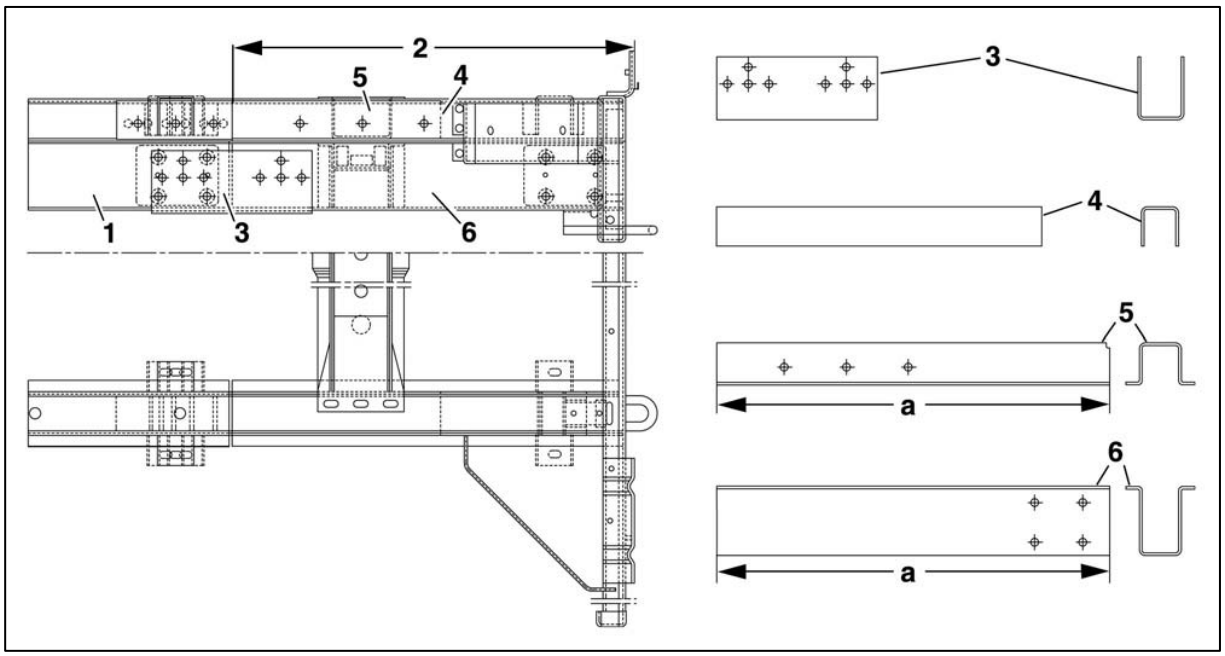


Fig. 1: Frame extension for overhang extension

1 – Chassis frame longitudinal member

2 – Frame extension

3 – Exterior reinforcement

4 – Interior reinforcement

5 – Body carrier extension

(wall thickness 3.5 t: 2 mm)

6 – Chassis frame extension

(wall thickness 3.5 t: 2 mm)

a – Measurement is set by Converter

Practical note

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Practical note

Country-related regulations and guidelines shall be complied with.

5.0 t vehicles

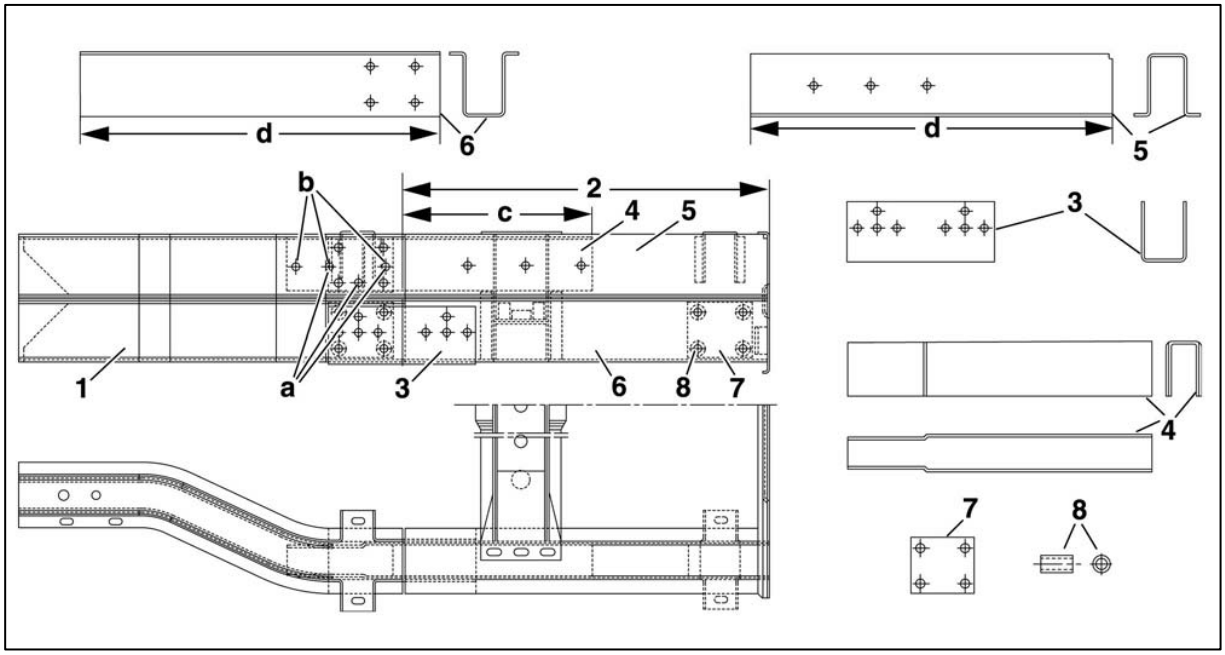


Fig. 2: Frame extension for overhang extension

1 – Chassis frame longitudinal member

2 – Frame extension

3 – Exterior reinforcement

4 – Internal – reinforcement (wall thickness 5 t: 3 mm)

5 – Body carrier extension

6 – Chassis frame extension (wall thickness 5 t: 3 mm)

7 – Reinforcement plate at least 2 mm

8 – Spacer bushing pipe 24 × 4 M-steel or St 35 NBK

a – Drill holes wheelbase 3,640 mm

b – Drill holes wheelbase 4,490 mm

c – 350 mm (wheelbase 3,640 mm) 300 mm (wheelbase 4,490 mm)

d – Measurement is set by Converter

A bolt-on frame extension is also possible:

- Up to a maximum length of 300 mm.
- If a towing device is mounted on the bolt-on frame extension, it must be classified together as a towing bracket and must be checked and approved according to UNECE-R 55.
- To bolt the extension to the original frame, the standard holes (diameter D = 15 mm) with spacers (diameter d = 14 mm) in the longitudinal member must be used.
- M12 size bolts of property class 10.9 are to be used.
- There must be a body bracket at the end of the frame, with which the body is then connected to the bolt-on extension.
- The connection between the extension and the subframe must be shear-proof. See 8.1.4.3 “Shear-proof connection”.

Practical note

Country-related regulations and guidelines shall be complied with.

Practical note

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

7.2.5 Wheelbase modifications

Warning note

Wheelbase changes outside the specifications listed below may result in vehicles with ESC no longer functioning as intended with this system. This may result in the driver losing control of the vehicle and causing an accident. (see chapter 6.8.3 “Electronic Stability Control (ESC)”).

To avoid accidents, it is necessary to carefully follow the instructions and limitations specified in this section.

In addition, observe relevant country-specific regulations.

In accordance with the vehicle approval regulations of the 28 EU Member States, wheelbase modifications are permissible subject to the following restrictions:

- For vehicles with the electronic stability program (ESC), wheelbase changes can be made to reach the standard wheelbase of 3,640 mm and 4,490 mm. If the specifications for the frame change are observed, it is not necessary to present the converted vehicle. However, the ESC parameter set must be adapted to the changed wheelbase. For details on obtaining the data set, see the info box below.
- Subsequent ESC configuration is required on all vehicles with ESC and a modified wheelbase divergent from the standard wheelbases. It is essential to present the concept or the vehicle in order to determine the required ESC parameter set. Wheelbase modifications may also affect the correct functioning of assist and safety systems. These systems are optimally matched to standard wheelbases. If the planned conversion requires a modification to the wheelbase that deviates from the standard wheelbases, please contact Volkswagen Commercial Vehicles before the conversion.
- If, on vehicles with rear-wheel drive and single tyres (1X4), the wheelbase is extended beyond the longest standard wheelbase of 4,490 mm and/or a tandem axle is fitted behind the standard axle and, in vehicles with front-wheel drive (1X0), the medium wheelbase of 3,640 mm is extended, the existing transverse links of the front axle must be replaced with components with part number 2N0.407.151.P/152.P.
- If the frame is extended more than 350 mm, additional frame cross members must be installed.
- Additional frame cross members shall have the function of a standard cross member.
- The clearance for the input shaft to the rear axle must be observed.
- Wheelbase changes by moving the rear axle on the frame are not permitted.
- Align the chassis horizontally before cutting the frame longitudinal member.
- Place cutting points so that no existing drill holes on the frame longitudinal member are cut.
- Note changed values for chassis weight and turning circle.

Information

Please contact the Conversion Portal hotline, your direct point of contact at the Converter support team or the responsible importer (see chapter 2.1.1 “Contact in Germany” and 2.1.2 “International contact”)

The changed ESC parameter set can be requested from the following address:
NSC.Convert@volkswagen.de

Frame cuts are not permitted in the vicinity of:

- Load application points (e.g. spring hangers)
- Axle guides, axle suspension
- Profile modifications (offset frame, tapered frame)
- Bores

Please also note chapters 6.4.6 “Extending cables”, 7.1.3 “Brake system” and 7.3.6 “Drive shafts”.

7.2.5.1 Cuts on frame

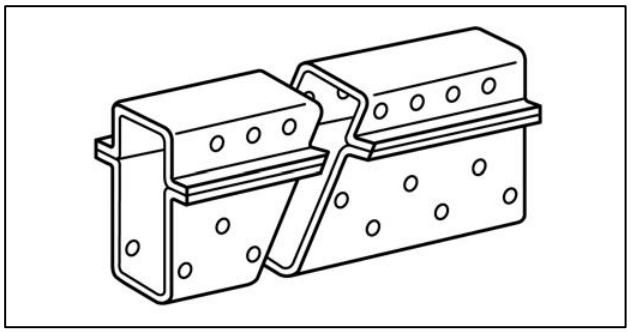


Fig. 1: “Diagonal” frame cut, taking example of frame longitudinal member on chassis

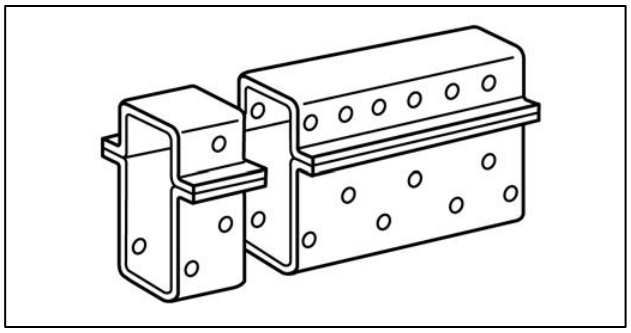


Fig. 2: “Straight” frame cut, taking example of frame longitudinal member on chassis

7.2.5.2 Recommended frame cutting areas

Cutting in the area of frame inserts shall be avoided for subsequent wheelbase extensions. We recommend the areas specified for the respective wheelbases. (see table, see illustration).

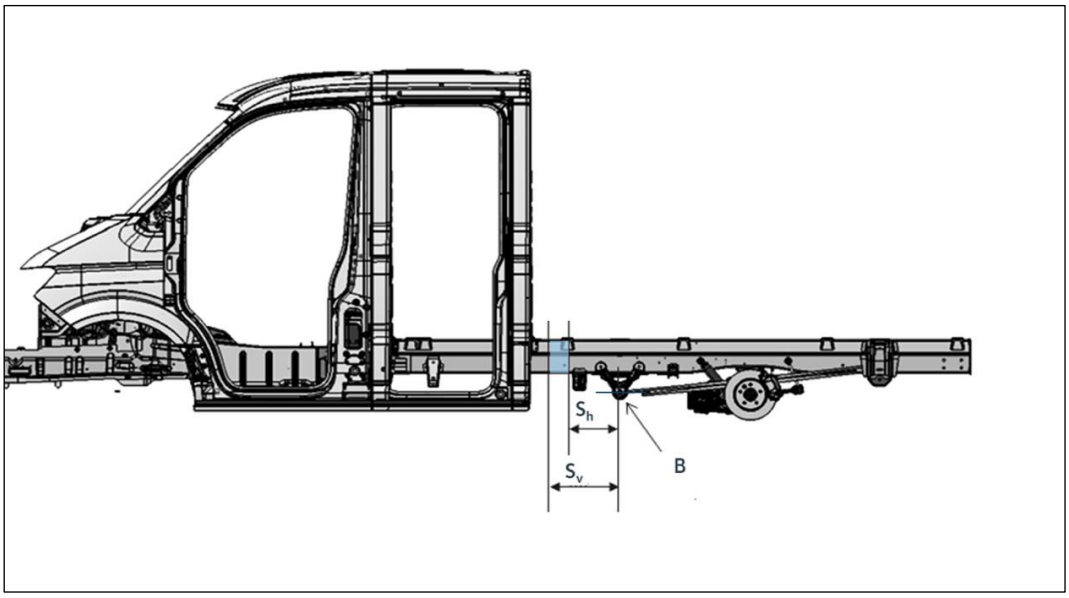


Fig. 1: Cutting area of the frame

Sv – distance of front cut surface from reference point (front leaf spring mounting point)

Sh – distance of rear cut surface from reference point (front leaf spring mounting point)

B – reference point: front leaf spring mounting point

Open bodies	Wheelbase/vehicle length	SV [mm]	Sh [mm]
Chassis with double cab (double cab L3)	3640/6204	273	261
Chassis with double cab Double cab L4	4490/7004	516	266
Chassis with single cab Single cab L3	3640/6204	316	276
Chassis with single cab Single cab L4	4490/7004	1166	276
Chassis with double cab (Double cab L3, twin tyres)	3640/6204	180.3	178.7
Chassis with double cab (Double cab L4, twin tyres)	4490/7004	638.55	178.7
Chassis with single cab (Single cab L3, twin tyres)	3640/6204	317	178.7
Chassis with single cab (Single cab L4, twin tyres)	4490/7004	1167	178.7
Chassis with single cab (Single cab L5, twin tyres, + longer overhang)	4490/7404	1167	178.7

Values refer to chassis with cab

Sv – front distance from reference point (front leaf spring mounting point)

Sh – rear distance from reference point (front leaf spring mounting point)

Practical note

If the wheelbase of the vehicle is modified, the length of the drive shaft shall be adapted to the vehicle. Lengthening shall be performed by a company qualified for drive shaft manufacture.

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Please also observe the specifications on bolted, welded and bonded joints (see chapter 3.7) and the Workshop Manual issued by Volkswagen AG.

7.2.5.3 Reinforcement of frame cutting areas

The cutting areas shall be reinforced with frame inserts if the frame is extended by the converter. The specified covering and the material properties of the frame inserts shall be observed.
Wheelbase extensions shall be made as follows:

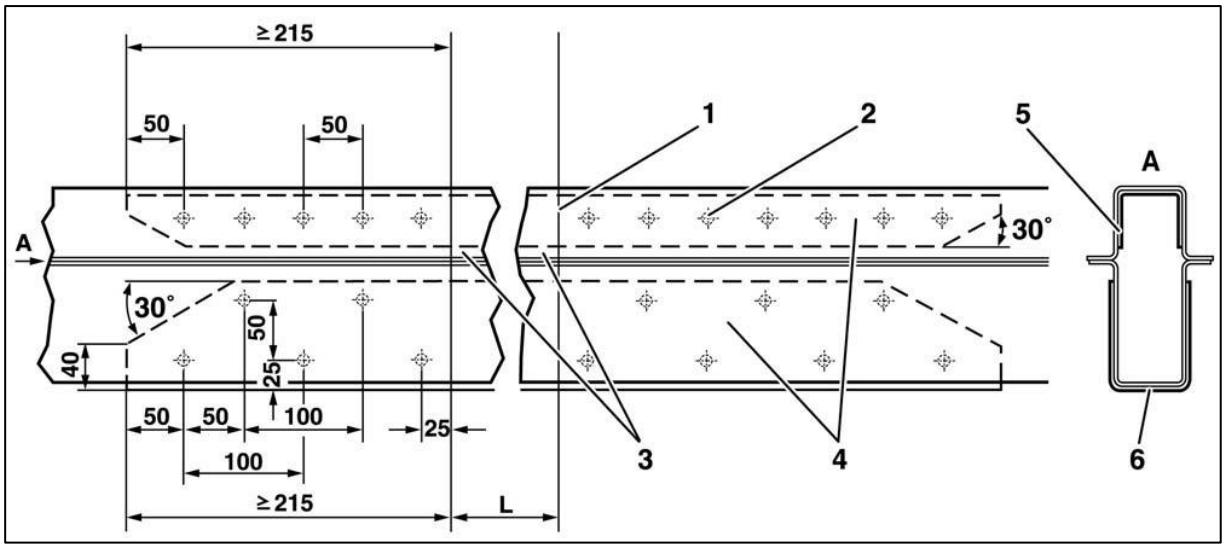


Fig. 1: Configuration of frame inserts, taking example of frame longitudinal member on chassis

1 – Joins welded all round

2 – Plug welding, hole diameter 12 mm

3 – Material quality of top-hat profile inserted corresponding with standard

4 – Inserts, material at least St 12.03, material thickness 2 to 3 mm

5 – Insert for upper chord (inner)

6 – Insert for lower chord (outer)

L – Wheelbase extension

Please ensure that the end of the exhaust pipe is not directed at a tyre following wheelbase modifications.
After wheelbase modifications, the chassis shall be reinforced with a full-length assembly frame (see chapter 8.1 “Assembly frame”).

If the assembly frame is also extended when the overhang is extended, the weld seams shall be arranged offset by at least 100 mm (see illustration).

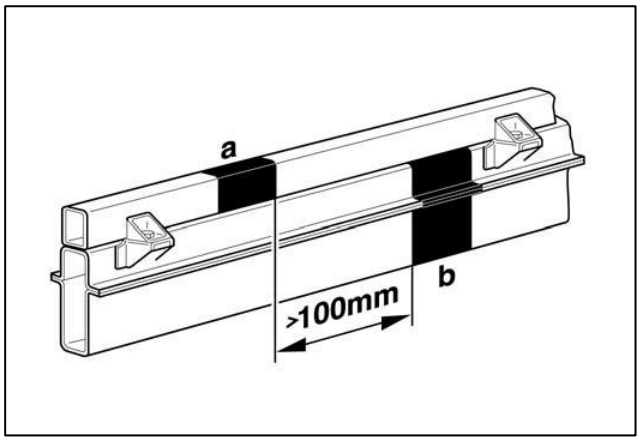


Fig. 2: Overhang extension vehicle frame with assembly frame

a – Extension of assembly frame

b – Extension of frame

7.2.5.4 Letter of non-objection for wheelbase modifications

More information on wheelbase modification and, if necessary, corresponding letters of non-objection can be obtained from the responsible department.

When sending inquiries, please include two drawings of the conversion and the body giving the following details:

- Position of the cut,
- Reinforcement measurements,
- Drive shaft line,
- Indication of purpose.

7.2.6 Modifications to cab

A letter of non-objection from the responsible department is required for all modifications to the cab.
Fixed installations or conversions must meet the criteria of legislation relating to head impact acc. to UNECE R 21 (vehicle class M1) and FMVSS 201.

Warning note

Changes to the cab are not allowed to impair the function of any safety-relevant components (such as airbag units, sensors, pedals, selector lever, cables, lines and the like). This can lead to a failure of components or safety-relevant parts.

Practical note

If the tank cap or parts placed on the tank cap are removed, blocking can occur in an accident. As a result, the survival space in the B-pillar can no longer function correctly. Covering with trim parts and securing “blocking” parts to the B-pillar is not permitted.

The strength and rigidity of the cab structure must not be reduced.
The air intake for the engine shall not be impaired.
The centre of gravity is affected by modifications to the cab. The permitted centre of gravity limits and axle loads shall be observed.

Practical note

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

7.2.6.1 Modification of cab roof general information

Warning note

Later modifications to the headliner or the roof skin are not permitted if the vehicle is equipped with a window bag between the A-pillar and the B-pillar. Otherwise the window bag might no longer deploy correctly (e.g. delayed or incomplete deployment of the window bag).

Modifications to the cab roof (e.g. roof lowering) are only possible after consultation with the responsible department or as described in 7.2.11 “Cutting cab roof and B-pillar roof cross strut”.

Plastic roofs are only suitable for the installation of emergency hatches to a certain extent.
The roof load capacity is limited (see chapter 4.3.8 “Vehicle roof/roof load”).

Practical note

Roof cross struts or weight-bearing parts are not allowed to be removed without replacement or to be reworked.

Information

You will also find information on cab superstructures and air baffles in chapter 7.6.1 “Wind baffles”.

The permitted centre of gravity and the permitted axle loads shall be observed.

7.2.6.2 Modifications to cab rear wall

If it becomes necessary to make a cut in the back wall of the cab then this is possible in conjunction with a frame around the outline of the cut
session. The replacement rigidity provided by the frame must be at least that of the original rigidity.
Partitions can be removed completely or partially. Also refer to Chapter 8.4 “Modifications to closed panel vans”.

Warning note

Later modifications to the headliner or the roof skin are not permitted if the vehicle is equipped with a window bag between the A-pillar and the B-pillar. Otherwise the window bag might no longer deploy correctly (e.g. delayed or incomplete deployment of the window bag).

7.2.7 Side panel, windows, doors and lids

7.2.7.1 Side panel

If modifications are made to the side panel on the panel van, replacement rigidity corresponding with the base vehicle shall be provided.
The function of the roof frame is not allowed to be impaired and shall be retained.
A letter of non-objection from the responsible department is required.

Practical note

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Information

You will find further information on modifications to the side panel chapter 7.6.5 “Shelf installation/ installations in vehicle interior”.

7.2.7.2 Windows

Windows shall be fitted with a sturdy frame. This frame shall be connected to other body elements by means of a force-locking connection.
If the supporting structure (pillars, reinforcements and cross strut mountings) of the base vehicle is modified to fit windows (panorama window), replacement rigidity corresponding with the base vehicle shall be provided.

If the Converter is fitting its own windows, a vehicle *without rear window* is available from the factory with the PR no. 4HA.

Practical note

Fitting panorama windows in the panel van by cutting the stamped window outline without a corresponding replacement rigidity is not permitted. Otherwise the side panel could be damaged.

Information

A letter of non-objection from the responsible department is required for conversions involving the cut-out of stamped window outlines with rigidity measures. Please contact the hotline of the Conversion Portal, your direct point of contact at the Converter support or the responsible importer (see 2.1.1 “Contact in Germany” and 2.1.2 “International contact”).

If the Converter installs their own windows in the rear pivoting door, the following is to be noted, in conjunction with PR No. 4HS “Screen wipers on the rear pivoting door” (“Rear window washer-wiper system with intermittent operation”).

- To ensure perfect function of the rear window wiper, the geometry of the windows supplied by the Converter shall correspond with the windows available as standard.
- The wiper blades of the rear window wiper shall rest against the window across the whole wiping area.
- The thickness of the rear windows shall be 3.15 ±0.1 mm.
- The rear windows shall not protrude over the door trim.

7.2.7.3 Doors and flaps

If the supporting structure (cross members, frame, pillars, reinforcements and cross strut mountings) of the base vehicle is altered by modifying doors, replacement rigidity corresponding with the base vehicle shall be provided.
The trigger sensor for the occupant protection systems is located in the door body on vehicles with window or thorax bag. Modifications to the door body are not permitted.

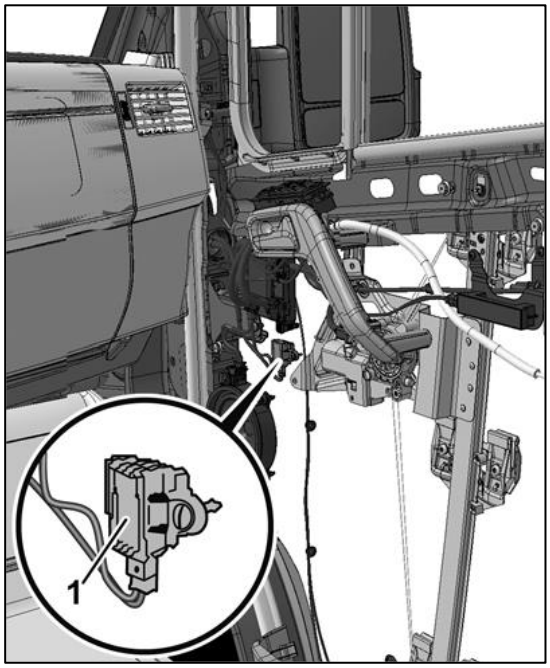


Fig. 1: Door body with sensor system (schematic diagram)

1 – Pressure sensor

(trigger sensor for the occupant protection systems)

Seats in the camper and passenger compartment shall be accessible from outside through a door or from the cab.
Locked doors shall also be quick and easy to open from the inside.
The doors shall open far enough and the entries shall be designed so that safe and comfortable access is possible.
The distance between the road and the lowest step is allowed to be a maximum of 400 mm.
Installed components shall allow for sufficient clearance to the inside handles in all positions (anti-trap protection).
Modifications to the lock system in the immediate vicinity of the door and in the area of the pillars/cross members are not permitted.
After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

7.2.7.4 Rear gate

Modifications to the rear gate including the roof area are only permitted in exceptional cases and with a letter of non-objection from the responsible department.
After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

7.2.8 Wings and wheel housings

The spacing between the tyre and the wing or wheel housing is sufficient even when snow or anti-skid chains are fitted and during full compression (even with axle articulation). The measurements in the offer drawing shall be taken into consideration.

Warning note

The attachment of seats to the wheel housing is not permitted. This also applies to wheel housings that are lowered. Otherwise damage could be caused to the vehicle (e.g. wheel housing and tyres) and accidents could result.

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).
Making the wheel housing narrower is not permitted.

Information

Further information can be found in chapter 4.3.3 “Lowering of wheel housing in panel van” and chapter 4.3.4 “Minimum dimensions for rear wheel housing/chassis”.

7.2.9 Frame end cross member

For the attachment of special installations, the sheet metal rear cross member that serves as an underbody impact guard can be omitted at the factory (PR no. AT0 “without rear cross member”) (see chapter 3.9 “Optional equipment”).
You will find further information on the underbody guard in chapter 7.9 “Underbody guard”.

Practical note

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Country-related regulations and guidelines shall be complied with.

7.2.10 Roof of panel van

The following points shall be observed if modifications are made to the roof structure of a panel van:

- In order to reduce body roll, it is recommended to order the “reinforced stabiliser for raised centres of gravity” or to retrofit the required running gear parts. See chapter 4.2 “Limit values for running gear”.
- If the roof skin and roof cross struts are cut and an all-round profile frame is not possible, additional roof cross struts are required. The all-round concept shall be retained, and adequate replacement rigidity shall be guaranteed.
- To avoid functional impairments, the body limits for camera-based assistance systems must be observed, see chapter 6.8.6 “Rain/light sensor”.

Practical note

The replacement rigidity of the new roof structure shall correspond to that of the standard roof.

Modifications on the rear gate and in the roof area are not allowed.

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

7.2.10.1 Attachment on roof

Attachments similar to the roof rack are possible for subsequent attachment of add-ons (see chapter 7.6.3 “Roof rack”).

A letter of non-objection from the responsible department (see 2.2 “Converter guidelines, consulting”) is required for attachments to the roof skin (except for area illumination and spotlights).

A letter of non-objection from the responsible department is required for attachments on roof cross struts.

Warning note

Later modifications to the headliner or the roof skin are not permitted if the vehicle is equipped with a window bag between the A-pillar and the B-pillar. Otherwise the window bag might no longer deploy correctly (e.g. delayed or incomplete deployment of the window bag).

7.2.10.2 Increasing roof height

Modifications to the rear gate including the roof area are only permitted in exceptional cases and with a letter of non-objection from the responsible department (see chapter 2.2.1 “Letter of non-objection”)

Roof height increases are only allowed to be made using integrated cross struts and reinforcement frames.

The replacement rigidity of the new roof structure shall correspond to that of the standard roof.

Practical note

The replacement rigidity of the new roof structure shall correspond to that of the standard roof.

7.2.10.3 Number of roof cross struts

Wheelbase [mm]	Required number
3640	≥ 6 cross struts
4490	≥ 8 cross struts
4,490 (with long overhang)	≥9 cross struts

7.2.10.4 Arrangement of roof cross struts

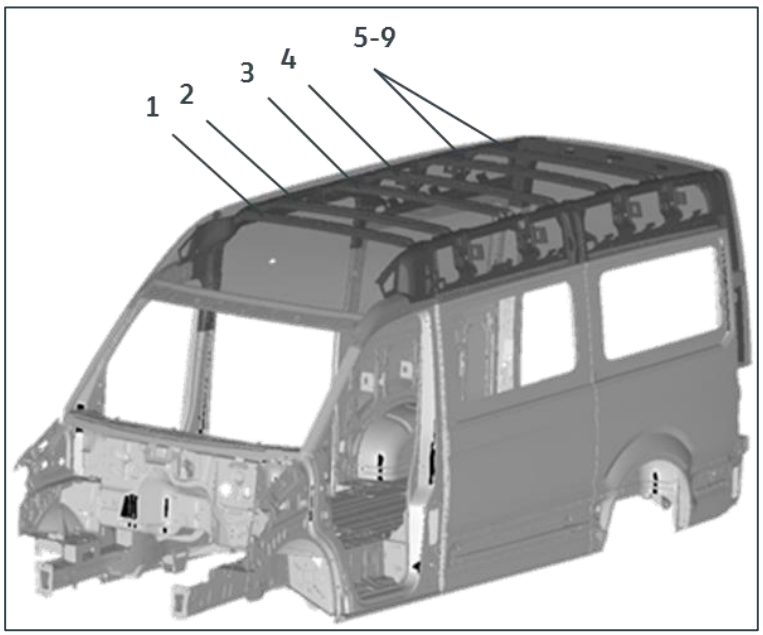


Fig. 1: Panel van roof cross strut

Cross strut no.	Position
1	Behind the front doors (B-pillar)
2-3	In the middle of the load compartment sliding door (between B and C-pillar)
4	In the centre of the vehicle behind the luggage compartment sliding door (C-pillar)
5-9	Between C-pillar and rear of the vehicle (rear pillar)

Practical note

The cross struts shall be attached to the side walls in such a way that a force-locking connection is guaranteed (flexurally rigid connection between cross struts and roof frame).

If the roof is raised, the cross struts shall be reinforced accordingly.

The minimum moment of inertia Ix of each roof cross strut is given in the table below:

Roof height, increasing [mm]	Moment of inertia Ix per cross strut [mm4]
≤ 250	≥ 50,000
≤ 400	≥ 65,000
≤ 550	≥ 86,000

The maximum roof load of the high roof with even load distribution across the whole roof area is 150 kg (see chapter 7.6.3 “Roof carrier”).

Warning note

The maximum permitted centre of gravity shall not be exceeded. Otherwise the ESC system in vehicles with ESC will no longer function correctly and will fail. This can result in the driver losing control of the vehicle and causing an accident (see chapter 6.8.3 “Electronic Stability Control (ESC)”).

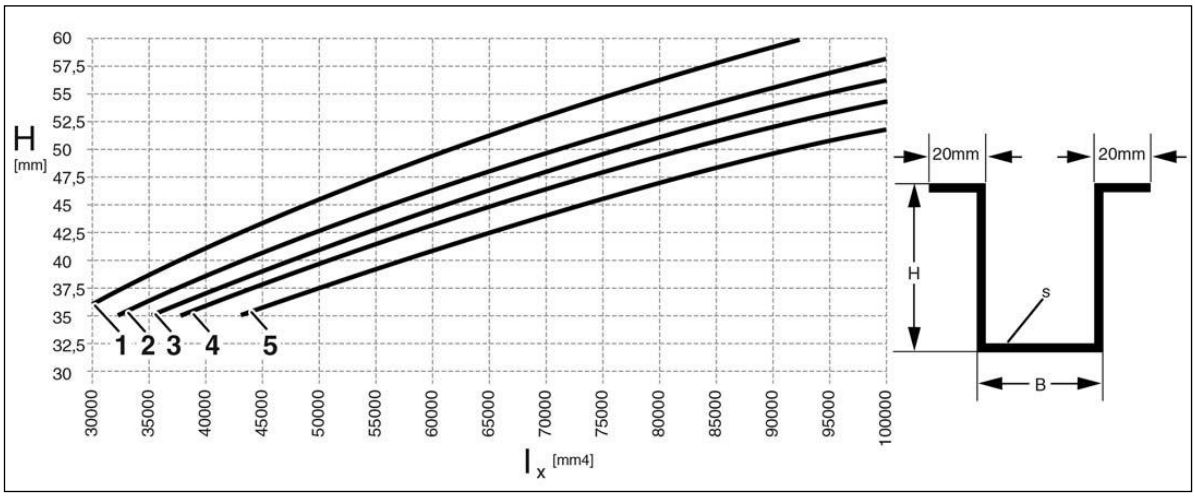


Fig. 2: Required moment of inertia for cross struts with 20 mm flange to roof skin

No.	B [mm]	s [mm]
1	50	0.8
2	40	1.0
3	50	1.0
4	60	1.0
5	50	1.2

7.2.10.5 Retrofitting tilting sunroof

Warning note

Later modifications to the headliner or the roof skin are permitted if the vehicle is equipped with window and thorax bags between the A-pillar and the B-pillar. Otherwise the window and thorax bags can no longer deploy correctly (e.g. delayed or incomplete deployment of the window and thorax bags).

Plastic roofs are only suitable for the installation of emergency hatches to a certain extent.
The roof load capacity is limited (see chapter 4.3.8 “Vehicle roof/roof load”).

Practical note

Roof cross struts or weight-bearing parts are not allowed to be removed without replacement or to be damaged (see chapter 7.2.10.2 “Increasing roof height”).

7.2.11 Cutting a cab roof and B-pillar roof cross strut

For partially integrated superstructures, e.g. mobile homes or integrated boxes, the cab roof including the B-pillar roof cross strut can be cut, if necessary, in the specified area (see illustration).

The Converter is responsible for all modifications to the body. Volkswagen Commercial Vehicles will not assume any responsibility for the design and execution.

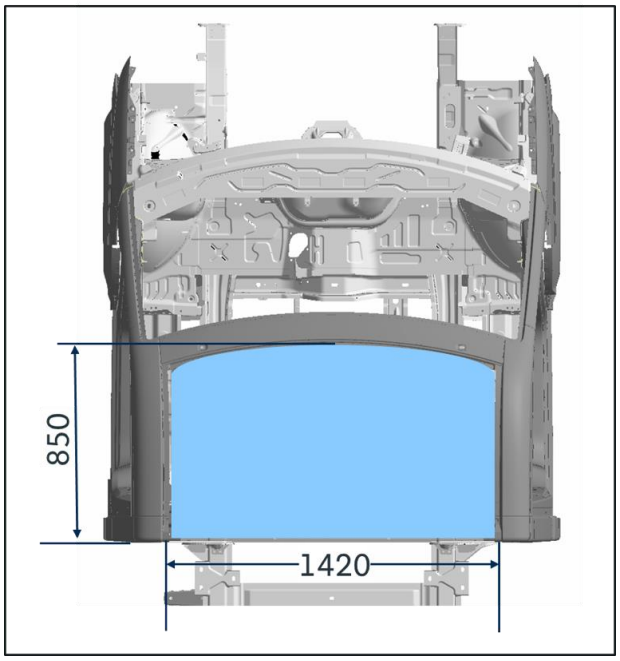


Fig. 1: Permitted roof cut 850 x 1420

Practical note

Roof cross struts or strength-relevant parts are not allowed to be removed without replacement, and must not be damaged.

If the B-pillar roof cross strut is cut or removed, compensatory rigidity must be provided. The rigidity of the passenger compartment after the conversion should correspond to the condition before the conversion. If vehicles in the “cowl panel without roof” variant are used for the conversion, chapter 8.5.1 “Cowl panel” must also be observed.

After removing the B-pillar cross strut, we recommend that the compensatory rigidity introduced in the installation be determined by calculations or tests and compared with the body before the modification.

The belt connection points on the B-pillar must comply with all legal requirements regarding occupant safety even after the conversion.

7.3 Engine peripherals/drive train

Practical note

Maintenance and repair of the vehicle shall not be hindered by the body
(see chapter 2.8 “Recommendations for inspection and maintenance”).

7.3.1 Fuel system

7.3.1.1 General information

Modifications to the fuel system should be avoided, and any such modifications may result in invalidation of the vehicle’s operating permit. If it is necessary to modify the fuel system for the conversion, the Converter is solely responsible for ensuring a proper design, for proper functioning of the system, including all components used, and for the materials used.
Sufficient clearance to all adjacent components must be ensured. The ground clearance must not be restricted compared to the standard production vehicle. Particular attention must be paid to the effect of heat from the exhaust system and the modified tank. If thermal protection parts are removed from the production vehicle, they must be replaced in a suitable manner. A new operating permit must be applied for from the registration authority.

Practical note

If the fill level indicator does not function properly, the components in the fuel system and the engine may be damaged.

Information

Adaptation of the fuel gauge to the modified fuel system is not supported by VW Commercial vehicles.

Comply with the following points if making any modifications to the fuel system:

- The whole system must be permanently leak-proof in all operating conditions.
- Ensure good quality refuelling if modifications are made to the tank filler pipe, and avoid any siphon effect in the pipe routing.
- All components that come into contact with fuel shall be suitable for the particular type of fuel used (e.g. petrol/diesel etc.) and the ambient conditions in the installation location.
- Hoses must retain their shape and remain adequately stable throughout the service life, in order to ensure that there is no constriction in the cross section (e.g. hoses acc. to DIN 73379-1).
- The hose connections shall have a suitable geometry (e.g. all-round bead) in order to make it harder for the hose to slip off. If necessary, install reinforcing support sleeves so as to prevent any constriction at the clip connection and to guarantee leak-tightness.
- At the connections, use spring-type clips which automatically compensate for possible settling behaviour of the material and to maintain the preload. Hose clips with worm threads must be avoided.

- All parts of the fuel filler system must be routed at a sufficient distance from moving parts, sharp edges and components at high temperature, in order to avoid damage.
- If superstructures are fitted on the cab of base vehicles, protection for the fuel gauge sender will be necessary if the fuel gauge sender is not protected by the body.

Practical note

If superstructures are fitted on the cab of base vehicles, the tank sender shall be protected against falling cargo depending on the body. Otherwise the base vehicle could be damaged and could fail.

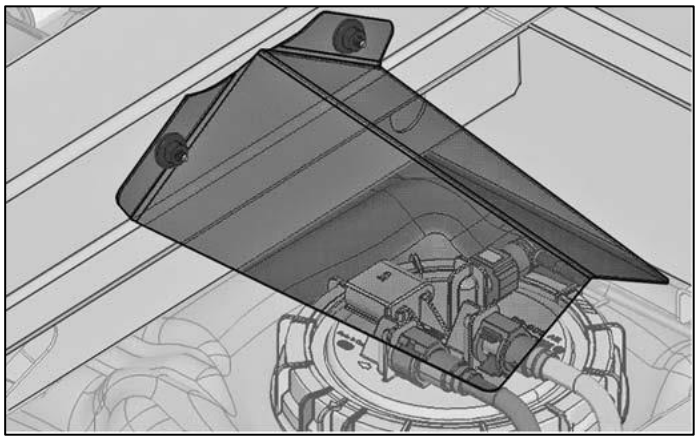


Fig. 1: Fuel gauge sender protection (schematic diagram)

If a fuel-powered supplementary heater is retrofitted, the following shall be observed:

- Design without sharp edges
- The fuel tank is not allowed to be subjected to loads in crashes; deflector plates shall be fitted if necessary
- Fuel lines shall be safe
- Exhaust gases shall not be led into the interior

When connecting the fuel supply to auxiliary heaters, the type approval shall be followed.

Environmental note

Incorrect modifications to the fuel system can be harmful to the environment.

7.3.2 Exhaust system

7.3.2.1 Exhaust system without SCR system

We recommend using genuine Volkswagen parts if making modifications to the exhaust system.
Country-related regulations and guidelines shall be complied with.
The length and installation position of the flexible metal hose between the exhaust manifold and exhaust pipe is not allowed to be modified.
The free cross-section of the exhaust pipe behind the silencer is not allowed to be reduced.
Under extreme loading, temperatures above 80°C can be reached between the exhaust system (diesel particulate filter, catalytic converter or main silencer) and the floor panel. Therefore shields or insulation shall be fitted underneath the body to reduce heat radiation.

- Pipe bend 90° maximum
- Avoid additional pipe bends
- Bend radii > 1.5 d

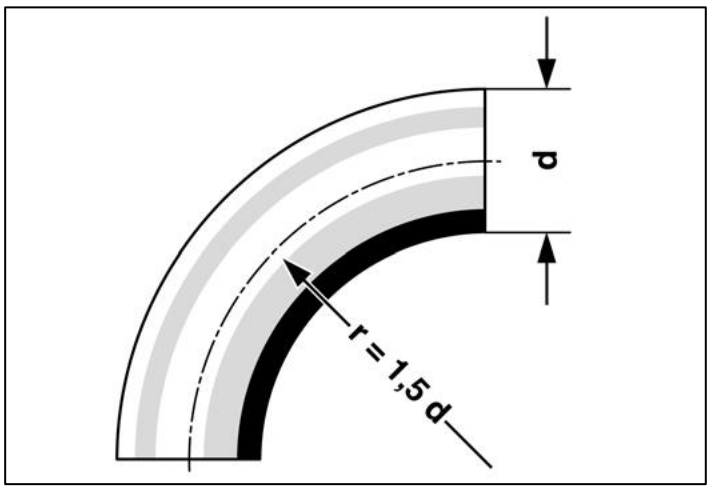


Fig. 1: Application example of pipe bend (schematic diagram)

Minimum distance from plastic pipes, electrical cables and spare wheels:

- 200 mm for exhaust systems without shielding,
- 80 mm with sheet metal shielding,
- 40 mm with sheet metal shielding with additional insulation.

Practical note

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Additional shielding is required:

- In area of operating units
- In area of assemblies, attachments and installations if they are not made from heat-resistant material.

Warning note

Modifications of the exhaust system up to the main silencer are not permitted.

The lengths and guides, e.g. between diesel particulate filter and main silencer, are optimised in terms of thermal behaviour. Modifications can result in greater to extreme heating of the exhaust system and the surrounding components (drive shafts, fuel tank, floor panel etc.).

You can obtain more information on optional equipment from your Volkswagen customer service, the responsible department (see 2.2 “Converter guidelines, consulting” or 3.9 “Optional equipment”)

7.3.2.2 Exhaust system with SCR system

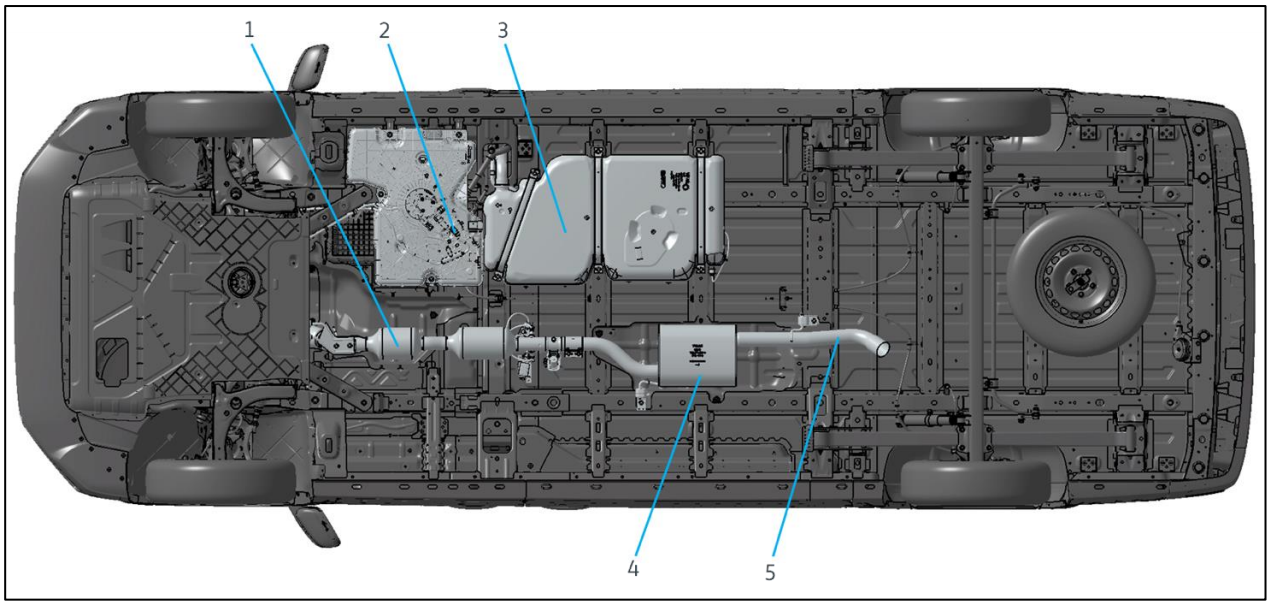


Fig. 1: Exhaust system MAR* with SCR system (engine: front-wheel drive/transverse installation) (schematic diagram)

1 – SCR converter

2 – SCR tank (AdBlue tank)

3 – Fuel tank

4 – Silencer

5 – Tailpipe

*Emission control module

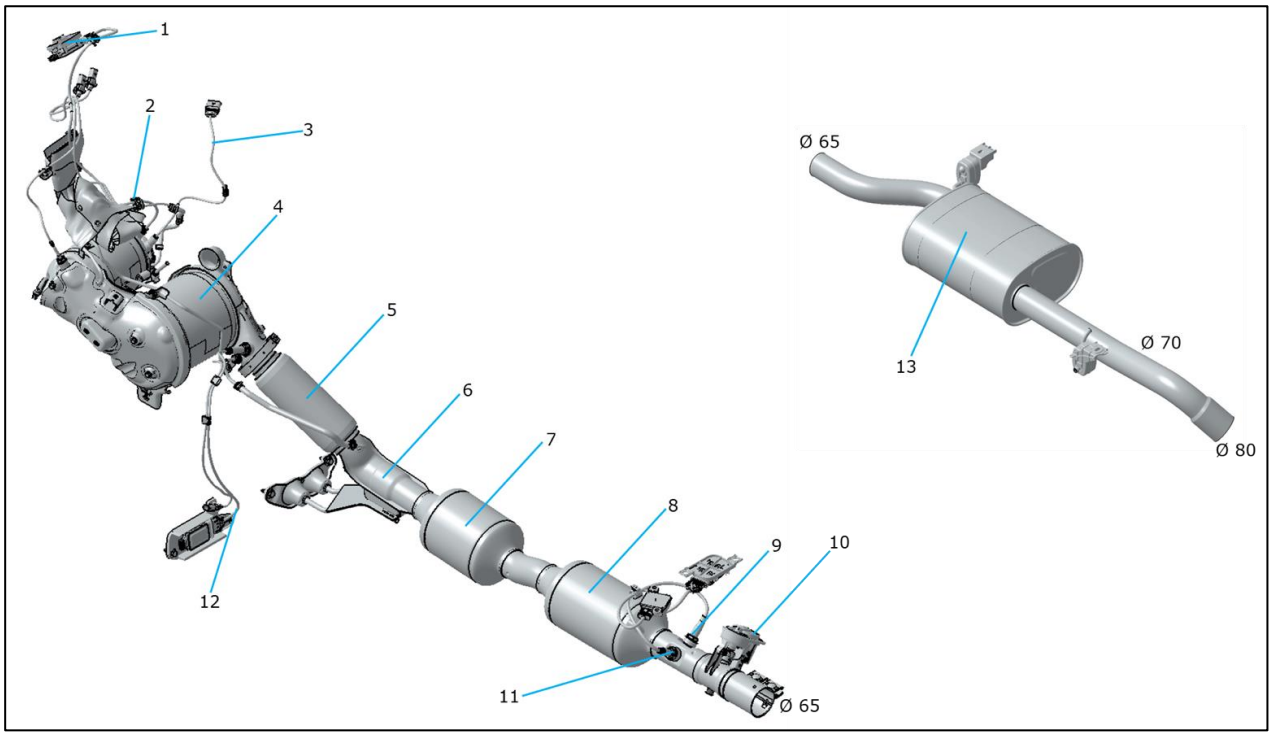


Fig. 2: Front exhaust system and rear silencer (engine: front-wheel drive/transverse installation), (schematic diagram)

1 – NOX1 sensor

2 – Temperature sensor before oxidation catalytic converter

3 – Lambda probe before catalytic converter

4 – Particulate filter

5 – Damper element

6 – Exhaust pipe

7 – SCR converter

8 – Ammonia trap catalytic converter

9 – Particulate sensor

10 – Exhaust control flap

11 – NOX1 sensor

12 – NOX2 sensor

13 – Front silencer

Modification to the exhaust system with an SCR system is not permitted. Neither the geometry nor the position of the sensors are allowed to be changed (see fig. 2). If a modification to the exhaust system due to body design, removal or conversion is nevertheless required, this can have consequences relevant to registration. Please contact the body builder’s support team in advance regarding the scope of your conversion so that we can advise you.

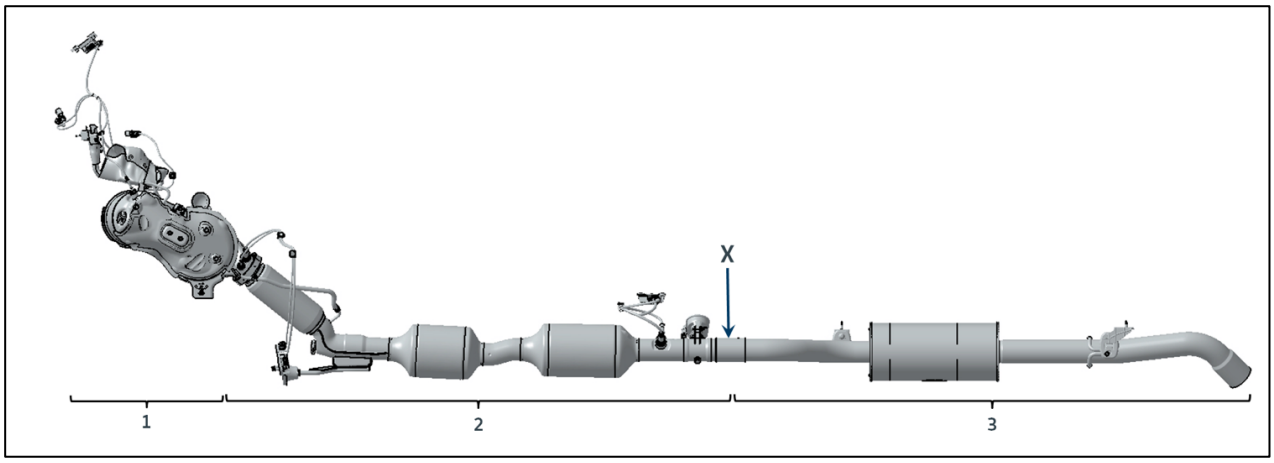


Fig. 3: Emission control section (engine: front-wheel drive/transverse installation), (schematic diagram)

1 Catalytic converter

2 Front end exhaust system

3 Rear end exhaust system

X Position to which no modifications are permissible

Modifications due to body design or conversions are not permitted near the selective catalytic reduction emission control (area 1+2). Modifications due to conversions are only possible from position “X” near the rear silencer (area 3) (see fig. 2 Front and rear exhaust system, and fig. 3 Emission control area).

Practical note

When working on lines carrying AdBlue®, comply with the workshop manuals from Volkswagen AG. Otherwise, AdBlue® could crystallise and lead to damage to system components.

7.3.2.3 Parked regeneration

Parked regeneration (SREG) or delayed regeneration (VREG) function.

In vehicles that travel extremely short distances and in mobile machines, regeneration of the diesel particle filter (DPF) is often not carried out completely. The temperature in the DPF for complete regeneration is not reached. This may result in:

- Mobility problems due to overcharging diesel particulate filter (DPF)
- A service regeneration in a qualified workshop

Function buttons for SREG and VREG

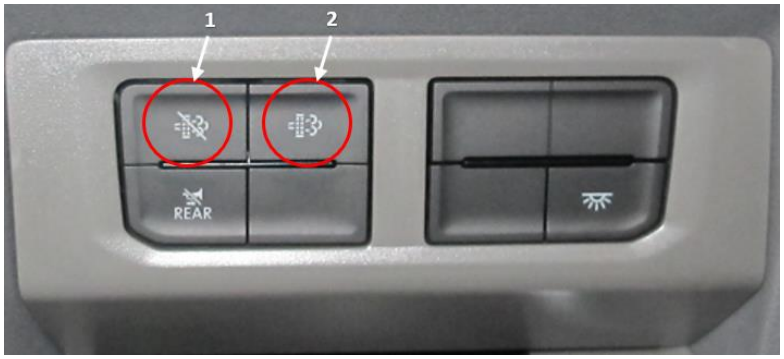


Fig. 1: Parked regeneration (SREG) or delayed regeneration (VREG) function

1 – VREG button (delayed regeneration)

2 – SREG button (start parked regeneration)

If the PR number 9HC is also ordered, the customer has the option of specifically starting the DPF regeneration when the vehicle is stationary within the predefined loading limits of the DPF (SREG) or of delaying an upcoming regeneration (VREG). This can be useful when driving in enclosed spaces/halls.
For more information see the Crafter vehicle wallet.

Escalation levels for regenerating the diesel particulate filter (DPF)

- Automatic regeneration at 100% load of the DPF.
- Manual activation of parked regeneration is possible from 90% load of the DPF (SREG switch lights up).
- Manual suppression of regeneration is possible with a load between 90 and 110% (VREG switch lights up). Automatic regeneration starts from a load of 110%!
- DPF warning lamp in the instrument cluster lights up from 125% load of the DPF.
- Drive regeneration is blocked from 150% load of the DPF. Regeneration is then only possible at a specialist workshop: an entry is made in the event memory.

During active start parked regeneration, the power take-off system, the engine remote start stop and the working speed control cannot be used.

For safety reasons, the duration of start parked regeneration is limited to 20 minutes. If the DPF has not yet fully regenerated during this time, the remaining load should be regenerated during regular vehicle operation.

More information on the particulate filter can be found in the Crafter vehicle wallet.

Practical note

Always park the vehicle on a level, non-flammable surface before starting regeneration.

Information

During parked regeneration, the engine speed is increased to 1,500 rpm. DPF parked regeneration usually takes around 20 minutes.

If the following specification packages are selected, the parked regeneration function cannot be ordered for technical reasons:

- Three-way tipper (5HN)
- 2nd air conditioning compressor

7.3.3 Engine cooling system

The cooling system, (radiator, radiator grille, air ducts, coolant circuit etc.) is not allowed to be modified as a sufficient flow of cooling air shall be guaranteed. Keep the cross-sections of the cooling air intakes clear. Warning signs, badges or other trim parts are not allowed to be fitted in the area in front of the radiator.
Additional cooling systems for assemblies shall be provided when the vehicle is stationary and consumption of high constant power.

7.3.4 Engine air intake

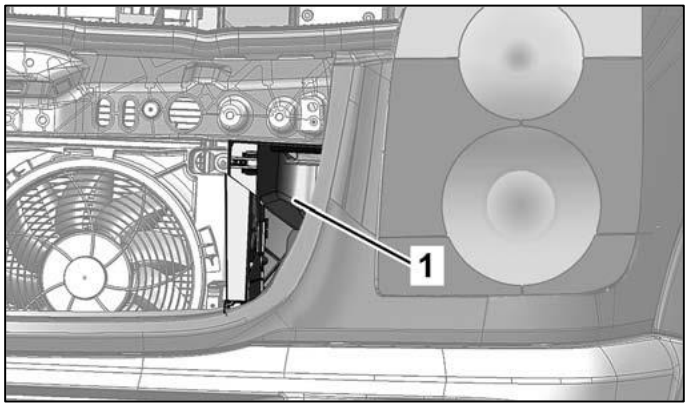


Fig. 1: Opening of engine air intake (schematic diagram)

1 – Area of engine air intake

Practical note

Modifications in the area of the engine air intake (see diagram) are not permitted.

The air filter is fixed in the front module with two rubber-mounted brackets.
If the front module is modified, the securing concept for the air filter is not allowed to be modified.

7.3.4.1 Warm air

The intake of warm air leads to a loss in engine power. A baffle plate is therefore absolutely necessary between the engine bay and intake point. The intake temperature should not exceed the outside temperature by more than 10°C.

7.3.4.2 Water

Water draining off the body, spray water or water from car washes must not flow directly past the intake point. Ensure that water cannot reach the intake point through any fresh air supply openings.
The flow speed at the intake point is not allowed to be increased by modification of the intake opening.

7.3.4.3 Dust/dirt

Increased intake of dust leads to shorter service intervals for the air filter.

7.3.5 Space for ancillaries

Sufficient space shall be provided in order to guarantee the function and operating safety of the components
(in particular from electrical wiring, brake lines and fuel lines). Observe the measurements in the offer drawings.
The distance between the cab and body shall be at least 50 mm (see chapter 4.3.6 “Attachment to the frame”).

7.3.6 Drive shafts

The right configuration of the drive shaft prevents formation of noise and vibrations. We recommend using genuine Volkswagen parts.

Practical note

If the wheelbase of the vehicle is modified, the length of the drive shaft shall be adapted to the vehicle. Modifications shall be performed by a company qualified in drive shaft manufacture.

The drive shaft intermediate bearings shall be made correspondingly stiff. In addition, they shall be configured so that no vibrations are transferred to the vehicle structure.

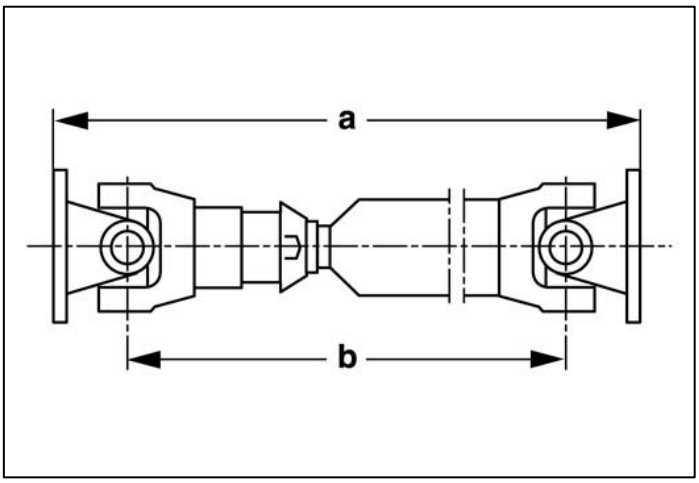


Fig. 1: Drive shaft

a – Operating length

b – Permitted shaft length

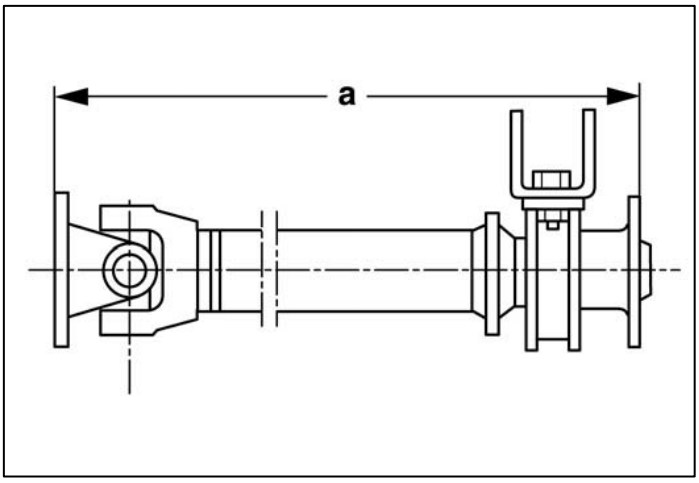


Fig. 2: Intermediate shaft

a – Operating length

If the wheelbase is changed, the drive shaft arrangement and drive shaft length shall be configured as on a comparable standard vehicle (same type and same or similar wheelbase).
The diameter and wall thickness of the drive shaft tube shall correspond with the standard drive shaft.
The retaining straps fitted on the substructure serve as passive safety and protect the fuel tank in crashes. Modifications to the retaining straps are not permitted.

7.3.6.1 Flexure angles

If necessary, use several drive shafts with centre bearings.
The flexure angles must be the same at both joints (ß1 = ß2). The flexure angles are not allowed to be greater than 6° and not less than 1°.

Practical note

Flexure angles more than 6° as well as flange angle errors (ß1≠ ß2) will lead to vibrations in the powertrain. They affect the life of the drive units and can cause damage.

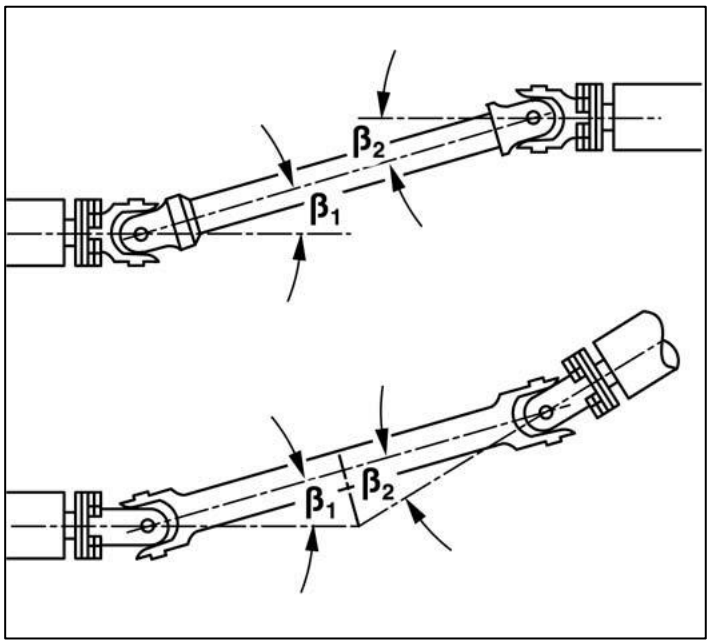


Fig. 1: Types of flexure

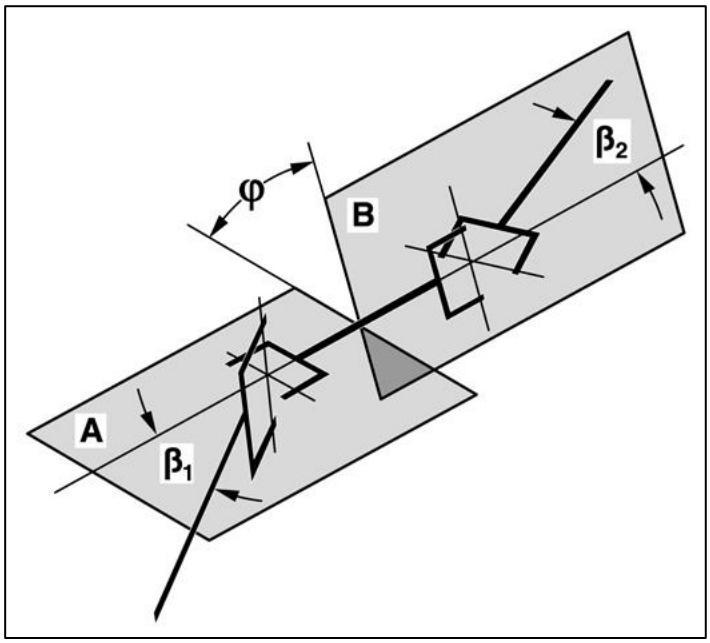


Fig. 2: ß1 = ß2

Flexure on one plane (planar flexure):

W or Z-flexure

Flexure on two planes (spatial flexure):

In spatial flexure, the drive and output shaft cross each other offset spatially (combined W and Z-flexure).

The inner joint forks shall be offset to compensate irregularities.

Balance drive shafts before installation.

Modifications outside the limit values are not permitted.

At its own discretion, Volkswagen AG can issue a letter of non-objection for possible exceptions.

Drawings of the intended drive shaft modification with exact measurements (shaft length and flexure angle) shall then be handed in.

7.3.6.2 Drive shaft installation

Observe the following when installing drive shafts:

- Installation guidelines of drive shaft manufacturer
- If necessary use several drive shafts with centre bearings
- The connecting surfaces shall be completely flat
- The flexure angles must be the same at both joints (ß1 = ß2). They are not allowed to be larger than 6° and not smaller than 1°
- Balancing plates are not allowed to be removed
- When installing, make sure that the markings on the drives shafts line up

Further information on configuring drive shafts (see chapter 7.3.6 “Drive shafts”).

7.3.7 Working speed control

To drive ancillaries (e.g. pumps, compressors etc.), it can make sense to operate the vehicle drive at a certain speed and keep this as constant as possible.

For some engine combinations, special working speed control equipment with the PR number US1* is available (with fixed speed stages) or US2** (with variable speeds), which is controlled via the CFCU. With PR number US2**, the engine speed can be set continuously over the speed range and kept constant.

However, an individual speed must be configured or determined as required for the respective usage purpose, otherwise only the safe working speed control set by the factory is available.

*3 static speed steps: 1,000 /1,500 /2,000 rpm.

**Variable speed stages from 1,000 to 3,800 rpm in 100 rpm increments

Practical note

Retrofitting solutions for working speed control are only possible with the optional equipment “Customer-specific functional control unit (CFCU)” and PR number IS2 or IS3. (See also chapter 6.4.3 “Customer-specific functional control unit (CFCU)”).

For superstructures and modifications that require engine speed control, the following points must be observed:

1. The Converter must ensure that the operational safety of the connected power units or machines is guaranteed in all cases, even in the event of a failure or if the drive energy of the internal combustion engine is switched off or reduced, and that this does not endanger the user.
2. An excessive drive speed of the body builder’s power unit, or excessively fast change of the drive speed, must not result in uncontrolled energy output at any time (e.g. due to a working medium, output of force or defective component) from the body builder’s power unit that exceeds a slight violation (S1 in accordance with ISO 26262).
3. All Converter assemblies that are permanently coupled to the engine or its speed must be able to withstand all permitted engine speeds and periods at these speeds.
4. Selection of the pre-programmed speed must not result in any danger. Otherwise the Converter must take additional measures.
5. The lowest permanently reliable engine speed that can be programmed is 1,300 rpm. All programmed speeds lower than this can be raised or overridden by functions of the base vehicle.
6. All assemblies only consume a low power at the moment when they are activated, and must be switched to the mode required to work by an additional operation.
7. All working speed parameters are set to a safe, low value upon delivery of a vehicle or a CFCU as a replacement part. The necessary values must be configured by the Converter for the specific assembly, must be validated and approved for further use. When selecting the PR number US2 (with variable speeds), the maximum engine speed is limited to 3,800 rpm.
8. When the CFCU is replaced by customer service, the working speed and ramp parameters must be configured to the values validated and approved by the Converter prior to commissioning a Converter assembly.
9. To protect the engine, the engine speed can be reduced and may be less than the required engine speed.
10. Regulating the working speed to more than 3,800 rpm is not permitted.
11. When a speed ramp with a value of 0 is specified, the engine speed does not change.
12. If the engine is not at operating temperature, the target engine speed may differ by greater values in the event of load changes.
13. When working with a working speed control system when the vehicle is stationary, especially when using the power take-off system on the gearbox side, note that the exhaust system can reach high temperatures. The position of the vehicle must be selected such that no parts of the exhaust system can come into contact with easily flammable material on the ground.

14. In the variable working speed control system (US2), it is possible to specify a target engine speed via the Converter CAN of the CFCU. The following table contains the specification of the CAN and the message.

CAN standard	Classic CAN / CAN FD	Classic CAN
CAN baud rate	KBaud	500 (250*)
CAN message ID	hex	0x18EF71C9 (extended)
Activation signal	Start bit/signal length (bits)	0/ 1
Target engine speed signal	Start bit/signal length (bits)	32/16
Target engine speed signal	Offset/factor	0/ 1

If the activation signal BIT is set in the CAN message, the control commands via the hard-wired inputs for increasing or reducing the speed are ignored. They are enabled again if the activation bit is not set or a message failure is diagnosed.

For vehicles with the fleet management system (PR no.: IS3), the CAN interface for the target engine speed specification of 250 kBaud must be configured and is to be ordered separately in the CustomizedSolution portal.

Information

Technical documentation on the CFCU and further information regarding the requesting and processing procedure can be found on the CustomizedSolution portal via the link:
https://www.customized-solution.com/de/de/technische-produktinformationen/kfg/technische-information

You must register on the CustomizedSolution portal in order to access this. The configuration of the customer-specific functional control unit (CFCU) can be ordered via the CS portal.

Information

Please note that the equipment scopes for working speed control and ignition bypass can influence each other's functions. If the engine speed is set to a value above 1,200 rpm, a previously activated ignition bypass switch is automatically deactivated again.

7.3.8 Engine preheating systems

When retrofitting an engine preheating system, the following (different) systems must be used due to the differences in inclination between longitudinal and transverse engine installation:

Transverse engine installation, front-wheel drive and 4x4:
Engine preheating systems with a thermosyphon effect (coolant circulation by density difference) can be used (i.e. without additional pumps).

Longitudinal engine installation, rear-wheel drive:
The heat circulation must be ensured with a pump.

Practical note

Installation of an oil preheating system is not permitted.

This is because local thermal overload of the oil may occur and damage the vehicle.

Observe the fitting instructions of the heater unit manufacturer and the Volkswagen AG installation recommendations during installation of the engine preheating system.

Information

More information can be found in the document “Installation recommendations for engine preheating systems”.

The document is available on the Volkswagen AG CustomizedSolution portal under the menu item “Additional technical information”.

*Registration required.

7.4 Interior

7.4.1 General notes

The driver and front passenger airbag units, the window and thorax bags and belt tensioners are pyrotechnical objects.
Their handling, transport and storage are subject to legislation on potentially explosive substances, and the responsible public authority or government agency shall therefore be notified.
Purchase, transport, storage, installation and removal as well as disposal are only allowed to be performed by trained staff in accordance with the corresponding safety regulations.
Modifications in the cockpit area and above the shoulder line shall be conducted in accordance with the criteria of the head impact tests acc. to
UNECE R 21 or FMVSS 201.
This applies in particular to the deployment zones of airbags (wooden trim, additional installations, mobile telephone retainers, bottle holders etc.). See also the diagram of the deployment zones of the airbags (see chapter 7.4.2.3 “Frontal airbag”).
Painting or surface treatment of the dash panel, steering wheel impact absorber and the tear seams of the airbags is not permitted.

Warning note

Painting or surface treatment of the instrument panel, steering wheel impact absorber and the tear seams of the airbags is not permitted. Otherwise chemical reactions can occur on the treated surfaces. This can weaken or damage the materials so that the restraint systems will no longer function correctly.

The permitted centre of gravity position and axle loads are not allowed to be exceeded.
You will find information of mobile home conversions in chapter 8.12 “Campers”.
It is possible to request appropriate information material for converting vehicles in the Federal Republic of Germany, from the responsible road traffic test centre (e.g. TÜV, DEKRA).
The interior fitting-out shall be configured with soft edges and surfaces.
Installations must be manufactured from flame-retardant materials, and be firmly installed.
Unhindered access to the seats shall be guaranteed. No projecting parts, corners or edges that could cause injuries are allowed to be located in the area of the seats.

Practical note

Add-ons that are permanently fixed to the structure at the front, side and rear of the vehicle and are at the height of possible accident areas can change the properties of passive safety.

Warning note

Modifications to the airbag system and the belt tensioner system are not permitted.

Modifications or incorrectly performed work on a restraint system (seat belt and seat belt anchors, belt tensioners or airbags) or its wiring could lead to the child restraint system no longer working correctly, i.e. airbags or belt tensioners could fail in accidents or be deployed unintentionally.

Warning note

In the event of procedures by the Converter affecting the structure of the vehicle, such as:

- Modifications to the seats and consequently altered kinematics of the occupants in case of a crash
- Modifications to the front body
- installations of parts in the vicinity of the exit openings and the deployment range of the airbags
- installation of third-party seats, modifications to the A and B-pillars as well as to the roof frame and their trim
- Modifications to the doors

the safe function of the front airbag, window bag, thorax bag and belt tensioners is no longer guaranteed. Otherwise personal injuries could result.

7.4.2 Safety features

7.4.2.1 Airbag control unit and sensors

The airbag control unit in the vehicle and the satellite sensors in vehicles with window and thorax bags are not allowed to be modified in terms of fitting location, fitting location and securing method are not allowed to be revised when compared with series. Other vehicle components are not allowed to be fastened to airbags, belt tensioners, the airbag control unit, the satellite sensors or the mounting points.

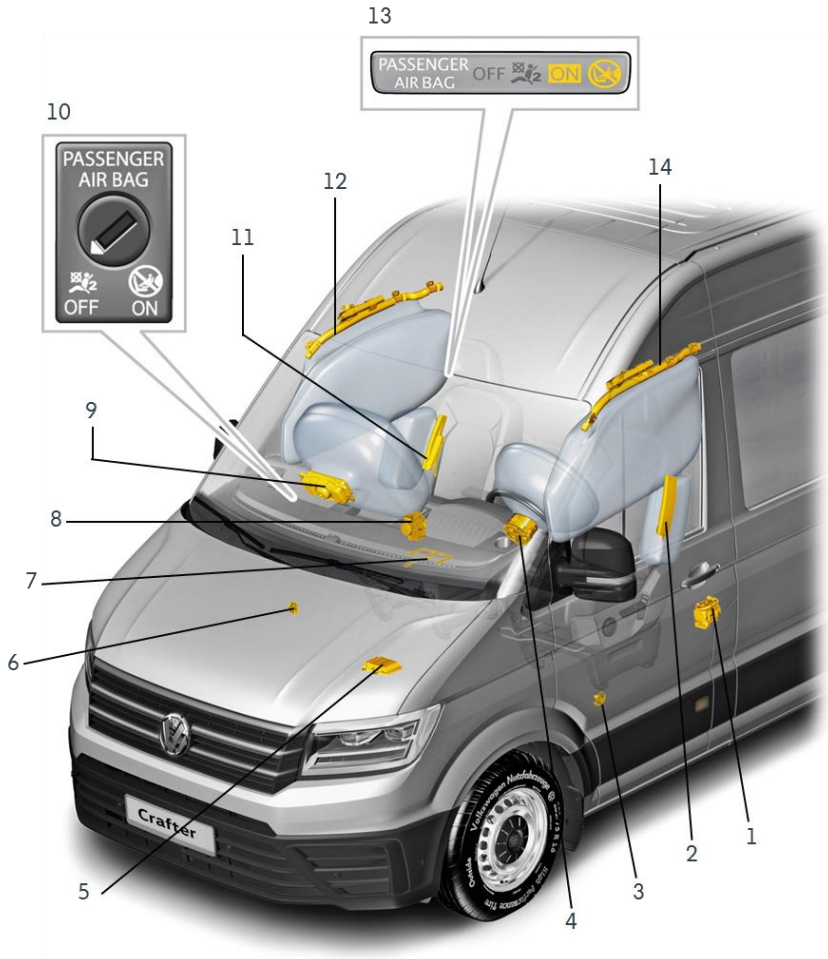


Fig. 1: Positions of the airbag control unit and sensors

1 – Seat belt with ball belt tensioner

2 – Side airbag, driver side

3 – Pressure sensor for airbag, left door

4 – Driver airbag

5 – Airbag control unit

6 – Pressure sensor for airbag, right door

7 – Seat occupied sensor on front passenger side

8 – Seat belt with ball belt tensioner

9 – Front passenger airbag

10 – In glove compartment: key operated switch for front passenger airbag

11 – Side airbag, front passenger side

12 – Front passenger side curtain airbag

13 – Warning lamp for front passenger airbag

14 – Driver side curtain airbag

Warning note

Vehicle components that generate vibrations shall not be attached in the vicinity of the airbag control unit or the sensor mounting positions. Modifications to the floor structure in the area of the airbag control unit or the satellite sensors are also not allowed. Otherwise the safe function of the front airbag, window bag, thorax bag and belt tensioners is no longer guaranteed and personal injury could result.

The position of the airbag control is on the centre tunnel underneath the centre console.

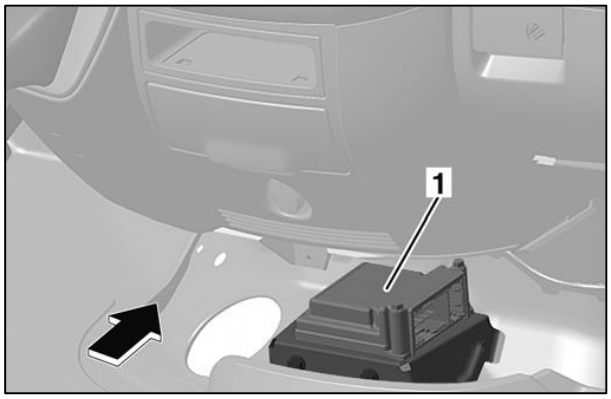


Fig. 2: Position of airbag control unit (schematic diagram)

1 – Airbag control unit

Arrow direction of travel

The satellite sensors are located in the driver and front passenger access boxes in the lower part of the B-pillar behind the sill trim. If window and/or thorax bags are equipped, the additional pressure sensors are fitted in the doors.

Warning note

For safety reasons, airbag sensors, ESC yaw rate sensors or airbag control units that have fallen onto the ground are no longer allowed to be fitted. In this case, a genuine part shall be sourced from Volkswagen. Otherwise the safe function of these systems is no longer guaranteed and personal injury could result.

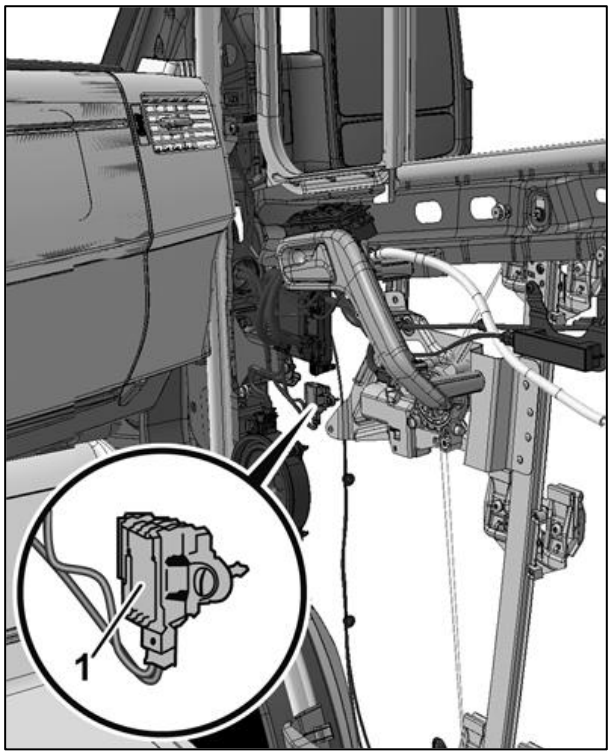


Fig. 3: Front pressure sensor (schematic diagram)

1 – Pressure sensor (trigger sensor for occupant protection systems)

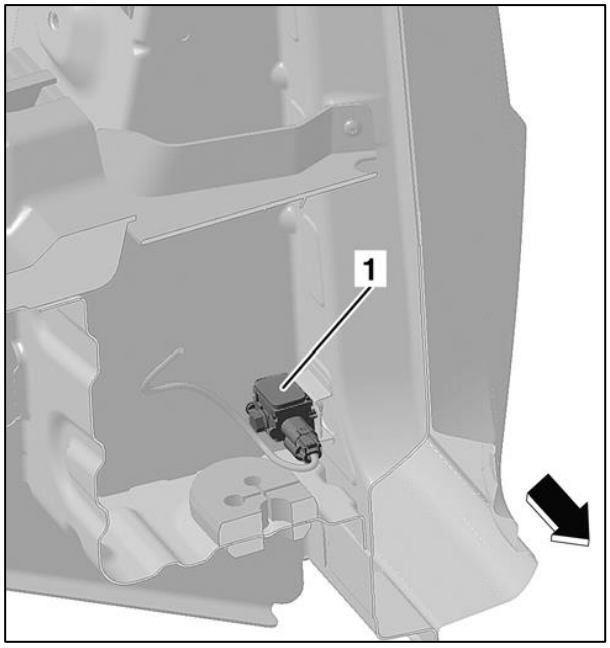


Fig. 4 Cross-section of left access box on B-pillar (schematic diagram)

1 – Satellite sensor (trigger sensor for the occupant protection systems)

Arrow: direction of travel

7.4.2.2 Seat belts and belt tensioners

Warning note

During work on the vehicle, safety-related parts like, for example, seat belts and seat anchors or belt tensioners shall not be damaged or soiled. Otherwise these systems can no longer function correctly and not provide sufficient safety in an accident.

Practical note

Only the original seat belts are allowed to be installed otherwise the general certificate of roadworthiness of the vehicle will become void.

Vehicles in the M and N classes must be equipped with seat belts that comply with the requirements of ECE R 16.
The seat belt anchorages must be tested according to ECE regulation ECE R 14.
All vehicles are equipped with pyrotechnical belt tensioners in the automatic belt retractor in the area of the front seats. The automatic belt retractors are located in the B-pillar. Another automatic belt retractor is located in the back rest of the seat bench for the two-seater front passenger seat.

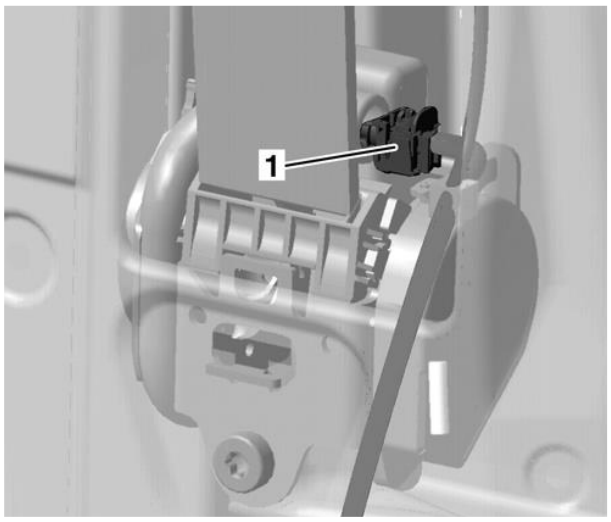


Fig. 1: Automatic belt retractor with pyrotechnical belt tensioner

1 – Connector

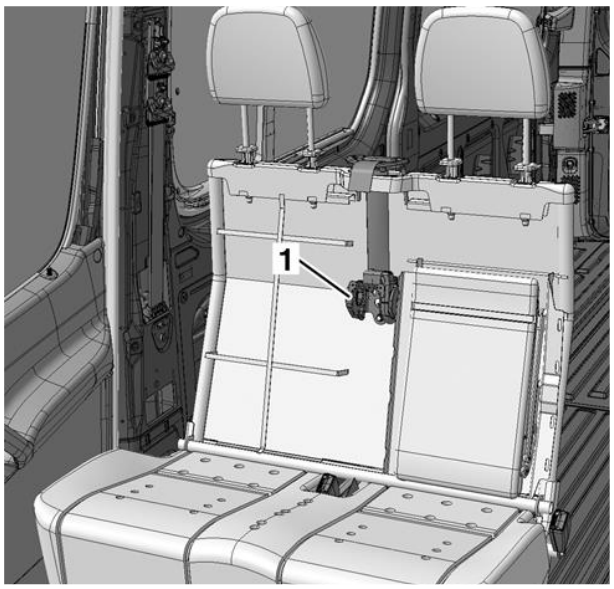


Fig. 2: Passenger seat with automatic belt retractors

1 – Retractor

In addition, there is a mounting point for a seat belt fitting at the bottom of the B-pillar that has been tested with a folding seat secured to the body-in-white, in accordance with ECE R 14 and ECE R16.

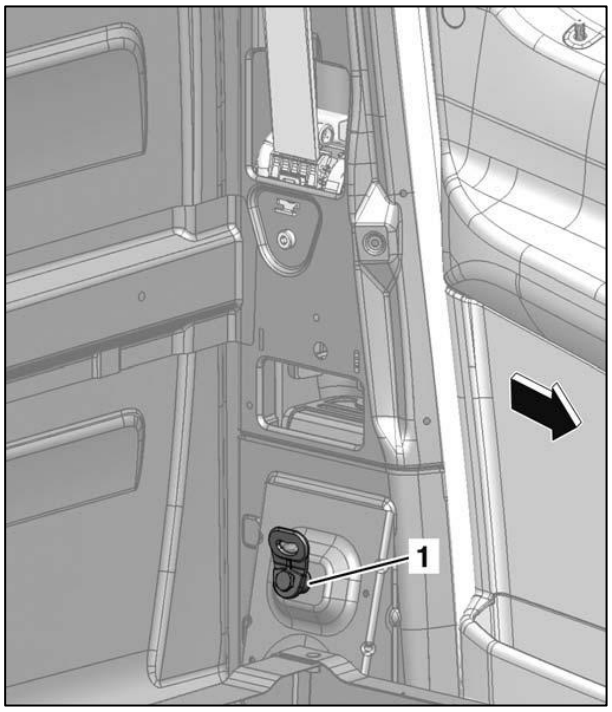


Fig. 3: Attachment point for belt end fitting in B-pillar

1 – Belt end anchor

Arrow direction of travel

7.4.2.3 Frontal airbag

All airbag units are labelled “Airbag”:

- The driver airbag unit can be recognised by the “Airbag” label on the steering wheel padding.
- Vehicle equipment with a front passenger airbag unit can also be recognised by the “Airbag” label.
- Vehicle equipment with a window bag is indicated by the label “Airbag” on the window bag cover.
- Vehicle equipment with a thorax bag is indicated by the “SRS airbag” on the backrest.

The warning lamp with the airbag symbol in the instrument cluster is a further recognition feature.

The following illustrations show the position and the deployment area of the driver and front passenger airbags (PR number 4UF) as well as the window and thorax bags. The deployment areas are shown larger than the airbag volume since space for vibrations are required during deployment of the airbag.

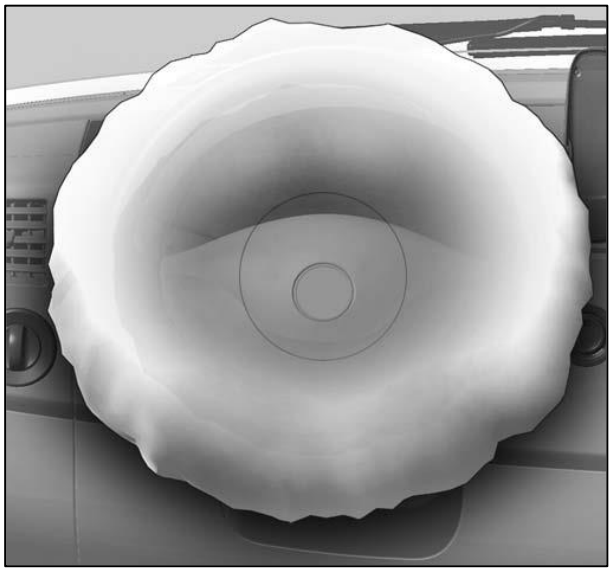


Fig. 1: Deployment zone of the driver airbag (schematic diagram)

Fig. 2: Deployment zone of the front passenger airbag (images in progress)

7.4.2.4 Side airbags

Modifications to the B-pillar, door bodies, trim and seat covers are not permitted.

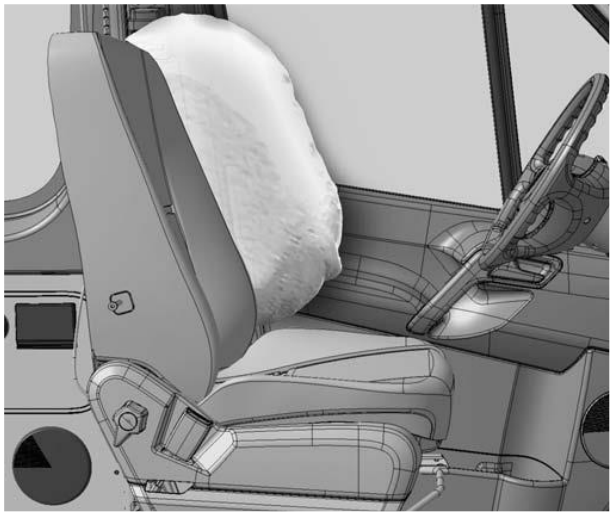
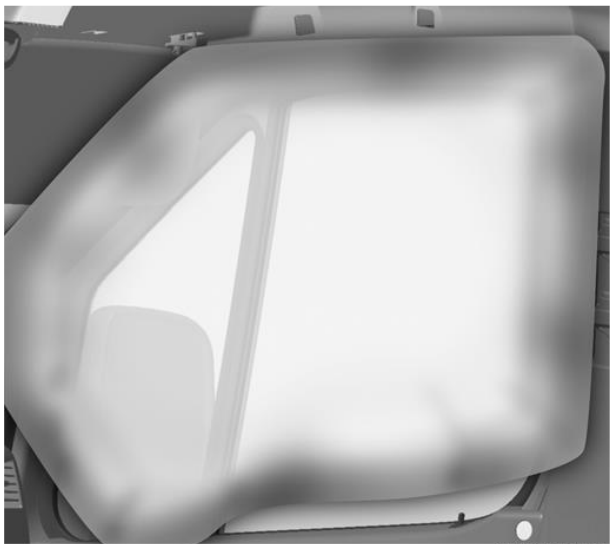


Fig. 1: Deployment zone of thorax bag, vehicle left (schematic diagram)



Deployment zone of window bag, vehicle right (images in progress)

Warning note

Work on the A-pillar can cause damage to the window bag. This can lead to the window bag no longer functioning correctly and not providing sufficient safety in an accident.

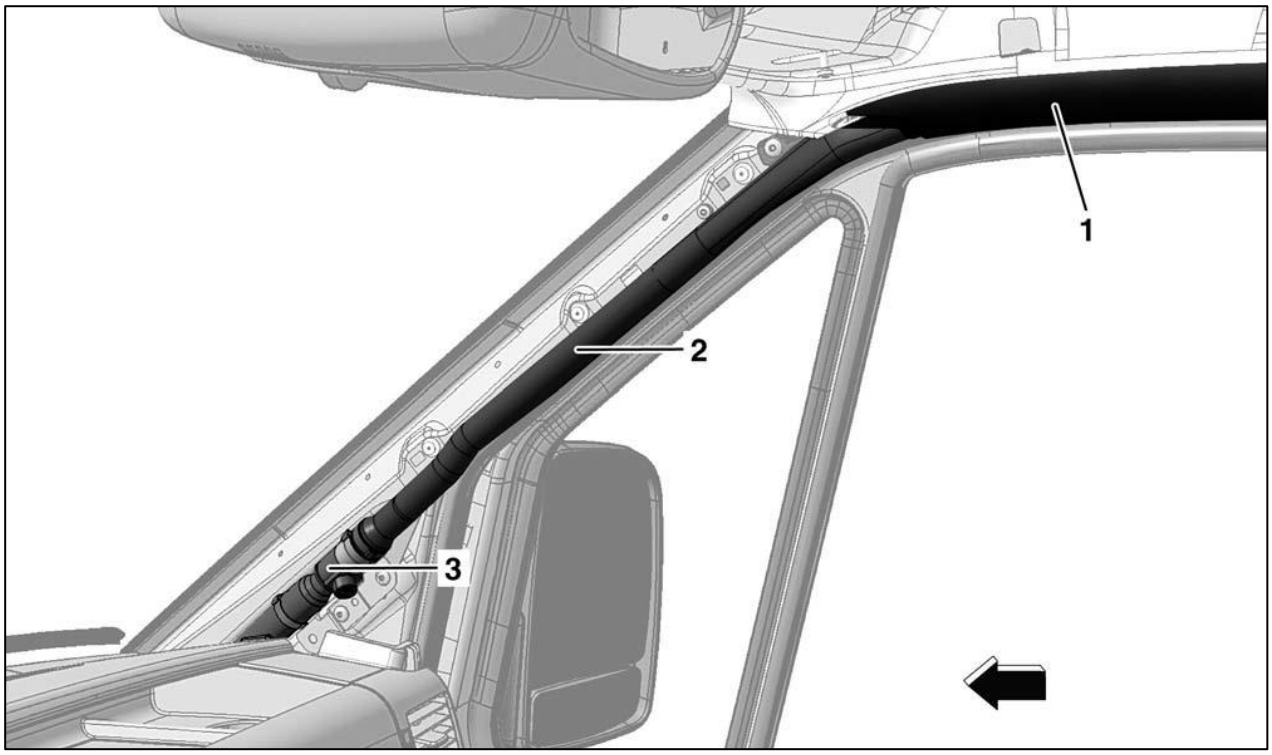


Fig. 3: Window bag installation position

1 – Cover

2 – Window bag in protective sleeve

3 – Gas generator in window bag

Arrow direction of travel

7.4.2.5 Working with airbag and belt tensioner units

Warning note

Removed airbag units shall always be stored with the padded side facing up. If the padded side is pointing downwards, the airbag unit will be catapulted through the air if it is ignited accidentally.

The airbag units fitted in the Crafter include driver, front passenger airbag, window bag and thorax bag.

- Work on removed airbag and belt tensioner units and also testing and assembly work are only allowed to be performed by specialist personnel.
- The assembly of the airbag and belt tensioner units as well as the airbag control unit is only allowed to be performed immediately after removal from the storage room and without delay if the battery has been disconnected, the negative terminal has been covered and the test connection/connector has been disconnected.
- If the work is interrupted, the airbag or belt tensioner units shall be stored again under lock and key.
- The airbag and belt tensioner units are not allowed to be treated with grease, cleaning agents or similar.
- The airbag and belt tensioner units must also not be exposed, even briefly, to temperatures above 100°C.

Airbag and belt tensioner units shall be renewed if they have been dropped from a height greater than 0.5 m. The airbag and belt tensioner units are only allowed to be electrically tested in installed state with the specified testers. For reasons of safety, the test should only be performed at a Volkswagen customer service department or at a workshop that has been specially trained to service these safety systems.
Before disassembling airbag and belt tensioner units, the battery shall be disconnected, the negative battery terminal covered and the test connection/electrical connector disconnected.

7.4.2.6 eCall emergency system

In the event of an accident, the EU eCall Emergency System can help to reduce the time it takes until emergency services arrive at the scene. Data is transmitted to the emergency response coordination centre via the OCU communication model.
The emergency call therefore does not depend on a mobile telephone being ready for operation, but does require a mobile phone connection and the possibility of locating the vehicle via GPS or Galileo. It is automatically triggered by the crash sensors or manually by the driver using the SOS button. The emergency call automatically goes to the nearest emergency response coordination centre.

General conditions:

The eCall Emergency System consists of the following components:

- Communication module (OCU)
- Emergency call button
- Microphone
- Emergency call loudspeaker
- Aerials for mobile network
- Global satellite navigation system
- and their connections and cables.

As this is a certified system, no changes to components of the ecall Emergency System are permitted.
It should also be ensured in particular that the acoustic properties of the eCall Emergency System (emergency call loudspeakers and microphone) are not changed by constructional changes to the vehicle.
Subsequent fitting or removal of a partition will change the overall acoustics. Proper functioning of the eCall Emergency System after the change is to be checked by a technical service. The eCall Emergency System can in principle be deactivated. In this case, the emergency call button must be replaced with a blind cap and the customer informed about the missing function in written form.
For further information, please contact the Volkswagen Commercial Vehicle Service Centre (NSC.Convert@volkswagen.de).

7.4.3 Seats

7.4.3.1 Retrofitting series seats

- When retrofitting seats, (side) airbags, belt tensioners, seat-occupied sensor, and belt fastening detection must all be re-coded by the customer service workshop.
- The strength data for seats available ex-works is only valid in conjunction with the original attachment elements.
- When the seat belts and seats (including seat box) are re-fitted, the prescribed bolts shall be used and tightened to the prescribed torque (see Workshop Manual for the Crafter).
- When installing seat belts and belt locks, only Volkswagen genuine parts must be used.

Warning note

Only fit seat covers or protective covers that are expressly approved for use in the vehicle.
The use of non-approved covers may prevent the side airbag from deploying.

Information

More information about torques can be found in the Workshop Manual for the Crafter, *General body repairs, interior*.

Volkswagen AG Workshop Manuals and workshop information can be downloaded from the Internet at **erWin*** (**E**lectronic **R**epair and **W**orkshop **In**formation from Volkswagen AG):
http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

7.4.3.2 Installation of seats by aftermarket providers or use of standard seats instead of seats fitted to series vehicles

As an alternative to retrofitting seats in accordance with 7.4.3.1, installation of seats can also be carried out with the following prerequisites:

- Seating that deviates from standard seat units with three-point seat belts has to meet the requirements of UNECE R 14. Seat units without seat belts, or with two-point belts are not permitted.
- Seats and seat belts must be tested and certified according to UNECE R 17 and UNECE R 16.
- Modifications to the original series production condition can result in the withdrawal of type approval.

Warning note

The attachment of seats to the wheel housing is not permitted. This also applies to wheel housings that are lowered. Otherwise damage could be caused to the vehicle (e.g. wheel housing and tyres) and accidents could result.

7.4.4 Reducing interior noise

Noise insulating materials can be installed to reduce the noise level in the vehicle interior. This must be manufactured from flame-retardant materials.

7.4.4.1 Floor area

Information was not available at the copy deadline.

7.4.4.2 Seals

Apertures, gaps and slots cut between the engine compartment, vehicle underbody and bulkhead to the vehicle interior shall be sealed carefully with elastic material. Do not install ventilation openings in the immediate vicinity of noise sources.
In addition, the insulation material manufacturers or suppliers should be consulted.
They can make suggestions for optimum noise protection for your particular conversion.

7.4.5 Air conditioning (heating and cooling)

A large number of components, and combinations of these, are available as optional equipment ex-works for air conditioning in the load compartment.

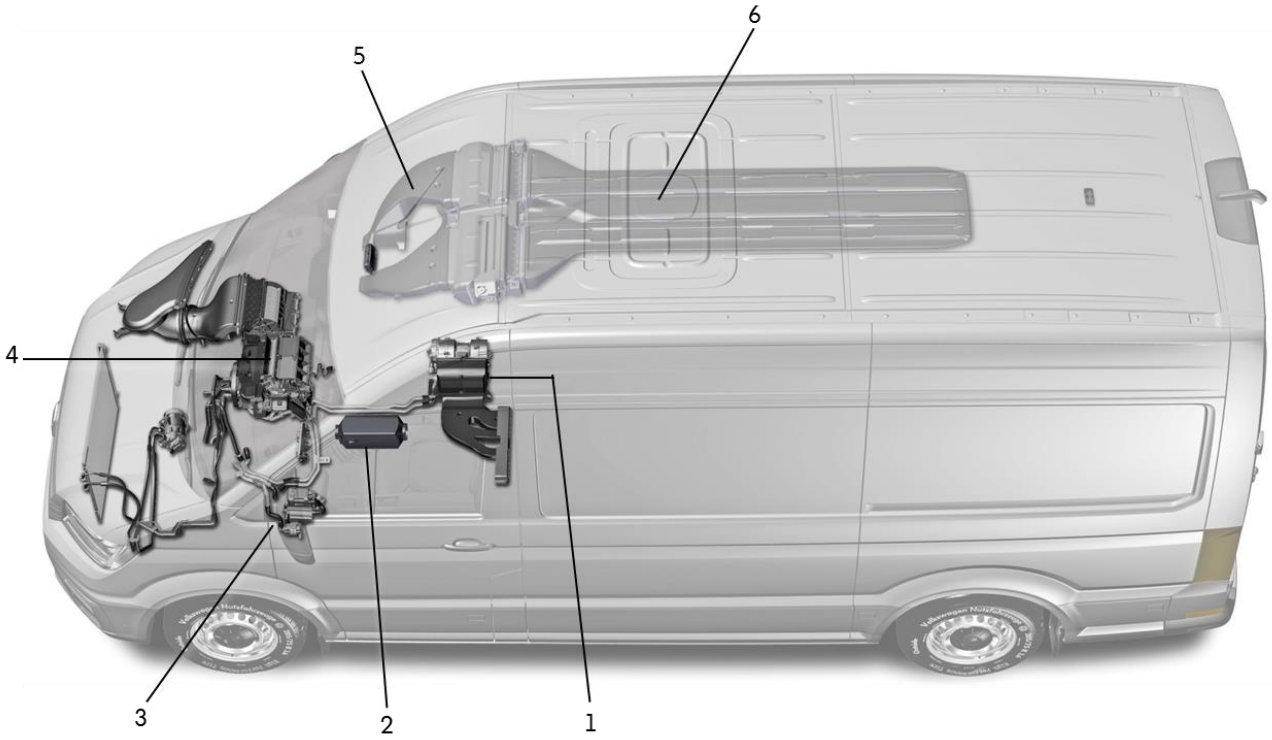


Fig. 1: Overview of air conditioning

1 – Second heat exchanger under front passenger seat (PR number 6AC)

2 – Auxiliary air heater under front passenger entry (e.g. PR number 7VM)

3 – Supplementary heater/auxiliary coolant heater (PR number 9M5)

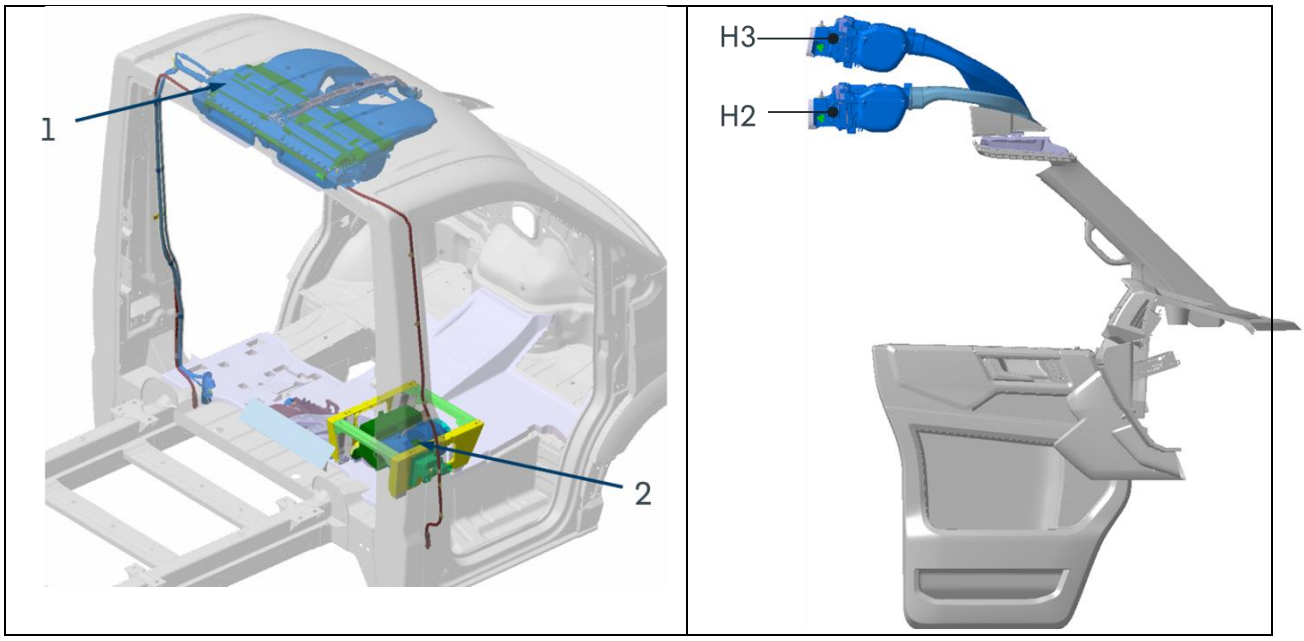
4 – Heater and air conditioning unit (PR number KH6, rear dash panel, optionally with electrical auxiliary heater “PTC” (PR number 7E7)

5 – Second evaporator (PR number 6AB)

6 – Air outlet (PR number 5CH)

7.4.5.1 Second evaporator/second heat exchanger/auxiliary air heater

Both the roof evaporator and the second heat exchanger can be ordered for panel vans and chassis, and always have the same installation position. Depending on the roof version (H2: 2,355 mm, H3: 2,590 mm), the height of the installation position of the air ducts will vary.



Installation position of the individual components in the cab (view from above and cross-section for various roof heights)

1- Second evaporator under headliner, illustrated on right: air ducts position for roof height variants H2: 2,355 mm H3: 2,590 mm

2- Second heat exchanger in the seat box (front passenger side)

Designation (PR. number)	Cooling output [kW]	Heating output [kW]
2nd evaporator under headliner in cab (6AB)	8.4	--
2nd heat exchanger (6AC)	--	5.9
Combination of roof evaporator and 2nd heat exchanger (6AD)	8.4	5.9

Advantages over air intake from surrounding air:

The air flow volume to be cooled for the luggage compartment is drawn in from the temperature-controlled vehicle interior. This ensures only a low cooling output is required to attain the required load compartment temperature.

The air has also been filtered beforehand by the vehicle interior air filter.

The air outlet grilles behind the roof evaporator are integrated in the headliner in panel vans, and are installed in the upper section of the partition in vehicles with a partition.

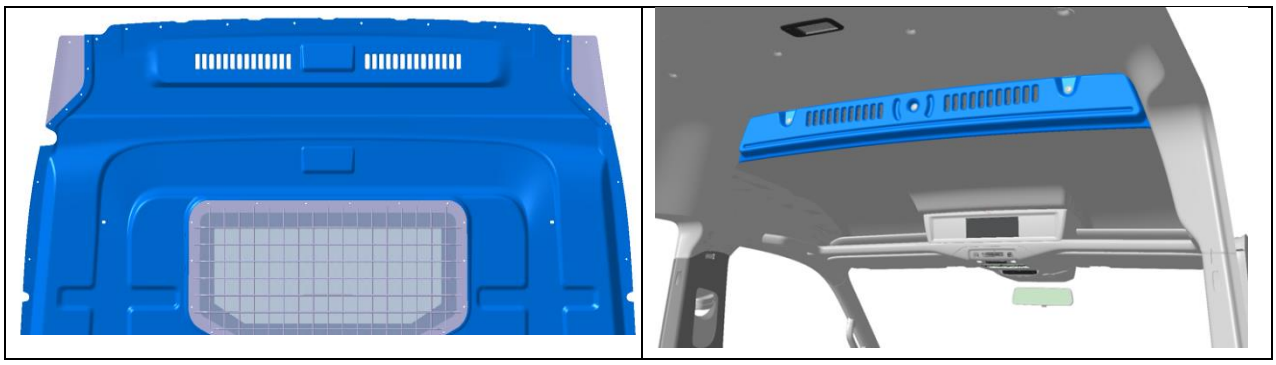
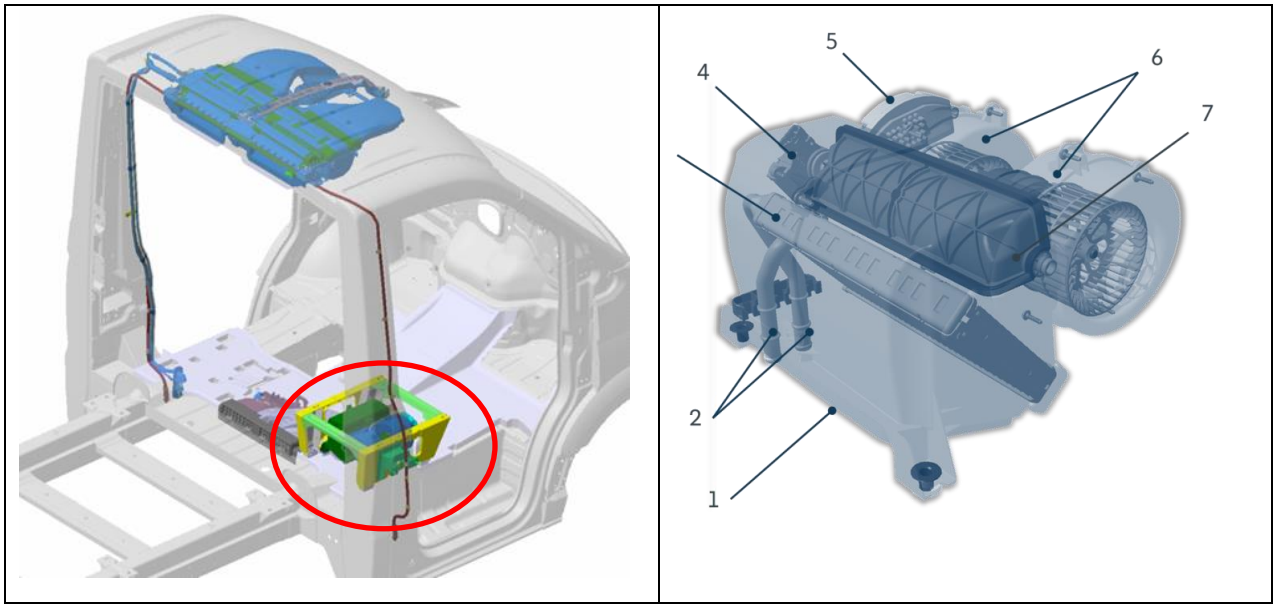


Fig. 2: Versions of the air outlet grilles in panel vans with and without a partition



Second heat exchanger with engine coolant connection (heat is drawn from the engine coolant)

1 – Air outlet

2 – Coolant connections

3 – Actuator

4 – Blower regulator

5 – Double stroke blower

6 – Temperature flap

In order to draw a heat output totalling 5.9 kW from the coolant even at low outside temperatures and a lower engine load, the auxiliary coolant heater operated using diesel (PR number 9M5) is required.

The design of the air outlets for the second heat exchanger varies depending on the vehicle version (panel van with or without partition, double cab).

The air outlets are installed in the middle of the vehicle floor near the rear wall of the cab, or partition.

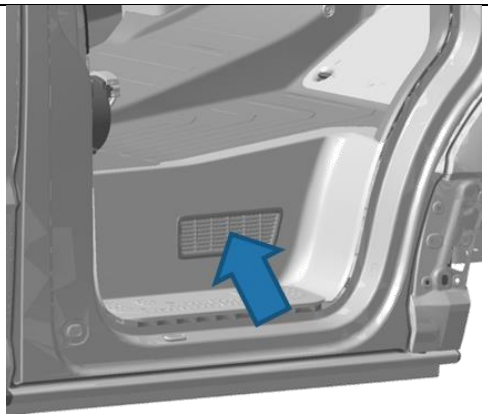


Fig. 4: Air intake for auxiliary air heater in the front step to the right

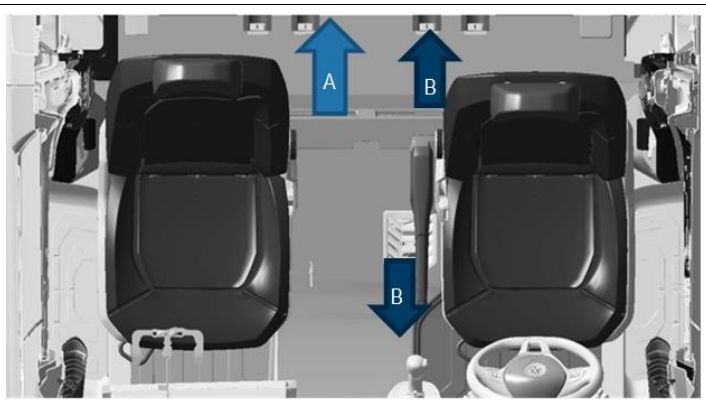


Fig. 5: Air outlets for 2nd heat exchanger (A) and auxiliary air heat (B) (panel van without partition)

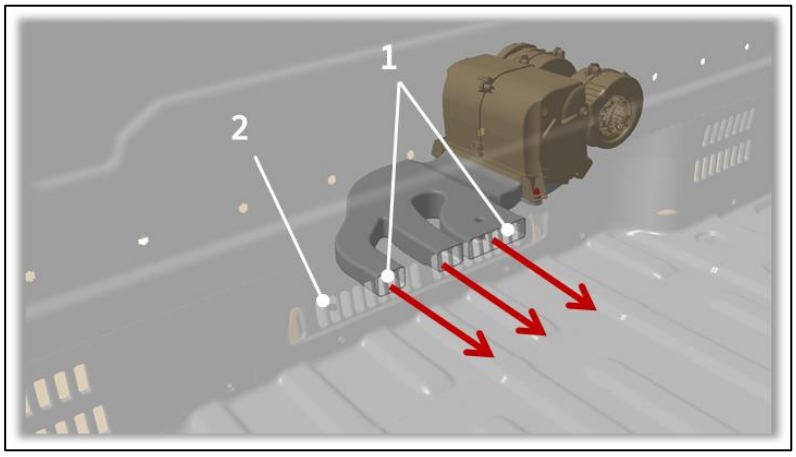


Fig. 6: Rear outlet area (panel van with partition)

1 – Outlet area of second heat exchanger

2 – Outlet area of auxiliary air heater

Practical note

The quality of defrosting of the windscreen and side windows by the standard ventilation system must also be retained in converted vehicles.

7.4.5.2 Auxiliary heater

If exhaust gases are guided downwards, the vehicle floor shall be gas tight. Floor opening for control shall be sealed with rubber grommets.
Please note that additional heat exchangers of heating systems such as convection heaters require a water auxiliary heater.

The following auxiliary heaters are available ex-works as optional equipment:

Description	PR number	Heating output [kW]
Electric auxiliary air heater 1,400 W (PTC integrated in the heater unit behind the dash panel)	7E7	1.4
Auxiliary air heater can be programmed using the remote control	7VM	3.5
Auxiliary air heater with remote control plus supplementary heater	7VF	3.5 + 5
Auxiliary coolant heater with programmable auxiliary heater function and remote control	7VL	5
Auxiliary air heater plus auxiliary coolant heater programmable with remote control	9M4	3.5 + 5
Diesel fuel operated supplementary heater	9M5	5

7.4.5.3 Retrofitting an air conditioning system

Practical note

Please note that subsequent modifications to the factory-fitted air conditioning system by the Converter are solely the responsibility of the Converter. In such cases, Volkswagen is unable to make any statement about the lubrication of the compressor and the effects on its service life.

As a result, Volkswagen AG does not offer any warranty for the compressor in these cases. An extensive measuring procedure must be carried out at the compressor manufacturer in order to ensure oil circulation in the refrigerant circuit.

7.5 Ancillaries

7.5.1 General information

Power take-off systems deliverable ex-works:

- Gearbox-dependent power take-off system
- Engine power take-off at front via belt drive

The version of the power take-off system and the selection of gear ratio depend on the power and speed of the unit to be driven.
Gearbox-dependent power take-off systems are only allowed to be switched on and off when the vehicle is stationary.
Specifications for the maximum transferable torques for the individual power take-off systems are guidelines for jolt and vibration-free operation.
The figures assume that gearing with adequate endurance strength is available. Additional inertia forces occurring on the driven assemblies are not taken into consideration.
The power decrease should be in the range of the maximum engine speed.
Exposed drive shafts, fan wheels or pulleys shall be covered.
Belts or chain drives are not allowed to be fitted on the drive shaft or flange of a power take-off system.

Practical note

In vehicles with a high proportion of engine running times with the vehicle stationary (working mode), the normal maintenance intervals specified by Volkswagen AG for the belt drive (poly V-belt, tensioning pulley, idler roller etc.) shall be reduced according to the application and customer profile.

Practical note

Information and notes in the Owner's Manual for the vehicle regarding regeneration of the diesel particulate filter in the exhaust system must be complied with when the power take-off system is used.

7.5.2 Gearbox-dependent power take-off systems

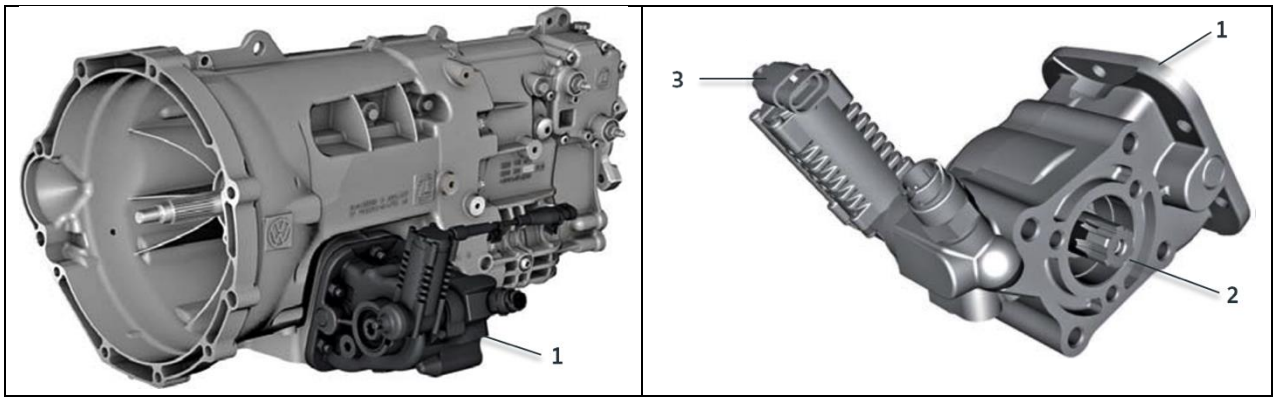


Fig. 1: Gearbox with power take-off system

1 – Power take-off system

2 – Output shaft

3 – Selector unit for power take-off system

The side power take-off system available for the Volkswagen manual gearbox (for vehicles with rear-wheel drive only) can be obtained ex-works as optional equipment. The direction of rotation is clockwise viewed in the direction of travel.

PR no. 0R1:	Gearbox with power take-off system (NA)

Warning note

A functional display of the power units connected to the power take-off system only in the driver's cab is not sufficient if work readiness can result in a danger that is not visible to the user (adjacent hydraulic pressure or rotating shafts). The user must be informed of the danger by clearly visible warning devices. The Converter must ensure that the user is suitably instructed.

Practical note

Theoretical installation space studies for axial piston pumps made by Sunfab, Hydrocar, Bosch, Parker and OMFB were conducted up to a displacement of 34 cm^3/rev.

Installation trials using an axial piston pump made by Sunfab were conducted.

Installation of other units shall be checked on a case-by-case basis.

Practical note

The power take-off system can only be operated when the vehicle is stationary.

To avoid thermal overloads when using the power take-off system, please observe and apply the following instructions!

Note on using the power take-off system:

- The power take-off system may only be operated when the vehicle is stationary.
- Make sure the fuel tank is filled to the maximum before continuous operation.
- Continuous operation is permissible for a maximum of 10 min. Before using the power take-off system again, a cooling phase of 20 min with the power take-off system switched off must be observed. This cycle can be repeated 3 times, after which a cooling phase of one hour must be observed.
- Exceeding the power take-off of 20 kW must be avoided.
- When using the power take-off system, please observe the power take-off system button, which signals a warning by flashing when limit temperatures are reached. This can lead to a deactivation of the working speed control.
- To ensure the necessary air circulation around the vehicle in the area of the vehicle front end, the greatest possible distance (at least 3 m) from other vehicles, buildings or similar must be maintained.
- In the event of an active diesel particulate filter message in the instrument cluster, regeneration must be carried out before using the power take-off system. To do this, please follow the instructions in the Owner's Manual for your vehicle.

Practical note

Note for body builders:

The power take-off system button warning signal is also output via the customer-specific functional control unit. If the body builder's body impedes the visibility of the power take-off system button, an additional warning signal must be made visible to the user by the Converter.

Depending on the type and application of the power units connected to the power take-off system, the Converter must prepare an owner's manual with the above content and provide it to the customer on delivery of the vehicle.

Practical note

The total weight of components fitted to the power take-off system must not exceed 13.2 kg.

Information

In order to use the power take-off system on the drive side, the optional working speed control version US1 with static speed steps or US2 with variable speed steps must also be selected. See also chapter 7.3.7.“Working speed control (ADR)”.

Practical note

Continuously excessive torque draw must be avoided, as otherwise damage to the gearbox and to the power take-off system may occur, or their lifespans may be shortened.

7.5.2.1 Gearboxes with a power take-off system (PR number 0R1)

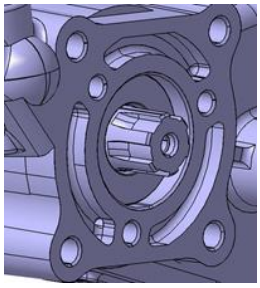
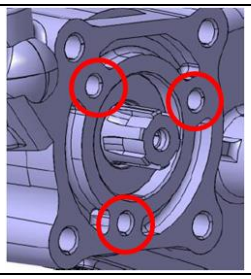
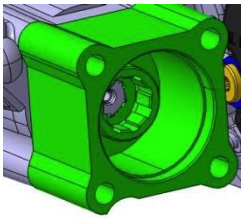
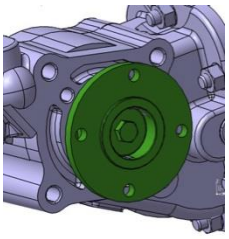
Technical data:

Ratio i (n_{NA}/n_{ENG})	i=1
Max. continuous power [kW]	20
Max. engine speed of power take-off system n_{NA} [rpm]	3800

Practical note

To ensure reliable power consumption at the power take-off system, an engine speed of 1,300 rpm must be selected.

7.5.2.2 Flange options

Flange options for power take-off from gearbox	
1. Factory-delivered state: + Splined shaft ISO14-6×21×25 + Suitable for connection between power take-off and work machine with 3-hole or 4-hole flange connection.	
2. 3-hole flange adapter: + Assembly kit, 3-hole flange adapter (2N0.800.167, see chapter 7.5.2.3 “Connection dimension for the assembly kit”) + Allows a hydraulic pump with a 3-hole flange to be fitted. + Available from Volkswagen Customer Services and ex-works as optional equipment with PR no. 0R1	
3. 4-hole flange adapter: + 4-hole flange adapter (2N0.409.339) + Allows a hydraulic pump with a 4-hole flange according to DIN ISO 7653-D to be fitted for splined shafts according to DIN ISO 14. + Available from Volkswagen Customer Services and ex-works as optional equipment with PR no. 0R1	
4. Round flange: + Round flange with mounting elements (part no. 2N0.409.356). Available from Volkswagen Customer Services. + Note: The axial installation space is restricted. Please check there is space for installation purposes beforehand.	

7.5.2.3 Connection dimension for the assembly kit (2N0.800.167)

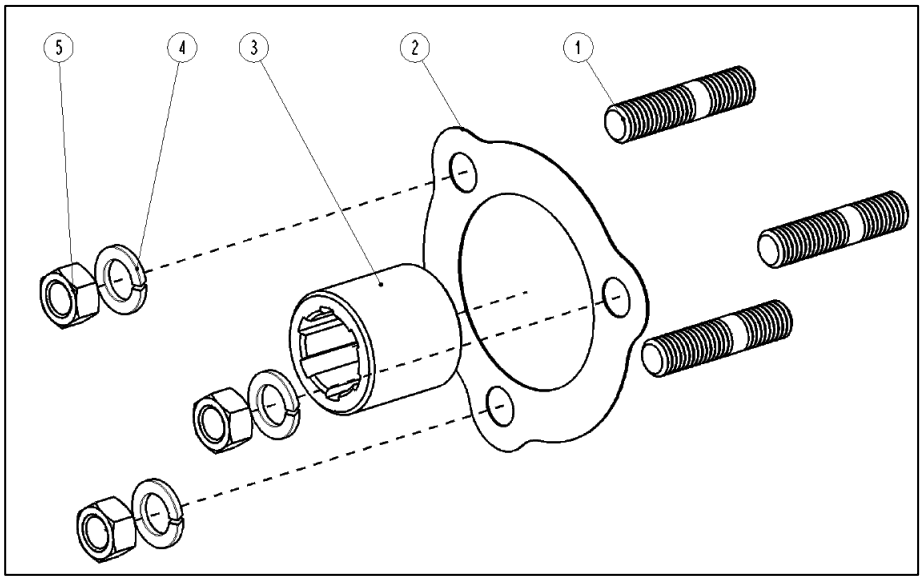


Fig. 1: Assembly kit (2N0.800.167)

1 – Stud

2 – Seal

3 – Adapter shaft SO 14– 6×21×25

4 – Spring washer

5 – Nut

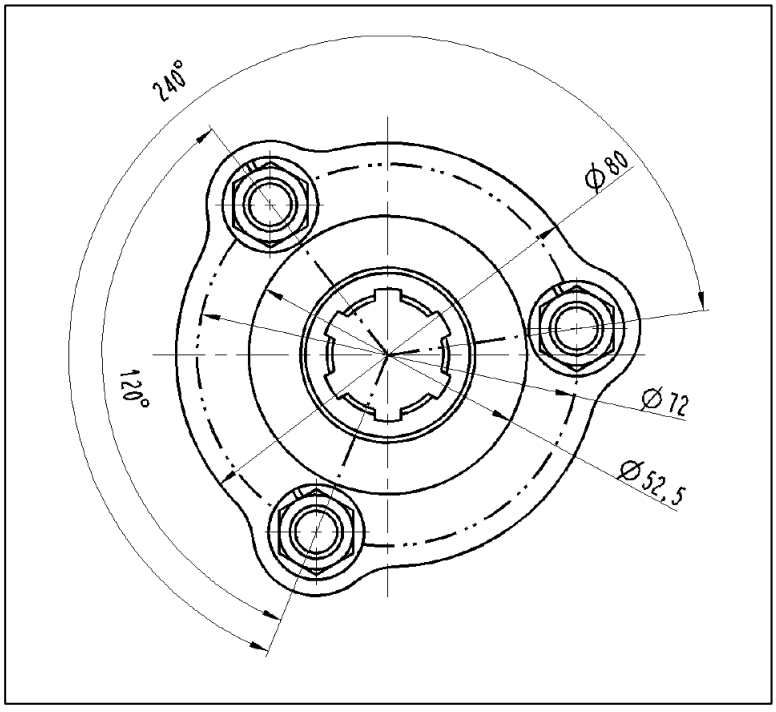


Fig. 2: Connection dimensions of assembly kit (2N0.800.167)

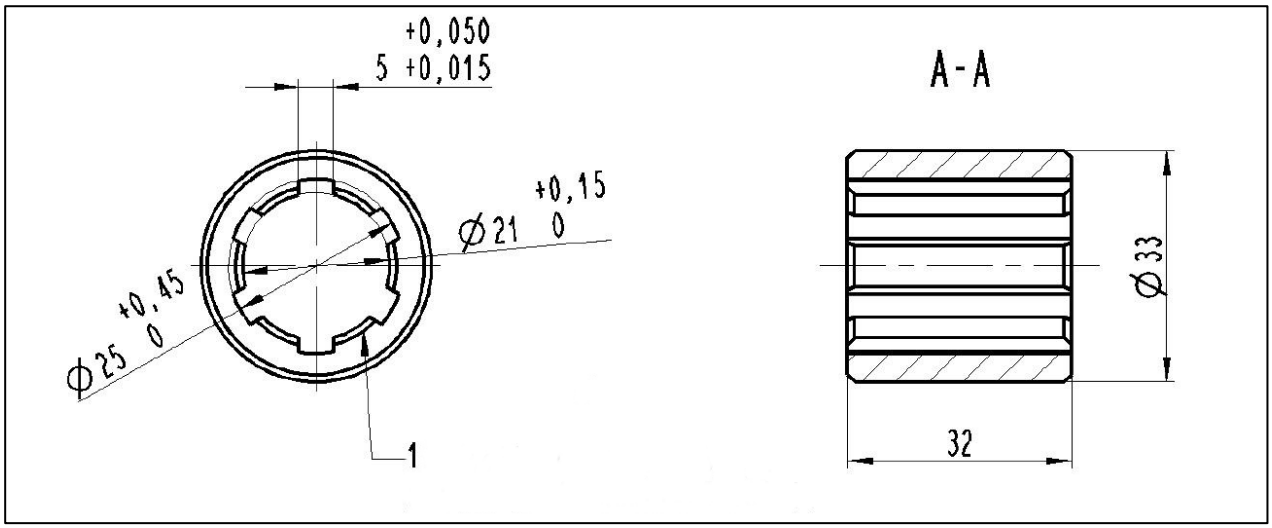
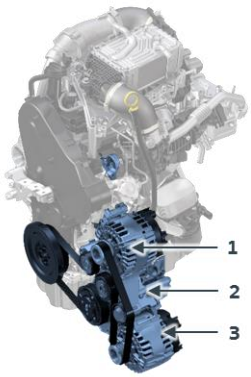
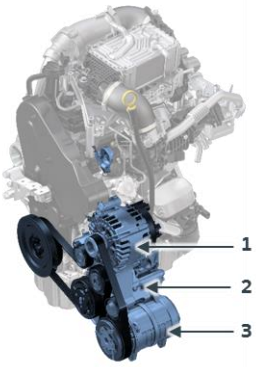


Fig. 3: Connection dimensions of splined shaft (1), ISO 14-6x21x25

7.5.3 Engine power take-off

An additional air conditioner compressor (PR number 2AB) or an additional alternator (PR number 8HI) in the belt drive are offered ex-works. Both assemblies are operated in the 1st belt track. All engine auxiliary drives described here cannot be combined with the series alternator in the 230 A power level (9G0).

Overview of power take-off systems:

Basic drive 1. Alternator (max. 180A)	
Air conditioning drive 1st alternator (140 A and 180 A) 2nd air conditioner compressor	
Air conditioning drive + 2nd alternator 1st alternator (140 A or 180 A) 2nd air conditioner compressor 3rd additional alternator 140 A and 180 A	
Air conditioning drive + 2nd air conditioner compressor 1st alternator (140 A or 180 A) 2nd air conditioner compressor 3rd additional air conditioner compressor	

Practical note

The operating of power units in a 2nd belt track can lead to premature wear or serious damage to the engine and is therefore not permitted.

7.5.3.1 Additional air conditioner compressor (option 2AB)

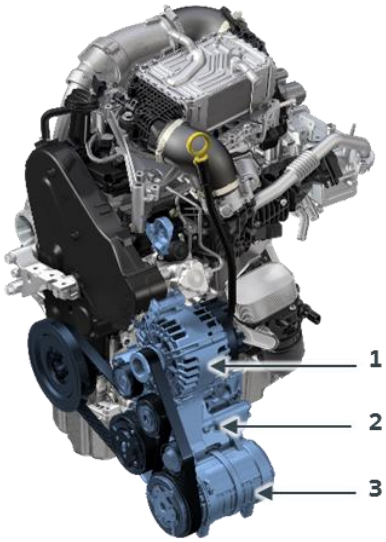


Fig. 1: Power take-off system with additional air conditioner compressor

1 – Alternator (140 A and 180 A)

2 – Air conditioner compressor

3 – Additional air conditioner compressor (163 cm³)

With model year 2025, the following Euro VI-e emission standards with rear-wheel drive (PR number 7GI) and Euro VI-e with front-wheel drive (PR number 7GI), the optional additional equipment for auxiliary unit second air conditioner compressor (PR number 2AB). For vehicles with the EU6-EA emission standard (PR number 4WG), the optional additional equipment second air conditioner compressor (PR number 2AB) is not available.

Depending on the intended country of registration and type of registration, other exceptions are possible. Details must be agreed with the responsible test institution or the responsible technical service in advance when planning the vehicle.

Description/functional scope of the additional air conditioner compressor (PR no. 2AB)

When the refrigerated or air conditioned body is activated in the direction of the 2nd air conditioner compressor, the CFCU must receive a signal on MFE_22 (multifunction input 22) and then implement the following scopes on an as-needed basis:

- Suppressing the engine start/stop function (MSS)
- Raising the idling speed to approx. 1,040 rpm

In addition, MFA_02 (multifunction output) is set when the engine is running properly and should therefore simulate the previous D+ signal.

Practical note

Engine speeds below 1,040 rpm n_{ENG} may result in impermissible, high forces in the belt drive. Care must be taken not to activate or operate the additional power unit below 1,040 rpm n_{ENG}.

Pin assignment on CFCU/input and output assignment/pins on CFCU

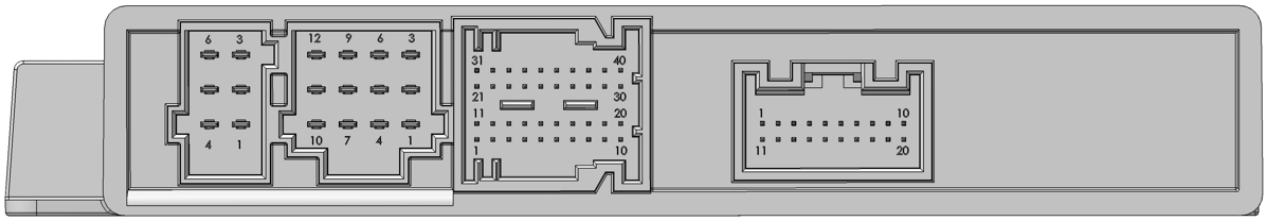


Fig. 2: View of pin assignments at “CFCU”

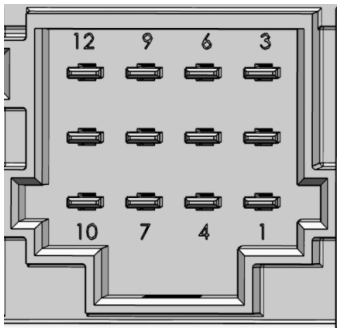


Fig. 3: Fuse location 2

Plug 2				
Pin no.	12	9	6	3
Signal	MFA_2	MFA_19	MFA_1	MFA_6
Pin no.	11	8	5	2
Signal	MFA_21	MFA_20	MFA_4	MFA_5
Pin no.	10	7	4	1
Signal	MFA_22	MFA_3	MFA_8	MFA_7

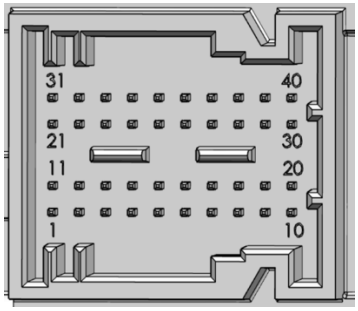


Fig. 4: Fuse location 3

Connector 3										
Pin no.	31	32	33	34	35	36	37	38	39	40
Signal	MFA_9	MFA_10	MFE_10	MFE_12	MFE_14	MFE_16	MFE_2	MFE_4	MFE_6	MFE_8
Pin no.	21	22	23	24	25	26	27	28	29	30
Signal	MFA_11	MFA_12	MFE_9	MFE_11	MFE_13	MFE_15	MFE_1	MFE_3	MFE_5	MFE_7
Pin no.	11	12	13	14	15	16	17	18	19	20
Signal	MFA_17	MFA_18	MFA_14	Rel2_no	Rel2_com	REL2_nc	MFE_18	MFE_20	MFE_22	MFE_24
Pin no.	1	2	3	4	5	6	7	8	9	10
Signal	MFA_15	MFA_16	MFA_13	Rel1_no	Rel1_com	REL1_nc	MFE_17	MFE_19	MFE_21	MFE_23

Pin assignment for 2nd air conditioner compressor (option 2AB)

CFCU pinning:

Request to 2nd air conditioner compressor	MFE_22	ST3 ST302 Pin 19	Input, high-side, wakeup-capable, Digital
“s_mo_engine_running”	MFA_02	ST2 ST301 Pin 12	Output, high-side, 10 A, terminal 30_1

You will find further information about the CFCU in chapter 6.4.3 “Customer-specific functional control unit (CFCU)”.

7.5.3.1.1 Technical data for additional air conditioner compressor

Type	Valeo TM16
Displacement [cm³]	162.9
Permitted refrigerants:	R134a, R404a, R1234yf, R452a
Max. speed of air conditioner compressor [rpm]	R134a: 700–6,000
	R404a: 700–4000
	R1234yf: 700–6,000
	R452a: 700–6,000
Pulley ratio (Crankshaft/air conditioner compressor) i = dCS/ dACC	d_{CS}/d_{ACC} = 1.16
Direction of rotation	Rotates to right
Clutch type:	Magnetic clutch, open when there is no current
Mass [kg]:	Transverse installation: 7.1
	Longitudinal installation: 7.4
Compressor oil required	R134a: Valeo ZXL 100PG 180 cm³ (+20) Sanden SP10 (G 052 154 A2)
	R404a: Sanden SP10 (G 052 154 A2)
	R1234yf: Valeo VC100YF
	R452a: Suniso SL-68S

d_{CS} – diameter of crankshaft pulley, d_{ACC} – diameter of air conditioner compressor pulley

Type	TCCI QP16
Displacement [cm³]	163
Permitted refrigerants:	R134a, R404a, R452a
Max. speed of air conditioner compressor [rpm]	R134a: 700–6,000
	R404a: 700–6,000
	R452a: 700–6,000
Pulley ratio (Crankshaft/air conditioner compressor) i = dCS/ dACC	d_{CS}/d_{ACC} = 1.16
Direction of rotation	Rotates to right
Clutch type:	Magnetic clutch, open when there is no current
Mass [kg]:	4.9
Compressor oil required	Suitable PAG or POE oil depending on the refrigerant used (TCCI recommends a PAG 46 and POE 68)

d_{CS} – diameter of crankshaft pulley, d_{ACC} – diameter of air conditioner compressor pulley

Practical note

The second air conditioner compressor (PR number 2AB) is delivered ex works as a preparation:

- without compressor oil
- without additional refrigerant lines
- without an electrical wire for activating the magnetic clutch via the CFCU

Parametrisation of the CFC to activate the second air conditioner compressor is set at the factory.

Electrical activation with line routing is the responsibility of the installing Converter or the authorised workshop commissioned by the Converter.

Information

Installation instructions can be found in the Volkswagen AG workshop manuals on the Internet at erWin* (Electronic Repair and Workshop Information of Volkswagen AG): http://erwin.volkswagen.de/erwin/showHome.do.

*Information system from Volkswagen AG, subject to payment

Cooling output of additional air conditioner compressor

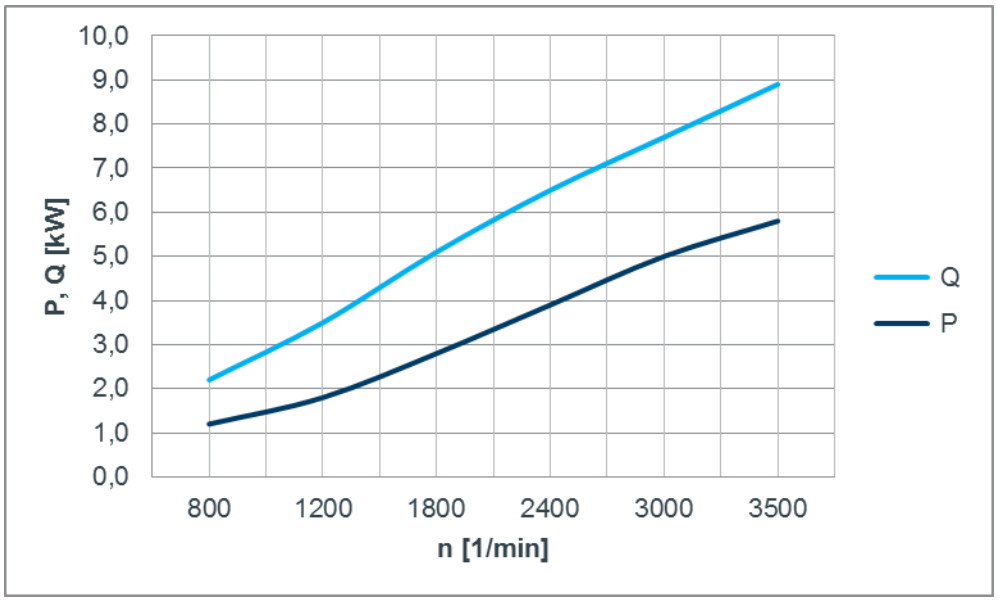


Fig. 1: Cooling capacity of air conditioner compressor TM16

Q – Cooling output [kW]

P – Power consumption [kW]

N – Engine speed [rpm]

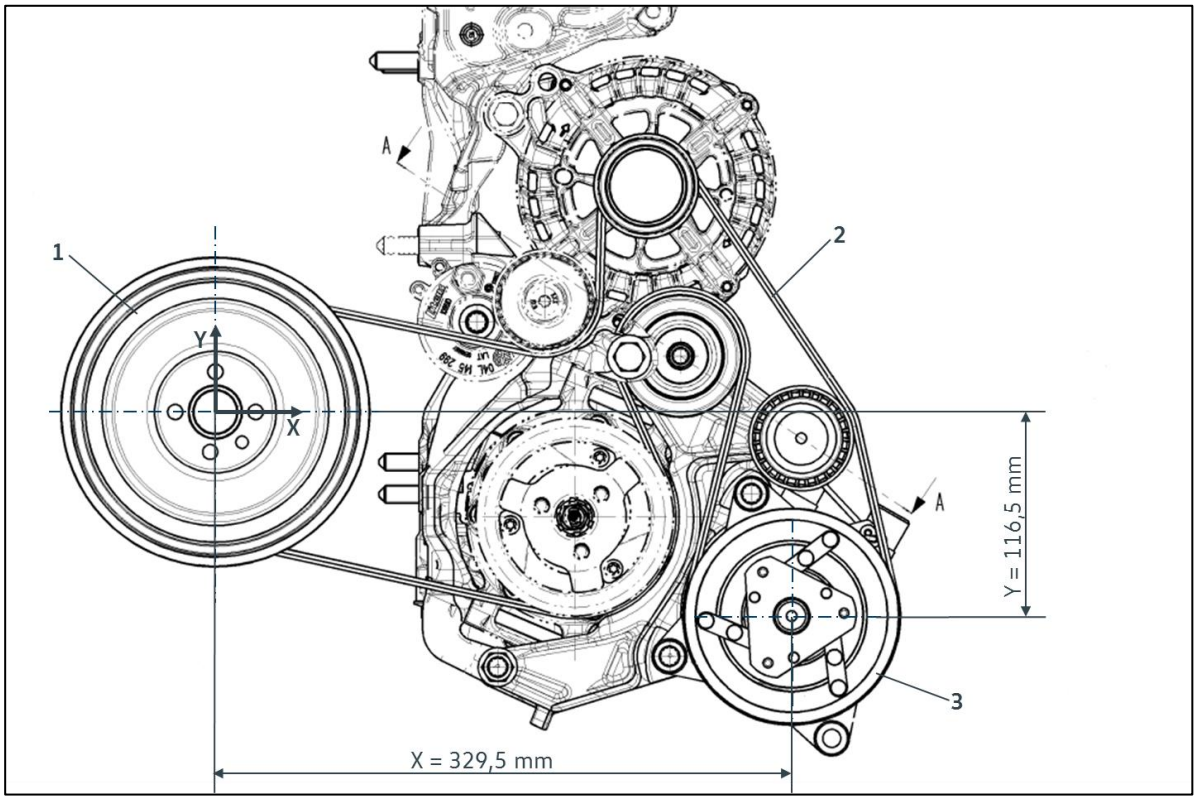


Fig. 2: Drive arrangement of the additional air conditioning compressor, axle distance to the crankshaft pulley

1 – Crankshaft

2 – Poly V-belt (6pk poly-V-1732)

3 – Second air conditioner compressor

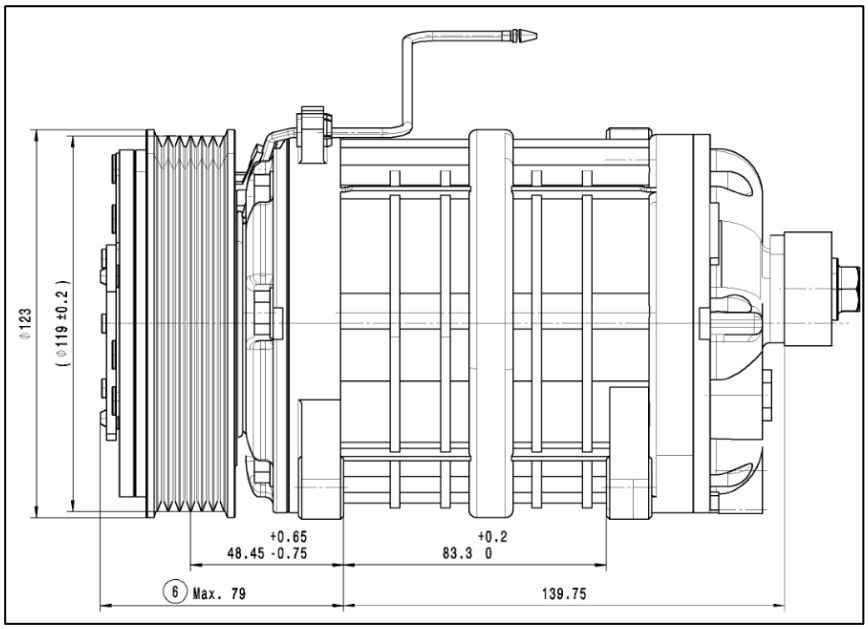


Fig. 3: Dimensions of air conditioner compressor (7C0.816.803 D/E), side view

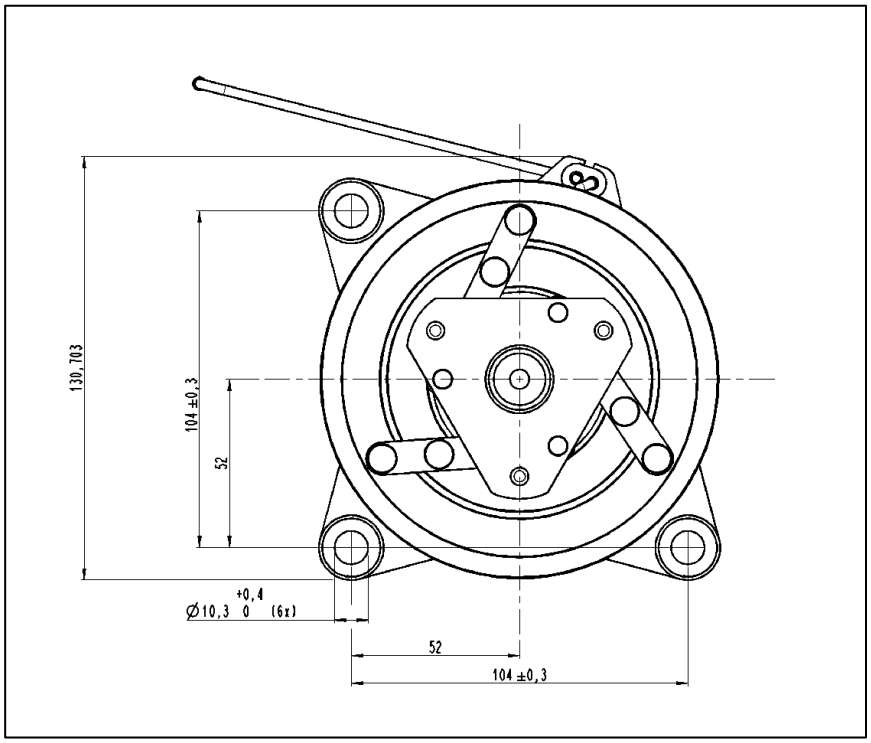


Fig. 4: Dimensions of air conditioner compressor (7C0.816.803 D/E), front view

7.5.3.1.2 Electrical connection – plug contact AMD42060-1 (CA 105)

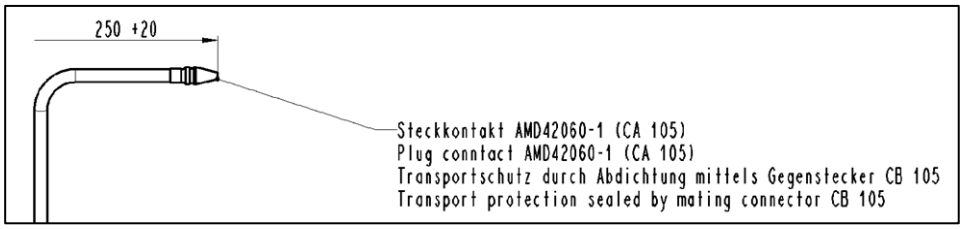


Fig. 1: Electrical connection, plug-in contact AMD42060-1 (CA 105)

7.5.3.1.3 Dimensions of pulley for belt 6pk poly-V

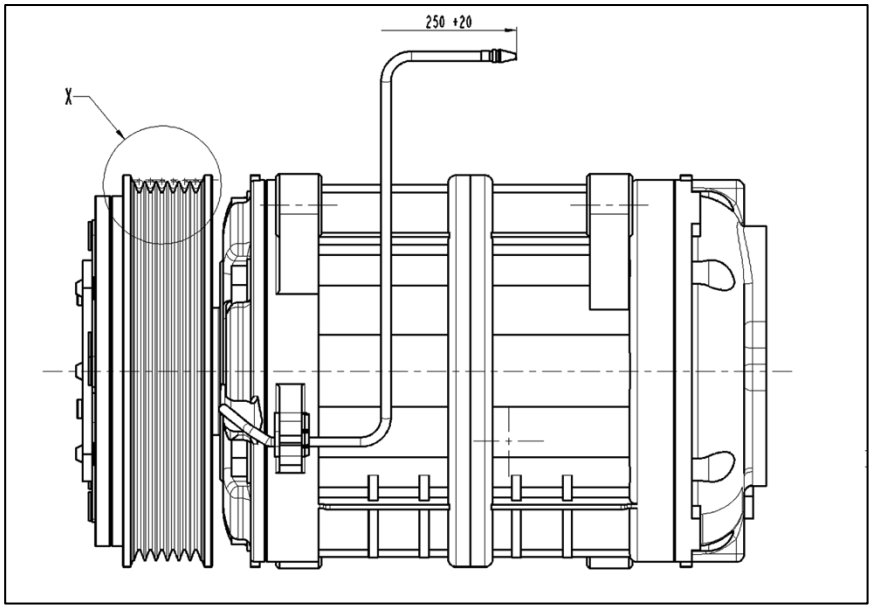


Fig. 1: Air conditioner compressor (7C0.816.803 D/E)

Detail X: Dimensions of pulley for belt 6pk poly-V

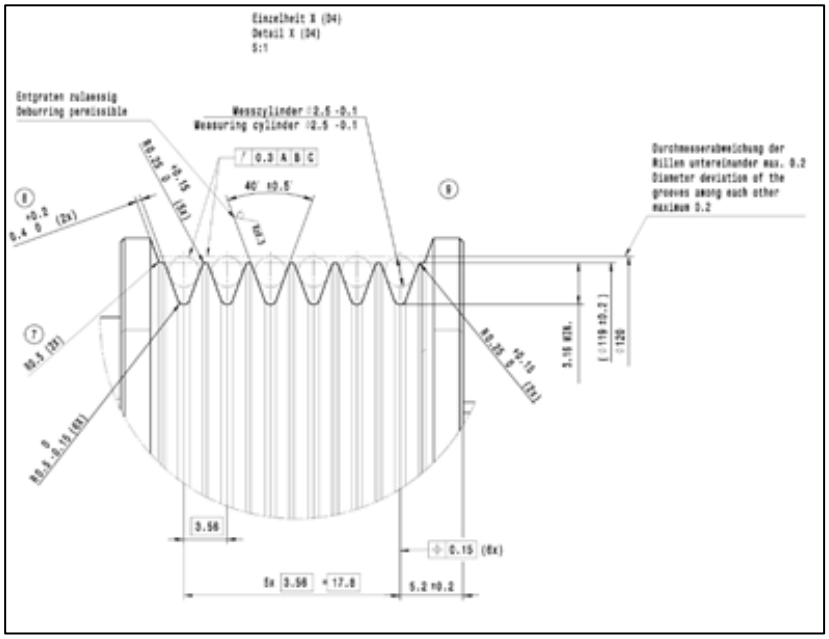


Fig. 2

7.5.3.1.4 Connection dimensions for air conditioner compressor

1. Transverse installation, axial outlet

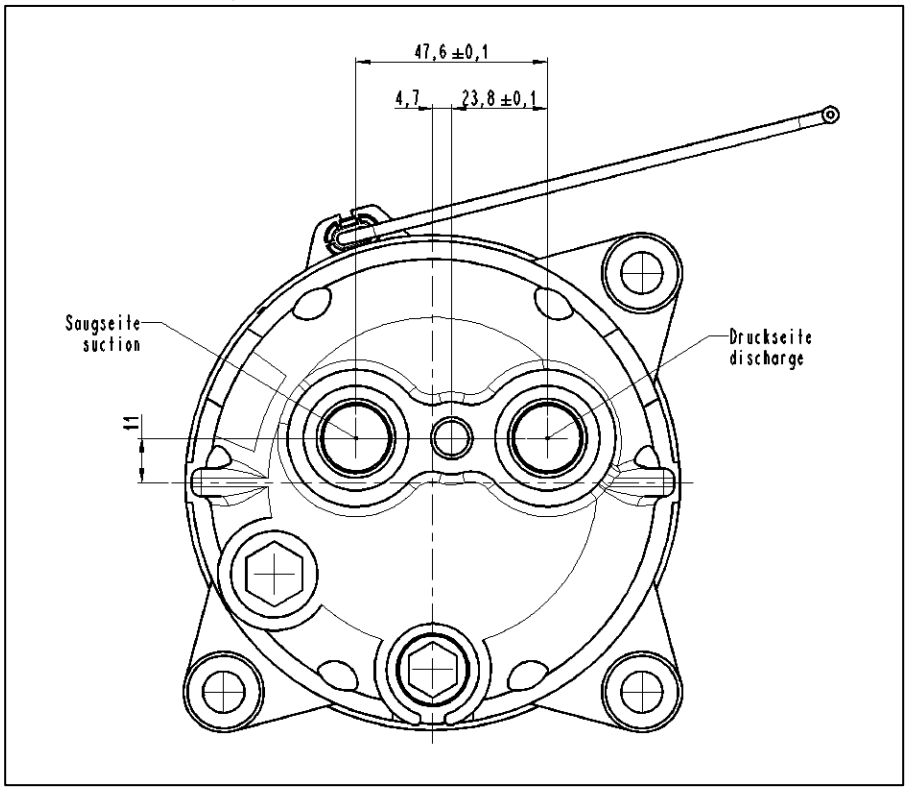


Fig. 1: Connection dimensions for transverse installation

2. Longitudinal installation, radial outlet

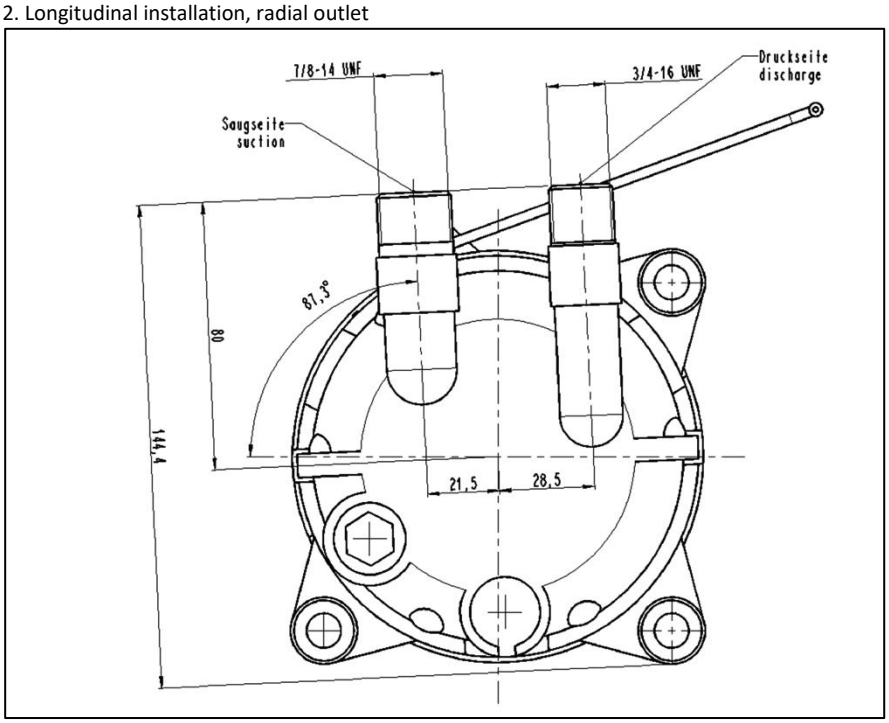


Fig. 2: Connection dimensions for longitudinal installation

7.5.3.1.5 Retrofitting the additional air conditioner compressor

From model year 2025 onwards, vehicles with the Euro VI-e emission standard with rear-wheel drive (PR number 7GI) and Euro VI-e with front-wheel drive (PR number 7GI) can be retrofitted with a second air conditioner compressor. Retrofitting is possible without limitation for vehicles with the EU6-EA (4WG) emission standard.

Information

Information for importers about retrofitting, and the required *measures code, can be found in ServiceNet. Body builders should contact their authorised Volkswagen Commercial Vehicles workshop or their importer.

*The measures code covers the functions:

- Raising the idling speed to approx. 1,040 rpm

- Suppression of the engine start-stop function (MSS)

Information

Installation instructions can be found in the Volkswagen AG workshop manuals on the Internet at erWin* (Electronic Repair and Workshop Information of Volkswagen AG): http://erwin.volkswagen.de/erwin/showHome.do.

Practical note

The following equipment in the vehicle is mandatory for retrofitting: customer-specific functional control unit (CFCU), 140 A and 180 A alternator, air conditioning system.

For a detailed overview of the components to be used or replaced during the conversion, please contact us. (See chapters 2.1.1 “Contact in Germany” and 2.1.2 “International contact”)

It is essential that the correct components are used in order to guarantee smooth and safe operation of the vehicle.

Information

If you have any questions about the content of the configuration of the functional control unit (CFCU), please use the following email address: config-cs@volkswagen.de

Information

Technical documentation on the CFCU and further information regarding the requesting and processing procedure can be found on the CustomizedSolution portal via the link:
https://www.customized-solution.com/de/de/technische-produktinformationen/kfg/technische-information

You must register on the CustomizedSolution portal in order to access this. The configuration of the customer-specific functional control unit (CFCU) can be ordered via the CS portal.

Information

Please contact us for installation instructions. (See chapters 2.1.1 “Contact in Germany” and 2.1.2 “International contact”)

Practical note

The following equipment in the vehicle is mandatory for retrofitting: customer-specific functional control unit (CFCU), 140 A and 180 A alternator, air conditioning system.

For a detailed overview of the components to be used or replaced during the conversion, please contact us. (See chapters 2.1.1 “Contact in Germany” and 2.1.2 “International contact”)

It is essential that the correct components are used in order to guarantee smooth and safe operation of the vehicle.

7.5.3.1.6 Installing other air conditioner compressors

In place of the TM16 air conditioner compressor, the air conditioner compressor QP16 can also be used, but only if the original belt drive components and the original tightening torques are used and idling speed is increased to 1,040 rpm when the compressor is loaded. The installation conditions and the power data of the QP16 air conditioner compressor (manufacturer TCCi) are equivalent to those of the TM16 (manufacturer Valeo). Identical general conditions apply (scope of parts, vehicle configuration etc.) as for the factory-fitted additional air conditioner compressor; please refer to chapter 7.5.3.1.5 “Retrofitting the additional air conditioner compressor”. The power consumption (see chapter 7.5.3.1.1) must not be exceeded.

Information

Installation instructions can be found in the Volkswagen AG workshop manuals on the Internet at erWin* (Electronic Repair and Workshop Information of Volkswagen AG): http://erwin.volkswagen.de/erwin/showHome.do.

Installation instructions:

- The configuration of the belt drive must be converted in the constructional design in the same way as the 2nd air conditioner compressor as standard equipment PR number 2AB.
- The coupling diameter and position must match the dimensions of the 2nd air conditioner compressor (see chapter 7.5.3.1.1 “Technical data for additional air conditioner compressor”, image of air conditioner compressor dimensions (7C0.816.803)).
- The track position of the poly V-belt must be identical to that of the original belt and the poly V-belt specifications must be observed. (See chapter 7.5.3.1.3 “Dimensions of pulley for belt 6pk poly-V”)
- It is imperative to maintain the distance between the axle centres and the crankshaft decoupler as per the drive formation table (see also chapter 7.5.3.1.1 “Technical data for additional air conditioner compressor, fig. Drive arrangement of additional air conditioner compressor”).
- In accordance with the specifications of the Crafter Workshop Manual, the tightening torques for the second air conditioner compressor fixation elements must be observed. (See chapter 2.1.3 “Electronic Repair and Workshop Information from Volkswagen AG (erWin))”.)
- The Converter is responsible for making any adaptation to the original connection for the power take-off system.
- For flawless operation of the compressor, comparable to the standard function, a configuration of the CFCU* must be present or must be requested and imported.
- Only Volkswagen genuine parts may be used for retrofitting. Please contact us for an overview of the components concerned (see chapter 2.1 “Product and vehicle information for body builders”).
- For the description of the functional scope of the additional air conditioner compressor and the pin assignment on the CFCU*, see chapter 7.5.3.1 “Additional air conditioner compressor”.

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

7.5.3.1.7 Changed maintenance intervals

The maintenance intervals in the belt drive change when additional ancillaries are retrofitted.

See table.

	Service interval
Additional auxiliary drive (first and second air conditioning compressor): renew poly V-belt and tensioning roller	Every 60,000km
Additional auxiliary drive: Renew poly V-belt pulley with freewheel of 1st alternator	Every 60,000km
Additional auxiliary drive: Renew idler roller 1 and 2	Every 120,000km
Additional auxiliary drive: Renew first air conditioning compressor	Every 120,000km
Additional auxiliary drive: Renew second air conditioning compressor	Every 120,000km

7.5.3.2 Additional alternator (option 8HI)

An additional alternator with 180A (PR number 8HI) is available ex works. The additional alternator is operated in the basic belt drive (1st belt track) and can be combined with the 1st 140 A and 180 A alternators. It cannot be combined with the series alternator in the power level 230 A (9G0).

The optional ancillary 2nd alternator (option 8HI) is available for the Euro VI-E emission standard (PR number 7GI). Depending on the intended country of registration, other exceptions are possible. Details should be agreed in advance with the responsible test institution or the responsible technical service when planning the vehicle.

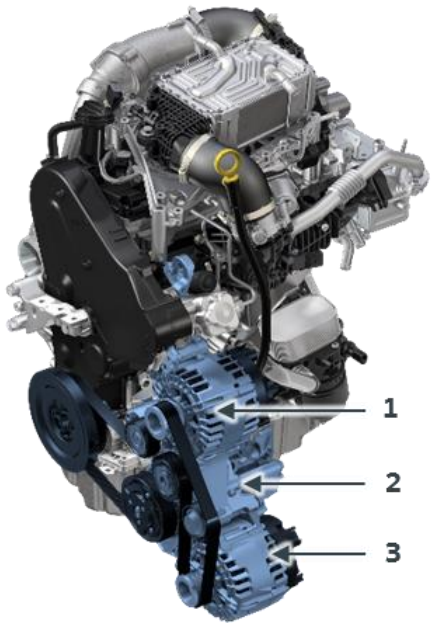


Fig. 1: Power take-off system with additional alternator

1 – Alternator (140 A/180 A)

2 – Air conditioner compressor

3 – Additional alternator 140A and 180A

7.5.3.2.1 Retrofitting additional alternator

No information was available at the time of publication.

7.5.3.2.2 Changed maintenance intervals

The maintenance intervals in the belt drive change when additional ancillaries are retrofitted.
See table.

	Service interval
Additional auxiliary drive (first and second alternator): Renew poly V-belt and tensioning roller	Every 60,000km
Additional auxiliary drive: Renew poly V-belt pulley with freewheel of 1st alternator	Every 60,000km
Additional auxiliary drive: Renew idler roller 1 and 2	Every 120,000km
Additional auxiliary drive: Renew first air conditioning compressor	Every 120,000km
Additional auxiliary drive: Renew second alternator	Every 180,000km

7.5.3.3 Retrofitting a hydraulic pump

In place of the 2nd air conditioner compressor, a hydraulic pump can be installed as an alternative, but only if the original belt drive components and the original tightening torques are used and idling speed is increased to 1,040 rpm when the compressor is loaded. Identical general conditions apply (scope of parts, vehicle configuration etc.) as for the factory-fitted additional air conditioner compressor; please refer to chapter 7.5.3.1.5 “Retrofitting the additional air conditioner compressor”.

The power consumption of the hydraulic pump must not exceed that of 2nd air conditioner compressor (see chapter 7.5.3.1.1).

Information

Please contact us for installation instructions. (See chapters 2.1.1 “Contact in Germany” and 2.1.2 “International contact”)

7.6 Add-ons

7.6.1 Wind baffles/roof spoilers

Fig. 1: Wind baffles/roof spoilers on the single cab (schematic diagram)

A wind baffle/roof spoiler is permitted with full surface bonding (with high-strength adhesive) on the cab roof of the Crafter chassis with single cab/double cab if the following prerequisite is met:
It shall be attached in a way that does not damage the base vehicle.

The following thresholds are to be maintained for the add-ons:

- Maximum permitted height of centre of gravity (see 4.1.2 “Maximum permitted height of centre of gravity”).
- Maximum gross front axle weight ratings must be observed (see 10.3 Weights (masses)”).
- Maximum permissible roof load of 50 kg for wind baffles/roof spoilers.

The Converter is responsible for ensuring the correct connection between the vehicle and wind baffle, as well as the durability of the wind baffle and its fastening.
Information on procuring a suitable wind baffle/roof spoiler is available on request. Please contact Customer Care (see chapter 2.1 “Product and vehicle information for body builders”).

Information

For the subsequent installation of side marker lights, for example in a wind baffle, a roof cab or a box body, it is recommended to install the base vehicle with the optional equipment “Position light preparation” with the PR number Ordering the 6S2 light (see chapter 6.5.4.3 “Preparation for side marker lights”)

7.6.2 Roof sleeper cabs

The addition of a roof sleeper cab with a maximum weight of 100 kg is permissible for the Crafter chassis with single/double cab, on the condition that adhesive is applied over the complete surface to attach it.

The following thresholds are to be maintained for the add-ons:

- The permitted centre of gravity and front axle load shall be observed (see chapter 4.1.2 "*Maximum permitted centre of gravity*").
- The max. dynamic roof load of 50 kg for the double cab and 100 kg for the single cab, and max. static roof load of 200 kg must not be exceeded.
- Mounting to the vehicle must be in a manner to ensure that even if the adhesive is insufficient, the add-on remains firmly attached to the vehicle by other fixation means, e.g. bolts or rivets.
- Potential interactions with driver assist systems shall be taken into account (see chapter 6.8 "Driver assistance systems").

7.6.3 Roof carriers

When using a roof carrier, please observe the following information:

- Ensure even load distribution over whole roof area.
- The supporting brackets shall be placed with equal spacing. 50 kg per pair of feet and cross bar can be taken as a rule of thumb.
- Reduce the load on a percentage basis for shorter roof racks.

Installation of a roof carrier is not intended for the Crafter cab or double cab.

Roof carrier thresholds (uniform load)		
	Max. roof load [kg]	**Minimum number of pairs of support feet**
Normal roof	300	6
High roof	150	3
Extra-high roof	0	--
Double cab/single cab	0	--

Roof rails for roof carriers can be installed on the roof of the Crafter in conjunction with the preparation for roof rails (PR no.: 3S4).

By mounting C-rails on the roof, left and right, it is possible to attach movable roof carriers. Available for the roof heights of the standard roof (H2) or high roof (H3), but not in combination with the super high roof made of plastic. Please note that it is not possible to use the interior roof rack with this equipment.

7.6.4 Preparation for roof rails (PR No. 3S4)

With this preparation (PR no. 3S4), roof rails can be retrofitted without great effort.

By mounting C-rails on the roof, left and right, it is possible to attach movable roof carriers. The preparation is available for the following roof heights: normal roof (H2), high roof (H3). Not for plastic super-high roof (H4).

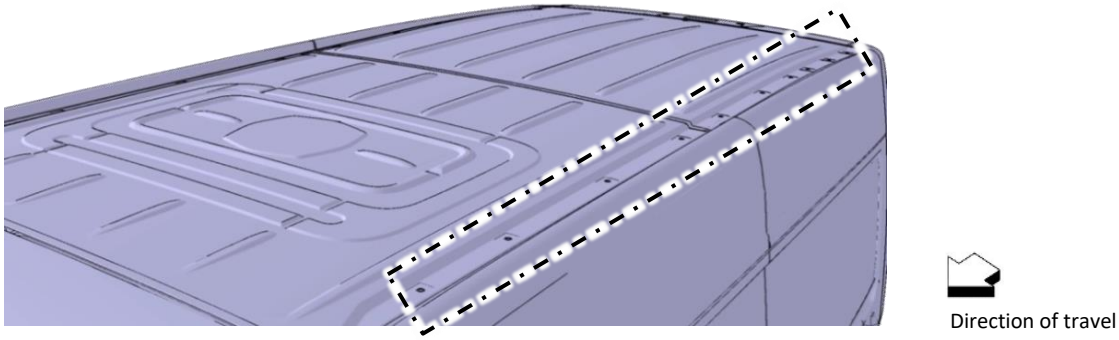


Fig. 1: Illustration of mounting holes on left side, right side in mirror image (here for L3 H3)

The mounting holes of the C-rail are sealed with aluminium pads and additionally with plastic covers. Before installing roof rails, the plastic covers must be removed to prevent settling. The aluminium pads must be pierced with an auxiliary tool.

Practical note

Attention: After opening the aluminium pads by mounting the roof rails, the sealing of the body must be ensured.

Practical note

The ALU pads glued to the roof frame are not durable for an extended period of time. They can be affected by environmental factors. To avoid leaks and corrosion of the body, it is necessary to permanently cover the taped-over openings in the roof area by installing roof rails.

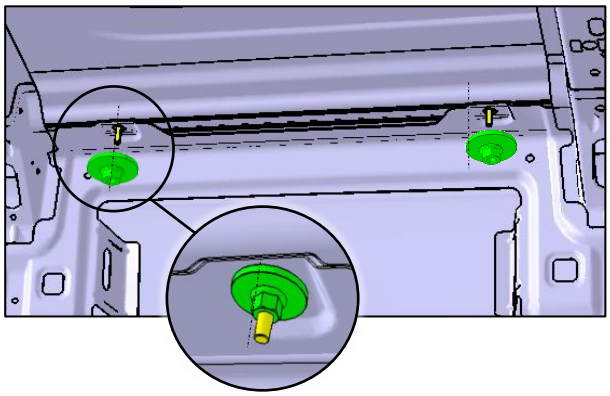


Fig. 2: Interior view of roof area threaded connection points

Practical note

When screwing on the roof strip, use bodywork washers to prevent damage to the paintwork.

7.6.5 Shelf installation/installations in vehicle interior

7.6.5.1 General information

Every panel van comes with factory fitted M6 hexagonal bore holes for intake nuts; they are spaced every 100 mm on the side walls and on the partition, in preparation for shelving and for attaching lashing rails (see fig. 1, fig. 2 and fig. 3).

Practical note

If the factory-fitted hexagon holes are used with intake nuts (N.909.278.01) on the side panel, the maximum permissible tensile force of 900 N per hexagon hole must not be exceeded.

If several adjacent mounting points are used, a load rail must be used to spread the load evenly across the side panel. Concentrated force applications must be avoided.

Maximum tensile forces with Volkswagen genuine load rails

	Permitted nominal pulling force [daN]
Upper load rail (in area of roof frame)	150
Lower load rail (in area of bracing belt)	150

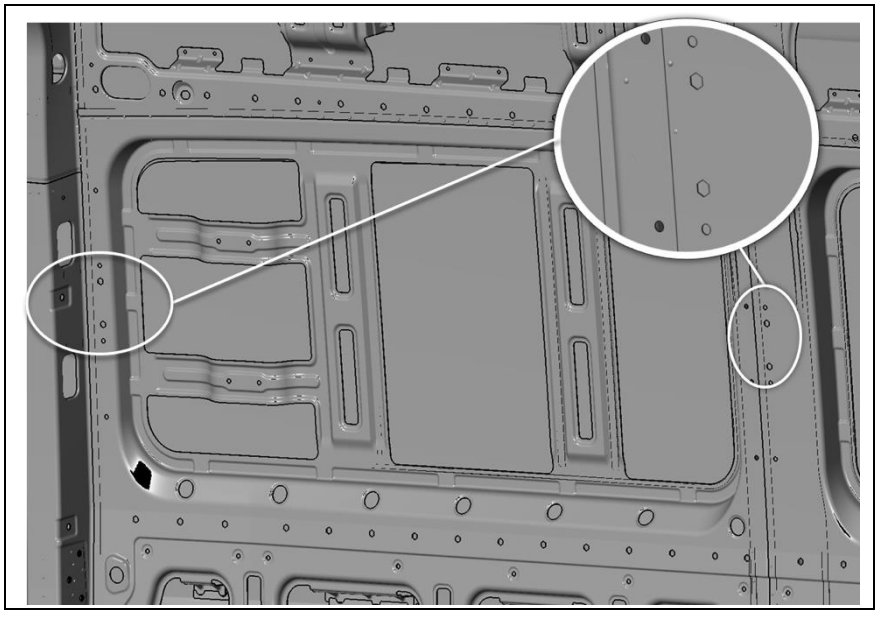


Fig. 1: Preparation for shelving on vehicle body (sidewall), example: airliner rails installed in the sidewall

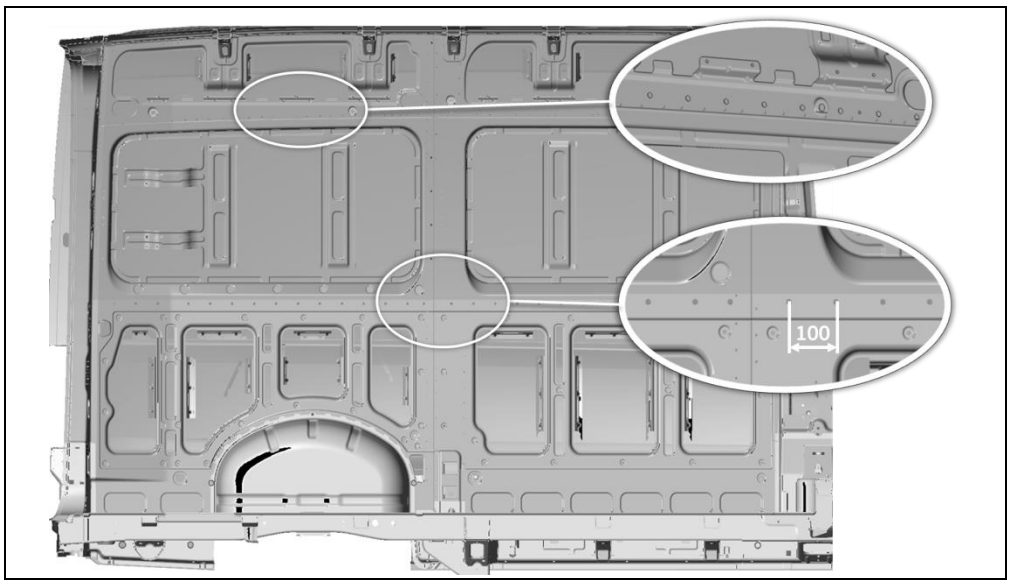


Fig. 2: Preparation for shelving on vehicle body (left side panel), hexagonal bore hole spacing 100 mm

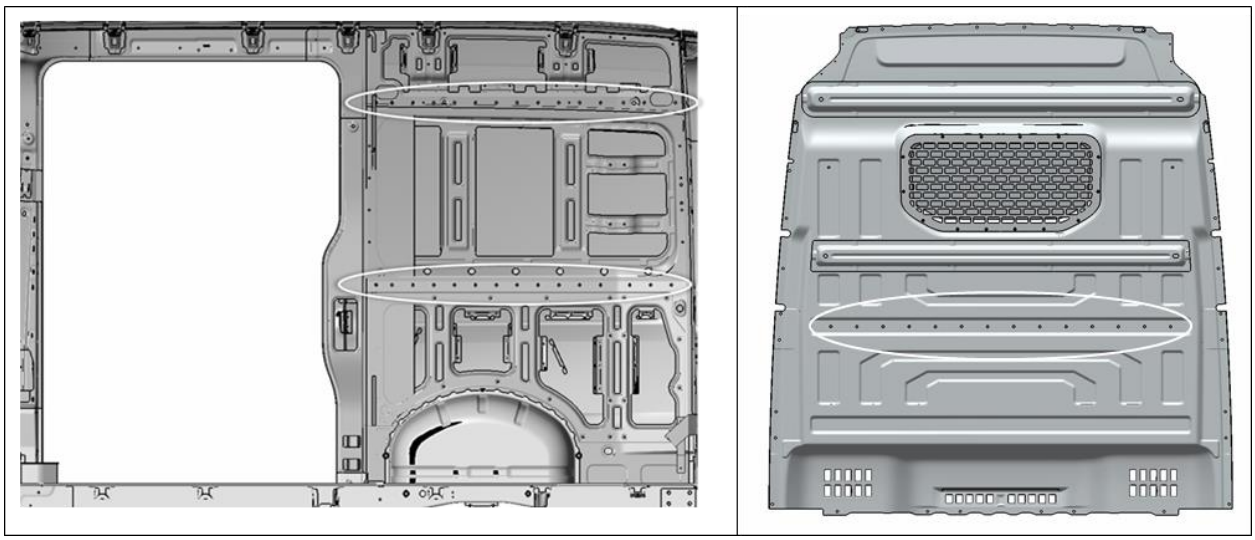


Fig. 3: Preparation for shelving on vehicle body (right side panel and partition)

Shelf installations shall:

- be sufficiently stable and self-supporting
- rest on the cross members and longitudinal members of the vehicle floor
- distribute the forces evenly
- be attached to load rails and fastening rings or to the entire contact surface on the body-in-white in the same way as the series production rails
- Note the installation direction when retrofitting fastening rings. The straight side of the fastening point shall be placed towards the panel wall. Otherwise, the fastening hoop could be bent beyond its incorrect limit point, and damaged, when fastening.

Practical note

Attachments subject to force application only into the vehicle side wall as well as individual force application points into the vehicle wall are not permitted. Otherwise the side wall might be damaged.

For the installation of shelves for parcel vehicles, the following chapter must also be observed (8.15 “Courier, express and parcel service (CEP)”)

For assembling and securing shelves, we recommend the load rails that are available as optional equipment ex-works.

Information

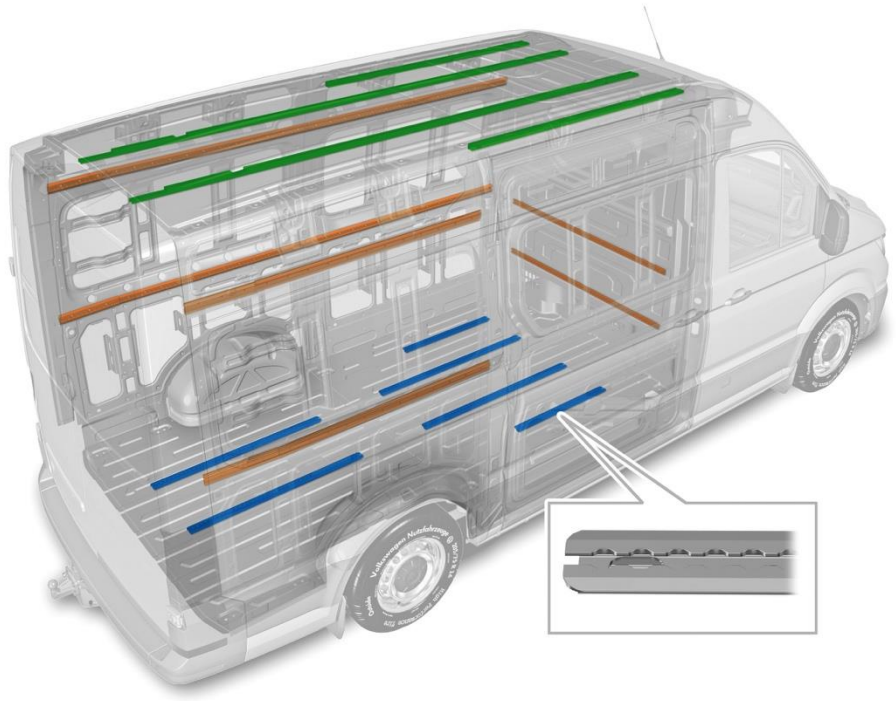
More information on the side wall (see chapter 7.2.7 “Side wall, windows, doors and lids”).

For the assembly and mounting of shelves, we recommend the load rails available ex-works as optional equipment (see also 7.6.5.2 “Load rails from factory”).

7.6.5.2 Load rails from factory

The following attachment systems are available ex-works as optional equipment:

PR number	Description
6L0	Without C-rails
6L1	C-rails on roof cross struts
6L2	C-rails on side wall and partition
6L3	C-rails on partition and roof
6L5	C-rails on side panel, partition and roof cross struts
6L6	C-rails on side wall
6L8	C-rails on side panel and roof



Key:

- Lashing rails on the side panels
- Lashing rails on the floor
- Lashing rails on the roof

Information

Please observe the operating manual supplied with the factory load rails.

7.6.5.3 Retrofitting load rails/securing rails

Practical note

Load rails and securing rails are only allowed to be retrofitted in the areas of the vehicle side wall that have been configured for this in the same way as the load rails available from the factory.

The following points shall be observed when retrofitting load rails on the vehicle side wall:

- The load rail manufacturer's specifications shall be observed.
- The maximum tensile forces (see chapter 7.6.5.1 “General information”) shall be clearly indicated in the area of the load rails (for example, with stickers) and enclosed with the vehicle Owner's Manual in a suitable form.
- The load shall be on the floor
- The load shall be fastened at two securing points on the rail
- The spacing from the next load securing point on the same rail may not exceed 1 m
- The rails must be attached using hexagonal locking nuts in the holes provided for this purpose.

7.6.6 Winch behind cab

When a winch is attached behind the cab, it shall be mounted on a suitably dimensioned assembly frame.

Practical note

The attachment of a winch to the front part of the frame is not permitted, Since it can interfere with the front crash structure, the airbag modules and the radar system (see chapter 7.2.2.1 “Attachment to front frame”).

7.6.7 Loading cranes

The crane size shall be suitable for the chassis size.
Loading cranes shall be secured on a mounting frame to reduce the load on the frame (see chapter 8.1 “Assembly frame”).
The compliance with the permitted axle loads should checked with the aid of a weight assessment.
The stability of the vehicle must be guaranteed by the Converter. The swivel range of the crane must be limited accordingly.
Loading cranes mounted on the vehicles must comply with the current legal regulations as well as the regulations on occupational safety and insurance in the countries of registration.

The assembly instructions from the crane manufacturer must be followed.

Information

If there are additional platform or tipper bodies, the dimensions of the assembly frame longitudinal member can be found in the platform body (see chapter 8.6 “Platform bodies”) or tipper body (see chapter 8.9 “Tipper bodies”) tables.

Practical note

Supporting equipment shall be provided on all loading cranes. We recommend hydraulic supports.
Do not raise the vehicle with the supports otherwise the frame will be damaged.

7.6.7.1 Loading crane body behind cab

Assembly frame

- The assembly frame must be connected to all bracket points and available bolting points of the vehicle frame.
  In addition, a shear-resistant connection between the assembly frame and the vehicle frame must be produced.
- Maximum crane load torque (kN x l): 25 kNm for vehicles with frames for twin tyres.
  20 kNm for vehicles with frames for single tyres.
- Resistance torques (W_X), material properties and profile dimensions of the assembly frame longitudinal members (see 8.1 “Assembly frame”).
- During crane operation, the stability shall be ensured by sideways extending outriggers.
- Outriggers that extend beyond the vehicle outline shall be marked with striking paint colours, reflectors and warning lights.
- Determine the length of the platform according to the position and weight of the loading crane observing the gross axle weight ratings.
- If the maximum crane load torque is exceeded, please contact us, (see 2.1 “Product and vehicle information for body builders”). The securing of the crane must be then reinforced accordingly.
- The vehicle is only allowed to be used on level, surfaced roads.
- A frame extension can be necessary due to the resulting load distribution.
- If a crane superstructure behind the cab requires a stronger assembly frame than for the body, the loading crane can be mounting on a shortened assembly frame (see the following illustration). The bevelled short assembly frame shall have a length $l_M \geq 35\%$ of the wheelbase.
- A letter of non-objection from the responsible department is required for this mounting method.

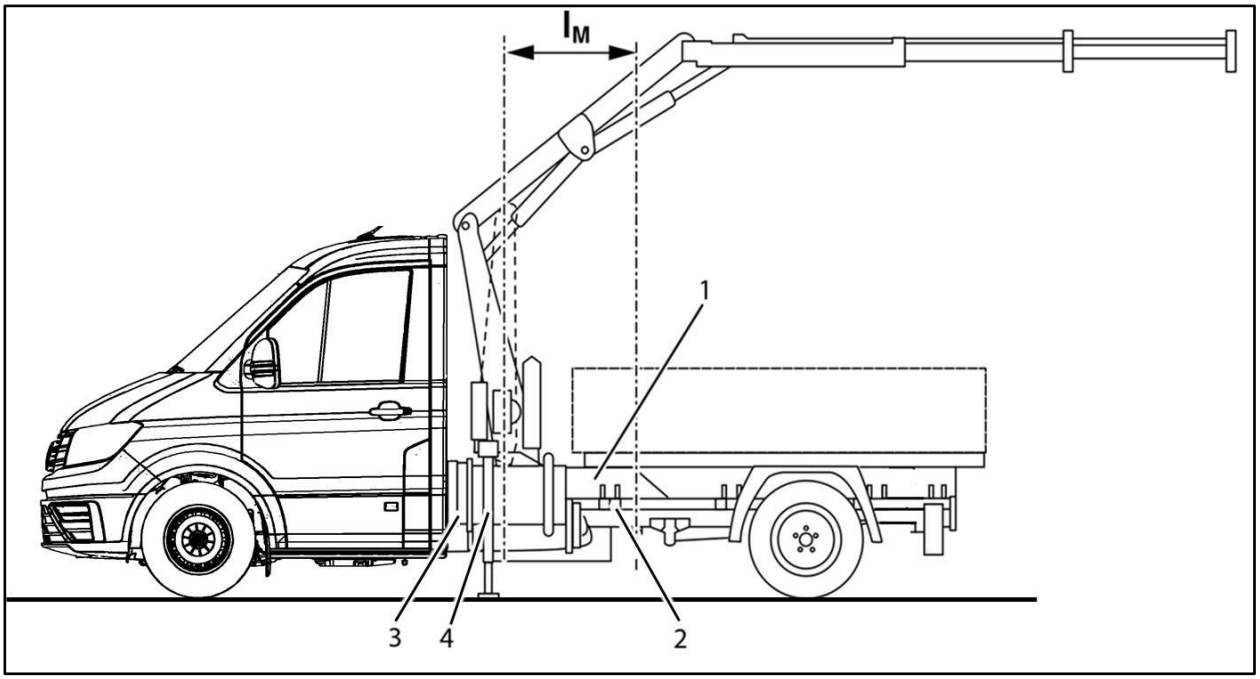


Fig. 1: Loading crane structure (schematic diagram)

1 – Assembly frame for loading crane

2 – Body brackets

3 – Loading crane mounting

4 – Side support

l_M Length of loading crane assembly frame

7.6.7.2 Loading crane body at end of frame

Warning note

The minimum front axle load shall be observed in all load states (see chapter 4.1.1 “Steerability”). Otherwise sufficient driving stability is no longer guaranteed.

- Loading cranes shall be secured to an assembly frame made from steel.
- Maximum crane load torque (kN x l): 25 kNm for vehicles with frames for twin tyres.
  20 kNm for vehicles with frames for single tyres.
- Resistance torques (W_X), material properties and profile dimensions of the assembly frame longitudinal members (see 8.1 “Assembly frame”).
- A letter of non-objection from the responsible department is required if the maximum crane load torques are exceeded. Please contact us in this regard (see 2.1 “Product and vehicle information for body builders”). The crane mounting must be correspondingly reinforced.
- During crane operation, the stability shall be ensured by sideways extending outriggers.
- The assembly frame must be connected to all bracket points and available bolting points of the vehicle frame. In addition, a shear-resistant connection between the assembly frame and the vehicle frame must be produced.

7.6.8 Attachments to the frame

A letter of non-objection from the responsible department is required for add-ons to the frame.

The gross axle weight ratings shall always be observed.

The function of vehicle parts is not allowed to be impaired by add-ons.

Please observe the applicable regulations in your respective country.

7.7 Tail lift

7.7.1 General information

Prior to installation of a third-party tail lift, the existing installation space shall be checked by the Converter. Restrictions on the installation space due to installed exhaust and tank systems shall be taken into account.

Mounting the tail lift on chassis:
To retrofit a tail lift on the chassis, we recommend using special equipment *Preparation for mechanical and electrical tail lift* (PR No. 5S8).
Please also comply with chapter 6.4.7 “Additional electrical circuits” for electrically or electro-hydraulically driven tail lifts.
Preparation for mechanical and electrical tail lift (PR No. 5S8) consists of a shortened, bolted rear cross member with electrical provision, that has a supply cable with a 25 mm² cross section, and a 7-core control line to the rear frame end. The supply cable is connected to the second battery (8FE). In addition, there is a switch with a warning lamp in the cab and an earth connection from the frame cross member in front of the rear axle to the rear end of the frame.
This equipment enables simpler connection of the electrics for a retrofitted tail lift and the mechanical provision enables simple installation of lifting mechanics for a tail lift to the left and right of the longitudinal member.

Mounting the tail lift on panel vans:
For the subsequent installation of a tail lift on a panel van, we recommend the use of the optional equipment “Preparation of the tail lift, electrical” (PR number 5S4).
Preparation of the tail lift (PR number 5S4) consists of a supply cable with 25 mm² cross section and a 7-core control line to the rear frame end. The supply cable is connected to the second battery (8FE).
In addition, there is a switch with a warning lamp in the cab and an earth connection from the frame cross member in front of the rear axle to the rear end of the frame.
This equipment enables simpler connection of the electrics for a retrofitted tail lift.

To connect a tail lift, there are holes in the longitudinal member (diameter: D=15 mm) with spacer bushings (diameter: d=14 mm) as standard. (see figure). M12 size bolts of property class 10.9 are to be used.

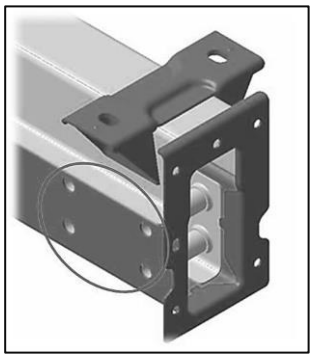


Fig. 1:^Longitudinal member with holes (diameter: d=14 mm)

7.7.2 Prerequisites for assembling a tail lift

Practical note

When mounting an electro hydraulic tail lift, an alternator, a high-power battery and a second battery must be used.

- In the EU, tail lifts must comply with EU EN 1756-1.
- In the Federal Republic of Germany, tail lifts must correspond to the accident prevention regulations (UVV).
- The maximum permitted rear axle load is not allowed to be exceeded.
- The minimum front axle load shall be observed in all load states (see chapter 4.1.1 “Steerability”).
- The stability shall be guaranteed by the Converter in all operating modes.
- Determine load distribution with calculations. Take all optional equipment into consideration.
- If necessary, shorten body length and rear chassis overhang accordingly (open prototype).
- We recommend using hydraulic supports.
- When installing a tail lift, the legal guidelines for “skid plate” and “lighting device” of each country must be observed.
- Anti-roll bars are recommended on the front and rear axles.
- The end cross member is only allowed to be cut after consultation with the responsible department (see 2.2 “Converter guidelines, consulting”).
- The stability of the vehicle shall be ensured by the user during loading and unloading.
- If a tail lift is installed at the connection points for the towing attachment (Crafter NF) instead, the same M12 size bolts of property class 10.9 must be used as for towing brackets. (see also chapter 7.2.2.2 “Attachment to the rear frame”)

Practical note

The permissible lifting load torque of the tail lift used must not be exceeded.

7.7.3 Attachment of tail lift

The attachment of the tail lift shall be configured as described in chapter 7.2.2.2 “Attachment to rear frame”.
An additional torque support via at least two bolted connections with spacer bushes (for example on assembly) shall be provided.
Place the assembly frame as far forward as possible and attach to chassis frame with force-locking connection.
An assembly frame is not required on vehicles with standard panel van body.
If modifications to the underbody guard are necessary due the attachment of a tail lift, the strength and flexural strength of the underbody guard shall not be changed (see chapter 7.9 “Underbody guard”).

Practical note

Do not raise the vehicle with the supports otherwise the frame will be damaged.

Permissible power* of the tail lift:

Crafter 35	Panel van	5 kN
	Chassis/load area/ box without assembly frame	5 kN
	Chassis/load area/ box with assembly frame as per chapter 8.1 “Assembly frame”	7.5 kN

Crafter 50 twin tyres	Panel van	5 kN
	Chassis/load area/ box without assembly frame	5 kN
	Chassis/load area/ box with assembly frame as per chapter 8.1 “Assembly frame”	10 kN

*The values for lifting power apply to all wheelbases and drive types.

Information

Please contact us for questions regarding main power supply to the tail lift, (see chapter 2.1 “Product and vehicle information for body builders”).

7.8 Towing bracket

- We recommend using Volkswagen approved towing brackets on the provided body-in-white mounting points (rear longitudinal member) (see chapter 10.2 “Hole patterns for towing bracket”).
- Access to the spare wheel shall be ensured when towing brackets that do not have a removable ball coupling are installed (in particular when vehicle is fully loaded).
- Attachment of a towing bracket including clearance dimensions shall meet the requirements of the respective countries.
  In the EU, the requirements are outlined in UNECE R 55, and in the Federal Republic of Germany the requirements of DIN 74050 also apply.
- In case of deviations from the accident prevention regulations (UVV), a certificate from the professional association for vehicle ownership in Hamburg must be requested in the Federal Republic of Germany for the admissibility of these deviations (see chapter 2.9 “Accident prevention”).

Information

Regarding the dependencies on towing weight, vehicle overhang and trailer stabilisation, see chapter 4.3.5 “Vehicle overhang”.

Practical note

Do not attach the towing bracket to the end cross member on the frame.

7.8.1 Trailer weights

Trailer towing couplings (ball hitches) can be ordered from the factory as optional equipment using the following PR numbers:

- 1D1 (ball head in combination with ESC including trailer stabilisation).
  Maximum trailer weight 750 kg unbraked and 2,000–3,500 kg braked (depending on the vehicle design) at 12% hill climbing ability (see table Maximum trailer weights on the next page)
- 1D2 Varioblock in combination with ESC including trailer stabilisation as above, but removable and lockable.

The gross trailer weight rating specified in the papers is not allowed to be exceeded. The actual maximum trailer weight may not exceed the gross vehicle weight rating of the vehicle used for towing.

Table 1: Rear-wheel drive Crafter panel van, maximum trailer weights/gross combination weight

Engine/torque	Tyres	Gross vehicle weight rating [t]	Maximum trailer weight [t]	Gross combination weight [t]	Load reduction (kg)
80 kW 90 kW 103 kW	Twin Supersingle	3.5	3.5	7.0	-
		3.88	3.5	7.38	-
		4.0	3.5	7.5	-
		4.8	3.5	7.5	-800
		5.0	3.5	7.5	-1000
		5.5	3.0	7.5	-1000
90 kW	Single	3.5	2.5	6.0	-
		4.0	2.5	6.0	-500
103 kW	Single	3.5	3.0	6.5	-
		3.88	3.5	7.0	-380
		4.0	3.5	7.0	-500
130 kW 120 kW	Twin Supersingle	3.5	3.5	7.0	-
		3.88	3.5	7.38	-
		4.0	3.5	7.5	-
		4.8	3.5	8.0 *	-300
		5.0	3.5	8.0 *	-500
		5.5	3.5	8.0 *	-1000
130 kW 120 kW	Single	3.5	3.5	7.0	-
		3.88	3.0	6.88	-
		4.0	3.0	7.0	-

Drawbar load = 140 kg for maximum trailer weight 3,000 kg/3,500 kg

Drawbar load = 100kg for maximum trailer weight 2,000kg/2,500kg

Table 2: Rear-wheel drive single cab/double cab, maximum trailer weights/gross combination weight

Power	Tyres	Gross vehicle weight rating [t]	Maximum trailer weight [t]		Gross combination weight [t]		Load reduction (kg)	
			1D1	1D2	1D1	1D2	1D1	1D2
80 kW 90 kW 103 kW	Twin Supersingle	3.5		3.5		7.0		-
		3.88		3.5		7.38		-
		4.0		3.5		7.5		-
		4.8	3.5	3.0	7.5	7.49	-800	-300
		5.0	3.5	3.0	7.5	7.5	-1000	-500
		5.5		3.0		7.5		-1000
90 kW	Single	3.5		2.5		6.0		
		4.0		2.5		6.0		-500
103 kW	Single	3.5		3.0		6.5		-
		3.88		3.0		6.5		-380
		4.0		3.0		6.5		-500
130 kW 120 kW	Twin Supersingle	3.5		3.5		7.0		-
		3.88		3.5		7.38		-
		4.0		3.5		7.5		-
		4.8	3.5	3.0	8.0 *	7.8	-300	-
		5.0	3.5	3.0	8.0 *	8.0	-500	-
		5.5	3.5	3.0	8.0 *	8.0	-1000	-
130 kW 120 kW	Single	3.5		3.5		7.0		-
		3.88		3.0		6.88		-
		4.0		3.0		7.0		-

Drawbar load = 140 kg for maximum trailer weight 3,000 kg/3,500 kg

Drawbar load = 100kg for maximum trailer weight 2,000kg/2,500kg

Table 3: Front and all-wheel drive Crafter panel van, single cab maximum trailer weights/gross combination weight

Engine / torque	Tyres	Gross vehicle weight rating [t]	Maximum trailer weight [t]	Gross combination weight [t]	Load reduction (kg)
75 kW	Single	3.0	2.5	5.5	-
		3.5	2.5	5.5	-500
		3.88	2.0	5.5	-380
		4.0	2.0	5.5	-500
103 kW	Single	3.0	3.0	6.0	-
		3.5	3.0	6.0	-500
		3.88	2.5	6.0	-380
		4.0	2.5	6.0	-500
130 kW 120 kW	Single	3.0	3.0	6.0	-
		3.5	3.0	6.0 *	-500
		3.88	2.5	6.0 *	-380
		4.0	2.5	6.0 *	-500

Drawbar load = 120 kg for maximum trailer weight 3,000 kg/2,800 kg

Drawbar load = 100 kg for maximum trailer weight 2,500 kg/2,000 kg

Table 4: front and all-wheel drive Crafter double cab maximum trailer weights/gross combination weight

Engine / torque	Tyres	Gross vehicle weight rating [t]	Maximum trailer weight [t]	Gross combination weight [t]	Load reduction (kg)
75 kW	Single	3.5	2.0	5.5	-
		3.88	2.0	5.5 *	-380
		4.0	2.0	5.5 *	-500
103 kW	Single	3.5	2.8	6.0 *	-300
		3.88	2.5	6.0 *	-380
		4.0	2.5	6.0 *	-500
130 kW 120 kW	Single	3.5	2.8	6.0 *	-300
		3.88	2.5	6.0 *	-380
		4.0	2.5	6.0 *	-500

Drawbar load = 120 kg for maximum trailer weight 3,000 kg/2,800 kg

Drawbar load = 100 kg for maximum trailer weight 2,500 kg/2,000 kg

7.8.2 Dimensioning the towing bracket

The size of the towing bracket is set according to the D value.

$$D = \mathrm{g} \times \frac{m_k \times m_a}{m_k + m_a}\ (kN)$$

D = towbar force in kN
m_k = gross vehicle weight rating of tractor vehicle in t
m_a = gross vehicle weight rating of trailer in t
g = 9.81 m/s²

7.8.3 Clearance dimensions towing bracket

The specified fitting dimensions and clearances must be adhered to. UNECE-R 55 applies in the EU.
Any other applicable national regulations must be taken into account.

When the vehicle is loaded with the permitted total mass, the middle of the coupling ball is permitted to hang between 350 mm and 420 mm above the road surface. This applies to vehicles with a permitted total mass ≤3,500 kg. Off-road vehicles are excepted.

Pin coupling (open jaw coupling)

The distance from the centre of the coupling bolt on the towing bracket to the end of the body is permitted to be a maximum of 300 mm.
The required clearances shall be observed.
Safe operation of the coupling shall not be impaired.
Mounting an open jaw coupling at the front is not permitted.

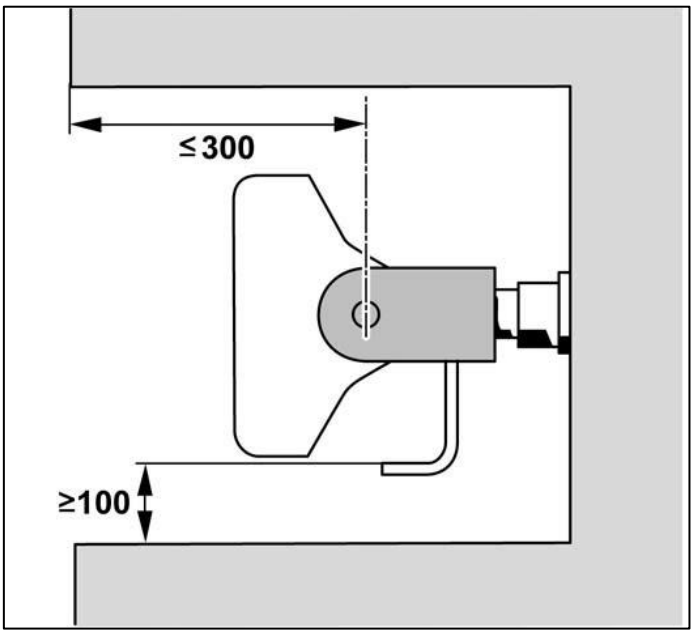


Fig. 1: Hand lever clearance for pin coupling as per UNECE R 55 (top view)

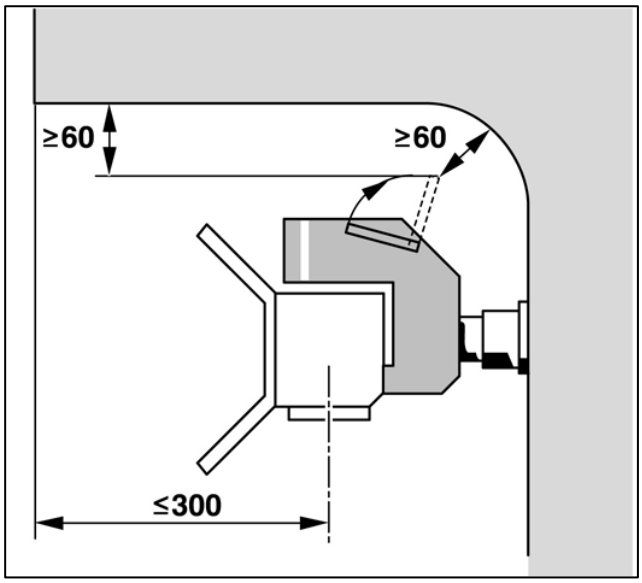


Fig. 2: Hand lever clearance for pin coupling as per UNECE R 55 (side view)

Ball hitch

The specified clearances shall be observed.

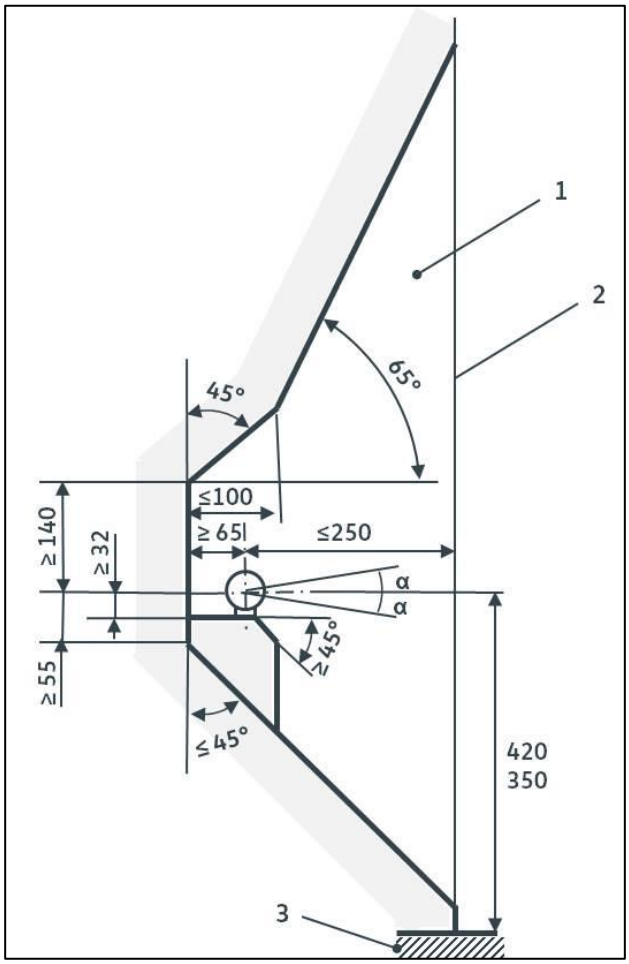


Fig. 3: Clearance and height of the coupling ball as per UNECE R 55 (side view)

1 – Clearance

2 – Vertical plane through end points of the total length of the vehicle

3 – Floor

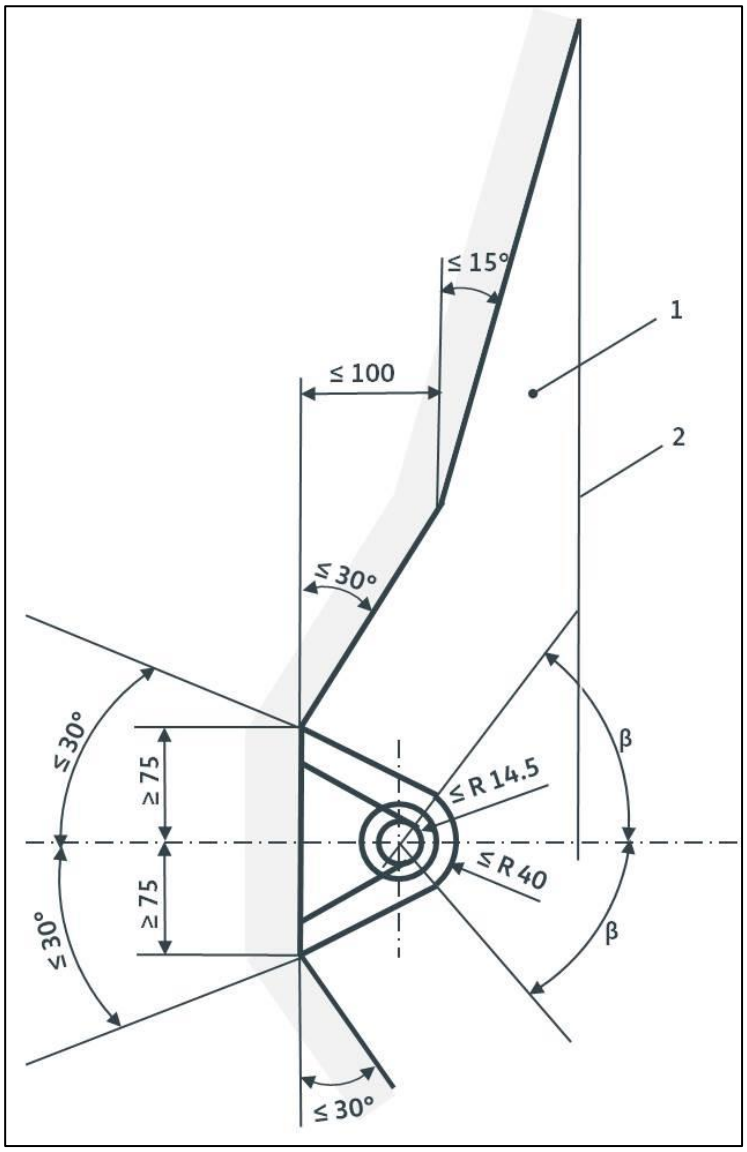


Fig. 4: Clearance of the coupling ball as per UNECE R 55 (top view)

1 – Clearance

2 – Vertical plane through end points of the total length of the vehicle

Practical note

On towing brackets with a removable ball coupling, an owner's manual indicating the special features and the use of the clutch shall be included with the vehicle

7.8.4 Towing bracket attachment

Only towing brackets/tow hitches are allowed to be attached to the provided body-in-white mounting points (rear longitudinal member) (see chapter 7.2.2.2 “Attachment to rear frame”).

On the panel van, a further fastening on the frame end cross member is also required for support.

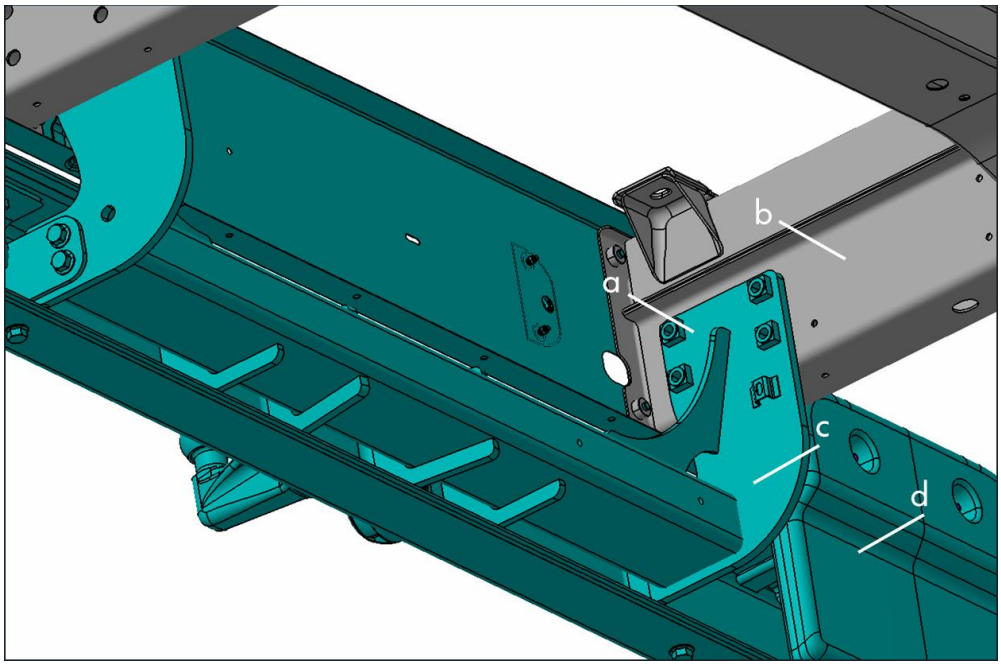


Fig. 1: Interior view

a – Attaching the assembly stand to the frame longitudinal member

b – Frame longitudinal member lower chord

c – Towing bracket assembly stand

d – Frame end cross member

- Attachment to the underbody guard is not permitted.
- Modifications to the underbody impact guard must be coordinated with the responsible test institution (TÜV). The strength or flexural strength is not allowed to be affected.
- If a frame extension is necessary, spacer bushes shall be fitted on the frame as reinforcement to secure the tow hitch or end cross member (see 7.2.1.3 “Drilling on the frame”). This can lead to limitations of the trailer weight and drawbar load.

You will find the hole patterns with measurements for attaching the towing bracket in chapter 10.2 “Hole patterns for towing bracket”.

The following optional equipment is available ex-works for retrofitting towing brackets depending on the prototype:

PR number	Description
1D7	Preparation for towing bracket (including trailer stabilisation) with wiring harness and control unit (serves as current supply for trailer including the lighting control). Preparation include: – Trailer detector control unit – Trailer stabilisation – Type plate with necessary or maximum permitted gross combination weight (GCW). The electrical connection between the vehicle and trailer is by way of a 13-pin trailer socket, which can be ordered as an adapter set from Volkswagen Genuine Accessories. Installation location: Rear axle longitudinal member Connectors/mating connectors: 14-pin Volkswagen connector (3C0.973.737) / 5Q0.973.837 Further information: please see erWin*, wiring diagram, section no.51/1-51/4
1D8	Preparation for towing bracket (including trailer stabilisation) with wiring harness, socket, control unit and mounting block Preparation include: – Trailer detector control unit – Wiring harness – Trailer stabilisation – Type plate with necessary or maximum permitted gross combination weight (GCW). – Mounting block Cross member for towing bracket. A special cross member with mounting plate for attaching a towing bracket is mounted on the rear of the vehicle. The configuration of the cross member depends on the vehicle tonnage. – Trailer socket (13-pin), including cable with permanent positive The electrical connection between the vehicle and trailer is by way of a 13-pin trailer socket. Installation location: Rear axle longitudinal member Connectors / mating connectors: 14-pin connector 3C0.973.837 Further information: please see erWin*, wiring diagram, section no.51/1-51/4
1D2	Towing bracket, removable (ball head) Removable ball head coupling for towing trailers with ball head). Towing bracket includes: – Trailer detector control unit – Wiring harness – Trailer stabilisation – Type plate with necessary or maximum permitted gross combination weight (GCW). – Mounting block – Ball head towing bracket, detachable and lockable – Trailer socket (13-pin), including cable with permanent positive The electrical connection between the vehicle and trailer is by way of a 13-pin trailer socket.

PR number	Description
1D1	Towing bracket, rigid (ball coupling) Towing bracket includes: – Trailer detector control unit – Wiring harness – Trailer stabilisation – Type plate with necessary or maximum permitted gross combination weight (GCW). – Mounting block – Ball head towing bracket – Trailer socket (13-pin) including cable with permanent positive. The electrical connection between the vehicle and trailer is by way of a 13-pin trailer socket.

*Information system from Volkswagen AG, subject to payment

7.8.5 Control of air-braked semitrailers

A dual circuit hydraulic-pneumatic trailer steering valve must be connected between the brake master cylinder and the ESC hydraulic unit on each of the two operating brake circuits. The displacement volume of the valve must not exceed 0.3 cm^3 per brake circuit. The permitted operating pressure of the valve must be at least 300 bar. (e.g. BEKA SCHD94-60)
The trailer steering valve must be positioned as close to the brake master cylinder as possible. The wires must predominantly consist of standard steel tube brake lines. Short hose lines for adaption are possible.
The Converter must perform a test of its own on the modified brake system in accordance with UNECE-R 13. The Converter bears sole responsibility for the right choice of curve for the trailer steering valve, and therefore for compliance with the pressures on the BRAKE coupling head (yellow) in accordance with the EU mapping bands.

7.9 Underbody impact guard

7.9.1 Rear skid plate

UNECE-R 58 prescribes a rear underbody guard for vehicles in categories N, M and O.
Tractor units, working machines and vehicles whose use is incompatible with the presence of an underbody guard are excluded from this regulation.
The factory-fitted rear underbody guard (PR number 0S1) in open bodies complies with UNECE-R 58.

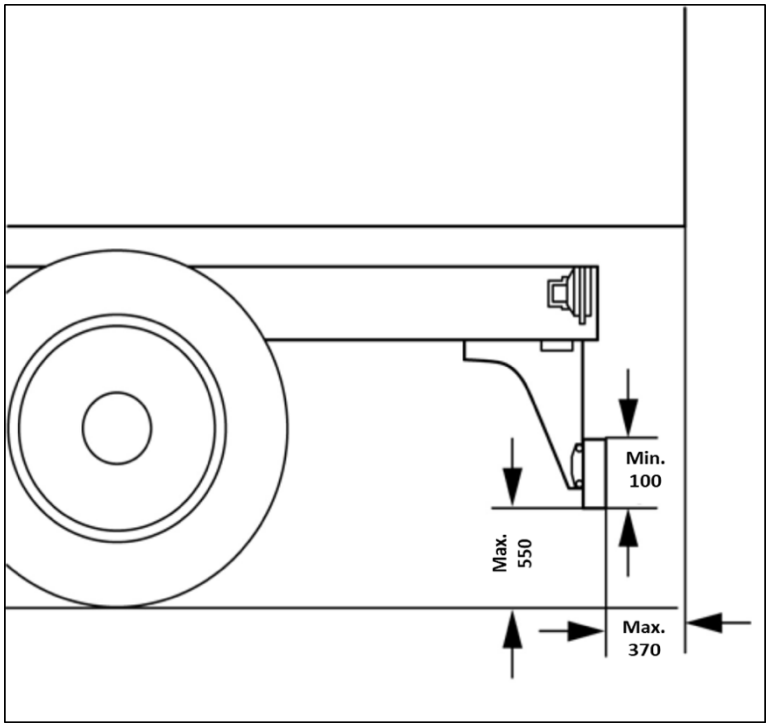


Fig. 1: Side view of underbody guard arrangement, limit dimensions acc. to UNECE-R 58 taking into account the static test forces to be applied for vehicles of classes M, N1 and N2 with a maximum mass of no more than 8 t.

Modifications to the underbody guard are not permitted.
If modifications are unavoidable, prior coordination with the responsible test institution (TÜV, Dekra) and possibly new testing and approval are required.

Modifications to the underbody impact guard
If the underbody impact guard needs to be moved when the overhang is extended, then the attachment shall correspond with that on the original vehicle.
If modifications to the rear underbody guard are necessary due to add-ons (e.g. tail lift), a suitable rear underbody guard that has been checked/approved for this purpose must be used.
If changes are made to the rear underbody guard, the regulations of the respective country of registration must be observed.

Dimensions

- Maximum distance from road to bottom of rear underbody guard (unladen vehicle) 550 mm.
- Width:
  - Maximum = width of rear axle (outer edges of tyres).
  - Minimum = width of rear axle minus 100 mm on each side. The widest axle is decisive.
- Profile height of cross member at least 100 mm.
- Edge radius at least 2.5 mm.
- The rear underbody guard must be mounted as far as possible to the rear of the vehicle.

The horizontal distance between the rear underbody guard and the rear end of the vehicle must not exceed the values listed below. These values take account of the deformations occurring under the test load. UNECE-R 58 allows 400 mm when loaded.

Rear underbody guard with towing bracket	370 mm
Rear skid plate without trailer towing bracket	370 mm

7.9.2 Side guard

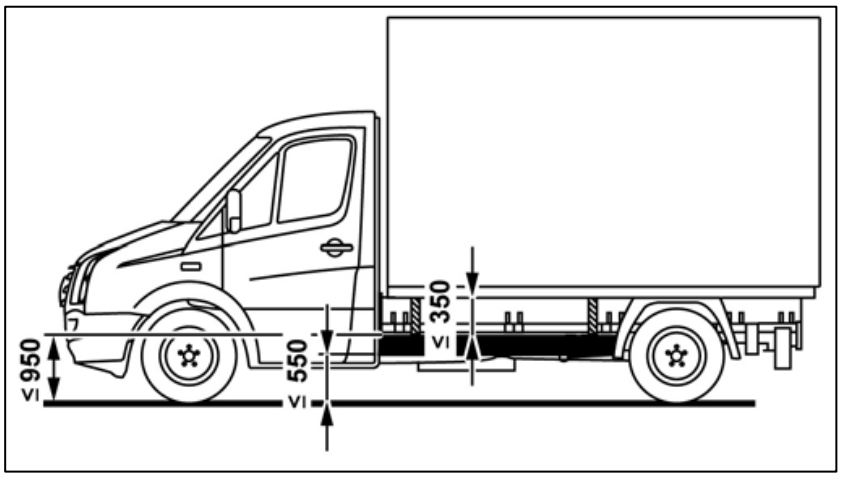


Fig. 1: Position of side guard (schematic diagram)

UNECE-R 73 prescribes a side guard for vehicles in category N_2 (over 3.5 t gross vehicle weight rating).
Tractor units, working machines and special-purpose vehicles whose use is incompatible with side guards are excluded from this regulation.
Components such as battery compartments, air tanks, fuel tanks, lights, reflectors, spare wheels and tool boxes may be installed in the side guard if the specified distances are observed.
Brake, air, hydraulic lines and other parts may not be fastened to the side guard.
The function and accessibility of any of the assemblies on the vehicle are not allowed to be impaired.
The side guard is fitted to the platform at the factory (PR number 0S4).

When retrofitting:

- The side guard must have the strength and rigidity specified by UNECE-R 73.
- The construction and conversion specifications defined in UNECE-R 73 must be observed.

8 Industry-specific conversions

In this chapter, you will find information that concerns the body to be produced by the Converter.

8.1 Assembly frame

For a perfect connection between the chassis and body, a full length assembly frame or a substructure that takes on the function of a full-length assembly frame is required (see chapter 8.1.5 “Assembly frame as floor panel” and chapter 8.2 “Self-supporting bodies”).
On vehicles with a stepped frame, under certain conditions, the assembly frame longitudinal members can be designed to run from the front to back in a straight line. (see chapter 8.1.2.2 “Assembly frame with stepped frame”).
The body shall be attached to the frame using all body brackets fitted at the factory, following the frame profile.
The contact surfaces of the consoles are approx. 10 mm above the upper edge of the frame.
This creates an air gap between the assembly frame and the top of the vehicle frame which must not be filled.

8.1.1 General information on material quality

Material qualities for specified assembly frame made of steel:

- Assembly frame with bracket attachment (force-locking) = H240LA or S235JRG2.
- For steels H240LA or S235JRG2 in accordance with the DIN EN standard, the same materials from the US standard SAE/ASTM J403/J412/J413, the Japanese standard JIS G3445 and the UK standard BS 970 can be used.

Material	**Ultimate yield strength [N/mm2]**	**Tensile strength [N/mm2]**
H240LA (DIN EN 10268-1.0480)	240-310	≥ 340
S235JRG2* (DIN EN 10025-1.0038)	≥ 235	340–470

*old designation: RST 37-2

Minimum required resistance torque for the assembly frame Wx1 [cm3]			
Design	**Platform/panel van²**	**Tipper/elevated work platform**	**Crane**
3.5 to 4.0 t	12	25	40
up to 5.5 t	16	40	40

1 – The minimum required section modulus for the assembly frame applies to the specified material properties and is to be provided by each individual longitudinal member of the assembly frame.

2 – Also applies to bodies with tail lifts

- If assembly frames made from high-strength steels are used, they shall at least correspond with the strength of steel assembly frames.
- If an assembly frame made from aluminium is used, for example, it shall at least correspond with the flexural rigidity (E × I) of a steel assembly frame. The specifications of the aluminium manufacturer shall be observed.

Reference values for the modulus of elasticity [N/mm²]:

- Aluminium: 70000
- Steel: 210000

Information

If necessary, observe differing specifications in chapters 8.6 “Platform bodies” and 8.9 “Tipper bodies”.

8.1.2 Design

8.1.2.1 General

The assembly frame cross members shall be placed above the chassis frame cross members.
The longitudinal members of the assembly frame shall be moved as far forward as possible to cover the area prone to bending behind the cab and thus prevent vibration problems.
The body shall be attached torsion-free to the body brackets of the frame longitudinal member.
The vehicle shall be parked on a level horizontal surface when the body is fitted.

If very high longitudinal members are required or if low frame heights are to be achieved, with force-locking connections, the U-profile can be:

- closed as a box,
- one slotted inside the other
- slotted together

This increases the section modulus and the torsional rigidity.

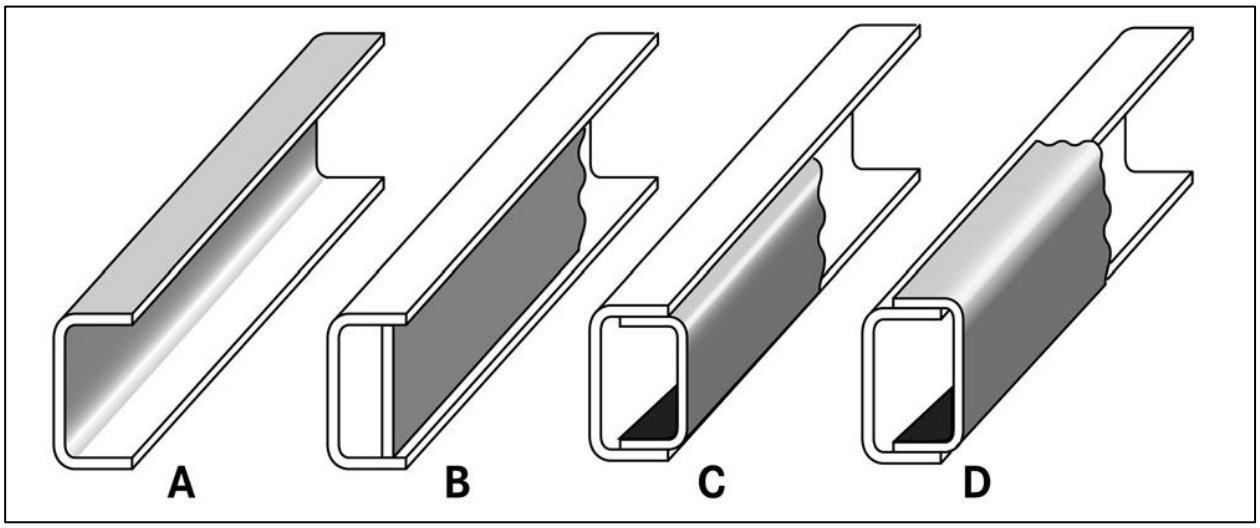


Fig. 1: Frame profiles

A – Open U-profile

B – Closed U-profile

C – One U-profile slotted inside the other

D – U-profiles slotted together

8.1.2.2 Assembly frame with stepped frame

On vehicles with stepped frame, the assembly frame longitudinal members can be designed to run from the front to back in a straight line.

However, all body brackets must be used.

The required wheel clearances must be maintained. (See chapter 4.3.4 “Minimum dimensions for rear wheel housing/chassis”)

The assembly frame longitudinal member requires an offset of 20 mm inwards on each side to guarantee tyre clearance in all situations (see illustration “Assembly frame offset with stepped frame”)

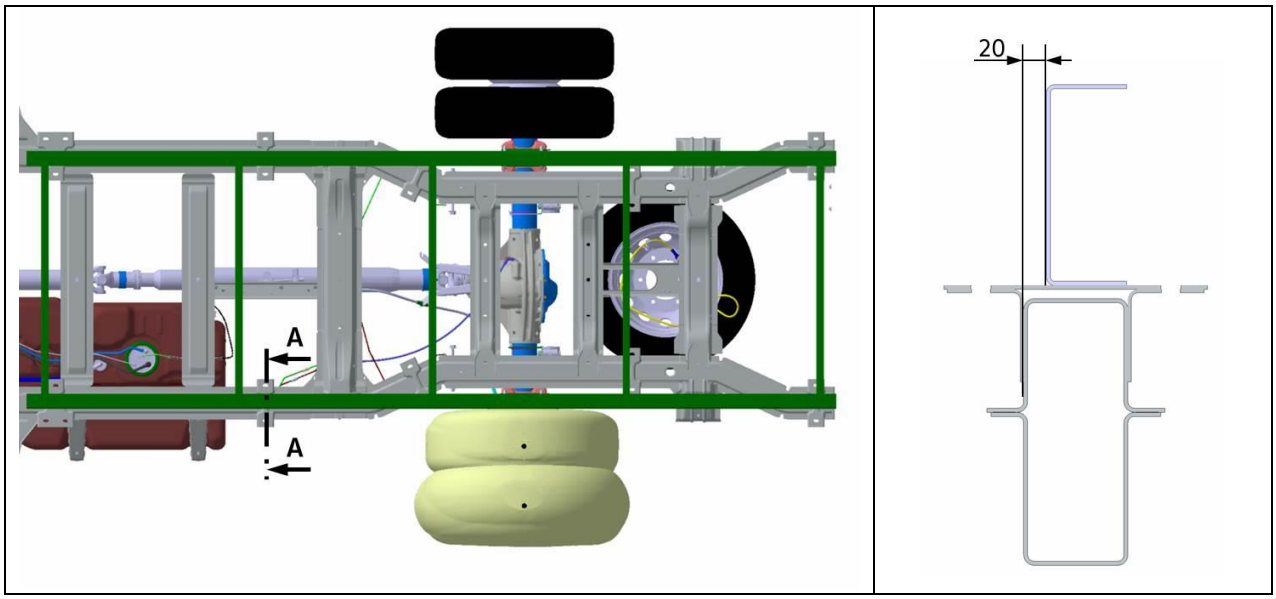


Fig. 1: Assembly frame offset with stepped frame

8.1.3 Profile dimensions/dimensioning

Bevelled U-profiles or commercially available U-profiles for vehicle construction (not rolled sections) shall be used for the longitudinal members. Box sections can also be used as longitudinal member profiles.

The dimensions of the longitudinal members result from the required section modulus (W_X) for the body and chassis (see chapter 8.1.1 “Material quality general”).

The specified section modulus and profile dimensions refer to frame longitudinal members with the same loading on each side.

Profile dimensions for assembly frame longitudinal members (open profile) can be found in the table.

The assembly frame and chassis frame should have approximately the same flange width.

Practical note

If several bodies are mounted on a chassis (such as a platform and tail lift), the definition of the mounting frame must be based on the larger of the specified moments of resistance.

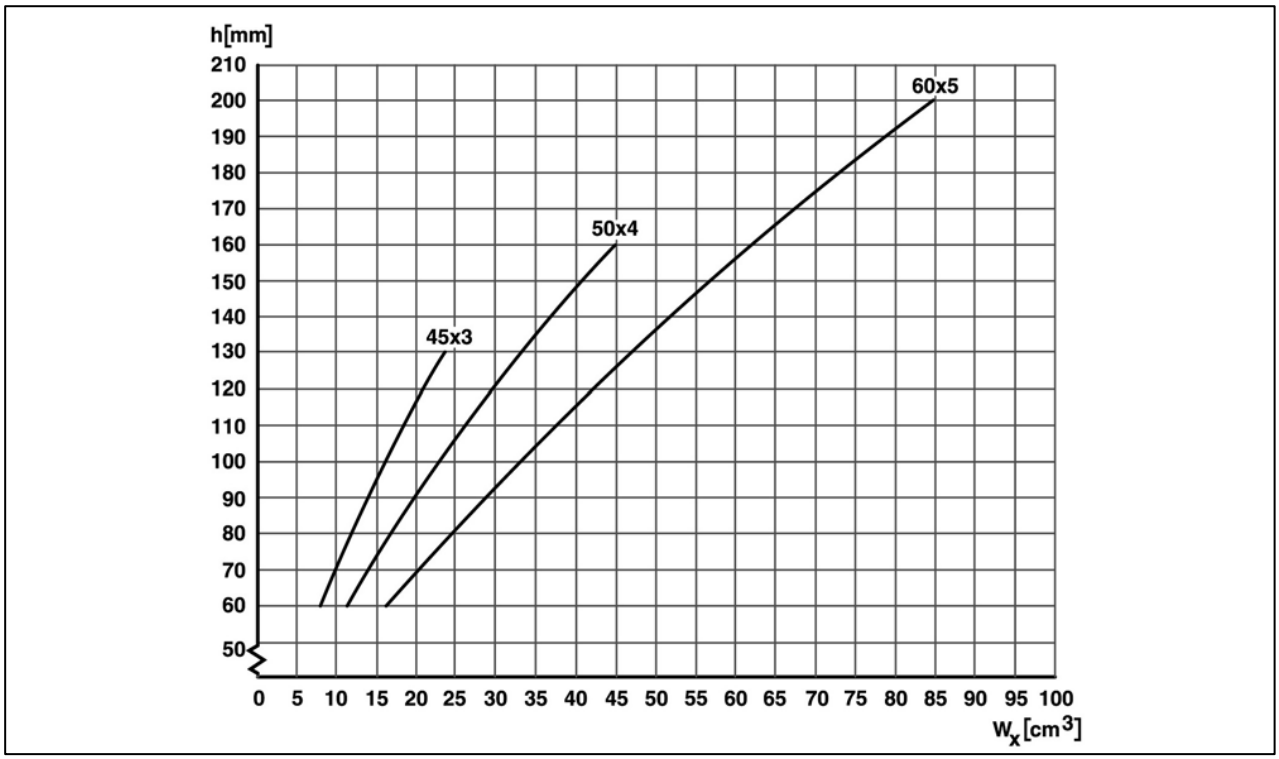


Fig. 1: Dimensioning of the U-profile longitudinal members

h	Profile height in mm
W_X	Section modulus in cm^3

8.1.4 Attachment to the frame

Superstructures must be secured to the vehicle frame using all of the body brackets and bolting points provided at the factory.
The securing bolts to be used are – as in the standard platform bodies – size M12 hexagonal bolts, strength class 10.9. Fine-pitch thread is recommended.

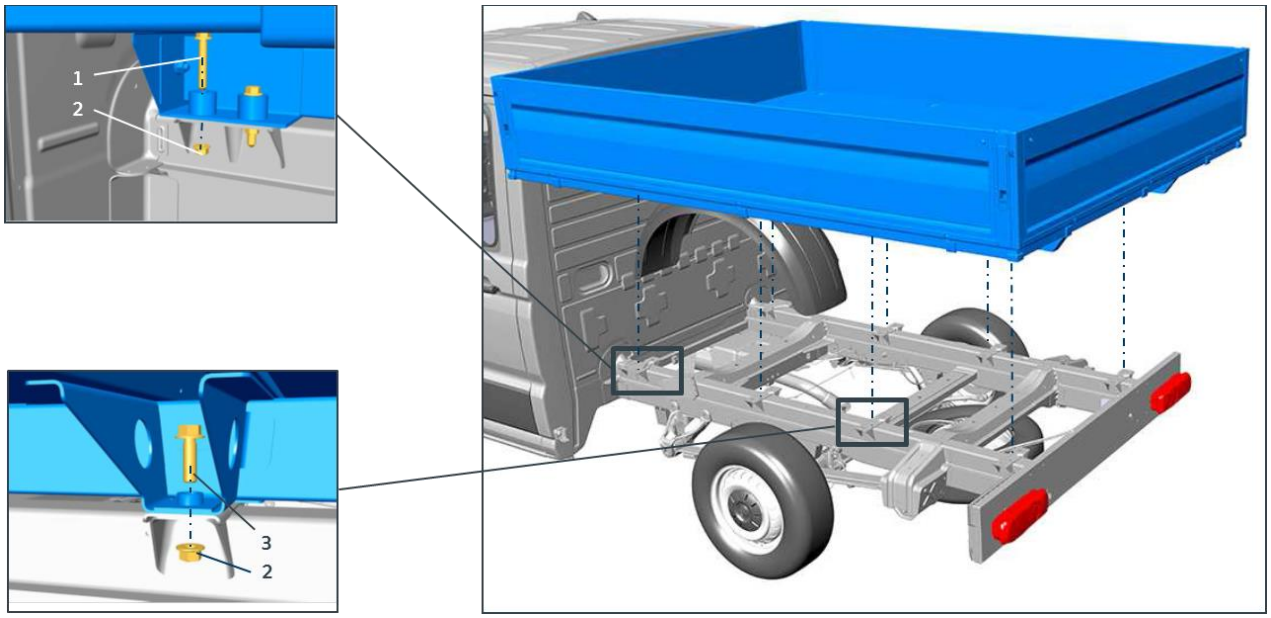


Fig. 1: Mounting the standard platform on the frame

1 – Hexagon flange bolt N.106.286.01 (M12x1.5x75, property class 10.9)

2 – Hexagon flange bolt N.015.018.6 (M12x1.5, property class 10)

3 – Hexagon flange bolt N.106.284.01 (M12x1.5x40, property class 10.9)

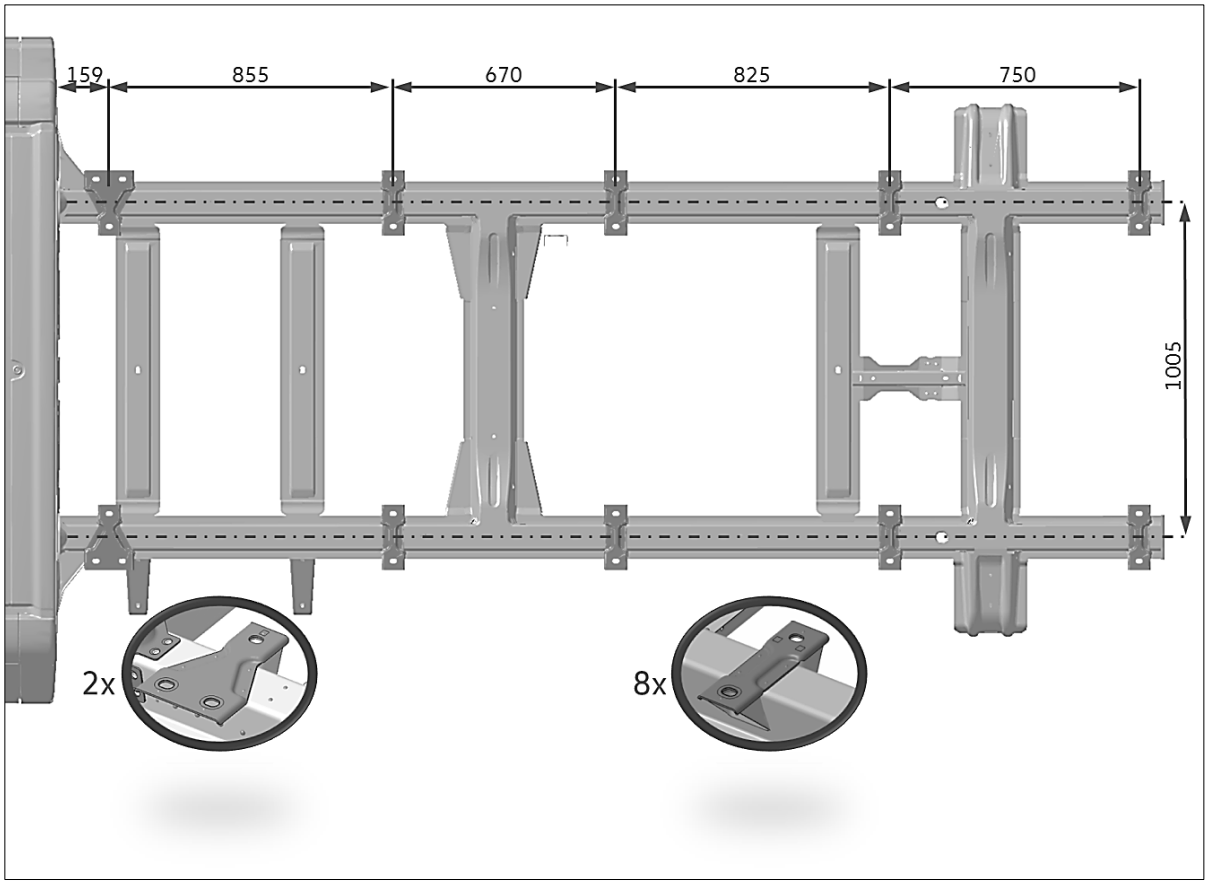
Practical note

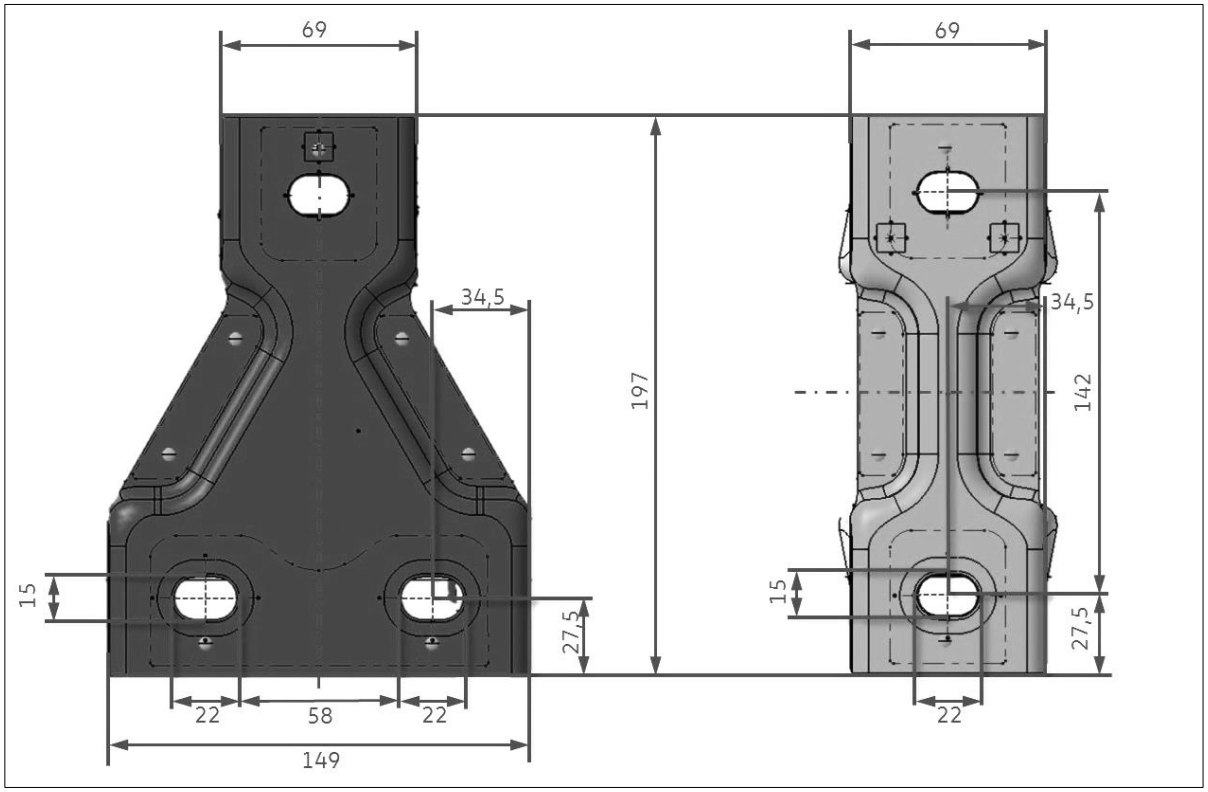
The minimum distance between the cab and body shall be >50 mm.

With prefabricated assembly frames, the design tolerances of the chassis frame width must be taken into consideration.

Information

The positions of the prototype-dependent body brackets are shown in the build dimension drawings.





Design of mounting points on the frame single cab, wheelbase L3: 3640 (top view)

8.1.4.1 Additional body brackets

If additional body brackets are required, observe the welding guidelines
(see 5.2 “Welding work”).

- Plug welding is only permitted in the vertical webs of the frame longitudinal member.
- Welding is not allowed in bending radii.

Two screws are be used for each body bracket.
The securing bolts to be used are – as in the standard platform bodies – size M12 bolts, strength class 10.9. Fine-pitch thread is recommended.

8.1.4.2 Attachment of body brackets

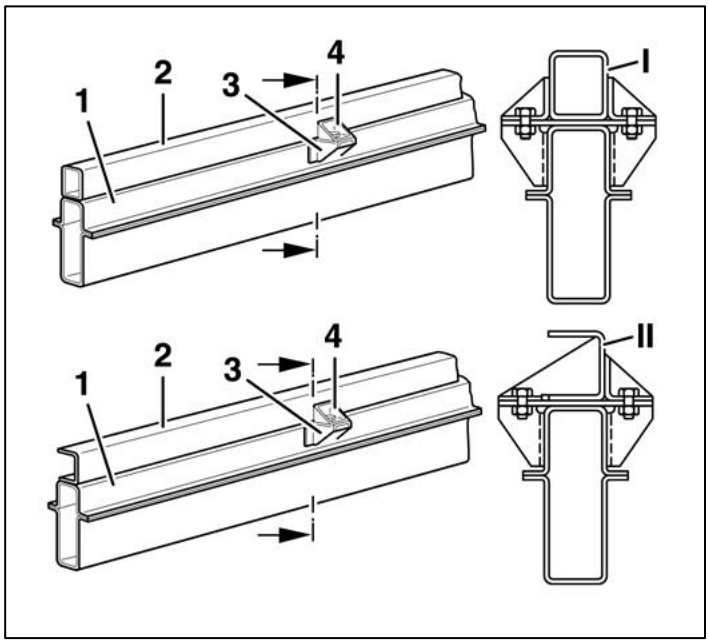


Fig. 1: Application examples of body brackets

I – Box profile

II – U-profile

1 – Chassis frame

2 – Assembly frame

3 – Standard fastening bracket

4 – Bracket

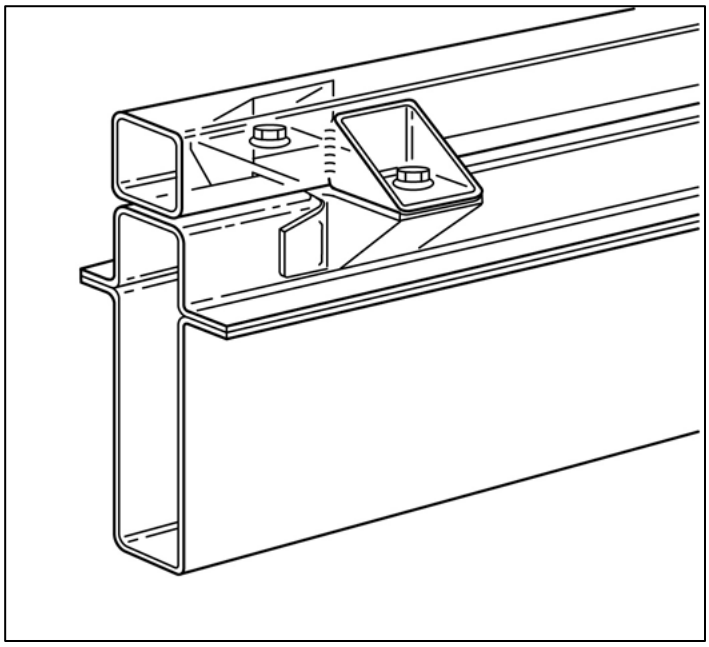


Fig. 2: Bracket attachment with longitudinal member

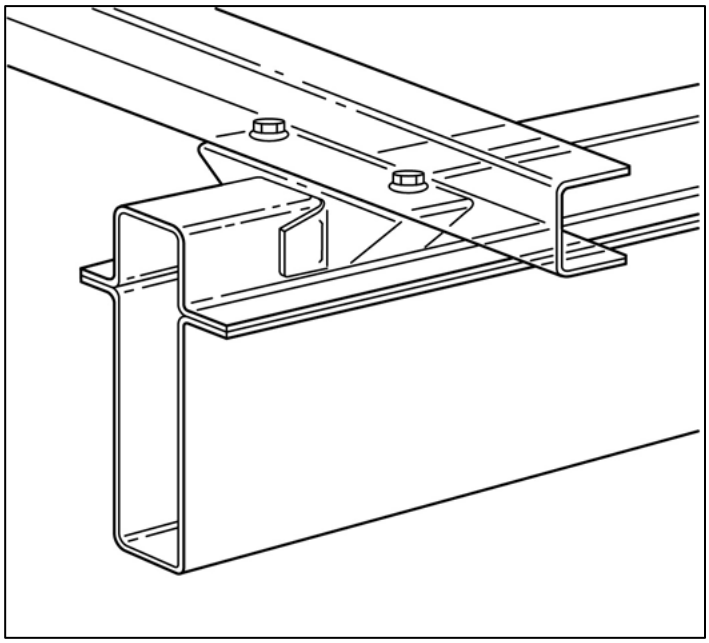


Fig. 3: Bracket attachment with cross member

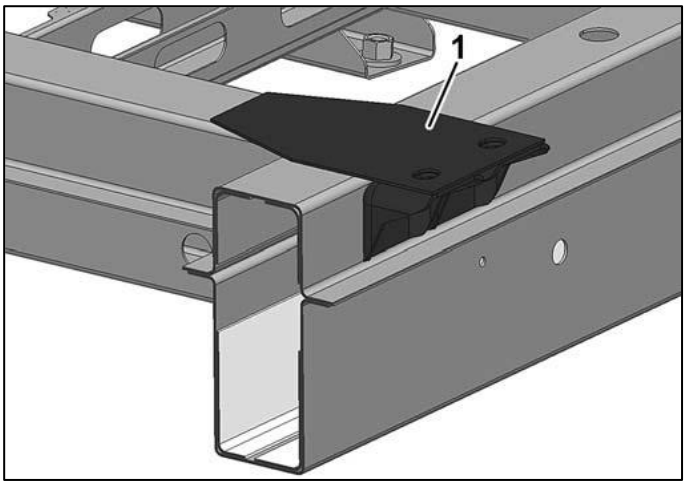


Fig. 4: Bracket attachment with external threaded connection

1 – Body bracket

The number of securing points shall be set so that the longitudinal and lateral forces are absorbed.
The right form of attachment is decisive for:

- the driving characteristics and operating safety of the vehicle
- the durability of the chassis frame and body

8.1.4.3 Shear-resistant connection

In a shear-resistant connection, the longitudinal members of the assembly frame shall be fixed in the longitudinal and lateral directions. It is therefore only possible to move the assembly frame longitudinal member to a certain extent.
The attachment can be on the side of the upper chord on the frame longitudinal member. It is necessary to use spacer bushes that shall be welded to the frame as reinforcement.

For shear-resistant connections, a double support as shown in the illustration is required on each frame longitudinal member.

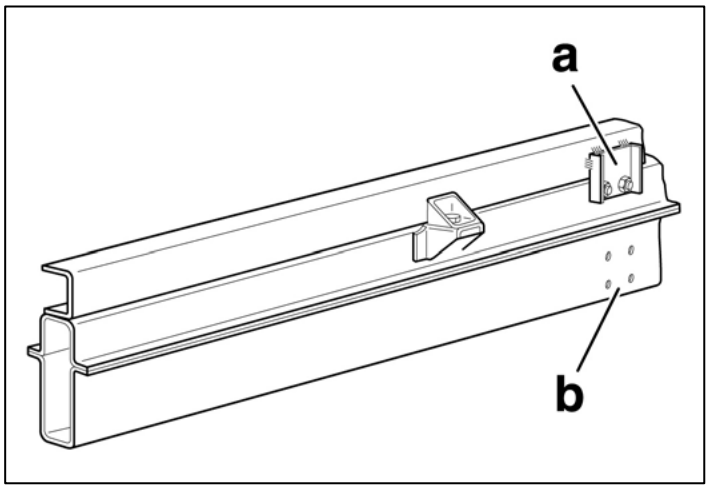


Fig. 1: Double support (non-slip connection)

a – Shear– resistant connection on end of frame

b – Standard holes on end of frame

8.1.4.4 Torsionally rigid superstructures

Bolted connection protected against loosening

On rigid superstructures (e.g. box bodies or elevated work platforms) bolted connections with spacer sleeves that are secured against loosening shall be used on the first body bracket behind the cab. The spacer sleeves shall be dimensioned so that they cannot be deformed.

When the 50 mm long spacer sleeves are used, a correspondingly longer bolt with a longer shaft also becomes necessary, so that, after application of the tightening torque, the bolted connection is more elastically stretched and preloaded than a short shaft bolt without spacer sleeve. This “expansion bolt connection” provides increased security against loosening of the bolt.

The thread projections in accordance with DIN 78 must be observed.

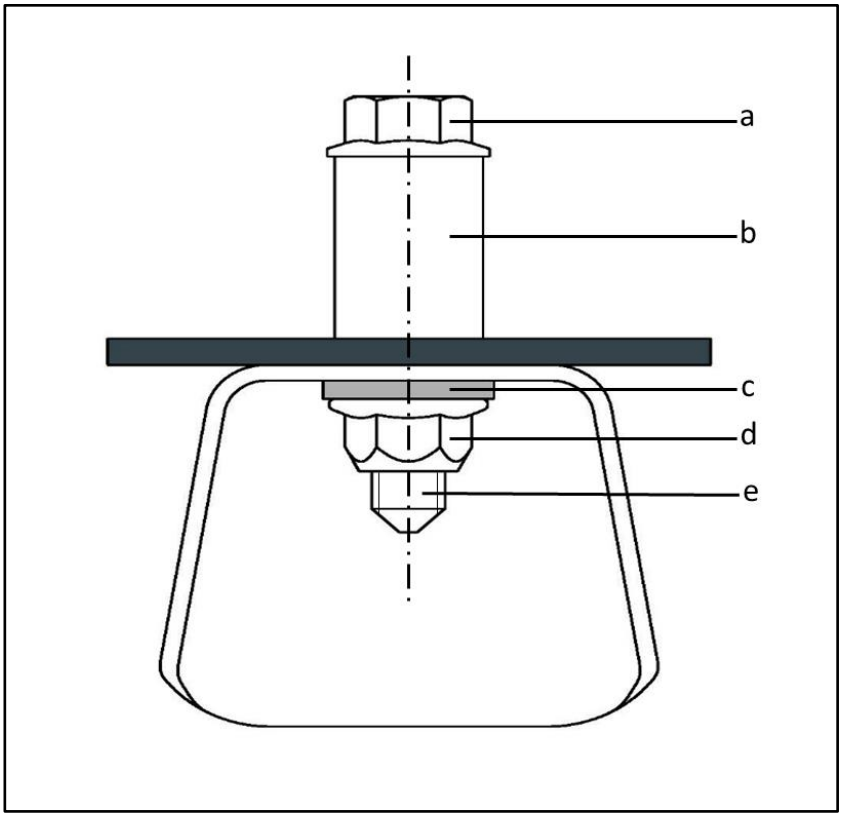


Fig. 1: Design suggestion for bolted connection protected against loosening (schematic diagram)

a – Bolt with flange, M12 × 90, strength 10.9

b – Spacer sleeve 22-13 × 50

c – Washer DIN 7349-13-ST

d – Nut with flange M12, strength 10.9

e – Thread projection

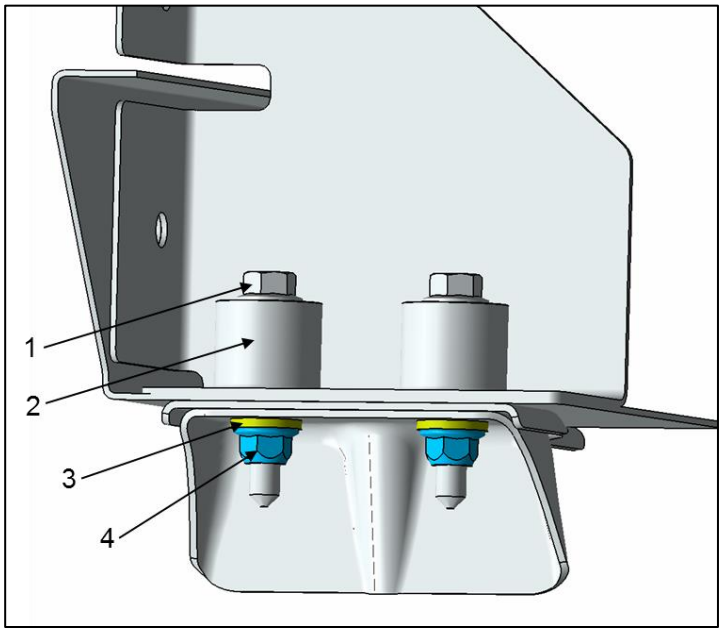
Bolted connection with damping element

The body and assembly frame for torsionally rigid superstructures (like municipal vehicles, fire brigade vans or road cleaning vehicles) shall be attached in the front area of the frame with bolted connections protected against loosening with spacer sleeves (expansion bolt) (see 8.1.4.4 “Torsionally rigid superstructures”).

All body brackets installed at the factory shall be used.

For particularly torsionally rigid superstructures,

such as bodies with cooler compartments, we recommend using elastic damping elements such as “elastic blue®”) to connect to the body brackets in the foremost position behind the driver's cab, to prevent damage to the frame and the body. (See Fig. 1 “Construction example: bolted connection with damping element“)



(See Fig. 2 “Application example: screw connection with restrictor”)

1 – Hexagonal bolt with flange M12x1.5x80, strength 10.9 (N.106.405.01)

2 – Vibration damper “elastic blue®” for M12 size bolts

3 – Washer, flat 13x28x3.5 (N.903.547.03)

4 – Hexagonal nut with flange, clamp, M12x1.5, strength 10.9 (N.104.029.04)

Information

You will find further information on the tightening torques of screws in the Workshop Manuals on the Internet at **erWin*** (**E**lectronic **R**epair and **W**orkshop Information from Volkswagen AG):
http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

A letter of non-objection from the responsible department is required.

8.1.5 Assembly floor as floor panel

An assembly frame with full-length longitudinal members is not necessary if the floor panel of the body can take on the function of the assembly frame.

Furthermore the longitudinal members can also be integrated into the body. If the assembly frame longitudinal member is divided by the cross members, a torsionally and flexurally rigid connection shall be formed between the longitudinal and cross members.

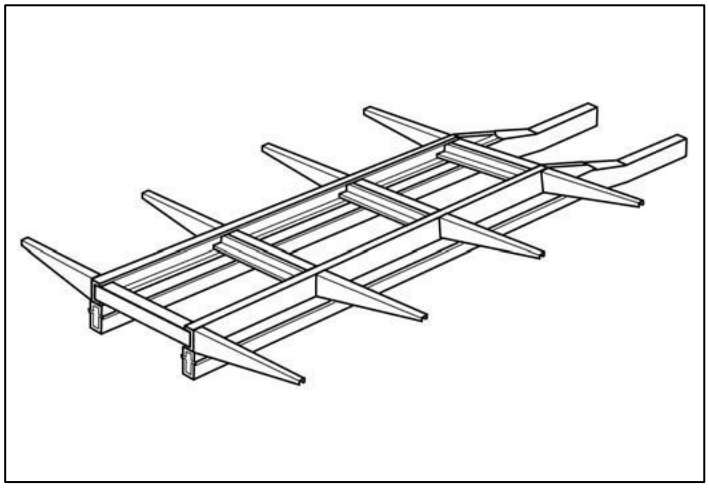


Fig. 1: Application examples of floor panel

8.2 Self-supporting bodies

An assembly frame with full-length longitudinal members is not necessary if the floor panel of the body can take on the functions of the assembly frame.
Self-supporting bodies shall correspond with the properties of the prescribed assembly frame. The floor panel of the body must provide the same replacement rigidity and section modulus as an assembly frame.

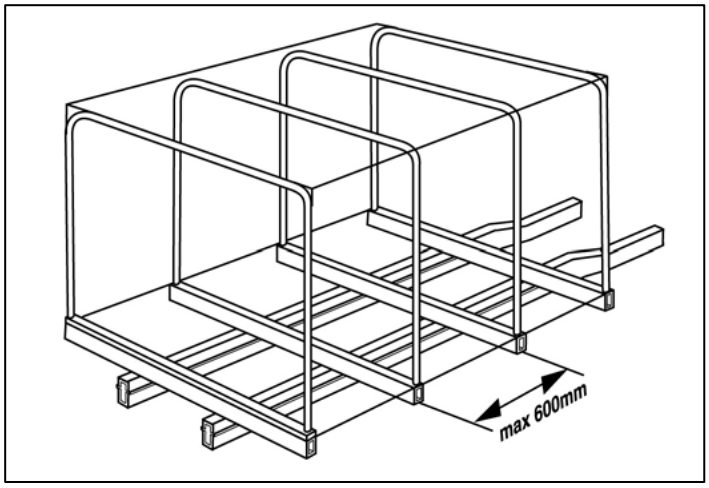


Fig. 1: Application example of body

8.3 Tractor units

For information on air-braked trailers and tractor units, see 7.8.5 “Control of semitrailers”.

8.4 Modifications to closed panel vans

8.4.1 Floor panel/side panels

The body and chassis frame form a self-supporting unit in the panel van. When modifying or installing body parts only weld them if a bonded joint is not possible.
Windows, emergency hatches, air inlets and air outlets shall therefore be surrounded by a stable frame.
This frame shall be connected to other body elements by means of a force-locking connection.

8.4.2 Partitions

Partition walls do not have any weight-bearing function. Partitions in the panel van can be complete or partial.
The following partitions are available ex-works as optional equipment:

PR number	Description
3CF	Full partition, without window
3CG	Full partition with fixed window
3CH	Full partition with sliding window
3CP	Partition, with trim and fixed window
3CS	Partition, with trim and without window
5WA	Partition, with trim and sliding window
5WB	Preparation for retrofitting partition installation
3CA	Omission of partition

You can obtain more information on optional equipment from your Volkswagen customer service, the responsible department (see chapter 2.1 “Product and vehicle information for body builders” or chapter 3.9 “Optional equipment”).

The following points must be observed if installing non-factory-fitted partitions:

- PR no. 5WB “Preparation for retrofitting partition installation” is required for the installation of a separate CFCU partition. A combination with the curtain airbag is not possible for safety reasons. If the partition is not installed, the curtain airbag would be exposed in the roof gallery.
- If installing non-factory-fitted partitions, make sure that the selected forced ventilation cross sections correspond to those of the factory-fitted partition.
  This is important in several respects:
  + Closing comfort of the doors
  + Possible flow rate of the heating blower
  + Pressure equalisation on airbag deployment
  + The minimum opening cross sections in the Crafter are approx. 200 cm² in total.
- The installed partition should have a factory label for clear identification.
- If the partition is located behind the 1st seat row, bear the possible seat adjustment range in mind (comfort partition with larger bulge for the seat backrest).
- If a non ex-works partition is located behind the first seat row then the standard bolt-on points and bonding surface shall be used if possible.
- The partition should be adequately stable and sound insulated with regard to acoustic comfort.
- The strength of the partition must be validated according to DIN ISO 27956, irrespective of the country in which the vehicle is to be marketed. Although validation according to this standard is not legally binding, it is a requirement of the trade association if the vehicle is used for commercial purposes.

8.4.3 Preparation for functional floor (PR no. 5BB/5BJ)

As preparation for the assembly of a functional floor with securing rails, vehicles ordered with PR no. 5BB/5BJ are equipped with weld nuts and M10 thread in the cross members of the floor panel. These screw connection points are suitable for mounting securing rails directly on the vehicle floor.

Practical note

Attention: The openings in the floor are covered with aluminium pads. These are not permanently durable and are only intended for the time until a floor is installed. Mechanical stress can damage the covers and cause them to leak.

Information

More detailed information on the exact positions of the screw connection points can be found in the CAD data models. For information on the associated CAD data, see chapter 10.7 “CAD models”.

Preparations for functional floors PR no. 5BB/5BJ are available for different wheelbases, body types, and powertrain options. Please contact your Volkswagen Commercial Vehicles partner for more information.

Always use the threaded connection points for the lashing lugs to secure the floors.

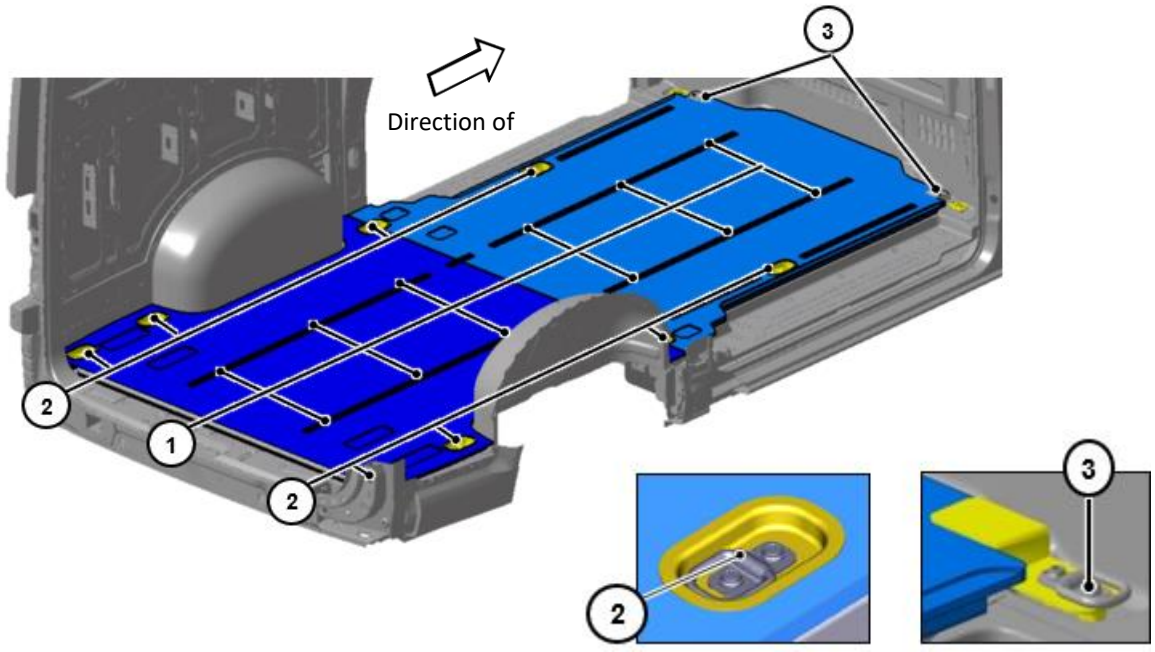


Fig. 1: Schematic diagram: Installed floor with longitudinal rails (not part of preparation) shown here: wheelbase L3

1 – Threaded connection points

2 and 3 – Lashing lugs

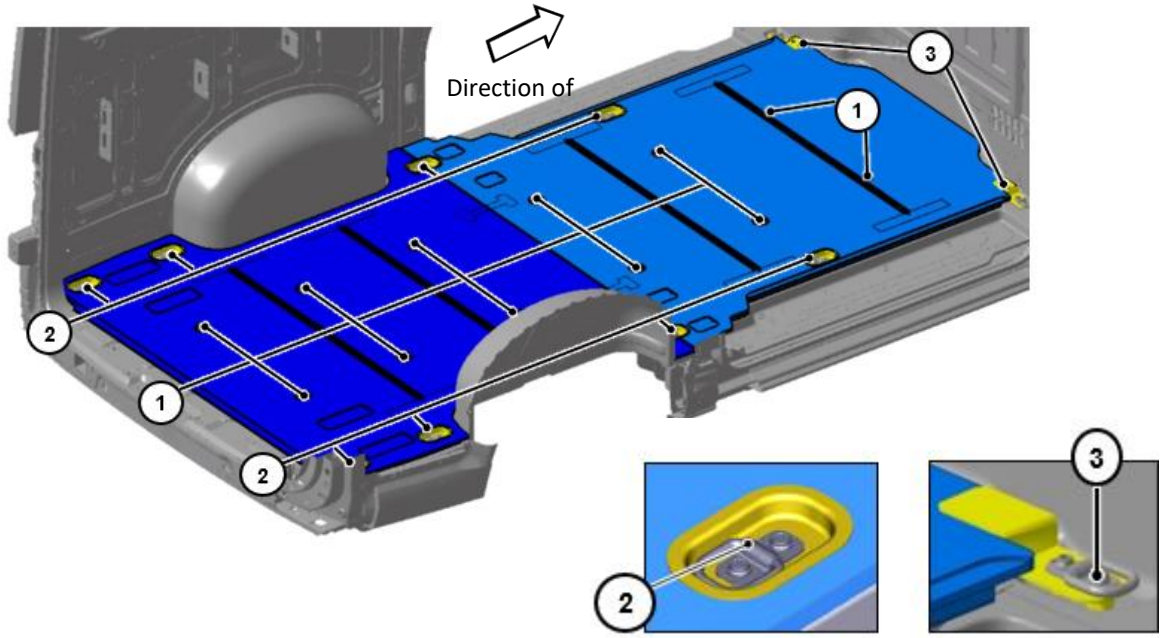


Fig. 2: Schematic diagram. Installed floor with crossbars (not included in the preparation) shown here: wheelbase L3

1 – Threaded connection points

2 and 3 – Lashing lugs

8.4.4 Vehicle roof

You will find further information on modifications to the roof in chapter 7.2.10 “Roof of panel van”.

8.5 Bodies on chassis with platform/cowl panel

8.5.1 Cowl panel

The cab rear wall, or rear wall, and the cab roof are not included in the factory fit cowl panel (PR No. K4N) based on the single cab chassis. An auxiliary roof cross strut (1) is used above the B-pillars to brace the cab for transport on the variant without a roof. (see Fig. 1 Cowl panel).
The auxiliary roof cross strut is only used for transporting the vehicle, and must be replaced by the Converter by bracing of its own.

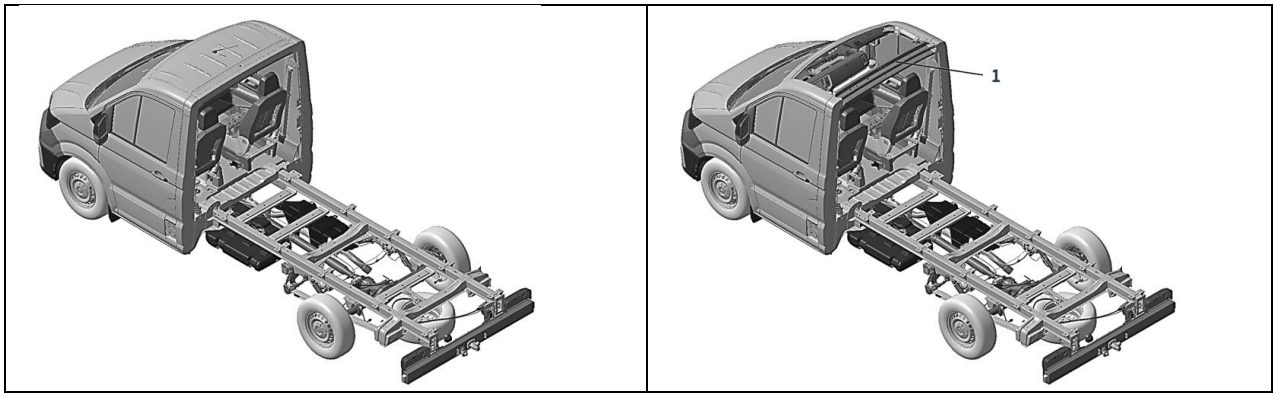


Fig. 1: Cowl panel (variant with and without cab roof)

The cowl panel is used by body builders as the basis for mounting special constructions that enclose the roof above the cab. In addition, the cowl panel makes it easier to convert vehicles with special conversions having a direct access to the cab. Application examples include, for example, ambulances, integrated boxes, mobile homes.

The cowl panel is available ex works in all engine and transmission variants and in all wheelbases and tonnages.
All air-conditioning variants are possible, except for vehicles without a roof as it is not possible to install a second evaporator.
The moulded headliner can be ordered in a simple version or with a roof gallery.

Omission of/cutting B-pillar auxiliary roof cross strut
Rigidity measures will be necessary if the B-pillar auxiliary roof cross strut is to be cut or removed (see chapter 7.2.11 “Cutting a cab roof and B-pillar roof cross strut”).

Retrofitting protective parts on the seat frame

In all seat variants of the driver seat and front passenger seat fitted with the cowl panel, Volkswagen recommends retrofitting protective parts for both rear lower seat pan frames before continuing the conversion in the following conditions (see Figure 2).

- No partition is fitted behind the driver and front passenger side.
- No other rear seat row is fitted.
- There is a load compartment that is more than 300 mm long and is suitable for stowing cargo.

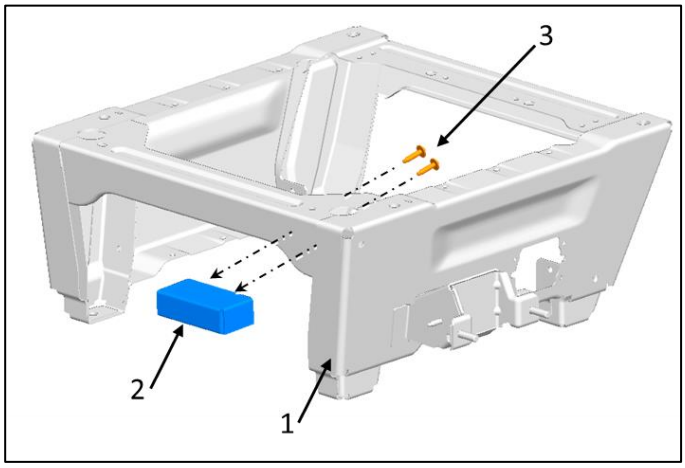


Fig. 2: High seat frame assembly

1 – Seat frame (part number 2N1.881.677*)

2 – Deflector (part number 7C0.881.071*)

3 – Screw (part no. N.909.699.01*/ 2X)

*For more information: see erWin / Volkswagen AG information system, fee required

8.5.2 Flat frame chassis with cowl panel

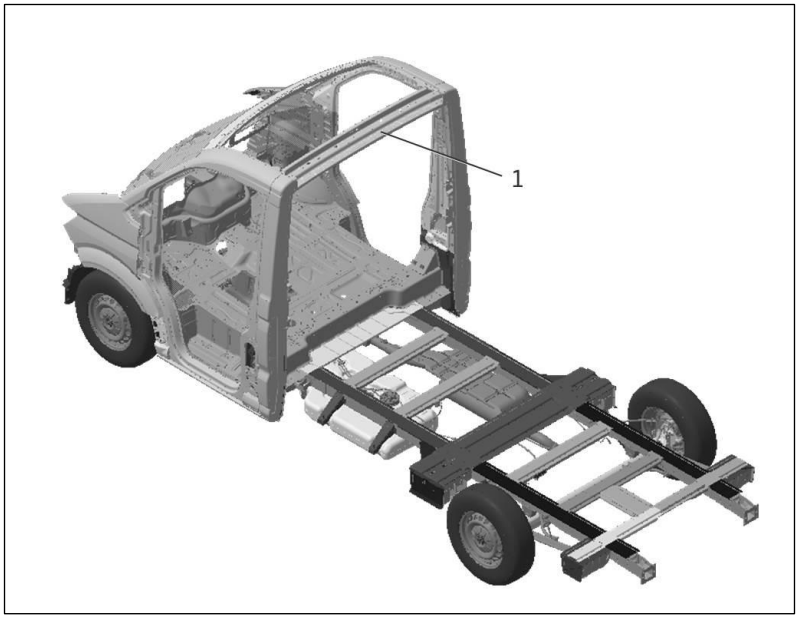


Fig. 1: Cowl panel with flat frame chassis (K4Z)/1-auxiliary roof cross strut for transport

Flat frame chassis are available from the factory as a cowl panel (PR number K4Z) as the basis for partially integrated bodies (see Fig. 1).

Available versions:

- Wheelbase L3 (3640 mm), L4 (4490 mm)
- Left-hand drive, right-hand drive
- Rear axle design: normal gauge axle (1780 mm) or wide gauge axle (1988 mm) (see Fig. 2)
- Gross vehicle weight rating: N2: 4.0 t; N1: 3.5 t
- Engine variants: front-wheel drive 103 kW, 120 kW

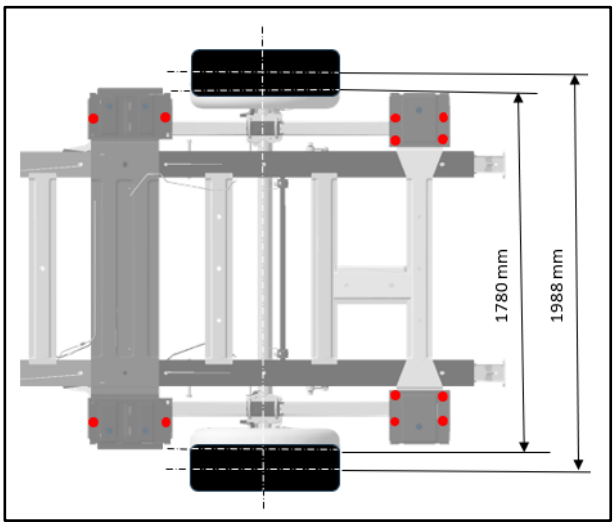


Fig. 2: Design of normal and wide-gauge rear axle

The following points must be observed when mounting on the Crafter flat frame chassis:

- The Crafter flat frame chassis, as an incomplete vehicle, does not provide self-supporting body. A box or similar body must be connected to the flat frame by means of a force-locking mechanism to ensure the structural strength of the converted vehicle.
- A suitable connection to the B-pillar (connection between back panel of the box and the cab) must be made using adhesive over the surface (see Fig. 4).
- If necessary, suitable reinforcement measures must be provided on the frame (longitudinal member and boom) of the base vehicle and connected to the floor structure of the body. In particular, observe chapter 7.2.1.3 “Drilling on the frame” when doing so.
- If a fully enclosed driver’s cab is created without access to the load compartment, it will be necessary to ventilate the partition with a minimum cross section of 200 cm². The ventilation will ideally be installed in the rear panel of the cab.
- The rear auxiliary roof cross strut (1) is only used for transport purposes and may not be used to connect the body (see Fig. 1 “Cowl panel with flat frame”.
- The wetting grade of the adhesive areas (red) must be **at least 75%** (see Fig. 3 “Crafter flat frame chassis adhesive areas for body”)
- In addition to bonding with the vehicle frame, all existing threaded connection points in the brackets must be used to secure the body (see Fig. 5 “Threaded connection points”).

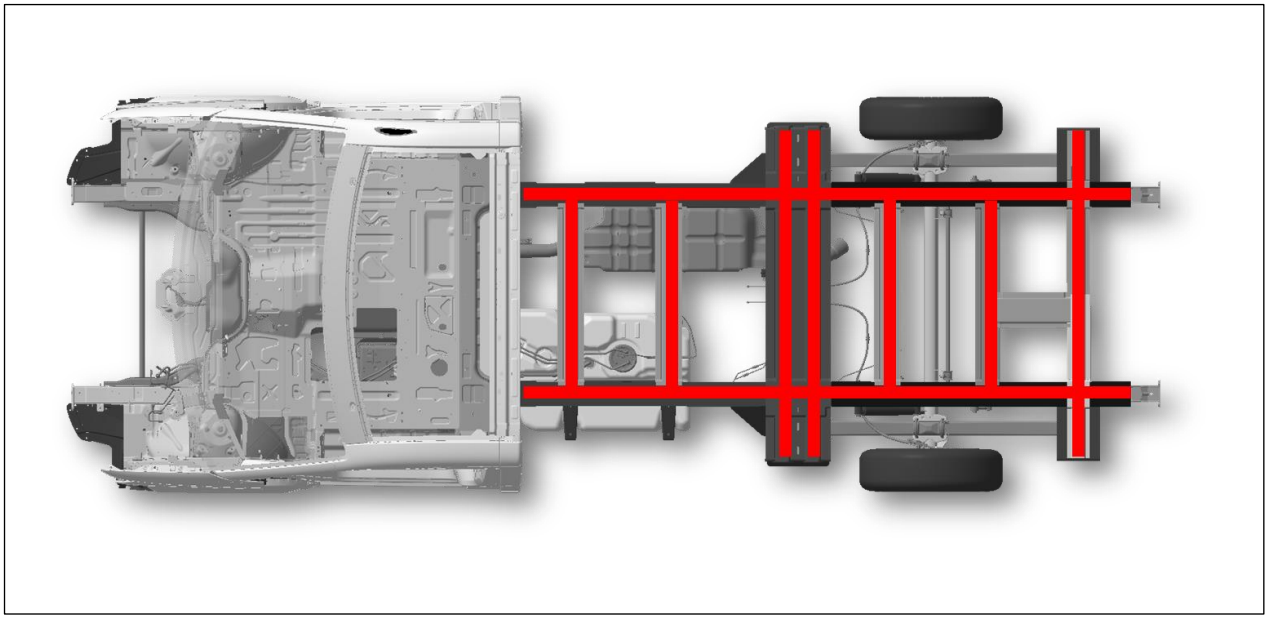


Fig. 3 Crafter flat frame chassis adhesive areas for body (illustration of frame area)

	Adhesive areas (recommended adhesive: 2K)

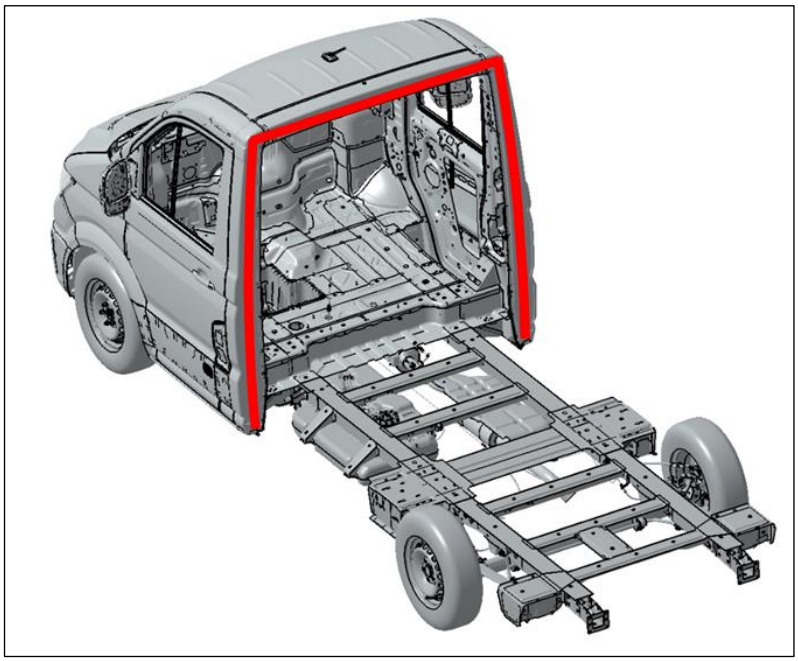


Fig. 4: Crafter flat frame chassis – bonding surfaces for connecting the rear panel of the box to the roof cross member and the B-pillar of the cab (schematic diagram of frame area)

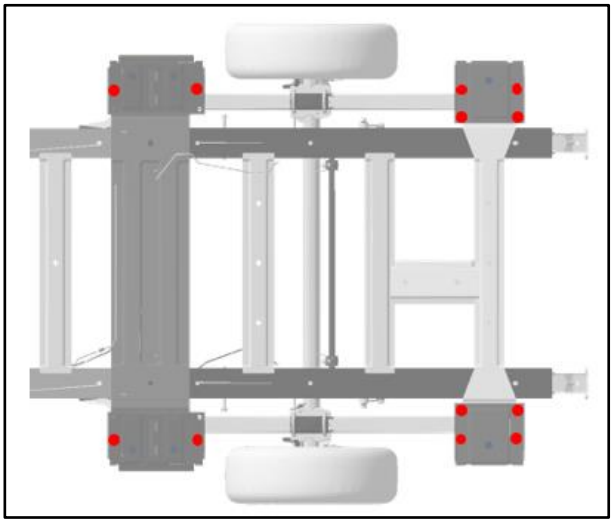


Fig. 5 Crafter flat frame chassis bolting points (schematic diagram of frame area)

	Threaded connection points

8.5.3 Minimum dimensions for rear wheel housing/flat frame

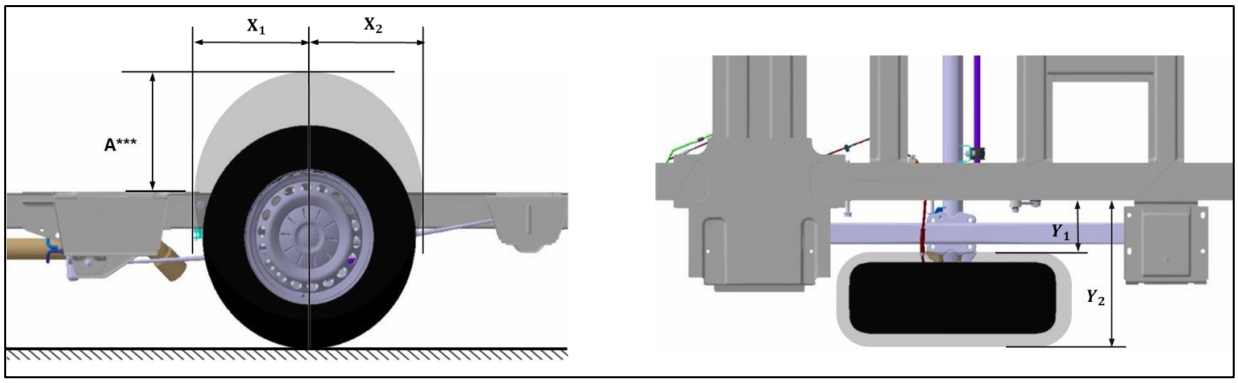


Fig. 1: Limit values for wheel housing clearance requirements

Drive type	Design	Gross vehicle weight rating [t]	Tyres	X1 [mm]	X2 [mm]	Y1 [mm]	Y2** [mm]	A*** [mm]
Front-wheel drive	Single tyres straight frame longitudinal member	3.5-4.0	235/65 R16					
			Normal gauge	≥ 400	≥ 380	≤ 140	≥ 490	≥ 330
			Wide gauge	≥ 400	≥ 380	≤ 245	≥ 595	≥ 335

*** Minimum distance A: upper edge of frame longitudinal member to wheel housing contour.

** Minimum wheel housing width with overlaps to centre of axle, measured up to the frame longitudinal member. see Fig. 4 in chapter 4.3.4

Dimensions Y_1 and Y_2 are measured from the outside edge of the frame flange on the frame longitudinal member, see Fig 4 in chapter 4.3.4. Regulation (EU) No 109/2011 (hubcaps, splash guard) must be taken into account.

Information

Further information can be found in chapter 7.2.8 “Wings and wheel housings”.

8.5.4 Partially integrated superstructures

On vehicles with partially integrated bodies, e.g. partially integrated campers, integrated boxes etc., a force-locking connection between the cab and body is required.

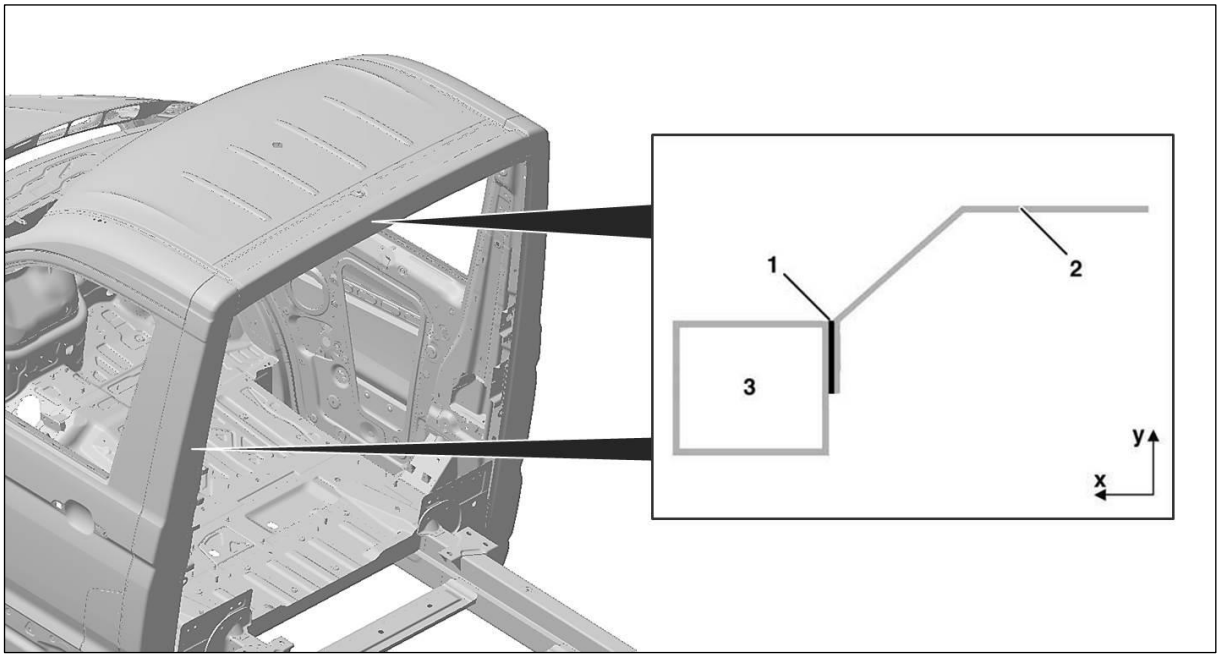


Fig. 1: Connection of body to B-pillar and roof frame via body flange (schematic diagram)

1 – Bonding flange

2 – Body flange

3 – B-pillar, roof frame

8.5.4.1 Connecting cab rear wall to B-pillar (z-axis)

The body side wall shall always be connected to the B-pillar. The connection between the body and base vehicle shall be force-locking.

The transfer of forces between the body and B-pillar shall be ensured. This can, for example, be done with:

- Connection of body to the B-pillar via a body flange with t = 2 mm angled at approx. 2 × 45°. The body flange shall be connected by bonding over the whole area (see Fig. 1 in chapter 8.5.4).

8.5.4.2 Connecting cab rear wall to B-pillar roof cross strut (y-axis)

In addition to the required connection between the body side wall and the base vehicle, a force-locking connection between the body and base vehicle is also required in the area of the roof frame for integrated bodies. This can, for example, be done with:

- Connection of body to the roof frame via a body flange with t = 2 mm angled at approx. 2 × 45°. The body flange shall be connected by bonding over the whole area. (See Fig. 1 in chapter 8.5.4)

8.5.5 Platform /chassis with normal frame

The platform based on the single cab chassis provides body builders with the basis for fully integrated bodies (e.g. motor homes) or special constructions, and must be ordered ex works (see chapter 3.9 “Special equipment”).

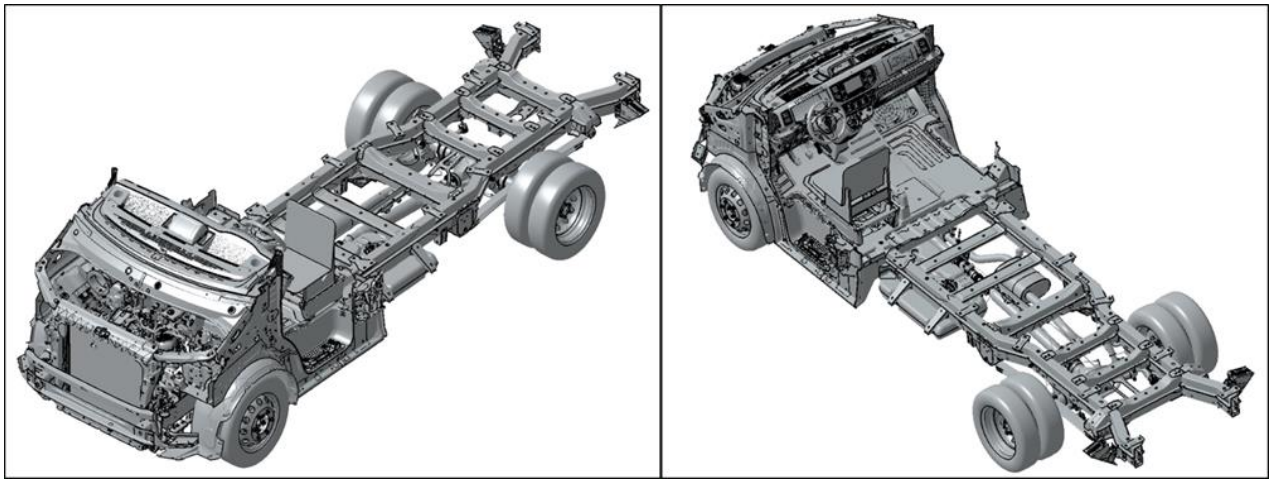


Fig. 1: Rolling chassis (front and rear views)

Information

For information about the availability of individual combinations of gross vehicle weight rating, engine, gearbox and body variants, as well as information about consumption levels, CO_2 emissions and energy efficiency classes, refer to the sales documents and the Configurator on the Volkswagen AG website:
www.volkswagen-nutzfahrzeuge.de

The country specific directives and laws shall be observed for bodies on the basis of the platform.

When superstructures are installed on a platform, a cab structure replacing the rigidity of the standard vehicle shall be created.

The front body area shall take the form of a self-supporting connection up to the B-pillar.

We recommend mapping a new cell structure according to the original structure, consisting of:

- A-pillar
- B-pillar
- Roof cross members
- B-pillar substructure cross member

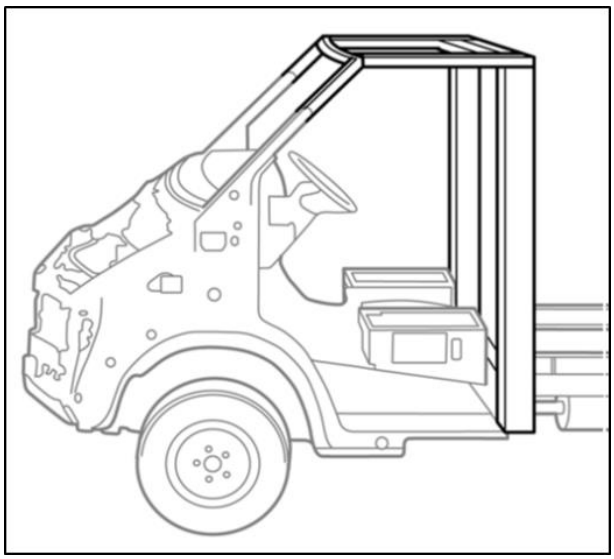


Fig. 2: Application example of rolling chassis with cell structure (schematic diagram)

The connection of cross member connections and A or B-pillars of cab shall be form-fitting.
A separate and force-locking connection shall be formed between the headlight frame and A-pillar inner part - bonding is not permitted.
If a wing is not made from steel, the common connection of headlight frame, A-pillar inner part and wing is not permitted.

Furthermore the information in the following chapters shall be observed for bodies on the basis of the platform:

- 2.8 Recommendations for inspection, maintenance and repair
- 7.3.3 *Engine cooling system*
- 7.3.4 *Engine air intake*

Practical note

A safety certificate from the responsible department is recommended for bodies on the basis of the platform.

After all work on the vehicle, it is necessary to comply with the specified corrosion protection measures (see chapter 5.3 “Corrosion protection measures”).

Modifications to the bonnet

If the bonnet is modified, ensure that the water separation system integrated there for the heating air is not impaired. If necessary, the water separation system shall be replaced with equivalent function parts.

Practical note

To guarantee the operating safety and function of the bonnet, no modifications are allowed to be made to the kinematics of the standard bonnet (bonnet lock, hinges, buffers, arrester etc.).

8.6 Platform bodies (open boxes)

For the construction of platform bodies, the following points should be observed:

1. Selection of a suitable base vehicle (gross vehicle weight rating, running gear, equipment) (see chapter 3.1 “Selecting the base vehicle”).
2. The gross vehicle weight ratings and axle weight ratings of the base vehicle must be observed (see 3.3 “Dimensions and weights”, 4.1.4 “One-sided weight distribution” and 10.3 “Weights (Masses)”).
3. The body should be constructed so that the forces introduced are evenly distributed.
4. Assembly, maintenance and owner's manuals specifying the load limits should accompany the modified vehicle.
5. The regulations and standards for load securing must be observed:
   a. VDI 2700 ff
   b. StVO or country-specific laws and regulations.
6. After all work to the vehicle is complete, remove the drilling chips and implement corrosion protection measures. (see chapter 5.3 “Corrosion protection measures” and chapter 5.4 “Paint work/corrosion protection measures”)
7. The requirements of the Converter guidelines for electrical wiring and fuses must be observed:
   a. Chapter 6.4.5 “Electrical cables/fuses”
   b. Chapter 6.4.9 “Retrofitting electrical devices”
   c. Chapter 6.4 “Interfaces”
8. During installation and conversion no electric wires or other components of the base vehicle (e.g. fuel tank, brake lines) must be damaged.
9. Conversion should only be performed by trained specialist personnel.
10. All of the body brackets provided as factory fittings are to be used for securing platform bodies to the vehicle frame.
11. For an even load on the chassis frame, the body shall be attached using an assembly frame (subframe) (see 8.1 “Assembly frame”).
12. For platform bodies, bolted connections protected against loosening with spacer sleeves shall be used on the first and second body brackets in the area behind the cab. The spacer sleeves shall be dimensioned so that they cannot be deformed (see chapter 8.1.4.4 “Torsionally rigid superstructures”).
13. See 8.1 “Assembly frame” for section moduli (WX) and material properties.
14. The minimum distance of 50 mm between the rear cab wall and the box body is to be maintained. (See chapter 4.10 “Limit values for body”)
15. The wheel clearance on the rear axle must be maintained. (See chapter 4.3.4 “Minimum dimensions for rear wheel housing/chassis”)
16. Appropriate exterior mirrors are to be chosen, depending on the width of the body (see chapter 4.1.3.1 “Vehicle width”)
17. Potential shifting of tail light clusters required (see chapter 4.7 “Limit values for electrics/electronics” and chapter 6.5 “Lights“)
18. The standard tail light clusters may not be built into a vertically upright position. (See chapter 6.5.3 “Tail light clusters”)
19. Depending on the gross vehicle weight rating, rear and side underbody impact guards must be provided (see chapter 7.9 “Underbody guard”)
20. Depending on the vehicle length, side marking lights must be provided (see chapter 6.5.4 “Marking lights”).
21. Roof loads must be observed. (See chapter 4.3.8 “Vehicle roof/roof load”).
22. Always comply with the current statutory provisions and legislation, regulations on health and safety and accident prevention, safety rules, and accident insurance providers’ data sheets. Country-specific laws, guidelines and registration conditions are to be observed (see chapter 2.9 “Accident prevention”).
23. If the standard platform is subjected to point or point-like loading (e.g. transportation of cable drums, coils etc.), the substructure and platform floor shall be reinforced suitably for the load.

Practical note

If a superstructure has moving attachments, make sure that there is sufficient clearance from the base vehicle, otherwise attachments could collide with the base vehicle causing damage.

Practical note

For countries which grant approval according to the WLTP procedure, it is important to note that planned, aerodynamically effective changes to the cabin or platform body and weight changes are checked using the WLTP calculation tool. If no calculation values can be generated, please contact the responsible technical service.

“Further technical information relevant for vehicle approval can be found in the WLTP newsletter and the CustomizedSolution portal.”

8.7 Box bodies (dry freight boxes and refrigerated boxes)

When designing box bodies, the following points must be observed:

1. Selection of a suitable base vehicle (gross vehicle weight rating, running gear, equipment) (see chapter 3.1).
2. The gross vehicle weight ratings and axle weight ratings of the base vehicle must be observed (see 3.3 “Dimensions and weights”, 4.1.4 “One-sided weight distribution” and 10.3 “Weights (Masses)”).
3. Chapter 7.6.1 “Wind baffles/roof spoilers” must be observed when attaching a wind baffle.
4. For box bodies on the Crafter with the Light Duty version, no values can be provided with the WLTP calculator. Box bodies are possible for Heavy Duty versions. For permissible weights and front surfaces, see chapter 11 “Notes on homologation”.
5. The body should be constructed so that the forces introduced are evenly distributed.
6. Assembly, maintenance and owner's manuals specifying the load limits should accompany the modified vehicle.
7. The regulations and standards for load securing must be observed:
   a. VDI 2700 ff
   b. StVO or country-specific laws and regulations.
   c. After all work to the vehicle is complete, remove the drilling chips and implement corrosion protection measures. (Chapter 5.3 “Corrosion protection measures” and chapter 5.4 “Paint work/corrosion protection measures”)
8. The requirements of the Converter guidelines for electrical wiring and fuses must be observed:
   a. Chapter 6.4.5 “Electrical cables/fuses”
   b. Chapter 6.4.9 “Retrofitting electrical devices”
   c. Chapter 6.4 “Interfaces”
9. During installation and conversion no electric wires or other components of the base vehicle (e.g. fuel tank, brake lines) must be damaged.
10. Conversion should only be performed by trained specialist personnel.
11. All of the body brackets provided as factory fittings are to be used for securing box bodies to the vehicle frame.
12. For an even load on the chassis frame, the body must be attached using an assembly frame (subframe) (see chapter 8.1 “Assembly frame”).
13. On box bodies, bolted connections with spacer sleeves that are secured against loosening shall be used on the first and second body brackets in the area behind the cab. The spacer sleeves shall be dimensioned so that they cannot be deformed (see chapter 8.1.4.4 “Torsionally rigid superstructures”).
14. See chapter 8.1 “Assembly frame” for section moduli (WX) and material properties.
15. The minimum distance of 50 mm between the rear cab wall and the box body is to be maintained. (See chapter 4.10 “Limit values for body”)
16. The wheel clearance on the rear axle must be maintained. (See chapter 4.3.4 “Minimum dimensions for rear wheel housing/chassis”)
17. Depending on body width, appropriate exterior mirrors and end-outline marker lamps are to be selected (on top of the box). (see 4.1.3.1 “Vehicle width” and chapter 4.7 “Limit values for electrics/electronics”). Potential shifting of tail light cluster may also be required (see chapter 4.7 “Limit values for electrics/electronics” and chapter 6.5 “Lights”).
18. The standard tail light clusters may not be built into a vertically upright position. (See chapter 6.5.3 “Tail light clusters”)
19. Depending on the gross vehicle weight rating, rear and side underbody impact guards must be provided (see chapter 7.9 “Underbody guard”)
20. Depending on the vehicle length, side marking lights must be provided (see chapter 6.5.4 “Marking lights”).
21. The instructions in chapter 7.6.2 “Roof sleeper cab” must be observed when assembling a roof sleeper cab.
22. Compliance is required with current statutory provisions and legislation, regulations on health and safety and accident prevention, safety rules, and accident insurance providers’ data sheets. Country-specific laws, directives and approval regulations must be observed. (see chapter 2.9 “Accident prevention”).

Information

For more information about box bodies, refer to:

- Integrated boxes (see chapter 8.5.4 “Partially integrated bodies”)
- Refrigerated boxes (see chapter 8.8 “Refrigerated vehicles”)
- Self-supporting boxes (see chapter 8.2 “Self-supporting bodies”)

8.8 Refrigerated vehicles

There are different uses for refrigerated vehicles requiring different load compartment temperatures to be complied with (cold storage/pharmaceuticals).
Attaining and maintaining the load compartment temperature requires cooling and/or heating.

The cold and heat output respectively depends on:
- The quality of the insulation
- The required temperature range
- The size of the load compartment
- The climate zone in which the vehicle is used
- Usage profile (number of door openings)

To air condition the load compartment, the following optional equipment is available for the Crafter Commercial Vehicle:
- 2nd evaporator in the headliner
- 2nd heat exchanger in the front passenger seat box

Designation (PR. number)	PR number	Cooling output [kW]	Heating output [kW]
2nd evaporator under headliner in cab	6AB	8.4	--
2nd heat exchanger	6AC	--	5.9
Combination of roof evaporator and 2nd heat exchanger	6AA	8.4	5.9

Further information is available in the following chapter:7.4.5.1 “Second evaporator/second heat exchanger”

If the cooling output is not sufficient, there is the option of using an additional air conditioner compressor to set up a cooling system for the luggage compartment which is self-contained and not integrated in the vehicle interior air conditioning.
If a separate cooling system is powered electrically, then an additional alternator is available ex-works.
For more information, see chapter 7.5 “Ancillaries”.

Choice of base vehicle:
- Sliding doors with larger opening
- Customer-specific functional control unit CFCU* for deactivation of the start/stop function

The following points must be observed for conversions:
- Country specific laws and regulations (hygiene, emergency door opening, water drainage) must be complied with.
- Gross axle weight rating and minimum front axle weight rating
- Side protection
- If the luggage compartment is an insulated box, then specifications covering box bodies must also be observed.
- To facilitate repair of the panel van, accessibility to the components of the door mechanism (e.g. guide rails and hinges) must be ensured.

Practical note

The insulation in the panel van increases the weight of the doors, and therefore also the load on the hinges, carriage and lock systems.

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

Observe the chapters:

- 7.4.5 “Air conditioning (heating and cooling)”
- 7.5 “Ancillaries”
- 7.2.10 “Roof of panel van”
- 6.4.9 “Retrofitting electrical devices”
- 7.4.4 “Reducing interior noise”

  The described requirements for reducing interior noise shall be met by the insulation material for refrigerated vehicles based on a panel van.
- 6.4.3 “Customer-specific functional control unit (CFCU)”

8.9 Tipper bodies

8.9.1 Preparation for 3-way tipper (PR No. 5HN)

We offer the option of preparation for a 3-way tipper (5HN) ex works.

PR number	Description
5HN	Preparation for 3-way tipper Installation location: longitudinal member in the rear axle area Connectors: 7-pin round connector: 7C0.973.707 Contact sleeve 7C0.973.701, 7C0.973.701.A Further information: please see erWin*, wiring diagram, section no.33/1-33/4

*Information system from Volkswagen AG, subject to payment

The 3-way tipper preparation consists of two control keys on the dash panel for the tipper function (lift and lower) and a coupling point to connect the tipper to the vehicle.
For correct operation of the tipper body, a limit switch is required.
This must be mounted in such a way so that

- it cannot be damaged by external mechanical influences (vibrations, impacts etc.).
- it is always activated safely (by observing the correct switching distance).

The limit switch ensures that the following statuses are transmitted to the control unit (J608).

- **Tipper body lowered (<u>only</u> in the bottom end position)**
  - Switch closed – pin 6 and pin 2 **<u>must</u>** be connected at the connection point for the 3-way tipper (round connector TDSK3).
- **Tipper body raised (only if outside of the bottom end position)**
  - Switch opened – pin 6 and pin 2 **<u>must</u>** be removed from the connection point for the 3-way tipper (round connector TDSK3).

The tipper wiring package to connect your body is rolled up behind the cab in the centre of the vehicle. This is for connection to the coupling points TDSK1, TDSK2 and TDSK3.

8.9.1.1 Coupling point

- TDSK 1 – Supply voltage tipper body
- TDSK 2 – Earth cable for the tipper body
- TDSK 3 – Round connector (see Fig. 1):
  - Pin 2 (Cable: blue/green) - Voltage supply of the end position switch
  - Pin 4 (Cable: yellow/violet) - Control signal *lower tipper*
  - PIN 5 (Cable: black/grey) - Control signal *lift tipper*
  - PIN 6 (Cable: blue/white) - Signal end position switch for CFCU*

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

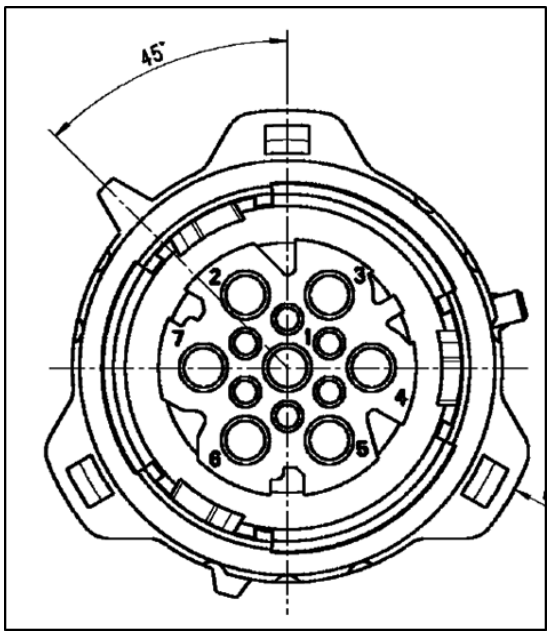


Fig. 1: Coupling point TDSK3 (round connector) – PIN assignment

8.9.1.2 Operation

Fig. 2: Operation button in vehicle (raise and lower)

1. Lift

To start the tipping operation, the user presses the *lift tipper* button (at least 1 second long). When this is done, a travelling speed restriction is activated. This restricts the vehicle speed to approximately 15 km/h.
After approx. 60 seconds, the activation is stopped automatically and may need to be performed again.
This should prevent any jammed buttons.

2. Lower

To start the lowering operation, the user presses the *lower tipper* button (at least 1 second long). The vehicle speed restriction of approx. 15 km/h is maintained.
After approx. 60 seconds, the activation is stopped automatically and may need to be performed again.
This should prevent any jammed buttons.

3. Speed restriction (approx. 15 km/h)

The restriction to the vehicle speed remains in place, even beyond terminal 15- , or re-ignition of the vehicle.

At speeds in excess of 10 km/h, operation of the *lift -button* has no effect. This guards against accidental misuse.
Use of the “lower” button, on the other hand, is independent of the speed, which gives the driver the opportunity to lower the tipper bed at any time and thereby make the situation safe.

4. The following notifications/functions are displayed:

- Tipper bed in default position and speed restriction:
  - Button-lighting**off**
  - Buzzer**off**
  - Speed restriction **off**
- Tipper bed not in default position and/or raise button pressed
  - Button-lighting**on**
  - Buzzer **on** (periodically)
  - Speed restriction **on**
- The lower end stop (tipper completely lowered) is accounted for by the CFCU*
- The body takes into account the top end position (tipper completely lifted).

For further information, contact your service partner or Converter management (see chapter 2.1 “Product and vehicle information for body builders”)

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

8.9.2 Construction of tipper bodies

For the construction of tipper bodies, the following points should be observed:

1. Selection of a suitable base vehicle (gross vehicle weight rating, running gear, equipment), see chapter 3.1 “Selecting the base vehicle”
2. The gross vehicle weight ratings and axle weight ratings of the base vehicle must be observed (see 3.3 “Dimensions and weights”, 4.1.4 “One-sided weight distribution” and 10.3 “Weights (Masses)”).
3. The body should be constructed so that the forces introduced are evenly distributed.
4. The Converter must produce the assembly, maintenance and owner’s manuals.
   The owner’s manual must contain the following:
   - Notes on safe operation
   - Information on permissible stress
   - Notes on dangers that may arise due to improper operation.

   All documents must be explained and handed over to the customer when the vehicle is delivered.
5. The regulations and standards for load securing must be observed:
   a. VDI 2700 ff
   b. StVO or country-specific laws and regulations.
6. After all work to the vehicle is complete, remove the drilling chips and implement corrosion protection measures. (see chapter 5.3 “Corrosion protection measures” and chapter 5.4 “Paint work/corrosion protection measures”)
7. The requirements of the Converter guidelines for electrical wiring and fuses must be observed:
   a. Chapter 6.4 “Interfaces”
   b. Chapter 6.4.5 “Electrical cables/fuses”
   c. Chapter 6.4.7 “Additional circuits” (for electro-hydraulic tipper drives).
   d. Chapter 6.4.9 “Retrofitting electrical devices”
8. During installation and conversion no electric wires or other components of the base vehicle (e.g. fuel tank, brake lines) must be damaged.
9. Conversion should only be performed by trained specialist personnel.
10. The minimum distance of 50 mm between the rear cab wall and the box body is to be maintained. (See chapter 4.10 “Limit values for body”)
11. The wheel clearance on the rear axle must be maintained. (See chapter 4.3.4 “Minimum dimensions for rear wheel housing/chassis”)

12. Appropriate exterior mirrors are to be chosen, depending on the width of the body (see chapter 4.1.3.1 “Vehicle width”). Potential shifting of tail light clusters may also be required (see chapter 4.7 “Limit values for electrics/electronics” and chapter 6.5 “Lights“)
13. The standard tail light clusters may not be built into a vertically upright position. (See chapter 6.5.3 “Tail light clusters”)
14. Depending on the gross vehicle weight rating, rear and side underbody impact guards must be provided (see chapter 7.9 “Underbody guard”)
15. Depending on the vehicle length, side marking lights must be provided (see chapter 6.5.4 “Marking lights”).
16. Compliance is required with current statutory provisions and legislation, regulations on health and safety and accident prevention, safety rules, and accident insurance providers’ data sheets. Country specific laws, guidelines and registration conditions are to be observed (see chapter 2.9 “Accident prevention”)
17. Tipper bearings
    a. The rear tipper bearings on three-sided and rear tipper bodies shall be placed as close to the rear as possible.
    b. The folded down tail lift shall not knock against the frame end, the lighting systems or the trailer towing coupling.
    c. For the front tipper bearings, guide brackets are required to guide the tipper bearings when the tipper is lowered.
18. Safety devices
    a. A prop (tipper stay) must be incorporated to prevent accidental lowering of the tipper on someone beneath it.
    b. Secure controls against accidental use.
    c. A warning device must be incorporated that shows when the tipper is not in rest position (drive position).
19. Tilting press
    a. The press carrier is secured on cross members in the assembly frame.
    b. The cross member of the assembly frame and the cross member of the chassis shall be arranged on top of each other if possible.
    c. On three-sided tipper bodies, the working point of the tilting press should be in front of the centre of gravity of the body and payload.
20. Assembly frame

    If chassis are fitted with tipper bodies, sufficient dimensioning of the assembly frame is necessary due to high vehicle loads.

    The following points must be observed:
    a. Secure the assembly frame to the body brackets in accordance with chapter 8.1.4 “Attachment to the frame”.
    b. Sufficient dimensioning of longitudinal and cross members.
    c. The rear area of the assembly frame is to be closed as a box and, if necessary, stiffened with an inserted diagonal cross or other suitable measures.
    d. At least all of the body brackets provided at the factory are to be used for securing tipper bodies to the vehicle frame.
    e. The use of vehicles with tipper bodies is only possible for normal usage conditions. In difficult conditions of use, we recommend consulting the responsible department (see 2.2 “Converter guidelines, consulting”).
    f. See chapter 8.1 “Assembly frame” for section moduli (WX) and material properties.
21. Subsequent installation of towing bracket

    To guarantee that the platform tailboard can slide over the towing bracket when tipping, it is advisable to fit a wiper plate to the platform rear wall panel when retrofitting a towing bracket. This plate should be 80 mm wide and have a material thickness of 3 mm, be centrally fitted and must reach from the lower to the upper edge of rear area (platform rear wall panel) (see Fig. 3 Wiper plate on platform rear wall panel).

Fig. 3: Wiper plate on rear platform wall

Practical note

If a superstructure has moving attachments, make sure that there is sufficient clearance from the base vehicle, otherwise attachments could collide with the base vehicle causing damage.

Practical note

For countries which grant approval according to the WLTP procedure, it is important to note that planned, aerodynamically effective, changes to the cabin or tipper body and weight changes are checked using the WLTP calculation tool. If no calculation values can be generated, please contact the responsible technical service.

“Further technical information relevant for vehicle approval can be found in the WLTP newsletter and the CustomizedSolution portal.”

8.10 Rescue vehicles

Vehicles with bodies for rescue or transport purposes must be attached using a sufficiently dimensioned assembly frame (see chapter 8.1.4 “Attachment to the frame”).
In addition, these shall be supplemented with two shear-resistant connections per frame longitudinal member (see chapter 8.1.4.3 “Shear-resistant connection”).
A letter of non-objection from the responsible department is required for the construction of rescue or towing vehicles.
Please also refer to 7.6.6 “Winch behind cab” for the attachment of winches.
Also refer to chapters 7.9.2 “Side protection equipment” and 7.9 “Underbody impact guard”.

8.11 Torsionally stiff body types

The chapter number has changed. See chapter 8.1.4.4 “Torsionally rigid superstructures”.

8.12 Campers

Information

For integral campers (see chapter 8.5.4 “Partially integrated bodies”).

Before conversions into campers, observe the following:

- The legal regulations (EC directives) shall be observed.
- The minimum requirement for interior design and equipment for campers shall be fulfilled.

Practical note

If the factory-fitted hexagon holes are used with intake nuts (N.909.278.01) on the side panel, the maximum permissible tensile force of 900 N per hexagon hole must not be exceeded. (See chapter 7.6.5 “Shelf installation/installations in vehicle interior”) for details.

If several adjacent mounting points are used, a load rail must be used to spread the load evenly across the side panel. Concentrated force applications must be avoided.

Information

It is possible to request appropriate information material for converting vehicles in the Federal Republic of Germany, from the responsible road traffic test centre (e.g. TÜV, DEKRA).

- To facilitate repair, accessibility to the components of the door mechanism (e.g. guide rails and hinges) shall be ensured.
- The standard tank cap is not allowed to be removed or covered with a part which creates a block.

Practical note

If the tank cap or parts placed on the tank cap are removed, blocking can occur in an accident. As a result, the survival space in the B-pillar can no longer function correctly. Covering with trim parts and securing “blocking” parts to the B-pillar is not permitted.

Attachment to the frame

- The body shall be attached to the base vehicle via at least all the body brackets fitted at the factory or via additional body brackets (see chapter 8.1.4 “Attachment to the frame”).
- Two screws shall be used on each body bracket to attach the body.

Practical note

The minimum distance between the rear edge of the door and integrated body shall be >20 mm. Otherwise, in an accident, the rear edge of the door and the body could come into contact and in extreme cases result in the door being jammed.

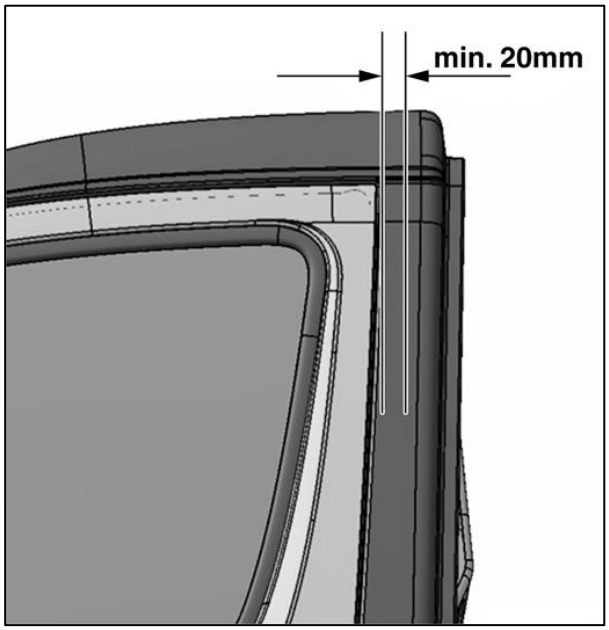


Fig. 1: Minimum distance between rear edge of door and integrated body

The following chapters of the Converter guidelines must be observed in particular:

- 3.3 “Dimensions and weights”
- 4.2.3 Industry-specific offer structure (vehicle packages)
- 4.2.4 “Gross axle weight ratings”
- 6 “Electrics/electronics”“
- 6.8.6 “Rain and light sensor”“
- 7 “Modifications to the base vehicle”
- 7.2.8 “Wings and wheel housings“

Modifying or converting standard vehicles (e.g. installation of a pop-up roof) could void the operating permit. The approval conditions and regulations of the European type approval (ETA) shall be complied with.
In Germany, vehicle modifications shall therefore be inspected by the responsible road traffic test centre in accordance with section 19(2) of the StVZO.
The vehicle documents shall be presented for the test. Once the modifications have been entered in the vehicle documents, the vehicle documents shall be presented to the responsible test centre to issue a new operating permit.
At least one anti-roll is required on the front axle due to the higher centre of gravity.
You will find further information on electrics and ancillaries in chapters 6 “Electrics/electronics” and 7.5 “Ancillaries”.

8.13 Lifting platform

8.13.1 General information

Practical note

If a superstructure has moving attachments, make sure that there is sufficient clearance from the base vehicle, otherwise attachments could collide with the base vehicle causing damage.

Practical note

The elevated work platform may only be operated if the vehicle has been fully raised on outriggers.

There must be no additional loads in or on the cab while the vehicle is raised on its outriggers. Otherwise the frame could be damaged. The vehicle is not allowed to be moved if the elevated work platform has been raised. The frame could be damaged if the vehicle is moved while the elevated work platform is raised. The Converter shall install a safety mechanism so that the vehicle cannot be moved while the elevated work platform is raised. This can, for example, be carried out using the elevated work platform control, or in combination with the customer-specific functional control unit (CFCU*) (see chapter 6.4.3 “Customer-specific functional control unit (CFCU*)”).

*CFCU: customer-specific functional control unit, see also chapter 6.4.3.

If chassis are equipped with elevated work platforms, the following points shall be observed due to the high loads when the platform is raised:

- A letter of non-objection from the responsible department is required for the retrofitted elevated work platforms.
- The stability of the elevated work platform shall be guaranteed by the Converter.
- The Converter shall produce an additional Owner's Manual for the lifting system and enclose it with the vehicle. The operating manual shall contain the warning that there shall be no persons or loads in the cab while the vehicle is raised on its outriggers.
- For an even load on the chassis frame, the body shall be mounted using an assembly frame.
- All of the body brackets and their mounting points provided as factory fittings must be used to attach the assembly frame. Use securing bolt size M12, property class 10.9, fine thread.
- Bolted connections protected against loosening with spacer sleeves must be used to attach the first brackets (see chapter 8.1.4.4 “Torsionally rigid superstructures”).

– The force induction from the supports shall be central between the two standard double bracket pairs behind the cab. In addition, the assembly frame needs to be protected sufficiently against torsion in the force induction area.

Assembly frame

A sufficiently dimensioned assembly frame is required for the installation of elevated work platforms on chassis.

See chapter 8.1 “Assembly frame” for section moduli (W_x) and material properties.

The assembly frame shall be attached uniformly to all body brackets. Bolted connections protected against loosening with spacer sleeves must be used to attach the assembly frame to the first, and additional brackets (see chapter 8.1.4.4 “Torsionally rigid superstructures”).
The force induction from the outriggers into the assembly frame shall be central between the two standard double bracket pairs behind the cab.
In the area of force induction into the assembly frame from the outriggers, a sturdy cross member (front and rear) shall protect the assembly frame sufficiently against torsion.

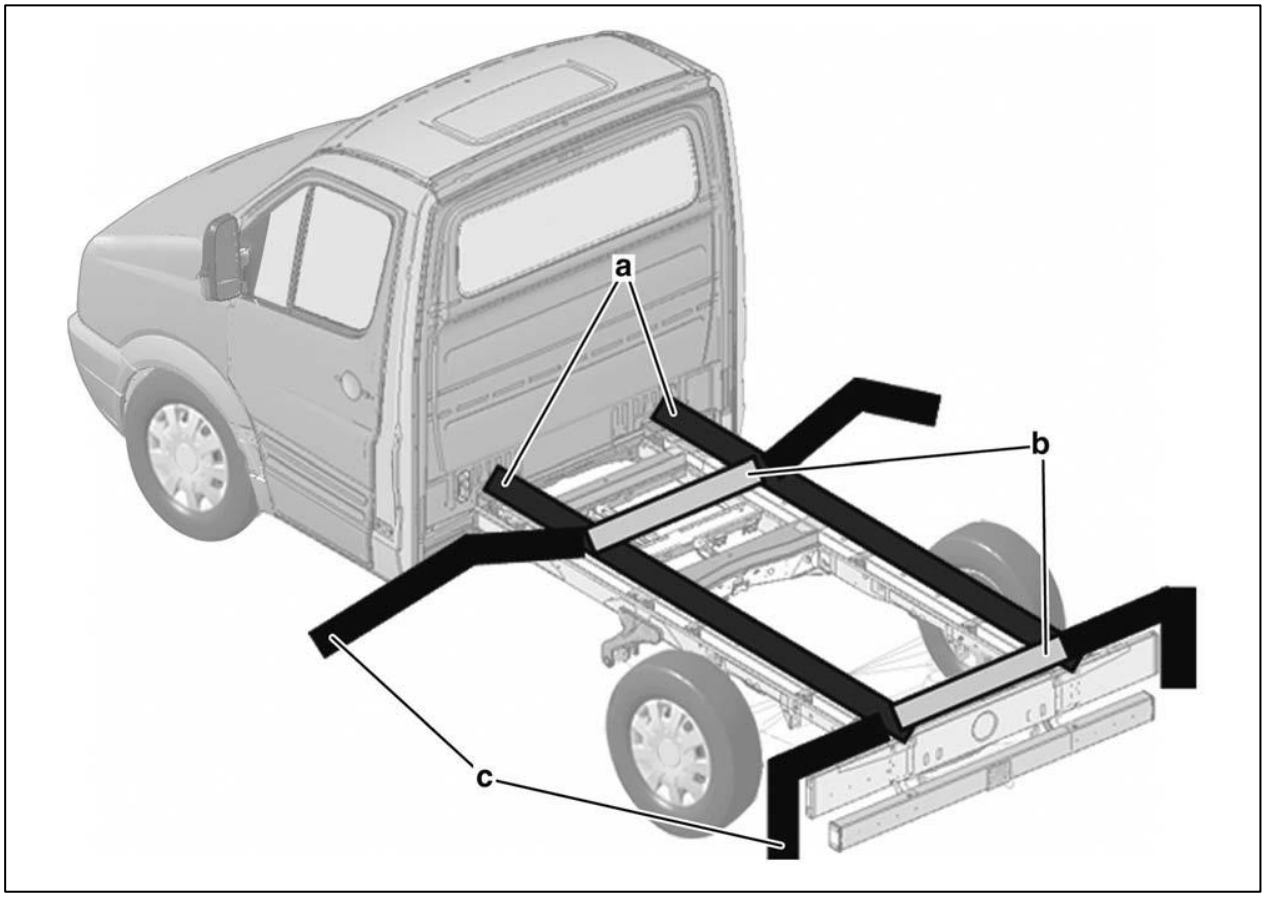


Fig. 1: Connecting the mounting frame to the body brackets

a – Area of additional brackets

b – Required assembly frame cross member in area of outrigger load induction

c – Outriggers

8.14 Workshop vehicles

For shelf and workshop installations, the following points must be observed:

1. Selection of a suitable basic vehicle (gross vehicle weight rating, running gear, equipment)
2. Driver's compartment and luggage compartment should be separated by means of a retaining device (partition, load guard) according to DIN ISO 27956.
3. The gross vehicle weight ratings and gross axle weight ratings of the base vehicle must be complied with.
4. The installation should take place in a way that ensures that the forces induced are evenly distributed.
5. The suitability of the available fastening rings should be checked before they are used to secure items.
6. Assembly, maintenance and owner's manuals specifying the load limits should accompany the modified vehicle.
7. The maximum load of drawers and shelves (taking dynamic forces into account) must be marked or indicated in the Owner's Manual. The Owner's Manual must be provided with the vehicle.
8. The vehicle structure must not be weakened by the installations in the event of an accident.
9. The regulations and standards for load securing must be observed:
   + DIN ISO 27956 (securing of cargo in delivery vans),
   + VDI 2700 ff
   + StVO or country-specific laws and regulations.
10. The installation should be performed so as to be safe in the event of a crash (e.g. UNECE-R 44-3 City Crash):
    + all items in the vehicle should be secured, installed or stowed in such a way that they do not become projectiles in the event of acceleration/deceleration in a forwards, backwards, left, right or vertical direction.
    + All tested compartments, rails, installations not intended for storage or storage equipment must be marked with the highest permitted weights.
11. Exposed edges that may come into contact with the hands, legs, head etc. of a vehicle occupant during normal operation must not have a radius of less than 2.5 mm.
12. Following all work to the body, drilling chips should be removed and corrosion protection measures should be performed.
13. The requirements of the Converter guidelines for electrical wiring and fuses must be observed:
    + Chapter 6.4.5 "Electrical cables/fuses"
    + Chapter 6.4.9 "Retrofitting electrical devices"
    + Chapter 6.4 "Interfaces"
14. During installation and conversion no electric wires or other components of the base vehicle (e.g. fuel tank, brake lines) must be damaged.
15. Conversion should only be performed by trained specialist personnel.
16. Ensure "sufficient ventilation" in vehicles intended for the transportation of gas cylinders. The so-called diagonal ventilation is deemed "sufficient". It usually runs from top front (roof) to rear bottom (floor, bottom side wall).

Please observe the following chapters:

- Chap. 3.1 Selecting the base vehicle
- Chap. 4.1.3 Vehicle dimensions
- Chap. 4.2.3 Industry-specific offer structure
- Chap. 6.4 Interfaces
- Chap. 6.5 Lighting
- Chap. 6.8 Driver assist systems
- Chap. 6.9 Preparing the tail lift
- Chap. 7.2.1 General information on body-in-white/ bodywork
- Chap. 7.6.5 Shelf installation/installations in vehicle interior
- Chap. 8.4.2 "Partitions"
- Chap. 8.4.3 Universal floor
- Chap. 10.3 Weights (masses)

8.15 Courier, express and parcel delivery services (CEP)

8.15.1 Installation of folding shelves

Installation of folding shelves as follows:

- On the floor
  e.g. by using the factory fitted fastening point holes
- At chest height
  The body-in-white comes with hexagonal bore holes as standard, that are spaced at 100 mm intervals and are to be used in conjunction with corresponding intake nuts (e.g. N.909.278.01).
  No trim parts are to be attached along with the bolt connections. Direct contact between e.g. angular plates and vehicle bodywork, is needed to avoid bolts becoming loosened by the movement of trim materials.
  To avoid uneven distribution of force, it is recommended that bolted connections are supplemented by bonding. To attach vertical supports (for example) to the body-in-white, angular plates should be attached in front of and behind the support, with two bolts each. (See also chapter 7.6.5 “Shelf installation/installations in vehicle interior”).
- At roof height on the side wall (only for roof height H3)
  The body-in-white comes with hexagonal bore holes as standard, that are spaced at 100 mm intervals and are to be used in conjunction with corresponding intake nuts (e.g. N.909.278.01).
  No trim parts are to be attached along with the bolt connections. Direct contact between e.g. angular plates and vehicle bodywork, is needed to avoid bolts becoming loosened by the movement of trim materials.
  To avoid uneven distribution of force, it is recommended that bolted connections are supplemented by bonding. To attach vertical supports (for example) to the body-in-white, angular plates should be attached in front of and behind the support, with two bolts each. (See also chapter 7.6.5 “Shelf installation/installations in vehicle interior”).
- On the roof cross struts
  For suitable induction of column connection forces in the roof area, they must be attached using the gusset plates/corner plates of the cross members. The existing hexagonal holes together with the pop rivet nut N.909.278.01 or other holes already present in the gusset plate should, ideally, be used for this. Drilling additional holes will weaken the structure, and is not permitted. The connection should be made directly via the gusset plates by means of a U profile to guarantee ideal force transmission (see figure 1)

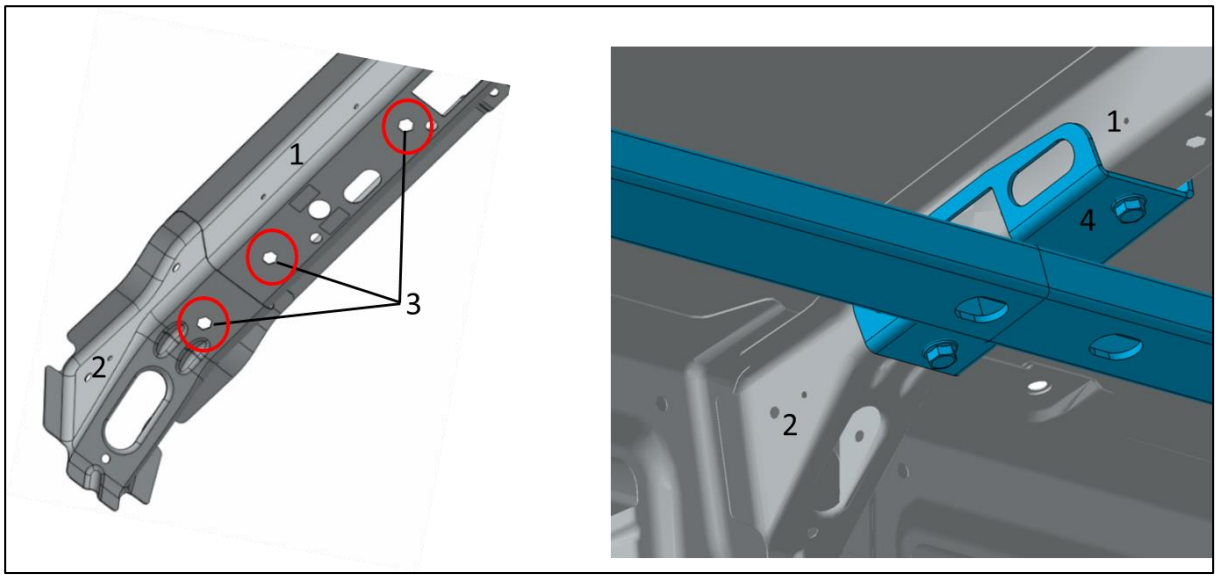


Fig. 1: Example of mounting of longitudinal profile to vehicle roof

1 – Roof cross strut with connection in roof area

2 – Roof cross strut bracket

3 – Hexagonal holes for pop rivet nuts

4 – Example of attaching a holder to the bracket and the cross strut

8.15.2 Installation of folding seat

Please note that seating deviating from standard seat units has to meet the requirements of UNECE-R 14, UNECE-R 17 and UNECE-R 16. (see chapter 7.4.3.2 “Installation of seats from after market suppliers”)

8.15.3 Construction of shelf installations

For the construction of shelf installations, the following points should be observed:

1. Selection of a suitable base vehicle (gross vehicle weight rating, running gear, equipment).
2. Driver's compartment and luggage compartment should be separated by means of a retaining device (partition, load guard) according to DIN ISO 27956.
3. The gross vehicle weight ratings and gross axle weight ratings of the base vehicle must be complied with.
4. The installation should take place in a way that ensures that the forces induced are evenly distributed.
5. The suitability of the available fastening rings should be checked before they are used to secure items.
6. Assembly, maintenance and owner's manuals specifying the load limits should accompany the modified vehicle.
7. The maximum load of drawers and shelves (taking dynamic forces into account) must be marked or indicated in the Owner's Manual. The Owner's Manual must be provided with the vehicle.
8. The vehicle structure must not be weakened by the installations in the event of an accident.
9. The regulations and standards for load securing must be observed:
   + DIN ISO 27956 (securing of cargo in delivery vans),
   + VDI 2700 ff
   + StVO or country-specific laws and regulations.
10. The installation should be performed so as to be safe in the event of a crash (e.g. UNECE-R 44-3 City Crash):
    + all items in the vehicle should be secured, installed or stowed in such a way that they do not become projectiles in the event of acceleration/deceleration in a forwards, backwards, left, right or vertical direction.
    + All tested compartments, rails, installations not intended for storage or storage equipment must be marked with the highest permitted weights.
11. Exposed edges that may come into contact with the hands, legs, head etc. of a vehicle occupant during normal operation must not have a radius of less than 2.5 mm.
12. Following all work to the body, drilling chips should be removed and corrosion protection measures should be performed.
13. The requirements of the Converter guidelines for electrical wiring and fuses must be observed:
    + Chapter 6.4.5 “Electrical cables/fuses”
    + Chapter 6.4.9 “Retrofitting electrical devices”
    + Chapter 6.4 “Interfaces”
14. During installation and conversion no electric wires or other components of the base vehicle (e.g. fuel tank, brake lines) must be damaged.
15. Conversion should only be performed by trained specialist personnel.

Please observe the following chapters:

- Chapter 3.1“Selection of base vehicle”
- Chapter 4.1.3 “Vehicle dimensions”
- Chapter 4.2.3 “Industry-specific offer structure”
- Chapter 6.4“Interfaces”
- Chapter 6.5 “Lighting”
- Chapter 6.8 “Driver assist systems”
- Chapter 6.9 “Preparing the tail lift”
- Chapter 7.4.3.2 “Installation of seats from after market suppliers”
- Chapter 7.6.5 “Shelf installation/installations in vehicle interior”
- Chapter 8.4.2 “Partitions”
- Chapter 8.4.3 “Universal floor”
- Chapter 10.3 “Weights (masses)”

8.16 Vehicles for persons with a mobility impairment (KMP)

Practical note

If the driver does not leave the vehicle through the driver or front passenger door, error messages may be generated after several driving cycles due to the safety concept. For this reason, Volkswagen recommends briefly opening and closing the driver door after unbuckling the seat belt when leaving the vehicle to avoid event memory entries.

Before using the vehicle, please familiarise yourself with all functions and special features of the vehicle by carefully reading the Owner's Manual. If you have any questions, please contact your Volkswagen authorised workshop.

Please observe the following chapters:

- Chapter 3.1“Selecting the base vehicle”
- Chapter 4.1.3 “Vehicle dimensions”
- Chapter 4.2.3 “Industry-specific offer structure (vehicle packages)”
- Chapter 4.6 “Limit values for interior”
- Chapter 6.3 “Battery”
- Chapter 6.3.2“Subsequent installation of a second battery”
- Chapter 6.4 “Interfaces”
- Chapter 6.4.5 “Electrical cables/fuses”
- Chapter 6.4.9 “Retrofitting electrical devices”
- Chapter 6.4.10 “Retrofitting alternators”
- Chapter 6.5 “Lighting”
- Chapter.6.8 “Driver assist systems”
- Chapter 6.9 “Preparing the tail lift”
- Chapter 7.2.1 “General information on body-in-white/ bodywork”
- Chapter 7.3.1 “Fuel system”
- Chapter 7.3.2 “Exhaust system”
- Chapter 10.3 “Weights (masses)”

8.17 Ambulance/rescue vehicles

Please observe the following chapters:

- Chapter 3.1“Selecting the base vehicle”
- Chapter 4.2.3 “Industry-specific offer structure (vehicle packages)”
- Chapter 4.6 “Limit values for interior”
- Chapter 6.3 “Battery”
- Chapter 6.3.2“Subsequent installation of a second battery”
- Chapter 6.4 “Interfaces”
- Chapter 6.4.5 “Electrical cables/fuses”
- Chapter 6.4.9 “Retrofitting electrical devices”
- Chapter 6.4.10 “Retrofitting alternators”
- Chapter 6.5 “Lighting”
- Chapter 7.2.1 “General information on body-in-white/ bodywork”
- Chapter 7.3.1 “Fuel system”
- Chapter 7.4.5 “Air conditioning”
- Chapter 7.5 “Ancillaries”
- Chapter 8.4.2 “Partitions”
- Chapter 10.3 “Weights (masses)”

8.18 Fire brigade and emergency vehicles

Please observe the following chapters:

- Chapter 3.1“Selecting the base vehicle”
- Chapter 4.2.3 “Industry-specific offer structure (vehicle packages)”
- Chapter 4.6 “Limit values for interior”
- Chapter 6.3 “Battery”
- Chapter 6.3.2“Subsequent installation of a second battery”
- Chapter 6.4 “Interfaces”
- Chapter 6.4.5 “Electrical cables/fuses”
- Chapter 6.4.9 “Retrofitting electrical devices”
- Chapter 6.4.10 “Retrofitting alternators”
- Chapter 6.5 “Lighting”
- Chapter 7.2.1 “General information on body-in-white/ bodywork”
- Chapter 7.3.1 “Fuel system”
- Chapter 7.4.5 “Air conditioning”
- Chapter 7.5 “Ancillaries”
- Chapter 8.4.2 “Partitions”
    - Chapter 10.3 “Weights (masses)”

8.19 Buses

Converting a panel van into a bus may require substantial modifications to the load-bearing structure of the vehicle (swing doors, overhang extension, low-floor conversion). In such cases, it is imperative that the planned conversions are agreed with us. Please contact us so that we can advise you in advance (see chapter 2.1 “Product and vehicle information for body builders”).

8.19.1 Roll bar

The scale required for buses with more than 16 occupants to fulfil the various requirements according to UNECE-R 66.02 (occupant protection in the event the vehicle turns over) is offered from the factory as an option. During planning, please ensure you also order the roll bar (PR no. 2Y1) and the preparation for the escape hatch (PR no. 3JN) as well (see chapter 8.19.2 “Preparation for the escape hatch”).

The roll bar is available for the following vehicles:

- Only closed bodies, glazed or windowless, with higher floor
- For vehicles ≥ 5 t gross weight rating
- Rear/longitudinal* (twin tyres) or rear/longitudinal* (Super Single tyres)
- Sliding door on left or right, or without sliding door
- Long wheelbase (L4H3) or extra-long wheelbase plus long overhang (L5*H3)
- Right-hand drive or left-hand drive
- Base vehicle: N2 with subsequent registration as M2 by Converter

* L5 = long wheelbase plus long overhang

** Front-wheel drive, longitudinal engine position

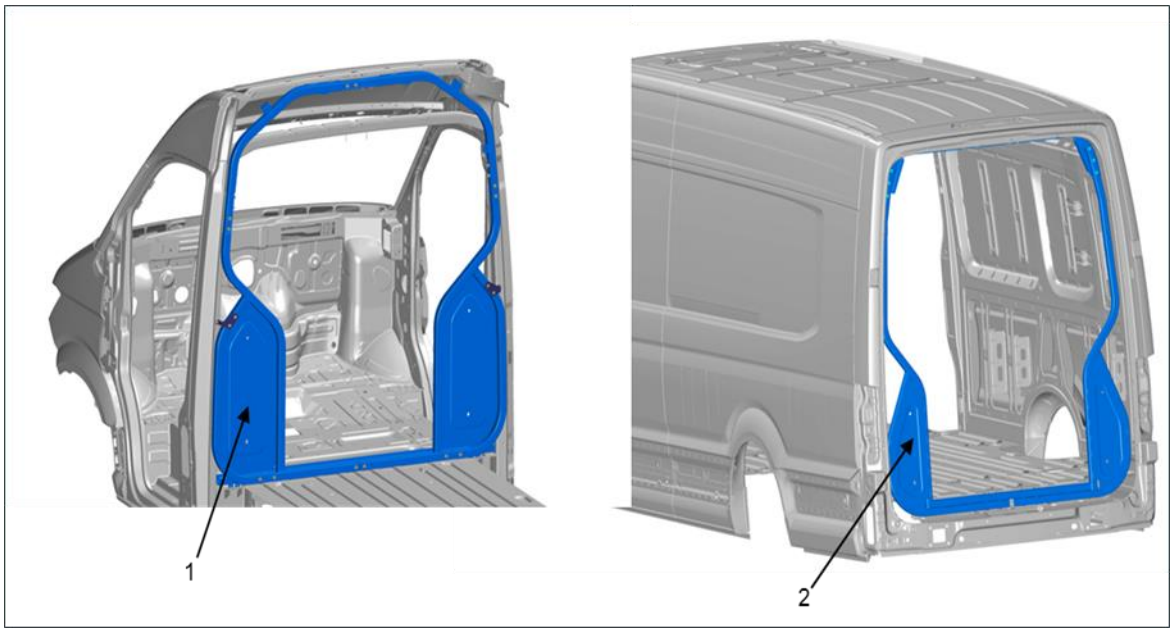


Fig. 1: Roll bar (PR no. 2Y1)

1 – Roll bar in B pillar

2 – Roll bar in D pillar

8.19.2 Preparation for the escape hatch

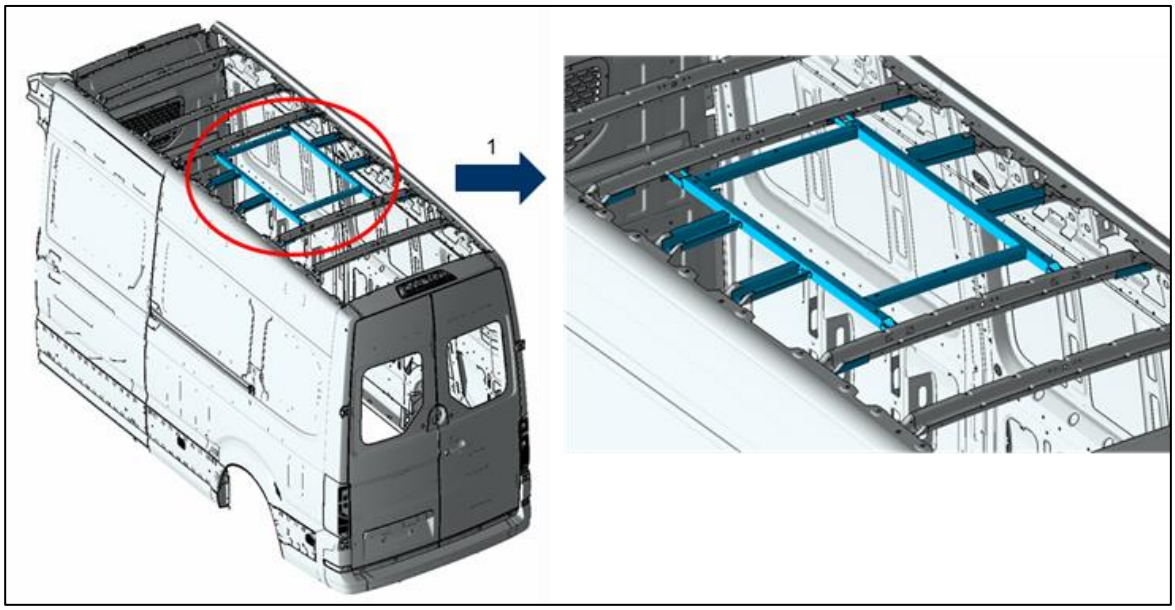


Fig. 1: Preparation for escape hatch (PR no. 3JN) 1 – Enlarged view

The preparation for the escape hatch is available from the factory for panel vans with high roof, long wheelbase (L4H3) and extra-long wheelbase (L5H3)
. The preparation for the escape hatch is designed according to UNECE-R 107.06.

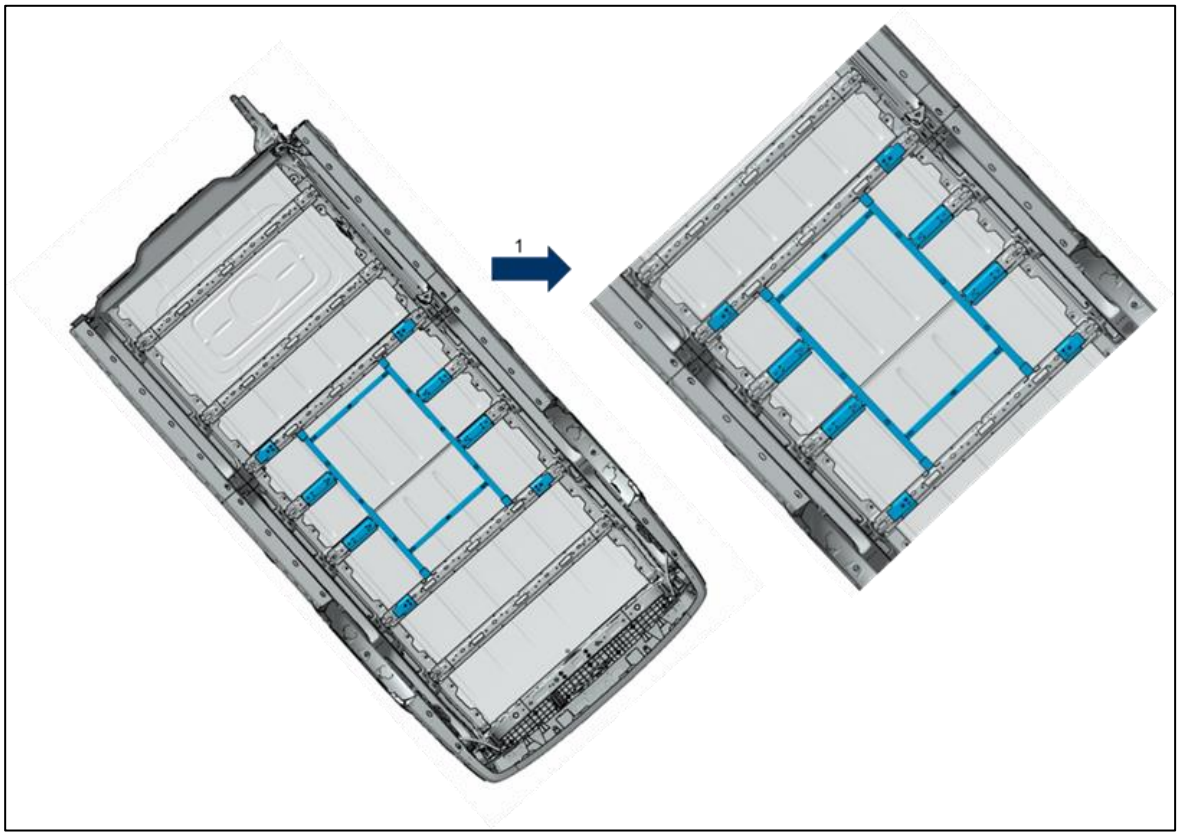


Fig. 3: Preparation for escape hatch (PR no. 3JN), view from below. 1 – Enlarged view. Refer to the dimensional drawings for the dimensions

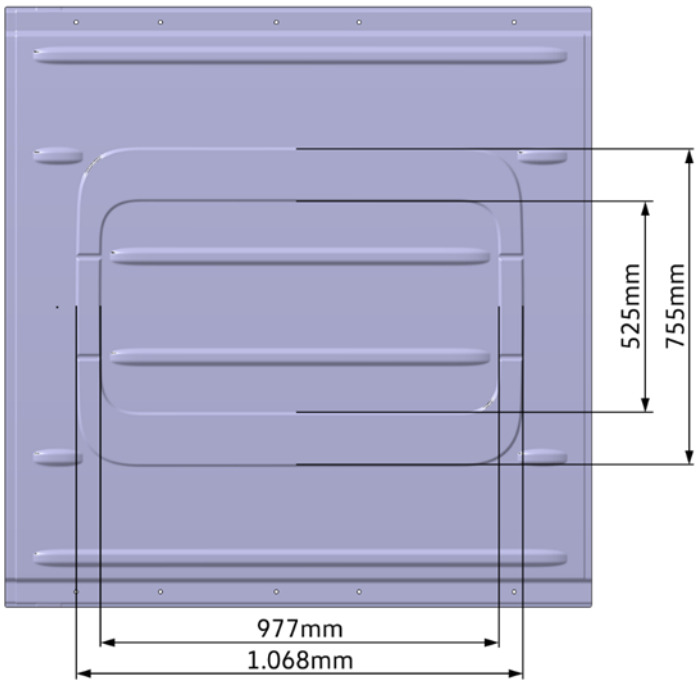


Fig. 4: Dimensions of embossed areas on the high roof

(* Embossing in a suitable position is available in the long wheelbase with overhang variant (L5))

The embossing is for hatches with the dimensions 500x600 or 600x700.

Please observe the following chapters:

- Chapter 3.1“Selection of base vehicle”
- Chapter 4.2.3 “Industry-specific offer structure (vehicle packages)”
- Chapter 4.6 “Limit values for interior”
- Chapter 6.3 “Battery”
- Chapter 6.3.2 “Installation of a second battery”
- Chapter 6.4 “Interfaces”
- Chapter 6.4.5 “Electrical cables/fuses”
- Chapter 6.4.9 “Retrofitting electrical devices”
- Chapter 6.4.10 “Retrofitting alternators”
- Chapter 6.5 “Lighting”
- Chapter 7.2.1 “General information on body-in-white/ bodywork”
- Chapter 7.3.1 “Fuel system”
- Chapter 7.4.5 “Air conditioning”
- Chapter 7.5 “Ancillaries”
- Chapter 10.3 “Weights (masses)”

8.20 Dangerous goods transport in accordance with ADR

Certain vehicles used to transport dangerous goods in accordance with ADR require a separate ADR registration certificate.
Volkswagen Crafters are usually used in the dangerous goods transport sector as an EX/II vehicle (vehicle for the transport of explosive substances or objects).

Volkswagen Crafters do not comply with all requirements in the ADR 2021 for EX/II vehicles by default.
An additional construction stage by a Converter will be necessary in any case.

To provide the Converter with support with obtaining an ADR registration certificate, Volkswagen Commercial Vehicles offers a manufacturer’s declaration for base vehicles that are to be fitted out as EX/II vehicles. This declaration specifies the construction regulations from the ADR 2021 which the base vehicle either already satisfied ex-works, or which must be completed by a Converter in a second construction stage.

A manufacturer's declaration for chassis and platforms, and a declaration for panel vans, are available.
Please direct your request to the following email address:
nutzfahrzeuge@volkswagen.de

For conversion into an EX/III, FL or AT dangerous goods vehicle, please contact us (see chapter 2.1.“Product and vehicle information for body builders”).

8.21 Preparation for the Panel Van Plus/Crew Cab conversion (PR no. 3UI/4C5)

3UI/4C5 Preparation for panel van+ 3-seater bench/4-seater bench

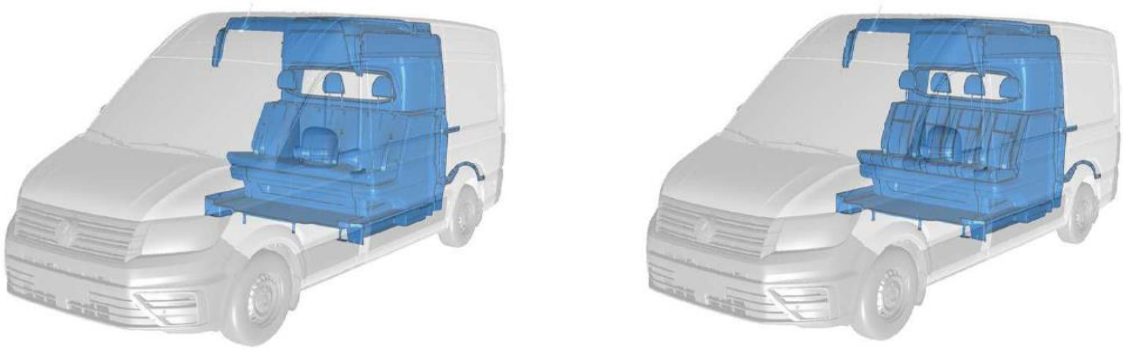


Fig. 1: Schematic diagram of a panel van+ 3-seater bench/4-seater bench conversion in the 2nd seat row.

Fig. 2: Schematic diagram of a panel van+ 3-seater bench/4-seater bench conversion in the 2nd seat row. Rear view.

The preparation PR no. 3UI/4C5 for the Panel Van Plus/Crew Cab conversion is available ex-works:

- Normal roof
- High roof

The equipment creates an option for an easier retrofitting of a 3-seater bench/4-seater bench, which allows three or four additional passengers to be carried in the second seat row.

Practical note

Please note the combinations between selected wheelbases and roof designs.

Normal roof available:

- With a medium-length wheelbase (L3)

High roof available:

- With long wheelbase (L4)
- With long wheelbase with long overhang (L5)

The wiring harness for preparing the seat-occupied recognition system with the coupling point is located in the interior on the left, is secured with adhesive pads (see Fig. 3) and ends with connector 4F0 972 575 G. The mating connector 8K0 972 483 G must be used for the connection with an adapter cable.

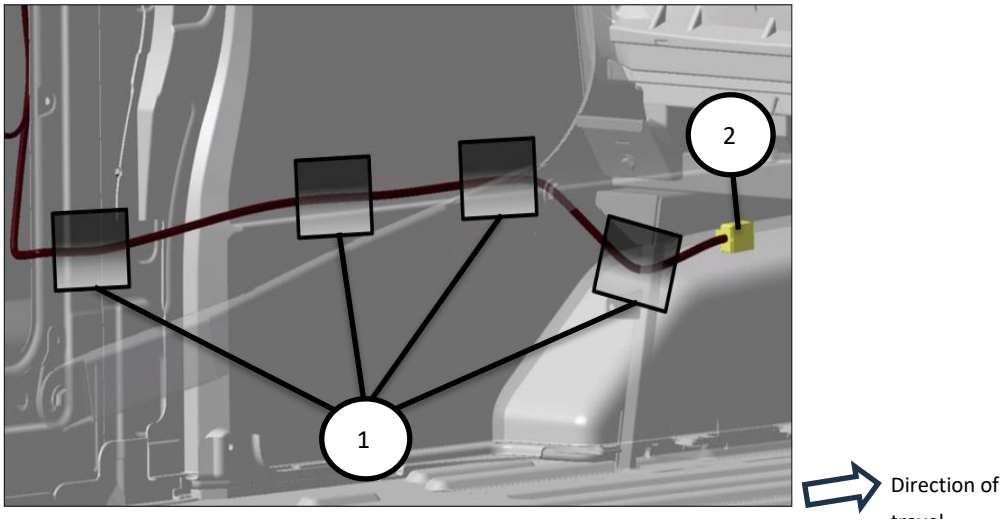


Fig. 3: Detailed view of the wiring harness for seat-occupied recognition in the interior on the left-hand side, secured with adhesive pads

1 – Adhesive pad

2 – Connector of the coupling point (4F0 972 575 G)

Fig. 4: Mating connector 8K0 972 483 G with set of single-wire cables, part number 000 979 026 E

Practical note

Please note that the partition wall (PR no.: 3CA) is omitted for this equipment. Fixed front left/right side windows (PR no.: 4DE/4EE) must be additionally selected.

9 Calculations

9.1 Determining the centre of gravity

The overall centre of gravity height (vehicle with add-ons or complete body without load) should be kept as low as possible.
The centre of gravity in the vehicle longitudinal direction is given in relation to a vehicle axle.
The centre of gravity height is related to the centre of the wheel hub or related to the road.
Volkswagen recommends having the centre of gravity determined by a recognised test institution with experience in this field (e.g. DEKRA, TV or others). You can obtain support from the responsible department (see 2.1 “Product and vehicle information for body builders”).
For the Converter to determine the centre of gravity, we recommend complying with the procedure described under chapter 9.1.1 “Determining the centre of gravity in x-direction” and chapter 9.1.2 “Determining the centre of gravity in z-direction” and using personnel with the corresponding qualifications to obtain realistic, usable results.

9.1.1 Determining the centre of gravity in x-direction

Centre of gravity coordinates in x-direction (axle load distribution FA/RA)

Procedure:

- The vehicle must be weighed without load and with the add-ons or complete body
- Inflate the tyres up to the tyre pressure that is specified for the respective gross axle weight rating
- Completely fill all fluid containers (fuel tank, washer fluid reservoir, if applicable, hydraulic tank, water tank etc.)
- Drive the vehicle onto the scales, switch off the engine, shift the gearbox to neutral and release the brakes
- The vehicle must be standing horizontal and level for weighing
- First weigh the individual axle loads (front and rear axle load) and then the gross weight of the vehicle
- The measured values can be used to calculate the position of the centre of gravity in the vehicle longitudinal direction with the equations (3) and (4)
- Equation (2) should be used to check the results of (3) and (4)

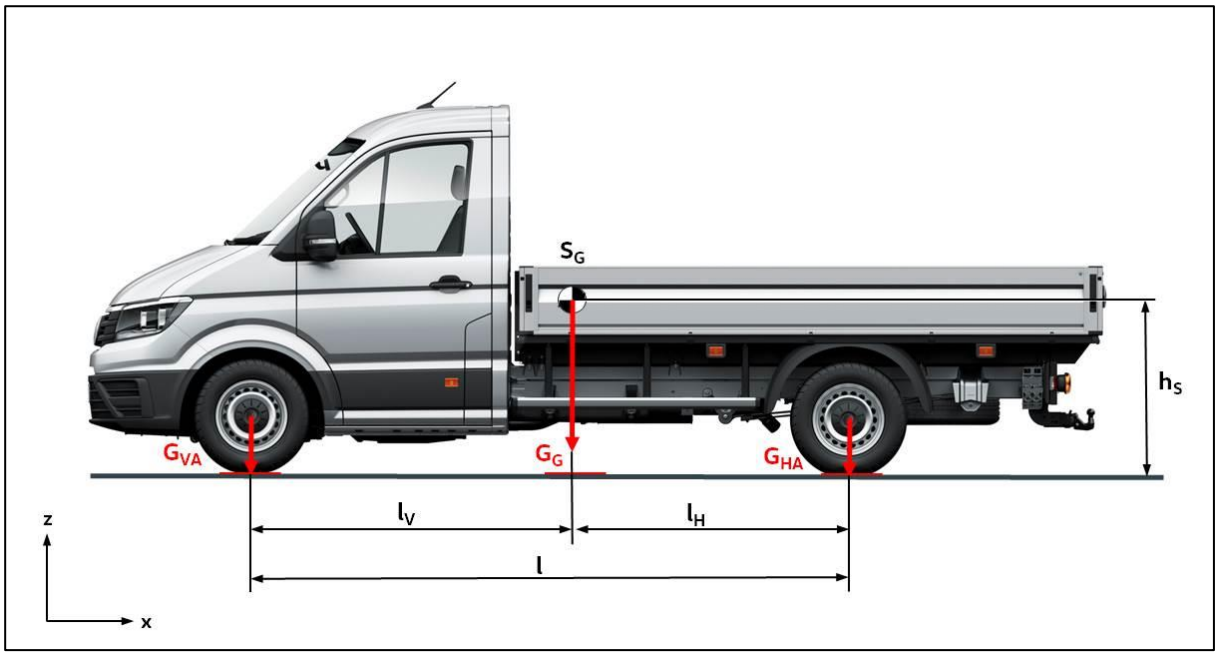


Fig. 1: Figure: Axle load calculation

Determining the total weight of the unladen vehicle with add-ons and body.

$$G_G = G_{HA} + G_{VA} \quad (1)$$

Calculating the position of the overall centre of gravity S_G in x-direction:

$$l = l_V + l_H \quad (2)$$

$$l_V = \frac{G_{HA} \times l}{G_G} \quad (3)$$

$$l_H = \frac{G_{VA} \times l}{G_G} \quad (4)$$

Abbreviations and parameters used:

G_G	-	Total weight of unladen vehicle
G_{VA}	-	Front axle load of unladen vehicle (specification or weighing of respective chassis)
G_{HA}	-	Rear axle load of unladen vehicle (specification or weighing of respective chassis)
l	-	Wheelbase
l_V	-	Distance from the overall centre of gravity of the empty vehicle to the front axle
l_H	-	Distance from the overall centre of gravity of the empty vehicle to the rear axle
S_G	-	Overall centre of gravity

Practical note

The practical determination of the centre of gravity height may only be performed by appropriately qualified personnel with the help of suitable and calibrated scales.

To reduce measuring errors, each measured value should be calculated at least three times and an average value calculated from the three results. This value is then used for calculating in accordance with the equations (3) and (4).

Information

The wheelbase “l” is defined by the vehicle prototype (see order) or shall be defined by measuring the length in accordance with DIN 70020, part 1.

9.1.2 Determining the centre of gravity in z-direction

Centre of gravity coordinates in z-direction (centre of gravity height h_S for the whole vehicle)

So that the Converter can determine the total vehicle centre of gravity height h_S, Volkswagen AG recommends the following procedure after completion of the whole vehicle:

- After conversion, the vehicle should be weighed on board scales or on suitable wheel load scales in two subsequent driving positions
- Here, the measured axle loads shall be determined with the vehicle in a level state (G_{FA} and G_{RA} (see chapter 9.1.1 "Determining the centre of gravity in x-direction") and the axle loads on an axle (Q_{RA} or Q_{FA}) increased by the quantity h'.
  The raising height h' should be as high as possible in accordance with the front and rear ramp angles of the vehicle (also known as approach/departure angle). The target value is h' > 600 mm.
- To reduce measuring errors, at least six individual measurements shall be made in the axle load calculation for each vehicle axle:
  + three per axle with vehicle level and
  + three each with a raised axle
  + The average value for each axle should be calculated from the three measurements for a state.
- The average value should be calculated from these three values and used in the calculations with the equations (5) to (9). To improve the accuracy of the final result, the axle load modification should be determined with raised rear axle and raised front axle.

Practical note

Observe the following to avoid incorrect measurements:

- The vehicle must be standing perfectly horizontal for weighing in level vehicle state. Height differences between the axles caused by scales should be compensated accordingly.
- When raising to the required lifting height, the axle being weighed should be locked to prevent suspension compression or extension.
- When raising to the required lifting height, no part of the vehicle may touch the ground.
- All vehicle wheels must be able to rotate freely: select neutral, release all brakes including handbrake and place chocks at sufficient distance from the wheels, if necessary.
- Move vehicle with own power (to weigh the respective other vehicle axle) to relieve any tension in the vehicle.
- Ensure that no objects inside the vehicle can move during the measurements.

If the vehicle suspension cannot be locked due to the body design or available space, further axle load measurements must be carried out at different levels (for example, 600 mm, 700 mm and 800 mm). This also allows errors to be limited by averaging. The centre of gravity height results from the arithmetic average of the individual centre of gravity heights for each raising height.

Example of procedure:

1. The vehicle must be weighed without load and with the add-ons or complete body.
2. Inflate the tyres up to the tyre pressure that is specified for the respective gross axle weight rating.
3. Completely fill all fluid containers (fuel tank, washer fluid reservoir, if applicable, hydraulic tank, water tank etc.).
4. On the scales, switch off the engine, set gearbox to neutral and release the brakes.
5. Position the vehicle with the rear axle (RA) horizontal and level on the scales and measure the axle load.
6. Raise the front axle by the value h', at least 600 mm. A greater height h' taking the other vehicle-related conditions into consideration is more favourable for the final result. The value h' must be measured for all individual measurements with raised axle and should be as identical as possible. Alternatively to the raised height h', the angle α between the wheel hubs can be defined.
7. Determine the axle load displacement Q_{RA} that occurs at the rear axle on the scales.
8. Lower and turn the vehicle around and perform the corresponding measurements on the front axle (first G_{FA} with rear axle level and then Q_{FA} with the rear axle raised by h').
9. Perform steps 4 to 7 a total of three times (with locked suspension).
10. The measured values can be used to calculate the height of the centre of gravity with the equations (5) to (9).
11. In the calculations using the equations (3) to (9), all length measurements are in millimetres (mm) and all weight figures in decanewton (1 daN = 10 N). *
12. Raise the raised axle further (by e.g. 100 mm) and measure the height of the centre of gravity again to confirm the measuring result.

Practical note

The practical determination of the centre of gravity height may only be performed by appropriately qualified personnel with the help of suitable and calibrated measuring systems and measuring tools.

* G = 1 daN = 10 N is the weight force that corresponds to the mass m = 1 kg.

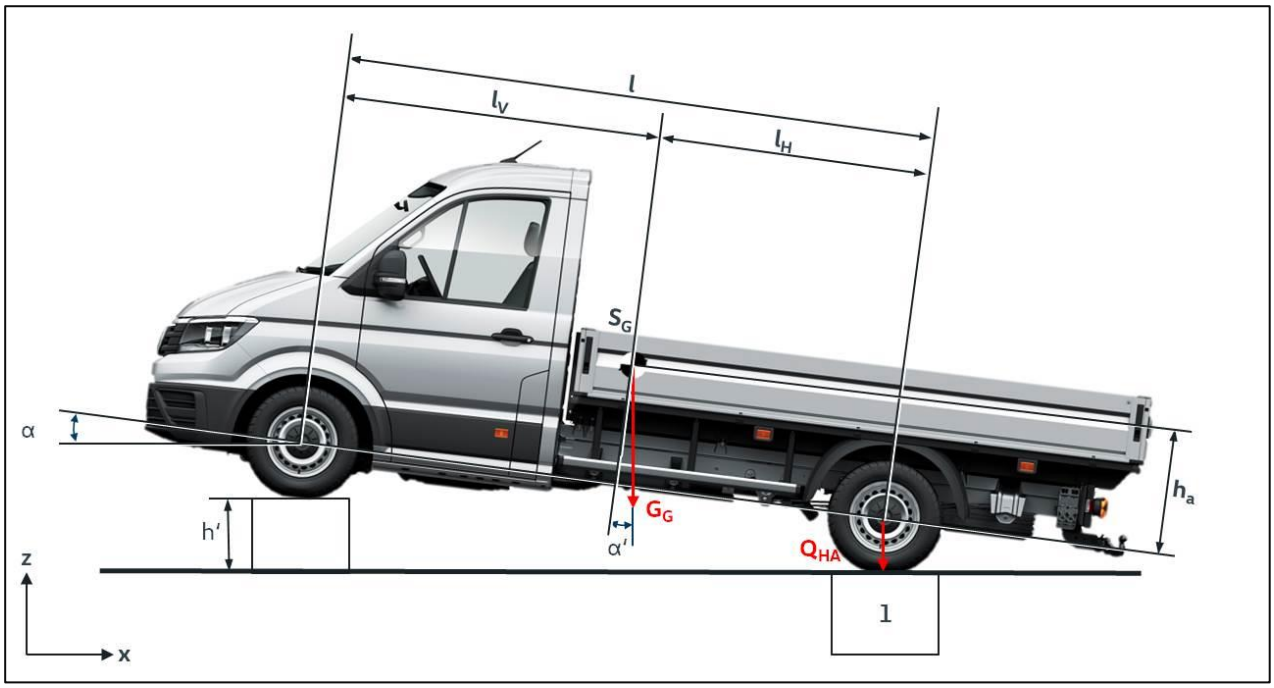


Fig. 1: Determining the height of the centre of gravity

Determining the overall centre of gravity S_G in z-direction:

$$h_S = h_a + r_{stat} \quad (5)$$

Determining the overall centre of gravity S_G in z-direction for the raised front axle:

$$h_S = \left(\frac{Q_{HA} - G_{HA}}{G_G} \times l \times \frac{1}{\tan \alpha}\right) + r_{stat} \quad (6)$$

$$\sin \alpha = \frac{h'}{l} \quad (6a)$$

$$\alpha = \arcsin\left(\frac{h'}{l}\right) \quad (6b)$$

$$h_S = \left(\frac{1}{h'} \times \frac{Q_{HA} - G_{HA}}{G_G} \times l \times \sqrt{l^2 - h'^2}\right) + r_{stat} \quad (7)$$

Determining the overall centre of gravity S_G in z-direction for the raised rear axle:

$$h_S = \left(\frac{Q_{VA} - G_{VA}}{G_G} \times l \times \frac{1}{\tan \alpha}\right) + r_{stat} \quad (8)$$

$$\sin \alpha = \frac{h'}{l} \quad (8a)$$

$$\alpha = \arcsin\left(\frac{h'}{l}\right) \quad (8b)$$

$$h_S = \left(\frac{1}{h'} \times \frac{Q_{VA} - G_{VA}}{G_G} \times l \times \sqrt{l^2 - h'^2}\right) + r_{stat} \quad (9)$$

Abbreviations and parameters used:

r_{stat}	-	Static tyre radius
Q_{VA}	-	Front axle load when vehicle raised at rear
Q_{HA}	-	Rear axle load when vehicle raised at front
G_G	-	Total weight of unladen vehicle
G_{VA}	-	Front axle load of unladen vehicle (specification or weighing of respective chassis)
G_{HA}	-	Rear axle load of unladen vehicle (specification or weighing of respective chassis)
l	-	Wheelbase
l_V	-	Distance from the overall centre of gravity of the empty vehicle to the front axle
l_H	-	Distance from the overall centre of gravity of the empty vehicle to the rear axle
h_S	-	Centre of gravity height over road
h_a	-	Centre of gravity height over centre of wheel
h'	-	Height by which the vehicle has been raised
1	-	Weighing equipment

Information

The wheelbase “l” is defined by the vehicle prototype (see order) or shall be defined by measuring the length in accordance with DIN 70020, part 1.

Practical note

The measured centre of gravity shall not exceed the limit values named in chapter 4.1.2 “Maximum permitted centre of gravity”.

10 Technical data

10.1 Bulb ratings for exterior lights

1. Left/right halogen headlights

Function	Type	Wattage [W]	Comment
Main beam	H15	55	
Dipped beam	H7	55	
Side lights	W	5	
Turn signal	PWY	24	

2. Left/right LED headlights

Function	Type	Wattage [W]	Comment
Left main beam	LED		
Left dipped beam/main beam	LED		
Left daytime running light/side light	LED		
Left turn signal	H	21	

3. Left/right fog light

Function	Type	Wattage [W]	Comment
Fog lights	H11	55	Front fog light in bumper, with turning light

4. Left/right tail light clusters

Function	Type	Wattage [W]	Comment
Tail light	P	21	Tail light clusters of tail light, brake light, turn signal and reversing light are designed as a single part and form a complete unit.
Brake light	P	21	
Reversing light	P	21	
Turn signal	P	21	
Rear fog light	LED		

5. Other lights

Function	Type	Wattage [W]	Comment
High-level brake light	LED	6.5	Fitted on the roof carrier above the wing doors. Consists of 30 LEDs
Front end-outline marker lamp	LED	2 x 1	
Rear end-outline marker lamp	R	5	5 W each on left and right
Number plate light	C5W	2 x 5	2 parallel lights for panel vans
Left, right side marker light	LED	3 x 0.5	LED
Left, right side turn signal	LED	3	On side, cat. 6 LED

10.2 Hole patterns for towing bracket

If a towing bracket is fitted, reinforcements are not required on the bolt-on point of the towing bracket carrier.

10.2.1 Fitting dimensions

10.2.1.1. Configuration 1 (closed bodies)

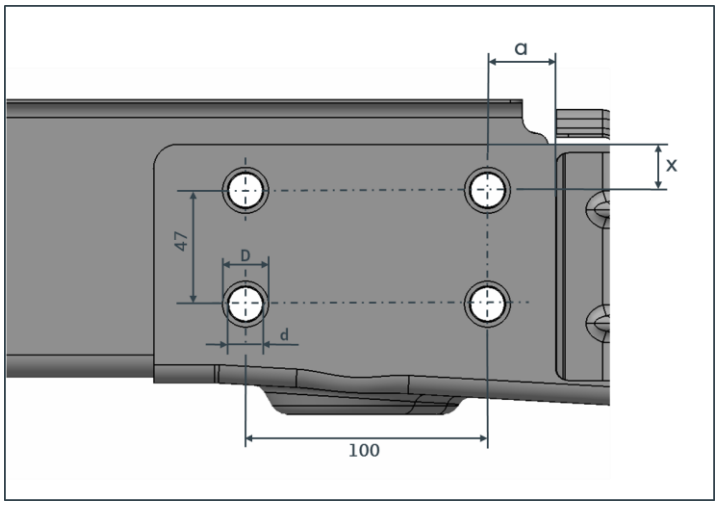


Fig. 1: Panel van/window van, 3.0 – 4.0 t (low floor)

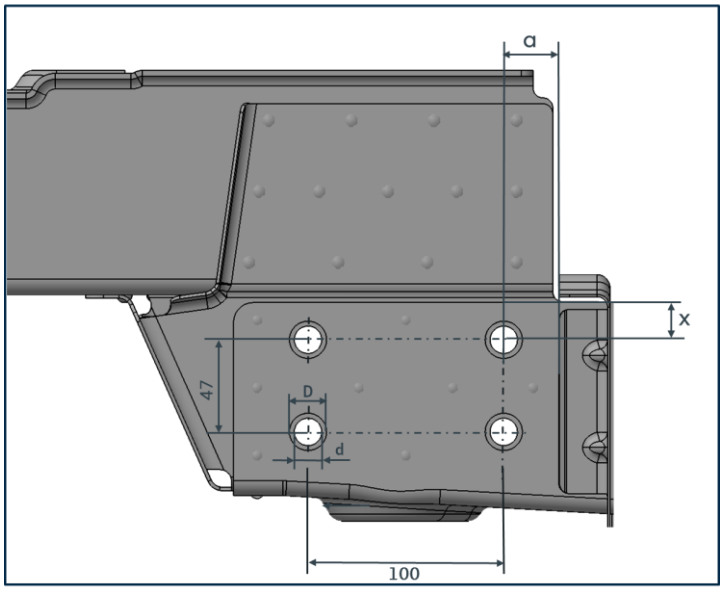


Fig. 2: Panel van/window van, 3.0 – 5.50 t (high floor)

Vehicle type	Wheelbase	Dimension a	Dimension x	Diameter D	Diameter sleeve d	Overhang dimension
Panel/window 3.0 t to 5.5 t	3640 millimeters	28millimeters	19millimeters	15 millimeters	14 millimeters	1345 millimeters
	4490 millimeters	28millimeters	19millimeters	15 millimeters	14 millimeters	1345 millimeters
	4490 millimeters	28millimeters	19millimeters	15 millimeters	14 millimeters	1900 millimeters

10.2.1.2 Configuration 2 (open bodies)

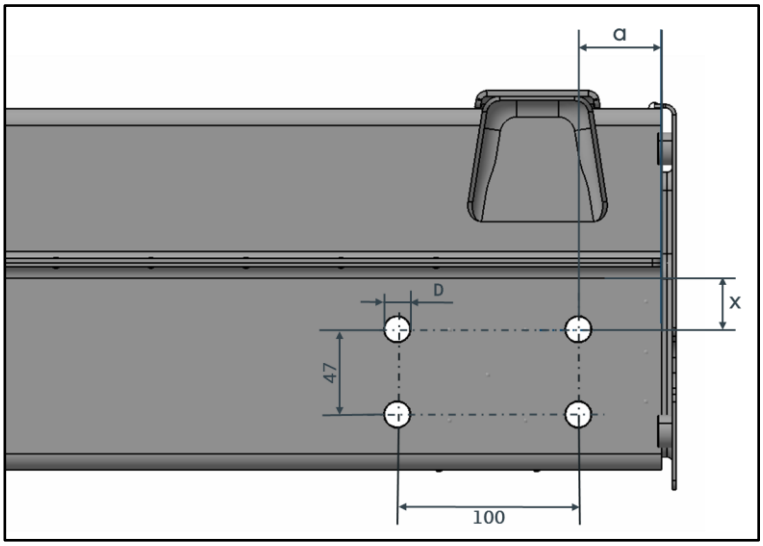


Fig. 1: Chassis/platform 3.0–5.5 t

Vehicle type	Wheelbase	Dimension a	Dimension x	Diameter D	Diameter sleeve d	Overhang dimension
Chassis/Platform with double cab 3.0 t to 5.5 t	3640 millimeters	46 millimeters	28 millimeters	15 millimeters	14 millimeters	1564 millimeters
	4490 millimeters	46 millimeters	28 millimeters	15 millimeters	14 millimeters	1514 millimeters
	4490 millimeters	46 millimeters	28 millimeters	15 millimeters	14 millimeters	1914 millimeters

10.2.2 Mounting position of towing bracket

We recommend the use of Volkswagen genuine parts for retrofitting a towing bracket, as these have been tested in-house for the specific application.

An original parts towing bracket (rigid or removable) must be assembled in accordance with the Crafter NF Workshop Manual. Of particular importance is that the original bolt-on points of the mounting plate are used for assembly, the original means of fixation are used, and that the screws are tightened with the specifically prescribed torque.

Information

The Workshop Manuals are available on the Internet via the Electronic Repair and Workshop Information (erWin*) operated by Volkswagen AG at:
http://erwin.volkswagen.de/erwin/showHome.do

*Information system from Volkswagen AG, subject to payment

The connection dimensions of the trailer towing bracket can be found in the figure below:

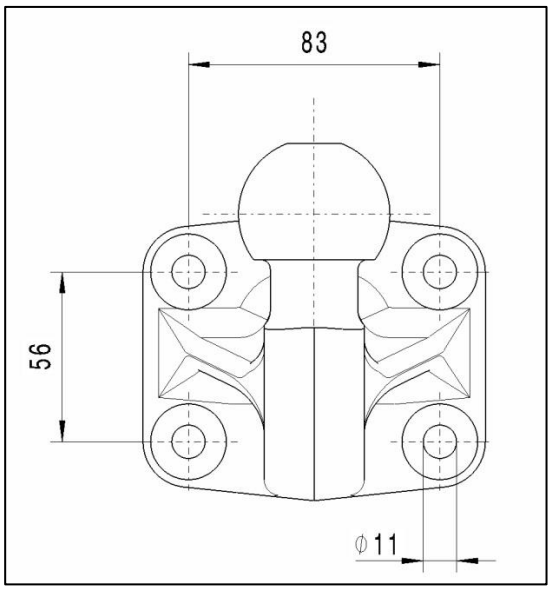


Fig. 1: Hole pattern

Information

Hole pattern applies to fixed and removable ball head.

In order to attach the tow hitch, the original hexagonal flange screws. size M10x45-10.9 (N.106.999), must be used.

For assembly of after market solutions the same clearance (x, z) of the ball coupling to the mounting plate (see fig. reference surface Rx and Rz) is maintained as that of the original towing bracket (rigid or removable coupling), or that it is between these two dimensions.
In addition, the fitting dimensions and clearances stipulated in UNECE R 55 must be maintained.
Any other applicable national regulations must be taken into account.

10.2.2.1 Closed body (panel van), single tyres

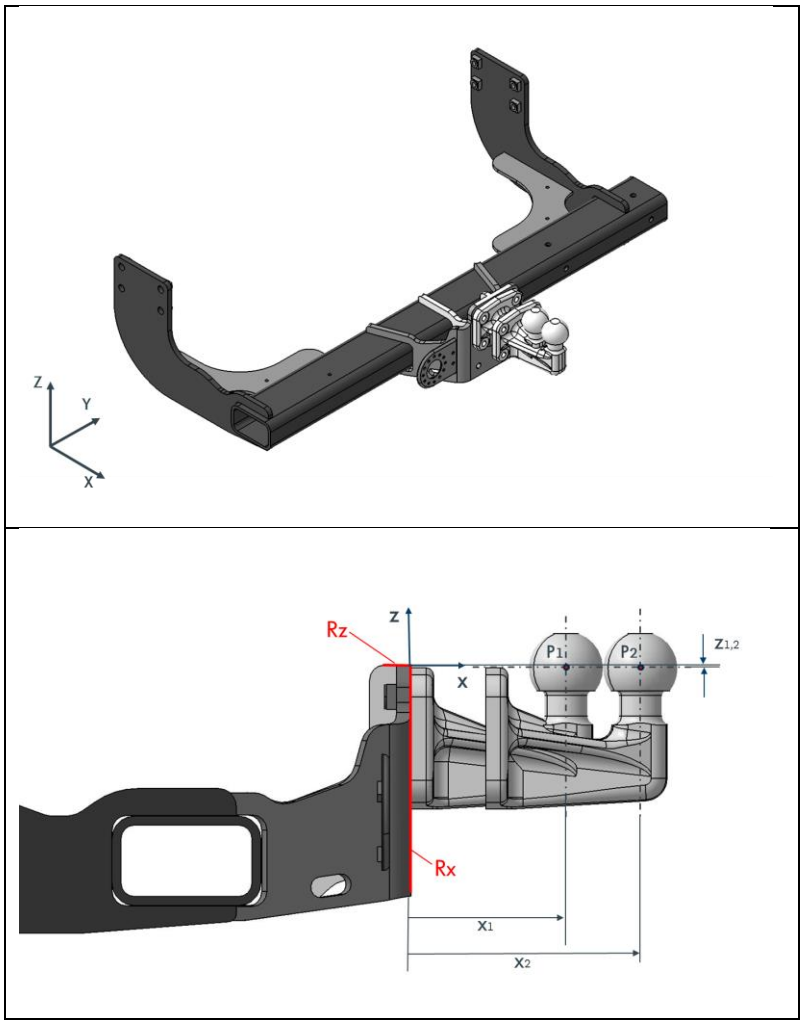


Fig. 1: Position ball coupling: rigid towing bracket (P1) and removable towing bracket (P2)

Rz – reference surface for clearance in z-direction

Rx – reference surface for clearance in x-direction

X1, X2 – clearance of reference surface Rx

Z1, Z2 – clearance of reference surface Rz

P1 – position of mid point of ball for rigid towing bracket

P2 – position of mid point of ball for removable towing bracket

Towing bracket	**Coordinates of ball coupling position to the reference surface Rz, Rx**		
	X [mm]	**Y [mm]**	**Z [mm]**
Ball coupling for vehicles with rigid towing bracket (P1)	104	0	-2.3
Ball head for vehicles with removable towing bracket (P2)	154	0	-2.3

10.2.2.2 Closed body (panel van), twin tyres

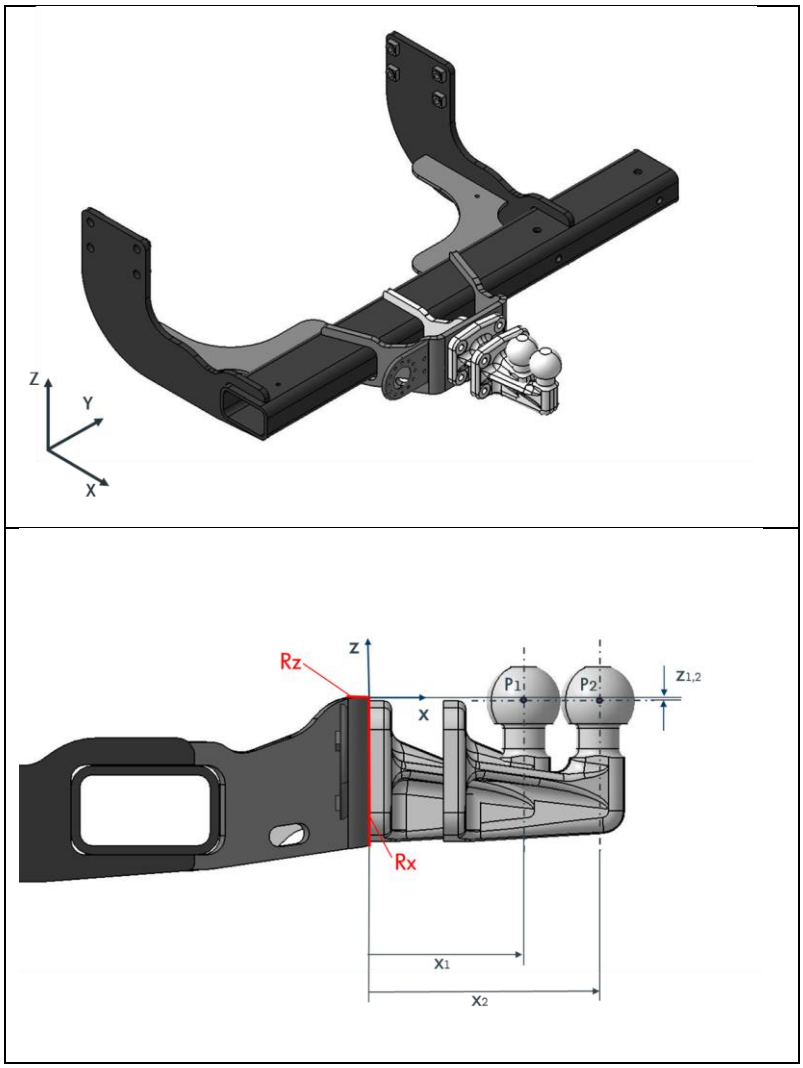


Fig. 1: Position ball coupling: rigid towing bracket (P1) and removable towing bracket (P2)

Rz – reference surface for clearance in z-direction

Rx – reference surface for clearance in x-direction

X1, X2 – clearance of reference surface Rx

Z1, Z2 – clearance of reference surface Rz

P1 – position of mid point of ball for rigid towing bracket

P2 – position of mid point of ball for removable towing bracket

Towing bracket	**Coordinates of ball coupling position to the reference surface Rz, Rx**		
	X [mm]	**Y [mm]**	**Z [mm]**
Ball coupling for vehicles with rigid towing bracket (P1)	104	0	-3.2
Ball coupling for vehicles with removable tow coupling (P2)	154	0	-3.2

10.2.2.3 Open body (platform, chassis), single tyres

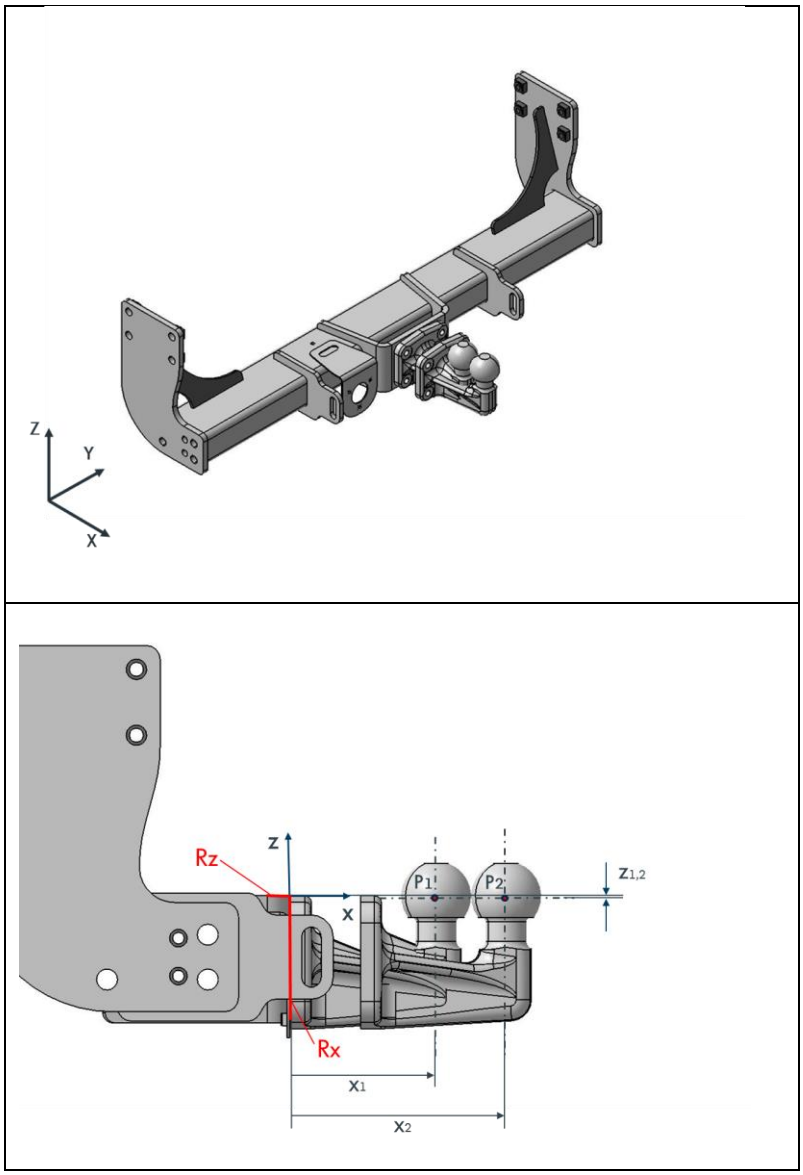


Fig. 1: Position ball coupling: rigid towing bracket (P1) and removable towing bracket (P2)

Rz – reference surface for clearance in z-direction

Rx – reference surface for clearance in x-direction

X1, X2 – clearance of reference surface Rx

Z1, Z2 – clearance of reference surface Rz

P1 – position of mid point of ball for rigid towing bracket

P2 – position of mid point of ball for removable towing bracket

Towing bracket	**Coordinates of ball coupling position to the reference surface Rz, Rx**		
	X [mm]	**Y [mm]**	**Z [mm]**
Ball coupling for vehicles with rigid towing bracket (P1)	104	0	-1
Ball coupling for vehicles with removable tow coupling (P2)	154	0	-1

10.2.2.4 Open body (platform, chassis), twin tyres

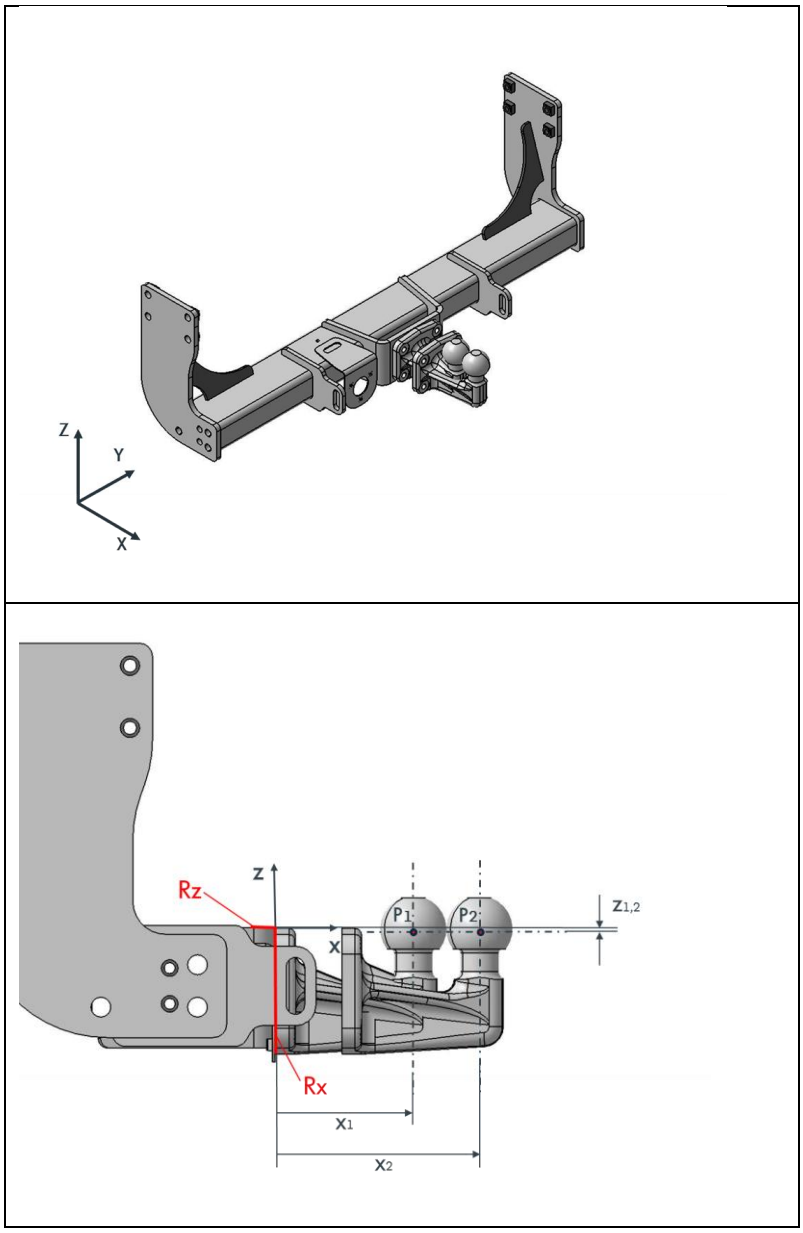


Fig. 1: Position ball coupling: rigid towing bracket (P1) and removable towing bracket (P2)

Rz-reference surface for clearance in z-direction

Rx-reference surface for clearance in x-direction

X1, X2- clearance of reference surface Rx

Z1, Z2 – clearance of reference surface Rz

P1-Position mid point of ball for rigid towing bracket

P2-Position mid point of ball for removable towing bracket

Towing bracket	**Coordinates of ball coupling position to the reference surface Rz, Rx**		
	X [mm]	**Y [mm]**	**Z [mm]**
Ball coupling for vehicles with rigid towing bracket (P1)	104	0	-1
Ball coupling for vehicles with removable tow coupling (P2)	154	0	-1

10.3 weights (vehicle earth)

Information on the axle load and maximum gross vehicle weight rating of the Crafter can be found in the sales documentation on the internet or in the vehicle configurator.
When ordering your vehicle, please note that the kerb weight increases when additional equipment is selected and the available payload capacity is therefore reduced.
We recommend determining the definitive kerb weight of the entire vehicle by weighing before the conversion.

To guarantee adequate steerability of the vehicle, please observe chapter 4.1.1 “Steerability”.

According to current Ordinance (EU) 1230/2012 for weights/dimensions, the following weight tolerances apply:

- 3% for vehicle classes M/N (excluding vehicles for special purposes)
- 5% for vehicles with special intended use

If you have any questions, please contact your customer service workshop or get in touch with us (see also chapter 2.1.1 “Contact”).

10.4 Vehicle dimensions (basic data)

10.4.1 Panel van

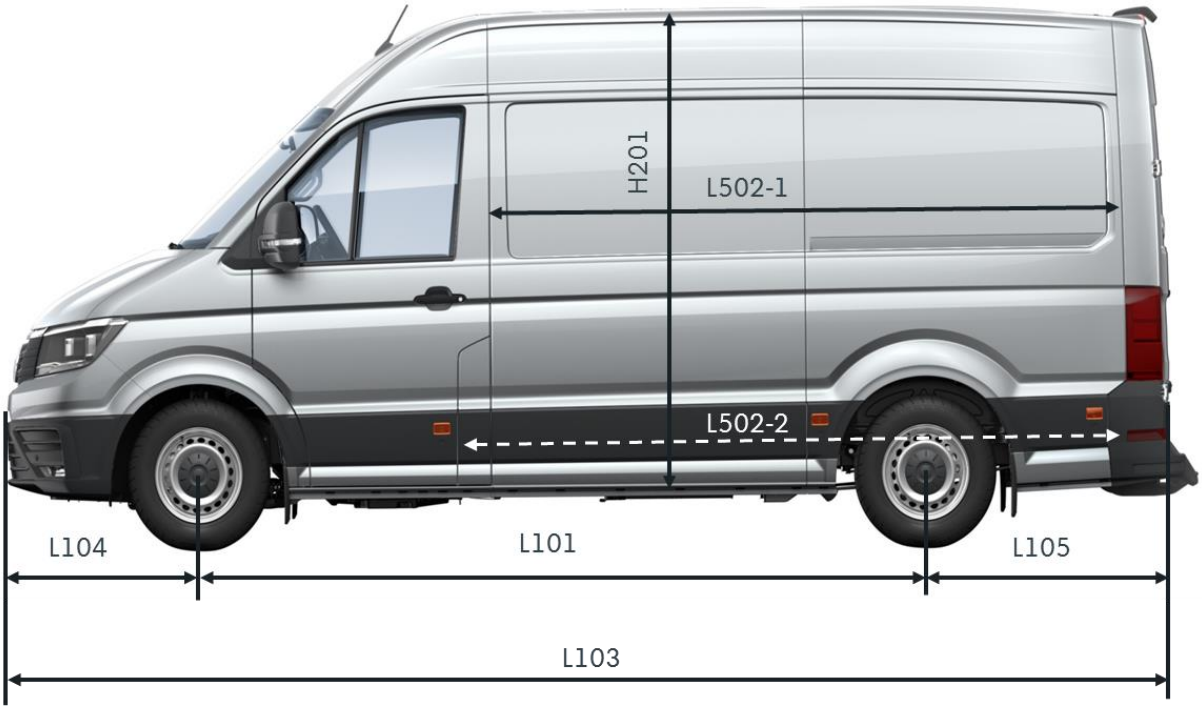


Fig. 1: Vehicle dimensions, panel van / side view

* All data can be found under the designations in the basic data table

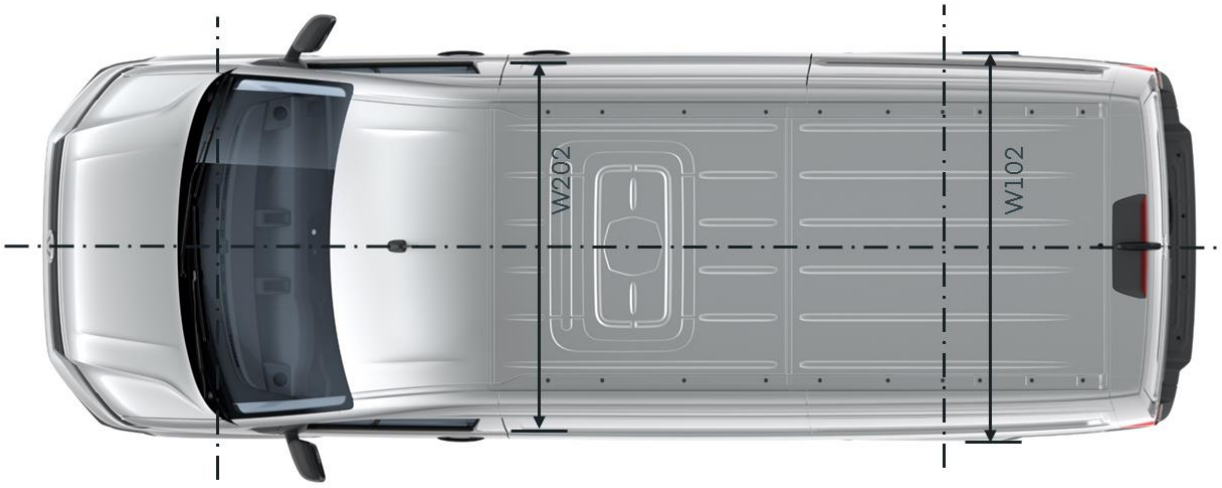


Fig. 2: Vehicle dimensions, panel van / overhead view

* All data can be found under the designations in the basic data table

Fig. 3: Vehicle dimensions, panel van / front and rear view

* All data can be found under the designations in the basic data table

Base data for panel van (ML1) (All engines)**			**Panel van Long wheelbase (L4) [mm]**	**Panel van Extra-long wheelbase (L5) [mm]**
Dimensions	L101	Wheelbase	4490	4490
	L103	Vehicle length	6836	7391
	L102****	Vehicle length with towing bracket	7004	7559
		Vehicle length with towing bracket (removable)	7054	7609
	L515	Centre of gravity position, load compartment, distance from front axle (FA), 3-seater	3607	3884
	W103	Vehicle width	2040	2040
		Vehicle width with twin tyres / SuperSingle tyres	2069	2069
	H100-B	Body vehicle height (front-wheel drive, rear-wheel drive/single tyres)		
		Standard roof (H2)	---	---
		High roof (H3)	2590/2565	2590
		Super-high roof	2798/2785	2798
	H100-B.Z	Vehicle height body (rear-wheel drive, twin tyres, with SuperSingle +5 mm)		
		Standard roof (H2)	---	---
		High roof (H3)	2625	2637
		Super-high roof	2830	2835
	H101M.1	Vehicle height with roof mounted turn signals	(H100-B) + 75mm	(H100-B) + 75mm
	H101M.2	Vehicle height with rotating roof light	(H100-B) + 110mm	(H100-B) + 110mm

Base data for panel van (ML1**) (All engines)			Panel van Long wheelbase (L4) [mm]	Panel van Extra-long wheelbase (L5) [mm]
	H101M.3	Vehicle height with roof ventilator	(H100-B) + 90mm	(H100-B) + 90mm
	H101M.4	Vehicle height with ladder fixing unit	(H100-B) + 490mm	(H100-B) + 490mm
	H101M.5	Vehicle height with roof cargo bay	(H100-B) + 260mm	(H100-B) + 260mm
	H101M.6	Vehicle height with reversing camera	(H100-B) + 11mm	(H100-B) + 11mm
	L104	Front overhang length	1000	1000
	L105	Rear overhang length	1346	1901
	L105.1	Maximum rear overhang length with towing bracket (ball head, ML1) [removable]	1514 1564	2069 2119
	W101-1	Track width at front with rim offset 60*		
		-> for front-wheel drive	1773	1773
		-> for rear-wheel drive	1773	1773
		-> for 4Motion	1773	1773
		-> with twin tyres / SuperSingle tyres	1773	1773
	W101-2	Track width at rear with rim offset 60*		
		-> for front-wheel drive	1788	1788
		-> for rear-wheel drive	1766	1766
		-> for 4Motion	1766	1766
		-> for twin tyres	1601	1601
		Track width at rear with rim offset 53*		
		>For SuperSingle tyres	1750	1750
	WX 1	Maximum rear axle width	2033/2029	2033
		Maximum rear axle width with twin tyres/SuperSingle tyres	2055	2055
	WX 2	Maximum front axle width	2018	2018
	H157	Ground clearance between axles acc. to 70/156/EEC		
		single tyres		
		Twin tyres	210/202	210
		SuperSingle tyres	214	214
			211	211
	A117	Breakover angle*		
		Front-wheel drive	10.5°/15.2°	10.5°
		Rear-wheel drive, single tyres and 4Motion	13.0°	13.0°
		Rear-wheel drive, twin tyres	13.0°	13.0°
Dimensions	A116-1	Front ramp angle* at full load, limited by bumper		
		Front-wheel drive/rear-wheel drive	19.3°	19.3°
		4Motion	20.9°	20.9°
		Rear-wheel drive, twin tyres/SuperSingle tyres	19°	19
		Front-wheel drive, SuperSingle tyres	18.9°	18.9°

Base data for panel van (ML1**) (All engines)			Panel van Long wheelbase (L4) [mm]	Panel van Extra-long wheelbase (L5) [mm]
	A116-2	Rear ramp angle* at full load, limited by bumper		
		Front-wheel drive	13.3°	9.2°
		Rear-wheel drive, single tyres and 4Motion	12.7°	8.8°
		Rear-wheel drive, twin tyres	14.5°	10.1°
	A116-2	Rear ramp angle* at full load, limited by towing eye		
		Front-wheel drive	12.6°	8.1°
		Rear-wheel drive, single tyres and 4Motion	11.9°	7.6°
		Rear-wheel drive, twin tyres	14.0°	9.1°
		Rear-wheel drive, SuperSingle tyres	15.2°	9.9°
Turning circle	D102	Minimum turning circle approx. (with maximum permissible front axle load ≤1,800 kg)	16.9 m	16.9 m/---
		Minimum turning circle approx. (with maximum permitted front axle load ≥ 1,800 kg)	16.9 m	16.9 m/---
Wheels/tyres		Basic tyres*** (see also chapter 3.6.1 "Overview of approved wheels/tyres")		
	L502-1	Length of loading surface (measured middle of vehicle)	4051	4606
	L502-2	Length of loading surface (measured on floor)	4240	4795
	W200	Panel van largest luggage compartment width	1832	1832
	W202	Smallest load compartment width (between the wheel housings)	1380/1375	1380
			1030	1030
		Smallest luggage compartment width (between the wheel housings) with twin tyres	1283	1283
		Smallest luggage compartment width (between the wheel housings) with SuperSingle tyres		
	H505	Maximum load space height (front-wheel drive)		
		Normal roof	1726	---
		High roof	1961	1961
		Extra-high roof	2189	2196
		Maximal load space height (rear-wheel drive/4Motion)		
		Normal roof	1626	---
		High roof	1861	1861
		Extra-high roof	2089	2096
	H196	Loading edge height above ground plane with front-wheel drive	570	570
			670	670
		Loading sill height above ground level with rear-wheel drive (single tyres and all-wheel drive)	720	725
		Loading sill height above ground level with rear-wheel drive (twin tyres)	725	730
		SuperSingle tyres		
	H508	Clear opening height of sliding door (front-wheel drive)		
		Normal roof	1587	1587
		High roof / Extra high roof	1822/1668	1822

Base data for panel van (ML1**) (All engines)			Panel van Long wheelbase (L4) [mm]	Panel van Extra-long wheelbase (L5) [mm]
		Clear opening height of sliding door (rear-wheel drive)		
		Normal roof	1487	1487
		High roof / Extra high roof	1722	1722
	L508	Clear opening width of sliding door	1311/1283	1311
	F201-1	Load compartment area	7.26 m²	8.26 m²
		Twin tyres	6.75 m²	7.72 m²
		SuperSingle tyres	6.96 m²	7.93 m²
	H101-M	Maximum vehicle height		
		Normal roof with front/rear/all-wheel drive, single tyres	---	---
		High roof with front/rear/all-wheel drive, single tyres	2590	2590
		Extra-high roof with front/rear/all-wheel drive, single tyres	2798	2798
		Normal roof with rear-wheel drive, twin tyres	---	---
		High roof with rear-wheel drive, twin tyres	2625	2637
		Extra-high roof with rear-wheel drive, twin tyres	2830	2835
	H202	Body opening height with rear lid		
		(front-wheel drive)	1605/1451	1605
		Normal roof	1840/1684	1840
		High roof / Extra high roof		
		Body opening height with rear lid	1505	1505
		(rear-wheel drive)	1740	1740
		Normal roof		
		High roof / Extra high roof		
	W206	Largest width of rear opening	1552	1552
Garage dimensions	W120-1	Vehicle width, front doors open	4122	4122
	W120-2	Vehicle width, rear doors open	2278	
	W114-L	Y-coordinate of exterior mirror on driver side	1224	1224
		with bracket-mounted exterior mirror	1328	1328
	W114-R	Y-coordinate of exterior mirror on passenger side	1203	1203
		with bracket-mounted exterior mirror	1329	1329
Vehicle interior	H61-1	Effective head area panel van 1st row of seats		1169

* ML3 = measurement load, loaded

** ML1 = measurement load, unloaded

*** The permitted tyre size varies depending on the engine and the gross vehicle weight rating.

10.4.2 Chassis/platform van with double cab

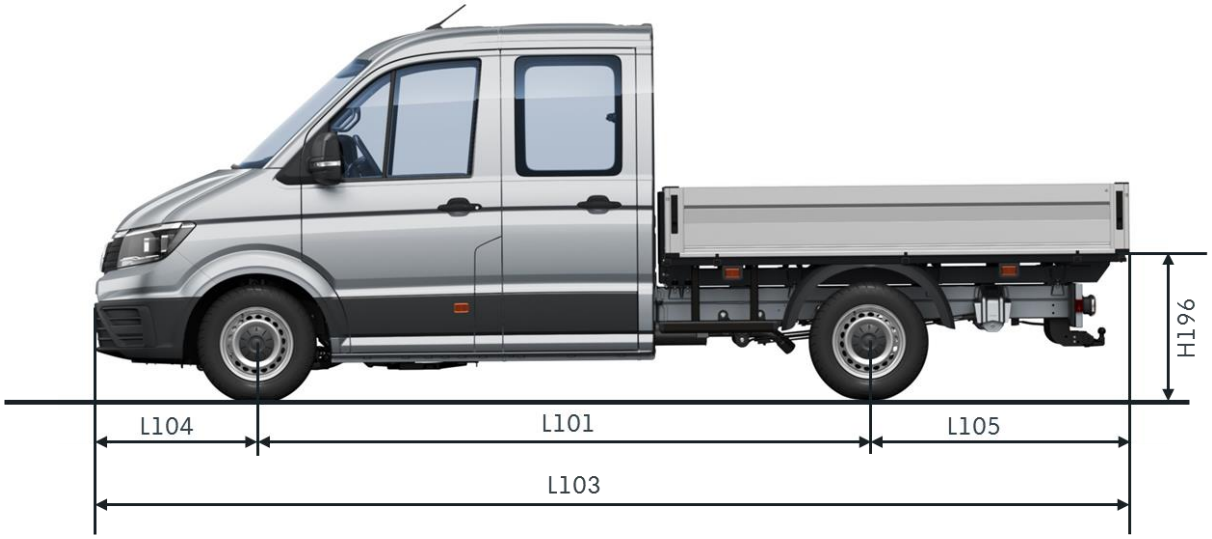


Fig. 1: Vehicle dimensions, double cab – platform van / side view

* All data can be found under the designations in the basic data table

Fig. 2: Vehicle dimensions, single cab, platform van/overhead view

* All data can be found under the designations in the basic data table

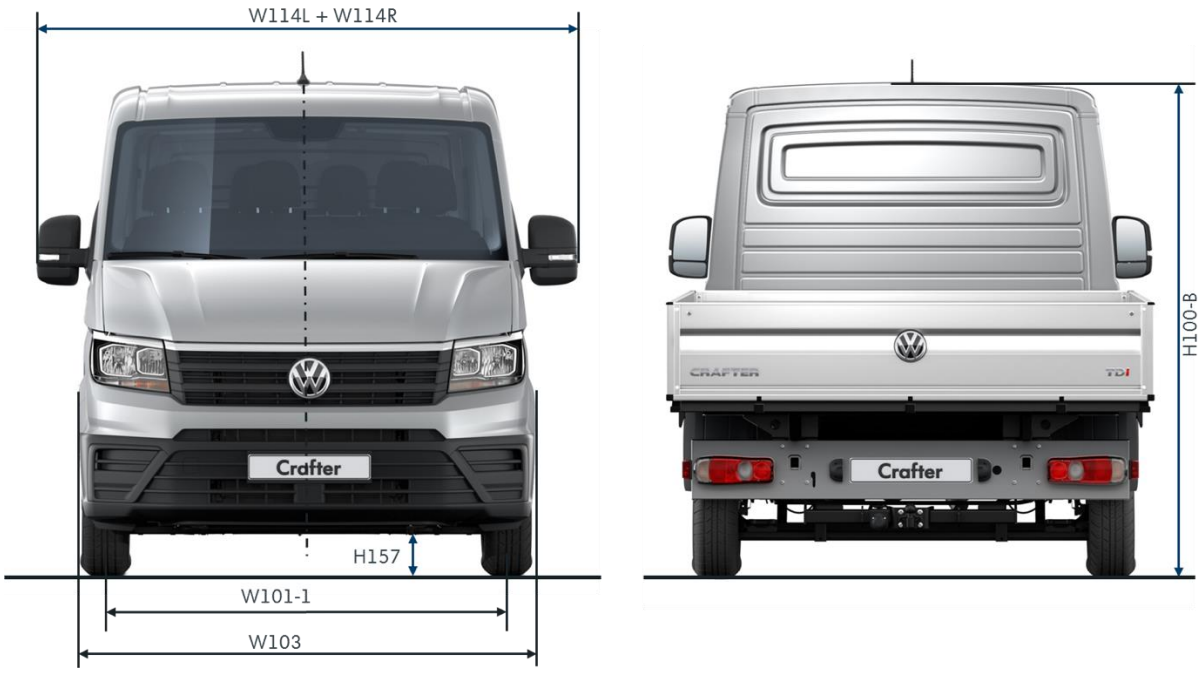


Fig. 3: Vehicle dimensions, double cab, platform van/front and rear view

* All data can be found under the designations in the basic data table

Base data double cab chassis/platform van (ML1) (All engines)**			**Chassis/platform van Mid length wheelbase (L3) [mm]**	**Chassis/platform van Long wheelbase (L4) [mm]**
Dimensions	L101	Wheelbase	3640	4490
	L103	Vehicle length N1[1] (Front-/rear/single tyres/4Motion) Vehicle length N2[2] (Front-/rear/single tyres/4Motion) Vehicle length N2[2] (Rear-wheel drive/twin tyres)	5996/6204 5968/6204 5968/6204	6846/7004 6818/7004 6818/7004
	L102	Vehicle length with towing bracket (ball coupling) Vehicle length with towing bracket (removable)	6094 6144	6944 6994
	L515	Centre of gravity of the loading platform, distance to front axle (FA)	3809	4209
	W103	Vehicle width	2037/2098	2037/2098
	H100-B	Vehicle height body with double cab (front/rear/single tyres/4Motion) Vehicle height body with double cab (rear-wheel drive and twin tyres)	2330 2352	2321 2339
	H101M.1	Vehicle height with cross strut, deep (twin tyres only)	(H100-B) + 200mm	(H100-B) + 200mm

Base data double cab chassis/platform van (ML1**) (All engines)			Chassis/platform van Mid length wheelbase (L3) [mm]	Chassis/platform van Long wheelbase (L4) [mm]
	H101M.2	Vehicle height with cross strut, high (twin tyres only)	(H100-B) + 600mm	(H100-B) + 600mm
	H101M.3	Vehicle height with lower/ladder transport frame or cab protection	(H100-B) + 210mm	(H100-B) + 210mm
	L104	Front overhang length	1000	1000
	L105	Rear overhang N1[1] (Front-/rear/single tyres and 4Motion Rear overhang N1[2] (Front-/rear/single tyres and 4Motion Overhang length, rear (rear-wheel drive/twin tyres)	1356/1564 1328/1564 1328/1564	1356/1514 1328/1514 1328/1514
	W101	Track width at front with rim offset 60* -> for front/rear/and 4Motion drive -> for twin tyres	 1773 1773	 1773 1773
	W102	Track width at rear with rim offset 60* -> for front-wheel drive -> for rear-wheel drive/4Motion drive -> for twin tyres	 1784 1766 1601	 1784 1766 1601
	WX 1	Maximum rear axle width Maximum rear axle width with twin tyres	2029 2055	2029 2055
	WX 2	Maximum front axle width	2018	2018
	H157	Ground clearance between axles acc. to 70/156/EEC	214/212	214/212
	A117	Breakover angle	15.2°	15.2°
Dimensions	A116-1	Front overhang angle* at full load, limited by bumper	19.4°	19.4°
	A116-2.1	Rear overhang angle* at full load, limited by rear cross member	18.4°	18.4°
	A116-2.2	Rear overhang angle* at full load, limited by spare wheel	19.2°	19.2°
	A116-2.3	Rear overhang angle* at full load, limited by ball coupling, rigid	11.4°	11.4°
	A116-2.4	Rear overhang angle* at full load, limited by ball coupling, removable	10.4°	10.4°
Turning circle	D102	Minimum turning circle	13.6m	16.2m
Wheels / Tyres		Basic tyres*** (see also chapter 3.6.1 “Overview of approved wheels/tyres”)		
Load compart	L202	#Length of the load area (EC 1230/2012)	---/2700	---/3500

Base data double cab chassis/platform van (ML1**) (All engines)			Chassis/platform van Mid length wheelbase (L3) [mm]	Chassis/platform van Long wheelbase (L4) [mm]
	H196	Loading edge height above ground level with front/rear/4Motion, single tyres Loading edge height above ground level with rear-wheel drive (twin tyres	---/1005 ---/1040	---/1000 ---/1035
	L 902	Clear opening height of front door	896	896
	L 502	Maximum length of the load compartment	---/2,700	---/3500
	H510	Height of the loading platform, platform body	---/400	---/400
	F201-1	Load compartment area	---/5.5 m²	---/7.1 m²
	H101-M	Maximum vehicle height -> with front/rear/4Motionantrieb, single tyres -> with rear-wheel drive, twin tyres	 2330 2352	 2321 2339
	W500	Loading platform width	---/2040	---/2040
Garage dimensions	W120-1	Vehicle width, front doors open Vehicle width, rear doors open	4122 3483	4122 3483
	W114-L	Y-coordinate of exterior mirror on driver side Y-coordinate of exterior mirror on driver side with bracket-mounted exterior mirror	1224 1328	1224 1328
	W114-R	Y-coordinate of exterior mirror on passenger side Y-coordinate of exterior mirror on passenger side with bracket-mounted exterior mirror	1203 1329	1203 1329
Vehicle interior	H61-1	Effective headroom – 1st seat row Effective headroom – 2nd seat row	1169 1146	1169 1146

*

ML3 = measurement load, loaded

** ML1 = measurement load, unloaded

*** The permitted tyre size varies depending on the engine and the gross vehicle weight rating.

[1] Category N1: vehicles for goods transit with a gross vehicle weight rating of up to 3.5 tonnes

[2] Category N2: vehicles for goods transit with a gross vehicle weight rating greater than 3.5 tonnes, and up to 12 tonnes

10.4.3 Chassis/platform van with single cab

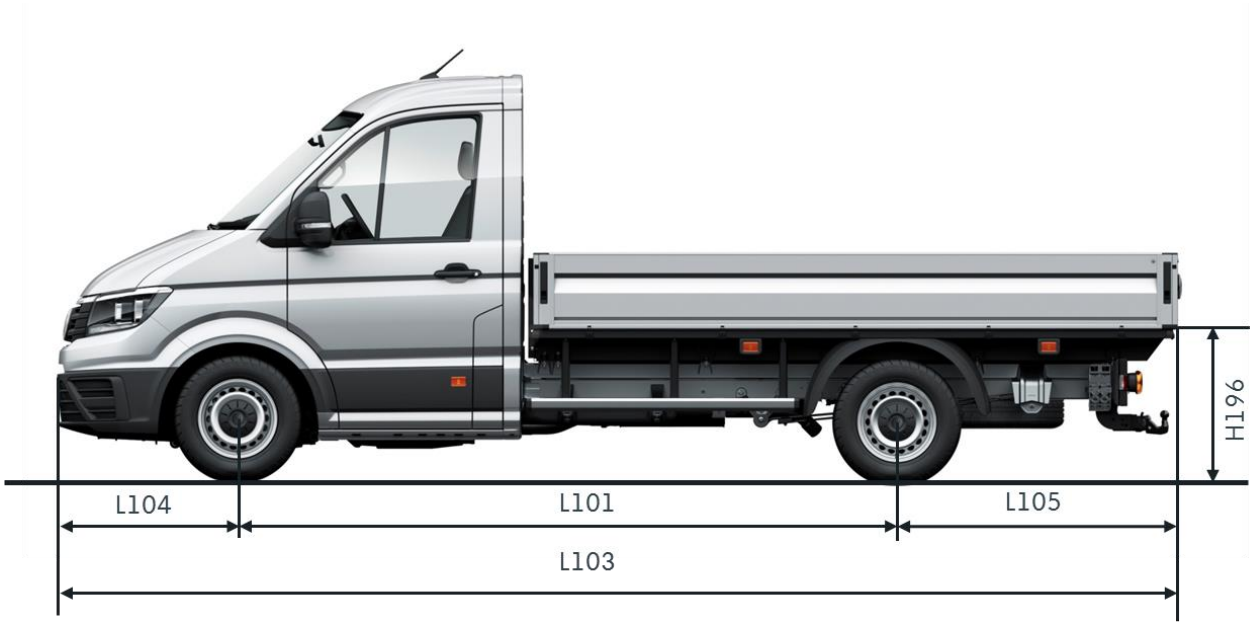


Fig. 1: Vehicle dimensions, single cab, platform van / side view

* All data can be found under the designations in the basic data table

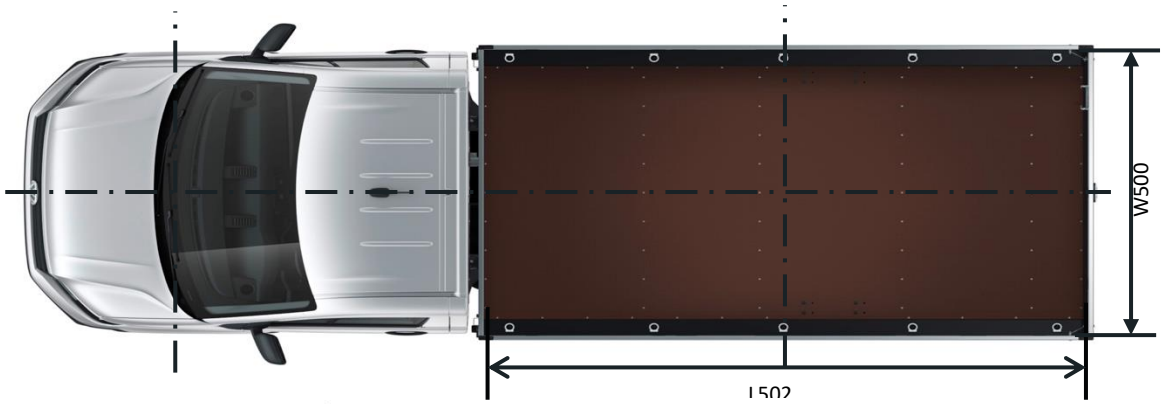


Fig. 2: Vehicle dimensions, single cab, platform van/overhead view

* All data can be found under the designations in the basic data table

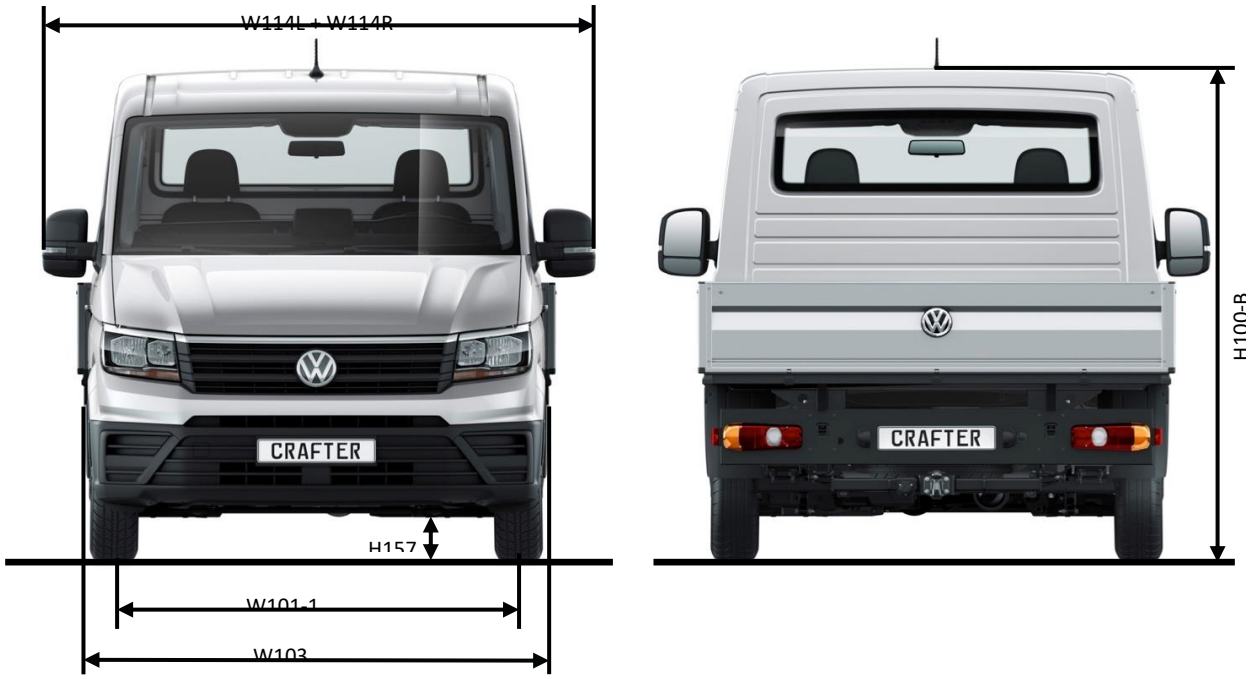


Fig. 3: Vehicle dimensions, single cab, platform van/front and rear view

* All data can be found under the designations in the basic data table

Base data single cab chassis/platform van (ML1) (All engines)**			**Chassis / platform van Wheelbase medium-long (L3) [mm]**	**Chassis/ platform van Long wheelbase (L4) [mm]**	**Chassis / platform van Extra-long wheelbase (L5) [mm]**
Dimensions	L101	Wheelbase (ML1*)	3640	4490	4490
	L103	Vehicle length N1[1] (Front-/rear/single tyres/4Motion) Vehicle length N2[2] (Front-/rear/single tyres/4Motion) Vehicle length N2[2] (Rear-wheel drive/twin tyres)	5996/6204 5968/6204 5968/6204	6846/7004 6818/7004 6818/7004	--- --- 7211/7404
	L102	Vehicle length with towing bracket (ball coupling) Vehicle length with towing bracket (removable)	6094 6144	6944 6994	7337 7387
	L515	Centre of gravity of the loading platform, distance to front axle (FA)	3409	3809	4009
	W103	Vehicle width	2033/2098	2033/2098	2033/2098
	H100-B	Vehicle height body with double cab (front/rear/single tyres/4Motion) Vehicle height body with cab rear-wheel drive and twin tyres	2312 2327	2305 2319	--- 2319

Base data single cab chassis/platform van (ML1**) (All engines)			Chassis / platform van Wheelbase medium-long (L3) [mm]	Chassis/ platform van Long wheelbase (L4) [mm]	Chassis / platform van Extra-long wheelbase (L5) [mm]
	H101M.1	Vehicle height with cross strut, deep	(H100-B) + 200mm	(H100-B) + 200mm	(H100-B) + 200mm
	H101M.2	Vehicle height with cross strut, high	(H100-B) + 600mm	(H100-B) + 600mm	(H100-B) + 600mm
	H101M.3	Vehicle height with under frame	(H100-B) + 210mm	(H100-B) + 210mm	(H100-B) + 210mm
	H101M.4	Vehicle height with rotating roof light	(H100-B) + 110mm	(H100-B) + 110mm	(H100-B) + 110mm
	H101M.5	Vehicle height with roof aerial	(H100-B) + 234mm	(H100-B) + 234mm	(H100-B) + 234mm
	H101M.6	Vehicle height with box body (single tyres)	(H100-B) + 905mm	(H100-B) + 905mm	(H100-B) + 905mm
	H101M.7	Vehicle height with box body (twin tyres)	(H100-B) + 1,005 mm	(H100-B) + 1,005 mm	(H100-B) + 1,005 mm
	L104	Front overhang length	1000	1000	1000
	L105	Rear overhang N1[1] (Front-/rear/single tyres and 4Motion Rear overhang N1[2] (Front-/rear/single tyres and 4Motion Rear overhang (rear-wheel drive, single, twin tyres)	1356/1564 1328/1564 1328/1564	1356/1514 1328/1514 1328/1514	--- --- 1721/1914
	W101	Track width at front with rim offset 60* for front/rear/ and 4Motion for twin tyres	 1773 1773	 1773 1773	 1773 1773
	W102	Track width at rear with rim offset 60* ->With front-wheel drive / wide gauge axle -> for rear-wheel drive/4Motion -> for twin tyres	 1784/1996 1766 1601	 1784/1996 1766 1601	 1784 1766 1601
	WX 1	Maximum rear axle width/wide gauge axle Maximum rear axle width with twin tyres	2029/2241 2055	2029/2241 2055	--- 2055
	WX 2	Maximum front axle width	2018	2018	2018
	H157	Ground clearance between axles acc. to 70/156/EEC	214/212	214/212	214/212
	A117	Breakover angle for front-wheel drive	15.2°	15.2°	---
	A117	Breakover angle for front-wheel drive/4Motion, and rear-wheel drive with twin tyres	15.5°	15.5°	15.5°
Dimensions	A116-1	Front overhang angle* at full load, limited by bumper	19.4°	19.4°	19.4°
	A116-2	Rear overhang angle* at full load, limited by rear cross member	18.4°	18.4°	---
	A116-2.3	Rear overhang angle* at full load, limited by ball coupling, rigid with front-wheel drive single tyres	9.6°/18.4°	9.6°/18.4°	---

Base data single cab chassis/platform van (ML1**) (All engines)			Chassis / platform van Wheelbase medium-long (L3) [mm]	Chassis/ platform van Long wheelbase (L4) [mm]	Chassis / platform van Extra-long wheelbase (L5) [mm]
	A116-2.3	Rear overhang angle* at full load, limited by ball coupling, rigid with rear-wheel drive single tyres and 4Motion	8.9°/17.7°	8.9°/17.7°	---
	A116-2.3	Rear overhang angle* at full load, limited by ball coupling, rigid with rear-wheel drive twin tyres	10.8°	10.8°	8.5°
Turning circle	D102	Minimum turning circle approx. (with maximum permissible front axle load ≤ 1800 kg) approx. (with maximum permissible front axle load ≥ 1800 kg)	13.9 m 14.2 m	16.9 m 16.9 m	16.9 m 16.9 m
Wheels / Tyres		Basic tyres*** (see also chapter 3.6.1 "Overview of approved wheels/tyres")			
Load compartment measurements	L202	#Length of the load area (EC 1230/2012)	---/3500	---/4300	---/4700
	H196	Loading edge height above ground level with front/rear/4Motion, single tyres Loading edge height above ground level with rear-wheel drive, twin tyres	---/1005 ---/1040	---/1000 ---/1035	--- ---/1050
	L 902	Clear opening height of front door	896	896	896
	L 502	Maximum length of the load compartment	---/3500	---/4300	---/4700
	H510	Height of the loading platform, platform body	---/400	---/400	---/400
	F201-1	Load compartment area	---/7.1 m²	---/8.8 m²	---/9.6 m²
	H101-M	Maximum vehicle height -> with front/rear/4Motion, single tyres -> with rear-wheel drive, twin tyres	 2312 2327	 2305 2319	 --- 2319
	W500	Loading platform width	---/2040	---/2040	---/2040
Garage dimensions	W120-1	Vehicle width, front doors open	4122	4122	4122
	W114-L	Y-coordinate of exterior mirror on driver side Y-coordinate of exterior mirror on driver side with bracket-mounted exterior mirror	1224 1328	1224 1328	1224 1328
	W114-R	Y-coordinate of exterior mirror on passenger side Y-coordinate of exterior mirror on passenger side with bracket-mounted exterior mirror	1203 1329	1203 1329	1203 1329
Inter-ior	H61-1	Effective headroom – 1st seat row	1169	1169	1169

* ML3 = measurement load, loaded

** ML1 = measurement load, unloaded

*** The permitted tyre size varies depending on the engine and the gross vehicle weight rating.

1 Category N1: vehicles for goods transit with a gross vehicle weight rating of up to 3.5 tonnes

2 Category N2: vehicles for goods transit with a gross vehicle weight rating greater than 3.5 tonnes, and up to 12 tonnes

10.5 Dimension drawings

Please refer to our build dimension drawings for the dimensions of the Crafter.
They are available for download in DXF, TIFF and PDF format at the Customized Solution Portal of Volkswagen AG.

Information

Current build dimension drawings can be downloaded from the Customized Solution Portal under the menu option “Technical information/Technical drawings”.

10.6 Diagrams (foil templates)

To help you create diagrams, you can download the vehicle views of all Crafter derivatives at the Customized Solution Portal of Volkswagen AG.

Information

Current labels for download can be found in the Customized Solution Portal under the menu option “Technical information/Foil templates”.

10.7 CAD models

On request, 3D data models in the CATIA V.5 and STEP formats can be provided to body builders for design purposes.

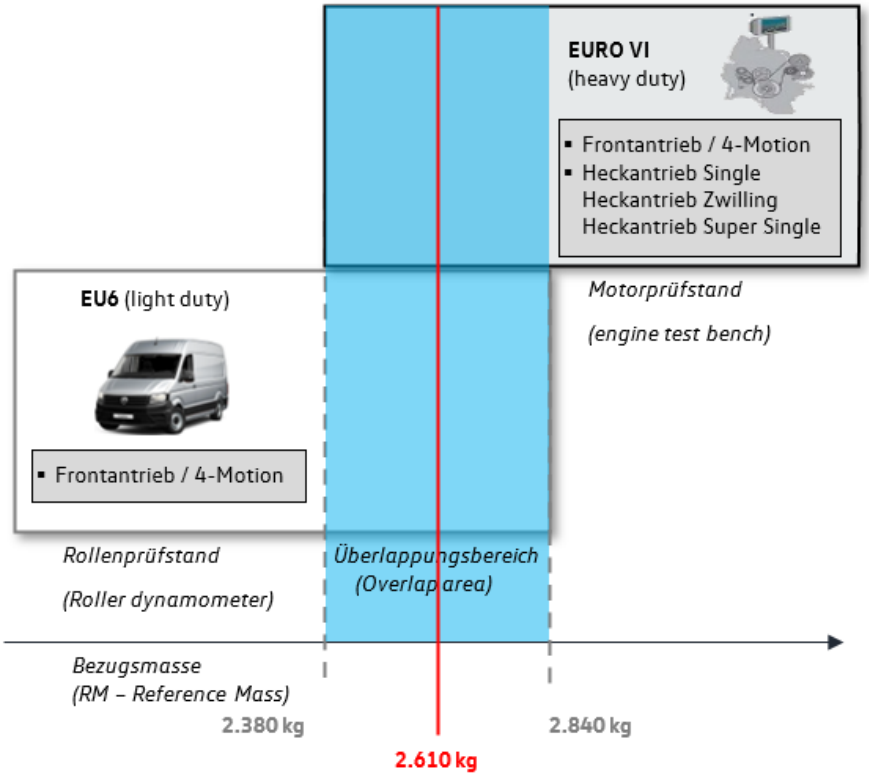
Information

The available 3D data can be found on the Customized Solution Portal of Volkswagen AG under the menu option “Technical information/Ordering CAD data”*.

*Registration required.

11 Notes on homologation of equipping and conversions

11.1 Overview, homologation and weight limits



Light duty: Single-axle roller dynamometer test: can be used up to max. <RM 2,840 kg

Heavy duty: Engine test bench test: can be used from RM 2,380 kg

Information

- For a mass in ready-to-drive state (multi-stage process) or actual mass (individual approval) between 2,356 kg and 2,585 kg after modification or conversion, the CO_2 data (g/km) and fuel consumption (l/100 km) from the EC Certificate of Conformity item 49 for the incomplete base vehicle apply.
- For a mass in ready-to-drive state (multi-stage process) or actual mass (individual approval) over 2,585 kg after extension or conversion, the CO2 data (g/km) and fuel consumption (l/100 km) from the EC Certificate of conformity item 49 for the incomplete base vehicle do not apply.
- Incomplete base vehicle EC certificate of conformity item 15 must be complied with
- Mass in ready-to-drive state = reference mass – 25 kg

11.2 Homologation of incomplete vehicles

Affected: Crafter open/closed construction with Certificate of Conformity document "incomplete vehicle"

Homologation of incomplete vehicles part 1 in accordance with Euro VI under Regulation EC 595/2009

If vehicles with heavy-duty type approval have a "reference mass"* of between 2,380 kg and 2,610 kg after conversion, specification of fuel consumption (l/100 km) and CO2 data is required for approval. The values from the stage 1 certificate of conformity documents can be adopted.

If there is a value for the "mass in ready-to-drive state" at item 15 of the Certificate of Conformity document from the base vehicle that is *** greater than** 2,355 kg **up to** 2,585 kg **and** a value for the completed vehicle at item 13 of the Certificate of Conformity document **greater than** 2,355 kg **up to** 2,585 kg, the CO2 and consumption values at item 49 of the Certificate of Conformity document of the base vehicle may be adopted for item 49 of the Certificate of Conformity document of the completed vehicle.

Technical specifications regarding the overall height and width of the vehicle after conversion must, however, be observed and complied with in order to ensure eligibility for approval. See the required specifications in chapter 11.7

Homologation of incomplete vehicles part 2 in accordance with Euro VI under Regulation EC 595/2009

For vehicles with a "reference mass" * greater than 2,610 kg after the conversion, the WLTP consumption value (l/100 km) and the value for CO2 (g/km) must **not** be used.

If there is a value for the "mass in ready-to-drive state" * **greater than** 2,355 kg **up to** 2,585 kg at item 15 of the CoC document from the base vehicle **and** a value greater than 2,585 kg at item 13 of the CoC document from the completed vehicle, the CO2 and consumption values at item 49 of the CoC document from the base vehicle must **not** be used for item 49 of the CoC document of the completed vehicle.

* Definition of masses

Mass in ready-to-drive state: mass of the vehicle in standard equipment according to the manufacturer's specifications + mass of the body + if present, mass of the towing bracket and the spare wheels + mass of the driver of 75 kg + mass of the fuel (tanks min. 90% filled) + mass of all service fluids (100% filled).

Reference mass: mass of the vehicle in ready-to-drive state minus the nominal mass of the driver of 75 kg but plus a nominal mass of 100 kg.

Please ask your technical service department/test centre for advice if you have questions about the mass in ready-to-drive state and the reference mass.

11.3 Closed/open bodies EU 6EA Light Duty according to WLTP

Overview of availabilities with complete/incomplete CoC ex works

Applies to  closed bodies  chassis/platform body

Drive type:	Front/transverse and all-wheel drive
Construction of	box, single cab, double cab and chassis, platform and case
Design	platform ex works OEM and Converter platform
Type of homologation:	Light duty
WLTP calculator:	Calculation of conversions (WLTP calculator) with the WLTP calculator possible
Calculable dimensions:	End face and vehicle mass in ready-to-drive state

Values for max. end face [in cm²] and max. vehicle mass in ready-to-drive state [in kg] see chapters 11.2, 11.08 and 11.9.

All the stated information relates to panel van; single cab, double cab chassis. **No** WLTP calculation possible for flat frames.

Information

Valid for the approved engine-gearbox versions (see offer for countries).

Unfortunately, there is no available box homologation for the Crafter with the light duty variant.
Therefore, it is not possible to calculate the WLTP required for type approval.
Box bodies are only possible on the Crafter with heavy duty.

For versions with flat frames, no values can be provided with the WLTP calculator.

Information

For all vehicles and/or engine-gearbox versions for which no values can currently be generated using the WLTP calculation tool, please contact your responsible Technical Service and check whether individual approval or multi-stage type approval is possible.

11.4 Open bodies EURO VI e Heavy Duty

Availability with incomplete Certificate of Conformity ex works

Applies to  box bodies/chassis 

Drive type:	Front/transverse, HL and all-wheel drive
Body:	Chassis/box bodies
Drive:	F/Q, 4Motion > 2,380 kg N1, N2
	HL Single > 2,380 kg N1, N2
	HL Twin > 2,380 kg N1, N2
Type of homologation:	Light duty
WLTP calculator:	Calculation of conversions (WLTP calculator) not possible
Calculable dimensions:	End face and vehicle mass in ready-to-drive state

F/Q = front-wheel drive, transverse engine installation

HL = rear-wheel drive, longitudinal engine installation

4Motion = all-wheel drive, transverse engine installation

Values for max. end face [in cm²] and max. vehicle mass in ready-to-drive state [in kg] see chapters 11.02 and 11.07.
All stated information relates to chassis/box bodies.

Information

Valid for the approved engine-gearbox versions (see offer for countries).

Information

For all vehicles and/or engine-gearbox versions for which no values can currently be generated using the WLTP calculation tool, please contact your responsible Technical Service and check whether individual approval or multi-stage type approval is possible.

11.5 Closed/open bodies EURO VIe Heavy Duty N1, N2

Availability with complete/incomplete Certificate of Conformity ex works

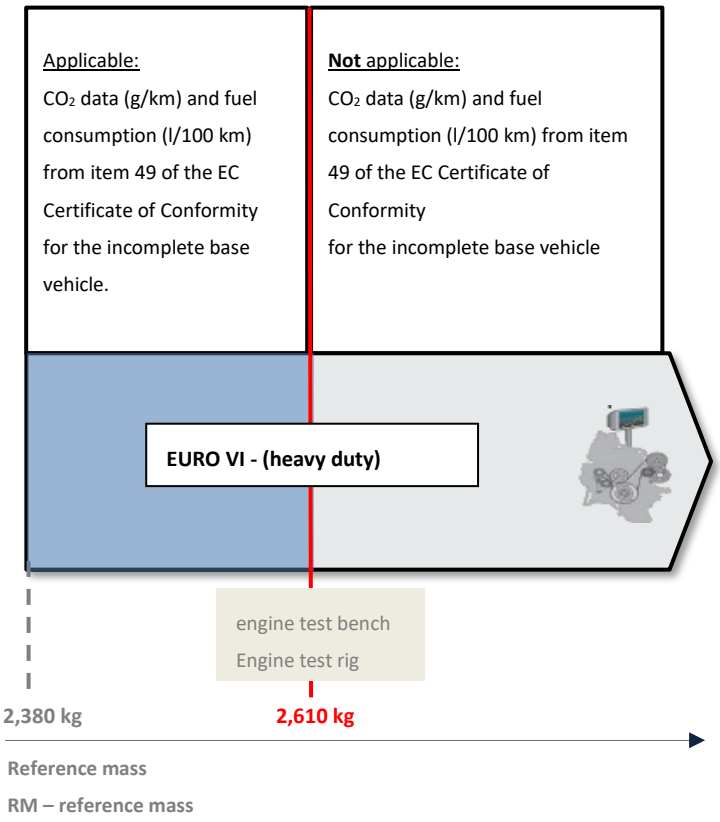
Applies to  closed bodies  chassis/platform body

Drive type:	Front/transverse, HL and all-wheel drive
Body:	Panel van, double cab and chassis
Version:	**Complete vehicles (panel van/works platform)**
	HL Single > 2,380 kg N1, N2
	HL Twin > 2,380 kg N1, N2
	HL Super Single > 2,380 kg only for N2 (not N1)
	Incomplete vehicles (panel van/chassis)
	F/Q, 4Motion > 2,380 kg N1, N2
	HL Single > 2,380 kg N1, N2, M2
	HL Twin > 2,380 kg N1, N2, M2
	HL SuperSingle > 2,380 kg only for N2/M2 (not N1)
Type of homologation:	Light duty
WLTP calculator:	Calculation of conversions (WLTP calculator) not possible

HL = rear-wheel drive, longitudinal engine installation

F/Q = front-wheel drive, transverse engine installation

4Motion = all-wheel drive, transverse engine installation



Information

Regarding eligibility for approval of conversions/add-ons, please contact your responsible technical service for all vehicles/engine/gearbox variants, and check whether individual approval or multi-stage type approval is possible.

Information

Please refer to chapters 11.02 and 11.7 for information on the permissible masses.

11.6 Availability ex works EURO VIe heavy duty/EU6EA light duty N1/N2/M2

Changeover of the heavy-duty emission standard from EURO VIe (7GT) to EURO VIe (7GI)
Changeover of the light-duty emission standard from EU6AR (4BK) to EU6EA (4WG)

	For closed (panel van) and open models (platform, chassis)
→ **SOP week 21/2024**	103 kW MQ N1 LD EU6EA
→ **SOP week 21/2024**	130 kW MQ N1 LD EU6EA

	For closed (panel van) and open models (platform, chassis)
→ **SOP week 29/2024**	120 kW rear-wheel drive N1/N2/M2 HD EURO VI-e.
	130 kW front 130 kW MQ N2 (panel van only) EU6EA
	103 kW AQ front LD N1 EU6EA

	For closed (panel van) and open models (platform, chassis)
→ **SOP week 44/2024**	103 kW MQ Front/AQ Front HD N1/N2/M2 EURO VIe
→ **SOP week 44/2024**	120 kW AQ all-wheel drive /MQ AQ front HD N1/N2/M2 EURO VI-e
→ **SOP week 44/2024**	130 kW AQ front/all-wheel drive LD N1/N2 EU6EA
→ **SOP CW 10/2025**	120 KW AL. Rear-wheel drive HD N1/N2

Information

Please refer to chapters 11.02 and 11.7 for information on the permissible masses.

11.7 Frontal areas for reference masses for EURO VIe Heavy Duty N1, N2

Information on the heavy-duty emission standard EURO VI-e, PR no.: 7GI

				Max. measured frontal area (product of width and height in accordance with ISO 612-1978) = body width x highest point of the body measured from the road.	
Drive type	**Body variant**	**Engine/drive (3)**	**Vehicle class**	**Reference mass between 2,380 kg and 2,610 kg (1)**	**Reference mass greater than 2,610 kg (2)**
Rear/longitudinal/ Twin tyres	Single cab/double cab/cowl panel	120 kW ML410-6H or AL550-8H	N2 max. 90 km/h N1 without maximum speed limiter	max. 5.58 m²	Bodies can exceed 5.58 m² .
Front-wheel drive/4x4 drive	Single cab/double cab/cowl panel/ panel van	103 kW/MQ500-6F or AQ450-8F 120 kW MQ500-6F or AQ450-8F/8A	N1 without maximum speed limiter N2 max. 90 km/h N2 without maximum speed limiter	max. 7.3 m²	Bodies can exceed 7.3 m² .
Rear/longitudinal/ Single tyres	Single cab/double cab/cowl panel/ panel van	120 kW/ML410-6H or AL550-8H	N1 without maximum speed limiter N2 max. 90 km/h	max. 5.58 m²	Bodies can exceed 5.58 m² .

Table: Specifications for the permissible dimensions after conversion depending on the drive type.

(1) Area of the vehicle from “width times height” incl. body, without mirrors. For the height, the highest point of the body must be specified, even if the actual body is lower!

(2) No specification of the max. area of the vehicle incl. body. The maximum permissible vehicle dimensions according to the general approval regulations must be adhered to

(3) EiKa = single cab; DoKA = double cab; HGB = maximum speed limiter;
ML410-6H = rear drive 6-speed manual gearbox
AL500-8H = rear drive 8-speed automatic
MQ500-6F = front-wheel drive 6-speed manual gearbox
AQ450-8F = front-wheel drive 8-speed automatic
AQ450-8A = all-wheel drive 8-speed automatic

HGB Maximum speed limiter

Information

Please refer to chapters 11.02 and 11.4 for information on the permissible masses.

11.8 ISC parameters for Crafter with light duty with closed body

Affected: Crafter up to 4.0 t GVWR, all engine-gearbox variants, approval types N1, N2

Notes: Calculation for conversions with weight and/or front face changes are possible in the CustomizedSolution portal (WLTP calculation) in accordance with ISC parameters.

Information

For all vehicles and/or engine-gearbox versions for which no values can currently be generated using the WLTP calculation tool, please contact your responsible Technical Service and check whether individual approval or multi-stage type approval is possible.

	Surface area of the final vehicle (in cm²)		**Rolling resistance (in kg/t)**		**Free radiator air flow surface perpendicular to direction of travel [in cm²]**		**Technically permissible total mass of the final vehicle when loaded (in kg)**	
EGV: engine-gearbox variant	**From**	**to**	**From**	**to**	**From**	**to**	**From**	**to**
103 kW MQ500-6F N1 gBm (951)	43200	52500	4.9	7.4	1145	1213	3000	3500
130 kW MQ500-6F N1 gBm (957)	43200	52500	4.9	7.4	1145	1213	3000	3500
130 kW MQ500-6F N2 gBm (958)	43200	52500	4.9	7.4	1145	1213	3880	4000
103 kW AQ450-8F N1 gBm (954)	43200	52500	4.9	7.4	1145	1213	3000	3500
130 kW AQ450-8F N1 gBm (961)	43200	52500	4.9	7.4	1145	1213	3000	4000
130 kW AQ450-8F N2 without maximum speed limiter gBm (961)	43200	52500	4.9	7.4	1145	1213	3000	4000
130 kW AQ450-8F N2 gBm (962)	43200	52500	4.9	7.4	1145	1213	3880	4000
103 kW AQ450-8A N1 gBm (965)	43200	52500	4.9	7.4	1145	1213	3500	4000
130 kW AQ450-8A N2 without maximum speed limiter gBm (965)	43200	52500	4.9	7.4	1145	1213	3500	4000
130 kW AQ450-8A N2 gBm (966)	43200	52500	4.9	7.4	1145	1213	3880	4000

	Calculated kerb weight (without driver, 75 kg)							
	GWVR: 3,000 kg		GWVR: 3,500 kg		GWVR: 3,880 kg		GWVR: 4,000 kg	
EGV	From	to	From	to	From	to	From	to
103 kW MQ500-6F N1 gBm (951)	1661	2899	1661	2912				
130 kW MQ500-6F N1 gBm (957)	1661	2899	1661	2912				
130 kW MQ500-6F N2 gBm (958)					1679	3105	1661	3059
103 kW AQ450-8F N1 gBm (954)	1689	2899	1661	2912				
130 kW AQ450-8F N1 gBm (961)	1700	2899	1661	3146				
130 kW AQ450-8F N2 without maximum speed limiter gBm (961)					1661	2998	1661	2952
130 kW AQ450-8F N2 gBm (962)					1715	2998	1668	2952
103 kW AQ450-8A N1 gBm (965)	1993	2899	1799	3259				
130 kW AQ450-8A N2 without maximum speed limiter gBm (965)					1661	3111	1661	3064
130 kW AQ450-8A N2 gBm (966)					1846	3111	1799	3064

Converter max. kerb weight = perm. max. kerb weight ready to drive incl. conversion/body by the Converter (without driver)

11.9 ISC parameters for Crafter Light Duty single cab and double cab with open body and works platform

Affected: Crafter **works platform van** up to 3.5 t GVWR, all engine-gearbox variants. Registration types N1.

Notes: Calculation for conversions with weight and/or front face changes are possible in the CustomizedSolution portal (WLTP calculation) in accordance with ISC parameters.

Information

For all vehicles and/or engine-gearbox versions for which no values can currently be generated using the WLTP calculation tool, please contact your responsible Technical Service and check whether individual approval or multi-stage type approval is possible.

	Surface area of the final vehicle (in cm²)		**Rolling resistance (in kg/t)**		**Free radiator air flow surface perpendicular to direction of travel [in cm²]**		**Technically permissible total mass of the final vehicle when loaded (in kg)**	
EGV	**From**	**to**	**From**	**to**	**From**	**to**	**From**	**to**
103 kW MQ500-6F N1 oBM (953)	46352*	55880*	4.9	7.4	1145	1213	3500	3500
103 kW AQ450-8F N1 oBM (955)	46860*	55880*	4.9	7.4	1145	1213	3500	3500
130 kW MQ500-6F N1 oBM (960)	46352*	55880*	4.9	7.4	1145	1213	3500	3500
130 kW AQ450-8F N1 oBM (964)	46860*	55880*	4.9	7.4	1145	1213	3500	3500
130 kW AQ450-8A N1 oBM (967)	46860*	55880*	4.9	7.4	1145	1213	3500	3500

* Height x width

	Calculated kerb weight (without driver, 75 kg)							
	GWVR: 3,000 kg		**GWVR: 3,500 kg**		**GWVR: 3,880 kg**		**GWVR: 4,000 kg**	
EGV	**From**	**to**	**From**	**to**	**From**	**to**	**From**	**to**
103 kW MQ500-6F N1 oBM (953)			1661	2600				
103 kW AQ450-8F N1 oBM (955)			1661	2632				
130 kW MQ500-6F N1 oBM (960)			1661	2610				
130 kW AQ450-8F N1 oBM (964)			1661	2773				
130 kW AQ450-8A N1 oBM (967)	1889	2899	1695	2773				

Converter max. kerb weight = perm. max. kerb weight ready to drive incl. conversion/body by the Converter (without driver)

12 Listings

12.1 List of modifications

Modifications to the Converter guidelines compared to the data status of June 2024.

Chapter no.	Chapter heading	Scope of change
1	Introduction	
1.1	Concept of this Owner's Manual	Chapter updated
1.2	Means of representation	
1.3	Vehicle safety	
1.3.1	Notes on vehicle safety	
1.4	Operational safety	
1.5	Note on copyright	
2	General information	
2.1	Product and vehicle information for body builders	
2.1.1	Contact in Germany	
2.1.2	International contact	
2.1.3	Electronic Repair and Workshop Information from Volkswagen AG (erWin*)	
2.1.4	Genuine Parts online order portal*	
2.1.5	Online operating manuals	
2.1.6	Homologation	
2.1.6.1	Amendments to legislation from 1 January 2022 Regulation (EU) 2018/858 EU and national (Art. 44 and Art. 45)	
2.1.6.2	European Type Approval (ETA) and EC Certificate of Conformity (CoC)	
2.1.6.3	Worldwide Harmonised Light Vehicles Test Procedure (WLTP)	
2.1.7	Manufacturer’s declaration	
2.2	Converter guidelines, consulting	
2.2.1	Letter of non-objection	
2.2.2	Application for the letter of non-objection	
2.2.3	Legal entitlements	
2.3	Warranty and product liability of the Converter	
2.4	Ensuring traceability	
2.5	Badges	
2.5.1	Positions on rear of the vehicle	
2.5.2	Appearance of whole vehicle	
2.5.3	Non-Volkswagen badge	
2.6	Recommendations for vehicle storage	
2.6.1	General information	Chapter updated
2.7	Compliance with environmental rules and regulations	
2.8	Recommendations for inspection, maintenance and repair	

Chapter no.	Chapter heading	Scope of change
2.9	Accident prevention	
2.10	Delivery range	
2.10.1	Model overview	
2.10.2	Dimension variants	Chapter updated
2.10.3	Drive variants	
2.11	Quality system	
3	Planning bodies	
3.1	Selecting the base vehicle	
3.1.1	Preparation for optional extras	Chapter added
3.2	Vehicle modifications	
3.2.1	Vehicle acceptance	
3.3	Dimensions and weights	
3.3.1	Payload increases and reductions	
3.4	Vehicle identification data	
3.5	Vehicle stability	
3.6	Tyres	
3.6.1	Overview of approved wheels/tyre overview	
3.6.2	Spare wheel	
3.7	Bolted, weldedand bonded joints	
3.7.1	Bolted connections	
3.7.2	Welded connections	
3.7.2.1	General information	
3.7.2.2	Selection of welding process	
3.7.2.3	Resistance spot welding	
3.7.2.4	Shielding gas plug welding	
3.7.2.5	Tacking	
3.7.2.6	Areas that must not be welded	
3.7.2.7	Corrosion protection after welding	
3.8	Noise insulation	
3.9	Special equipment	
4	Technical limit values for planning	
4.1	Base vehicle limit values	
4.1.1	Steerability – minimum front axle load	
4.1.2	Maximum permitted height of centre of gravity	
4.1.3	Vehicle dimensions	
4.1.3.1	Vehicle width	
4.1.3.2	Vehicle height	
4.1.3.3	Vehicle length	
4.1.3.4	Frame heights	

Chapter no.	Chapter heading	Scope of change
4.1.4	One-sided weight distribution	
4.2	Limit values for running gear	
4.2.1	General information	
4.2.2	Description of PR no. families	
4.2.3	Industry-specific offer structure	
4.2.3.1	Closed bodies (panel van)	
4.2.3.2	Open bodies (chassis, platform van)	
4.2.4	Gross axle weight ratings	
4.2.5	Turning circle diameter	
4.2.6	Modifications to axles	
4.2.7	Modifications to the steering system	
4.2.8	Changes to brake system and brake control system ESC*	
4.2.9	Brake regulation system ESC (Electronic Stability Control)	
4.2.10	Changes to springs, suspension mounting, dampers	
4.2.11	Wheel alignment settings	
4.2.12	Modifications to camera and radar systems	
4.3	Limit values for body-in-white	
4.3.1	Modifications to the body-in-white	
4.3.2	Limit values for vehicle frame	
4.3.3	Lowering of rear wheel housing/panel van	
4.3.4	Minimum dimensions for rear wheel housing/chassis	
4.3.5	Vehicle overhang	
4.3.6	Attachment to the frame	
4.3.7	Wheelbase modifications – free body lengths	
4.3.8	Vehicle roof/roof load	
4.4	SCR system	
4.4.1	SCR system	
4.4.1.1	Installation position of the SCR tank in the vehicle	
4.5	Limit values for engine peripherals/powertrain	
4.5.1	Modifications to engine/powertrain components/exhaust system	
4.5.2	Engine cooling	
4.6	Limit values for interior	
4.6.1	Modifications in the area of airbags and belt tensioners	
4.7	Limit values for electrics/electronics	
4.7.1	Vehicle marker and side marker lights	
4.7.2	Retrofitting electrical devices	
4.7.3	Mobile communication systems	
4.7.4	CAN bus	
4.8	Limit values of ancillaries	

Chapter no.	Chapter heading	Scope of change
4.9	Limit values of add-ons	
4.10	Limit values for body	
5	Prevention of damage	
5.1	Brake hoses/cables and lines	
5.2	Welding work	
5.3	Corrosion protection measures	
5.3.1	Planning measures	
5.3.2	Component design measures	
5.3.3	Coating measures	
5.3.4	After all work on the vehicle	
5.4	Painting/corrosion prevention	
5.5	Tow-starting and towing	
5.6	Storage and delivery of the vehicle	
5.6.1	Storage	
5.6.2	Delivery	
6	Electrical/electronic systems	
6.1	General information	
6.2	Electromagnetic compatibility (EMC)	
6.3	Battery	
6.3.1	Subsequent installation of a battery master switch	
6.3.2	Installation of a second battery	
6.3.2.1	Second battery, general information	Chapter updated
6.3.2.2	Parameterised* reactions on reaching certain second battery charge levels with second battery monitoring	
6.3.2.3	Intelligent external charging control	
6.3.2.4	Retrofitting a second battery	
6.3.2.5	More additional batteries	
6.3.2.6	Conversion to 2nd or 2nd and 3rd Lithium-ion battery system	
6.3.3	Maintenance and storage of battery	
6.4	Interfaces	
6.4.1	Electrical interface for special vehicles	Chapter updated
6.4.2	Electrical terminal strip (IS1)	
6.4.3	Customer-specific functional control unit (CFCU*)	
6.4.3.1	Installation position in the vehicle	
6.4.3.2	Interface for telematics control unit	
6.4.4	CAN bus and close integration	
6.4.5	Electrical wiring/fuses	
6.4. 6	Cable extensions	
6.4.7	Additional circuits	
6.4.8	Operation buttons	

Chapter no.	Chapter heading	Scope of change
6.4.9	Retrofitting electrical devices	
6.4.10	Retrofitting alternators	
6.4.11	Electronic tachograph	
6.4.12	Central protector (ZAS) for second battery	
6.4.13	Speed signal	
6.4.14	Earth points	
6.4.15	Preparation for reversing camera for open bodies	Chapter updated
6.4.16	Retrofitting a toll collection system	Information box inserted
6.5	Lighting	
6.5.1	Adjusting headlights	
6.5.2	Installation of additional lights/special signal systems	Chapter updated
6.5.2.1	Preparation for rotating light, yellow light (PR no. 9LN/9LX)	Chapter added
6.5.3	Tail light clusters	Chapter updated
6.5.4	Marking lights	
6.5.4.1	Side marking lights	
6.5.4.2	End-outline marker lamps/vehicle marker lights	Chapter updated
6.5.4.3	Preparation for side marker lights (PR no. 6S2)	Chapter added
6.5.5	Exterior lights	
6.5.5.1	Lamp monitoring	
6.5.5.2	Retrofitting the 3rd brake light	
6.5.6	Interior lights	Table updated
6.6	Mobile communication systems	
6.6.1	Devices	
6.6.2	Connection of and laying cables for aerial (radio)	
6.6.3	Installation of aerials for the serial radio and navigation system on non-metallic sections of the roof e.g. alcoves, sleeping cabs, cowl panels, platforms etc.	
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6.8	Driver assist systems	
6.8.1	General overview	
6.8.1.1	An overview of the driver assistance systems	
6.8.1.2	Cross Wind Assist for open bodies	
6.8.2	Electromechanical steering	
6.8.3	Electronic Stability Control (ESC)	
6.8.4	Tyre Pressure Monitoring System (TPMS)	
6.8.5	Front camera for driver assist systems	
6.8.6	Rain and light sensor	
6.8.7	Parking aids	
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Chapter no.	Chapter heading	Scope of change
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6.8.10	Front Assist with warnings and braking on detection of vehicles, pedestrians and cyclists	
6.8.11	Blind spot information system (BSIS)	
6.8.12	Start-up warning (Moving Off Information System MOIS)	
6.9	Preparation of tail lift	
6.10	Ignition bypass circuit	
6.10.1	Ignition bypass circuit ex-works	
6.10.2	Retrofitting the ignition bypass circuit	
6.11	Current flow diagrams	
6.12	Preparation for taxis and private hire cars	
6.12.1	Preparation for taxis and private hire cars ex works	Chapter updated
6.12.1.1	Pin assignment on CFCU* (input and output assignment/pins on CFCU*)	Chapter updated
6.12.1.2	Functional description	Chapter updated
6.12.2	Programming according to customer requirements	
7	Modifications to base vehicle	
7.1	Running gear	
7.1.1	Running gear general information	
7.1.2	Springs/shock absorbers/anti-roll bars	
7.1.2.1	General information	
7.1.3	Brake system	
7.1.3.1	Hydraulic brake system	
7.1.3.2	Line routing	
7.1.3.3	Routing additional lines along the brake hoses/brake lines	
7.1.3.4	Cable for handbrake/changing the length of the handbrake cable	
7.1.3.5	Disc brakes	
7.1.4	Air suspension	
7.2	Body-in-white/bodywork	
7.2.1	Body-in-white/bodywork general information	
7.2.1.1	Frame longitudinal member profile dimensions	
7.2.1.2	Welding on the frame	
7.2.1.3	Drilling on the frame	
7.2.2	Attachment to the frame	
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7.2.2.3	Attachment with body brackets	
7.2.3	Material for chassis frame	
7.2.4	Frame modification behind rear axle	
7.2.5	Wheelbase modifications	
7.2.5.1	Cuts on frame	

Chapter no.	Chapter heading	Scope of change
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7.2.5.3	Reinforcement of frame cutting areas	
7.2.5.4	Letter of non-objection for wheelbase modifications	
7.2.6	Modifications to cab	
7.2.6.1	Modification of cab roof general information	
7.2.6.2	Modifications to cab rear wall	
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7.2.9	Frame end cross member	
7.2.10	Roof of panel van	
7.2.10.1	Attachment on roof	
7.2.10.2	Roof height, increasing	
7.2.10.3	Number of roof cross struts	
7.2.10.4	Arrangement of roof cross struts	
7.2.10.5	Retrofitting tilting sunroof	
7.2.11.	Cutting a cab roof and B-pillar roof cross strut	Chapter updated
7.3	Engine peripherals/powertrain	
7.3.1	Fuel system	
7.3.1.1	General information	
7.3.2	Exhaust system	
7.3.2.1	Exhaust system without SCR system	
7.3.2.2	Exhaust system with SCR system	
7.3.2.3	Standard regeneration	Chapter updated
7.3.3	Engine cooling	
7.3.4	Engine air intake	
7.3.4.1	Warm air	
7.3.4.2	Water	
7.3.4.3	Dust/dirt	
7.3.5	Space for power units	
7.3.6	Drive shafts	
7.3.6.1	Flexure angle	
7.3.6.2	Drive shaft installation	
7.3.7	Working speed control (ADR)	Chapter updated
7.3.8	Engine preheating systems	
7.4	Interior	

Chapter no.	Chapter heading	Scope of change
7.4.1	General information	
7.4.2	Safety features	
7.4.2.1	Airbag control unit and sensors	
7.4.2.2	Seat belts and belt tensioners	
7.4.2.3	Front airbag	
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7.4.2.5	Working with airbag and belt tensioner units	
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7.4.5.2	Auxiliary heater	
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7.5	Ancillaries	
7.5.1	General information	
7.5.2	Gearbox-dependent auxiliary drive	
7.5.2.1	Gearboxes with a power take-off system (PR number 0R1)	
7.5.2.2	Flange options	PR numbers removed
7.5.2.3	Connection dimension for the assembly kit (2N0.800.167)	
7.5.3	Engine power take-off	Chapter updated
7.5.3.1	Additional air conditioner compressor (option 2AB)	Chapter updated
7.5.3.1.1	Technical data for the additional air conditioner compressor	
7.5.3.1.2	Electrical connection, plug contact AMD42060-1 (CA 105)	
7.5.3.1.3	Dimensions of pulley for belt 6pk poly-V	
7.5.3.1.4	Connection dimensions of air conditioner compressor	Title changed
7.5.3.1.5	Retrofitting the additional air conditioner compressor	Factual information changed
7.5.3.1.6	Installation of other air conditioner compressors	
7.5.3.1.7	Changed maintenance intervals	
7.5.3.2	Additional alternator (option 8HI)	Chapter updated
7.5.3.2.1	Retrofitting of additional alternator	
7.5.3.2.2	Changed maintenance intervals	
7.5.3.3	Retrofitting a hydraulic pump	
7.6	Add-ons	
7.6.1	Wind baffle/roof spoiler	Chapter updated

Chapter no.	Chapter heading	Scope of change
7.6.2	Roof sleeper cab	
7.6.3	Roof carriers	Chapter updated
~~7.6.4~~	~~Vehicle interior roof carrier~~	Chapter removed
7.6.4	Preparation for roof rails (PR no. 3S4)	Chapter added
7.6.5	Shelf installation/installations in vehicle interior	
7.6.5.1	General information	
7.6.5.2	Load rails from factory	
7.6.5.3	Retrofitting load rails/securing rails	
7.6.6	Winch behind cab	
7.6.7	Loading cranes	
7.6.7.1	Loading crane body behind cab	
7.6.7.2	Loading crane body at end of frame	
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7.7	Dropside	
7.7.1	General information	PR numbers removed
7.7.2	Prerequisites for assembly of a tail lift	
7.7.3	Securing the tail lift	
7.8.	Towing bracket	
7.8.1	Suspended load capacities	
7.8.2	Dimensioning the towing bracket	
7.8.3	Clearance measurements for towing bracket	
7.8.4	Attaching the towing bracket	
7.8.5	Control of air-braked semitrailers	
7.9	Skid plate	
7.9.1	Rear skid plate	
7.9.2	Side protection	
8	Industry-specific conversions	
8.1	Assembly frame	
8.1.1	General information on material quality	
8.1.2	Layout	
8.1.2.1	General information	
8.1.2.2	Assembly frame with stepped frame	
8.1.3	Profile dimensions/dimensioning	
8.1.4	Attachment to the frame	
8.1.4.1	Additional body brackets	
8.1.4.2	Attachment with body brackets	
8.1.4.3	Shear-resistant connection	
8.1.4.4	Torsionally rigid superstructures	
8.1.5	Assembly frame as floor panel	

Chapter no.	Chapter heading	Scope of change
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8.3	Articulated lorry	
8.4	Modifications to closed panel vans	
8.4.1	Floor panel/side panels	
8.4.2	Partitions	Table updated
~~8.4.3~~	~~Universal floor~~	Chapter removed
8.4.3	Preparation for functional floor (PR no. 5BB/5BJ)	Chapter added
8.4.4	Vehicle roof	
8.5	Bodies on chassis with platform/cowl panel	
8.5.1	Cowl panel	Chapter updated
8.5.2	Flat frame chassis with cowl panel	Chapter updated
8.5.3	Minimum dimensions for rear wheel housing/flat frame	
8.5.4	Partially integrated bodies	
8.5.4.1	Connecting cab rear wall to B-pillar (z-axis)	
8.5.4.2	Connecting cab rear wall to B-pillar roof cross strut (y-axis)	
8.5.5	Platform/chassis with normal frame	
8.6	Platform bodies (open boxes)	
8.7	Box bodies (dry freight boxes and refrigerated boxes)	
8.8	Refrigerated vehicles	
8.9	Tipper bodies	
8.9.1	Preparation for 3-way tipper (PR No. 5HN)	
8.9.1.1	Coupling point	
8.9.1.2	Operation	
8.9.2	Construction of tipper bodies	
8.10	Rescue vehicles	
8.11	Torsionally stiff body types	
8.12	Campers	
8.13	Aerial work platform	
8.13.1	General information	
8.14	Workshop vehicles	
8.15	Courier, express and parcel delivery services (CEP)	
8.15.1	Installation of folding shelves	
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8.15.3	Construction of shelf installations	
8.16	Vehicles for persons with a mobility impairment (KMP)	
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8.18	Fire brigade and emergency vehicles	
8.19	Buses (BUS)	
8.19.1	Roll bar	Chapter updated

Chapter no.	Chapter heading	Scope of change
8.19.2	Preparation for the escape hatch	
8.20	Dangerous goods transport in accordance with ADR	
8.21	Preparation for the Panel Van Plus/Crew Cab conversion (PR no. 3UI/4C5)	Chapter added
9	Calculations	
9.1	Determining centre of gravity	
9.1.1	Determining the centre of gravity in x-direction	
9.1.2	Determining the centre of gravity in z-direction	Formulas updated
10	Technical data	
10.1	Bulb ratings for exterior lights	
10.2	Hole patterns for trailer towing coupling	
10.2.1	Fitting dimensions	
10.2.1.1	Configuration 1 (closed bodies)	
10.2.1.2	Configuration 2 (open bodies)	
10.2.2	Mounting position towing bracket	
10.2.2.1	Closed body (panel van), single tyres	
10.2.2.2	Closed body (panel van), twin tyres	
10.2.2.3	Open body (platform, chassis), single tyres	
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10.3	Weights (masses)	
10.4	Vehicle dimensions (basic data)	
10.4.1.	Panel van	
10.4.2	Chassis/platform van with double cab	
10.4.3	Chassis/platform van with single cab	
10.5	Build dimension drawings	
10.6	Diagrams (foil templates)	
10.7	CAD models	
11	Notes on homologation of equipping and conversions	
11.1	Overview, homologation and weight limits	
11.2	Homologation of incomplete vehicles	Chapter updated
11.3	Closed/open bodies EU 6EA Light Duty according to WLTP	Chapter updated
11.4	Open bodies EURO VIe Heavy Duty	Chapter updated
11.5	Closed/open bodies EURO VIe Heavy Duty N1, N2	Chapter updated
11.6	Availability ex works EURO VIe Heavy Duty/EU6EA light duty N1/N2/M2	Chapter updated
11.7	Frontal areas for reference masses for EURO VI e Heavy Duty N1, N2	Chapter updated
11.8	ISC parameters for Crafter with light duty and closed body	Chapter updated
11.9	ISC parameters for Crafter light duty single cab and double cab with open body: works platform	Chapter updated
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Converter guidelines
The new Crafter

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www.volkswagen-nutzfahrzeuge.de
www.customized-solution.com

Consulting for body builders in Germany is available from the listed address.

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