Guidelines for car towing services Vehicle with electric drive

Mercedes-Benz • smart

Mercedes-Benz

Table of contents

List of abbreviations

ADR	Accord européen relatif au transport international des marchandises Dangereuses par Route (ADR) – Agreement concerning the International Carriage of Dangerous Goods by Road
BEV	Battery Electric Vehicle (vehicle with a battery as the sole energy storage system)
CCS	Combined Charging System
CFRP	Carbon Fibre-Reinforced Plastic
CNG	Compressed Natural Gas
CTIF	Comité Technique International de prévention et d'extinction du Feu – International Technical Committee for the Prevention and Extinction of Fire
F-CELL	Fuel-CELL (hydrogen-based fuel cell component)
TG	Tempered Glass
HEV	Hybrid Electric Vehicle (vehicle with two drives, electric drive and combustion engine)
HV	Hybrid Vehicle
ICE	Internal Combustion Engine
LPG	Liquefied Petroleum Gas
ISO	International Organisation for Standardisation
LV	Low Voltage
NGD	Natural Gas Drive (natural gas engine)
NGT	Natural Gas Technology
PHEV	Plug-in Hybrid Electric Vehicle (vehicle with two drives, electric and combustion engine, as well as a vehicle power socket for charging the high-voltage battery)
PWA	Progressive Web App
RESS	Rechargeable Electrical Energy Storage Systems
REX	Range Extended Electric Vehicle
SOC	State Of Charge
SRS	Supplemental Restraint System
LSG	Laminated Safety Glass

Dear readers,

Vehicles with alternative drive systems are becoming increasingly popular.
Their population is constantly growing. Whether hybrids, battery electric vehicles or vehicles with fuel cells, there are some special features to consider for all of them when recovering and towing. A key component of these drive technologies are high-voltage energy storage systems and high-voltage power units. Handling vehicles with these drives which have been involved in an accident requires additional measures beyond the familiar handling of conventionally powered vehicles. Therefore, we would like to inform you in this brochure about the safe handling of these vehicles based on typical examples of use in your working environment.

All instructions and procedures described in these guidelines are to be understood as supplementary to the instructions and procedures for handling conventional vehicles. The towing of such vehicles in the case of a breakdown or an accident must always be carried out by a professional towing service. Repair work on high-voltage systems may only be carried out in specialist workshops equipped for this purpose and by persons specially qualified for this purpose. This also applies if high-voltage components are damaged during the breakdown service or you notice other damage to these vehicles.

These guidelines make no claim to completeness and do not replace training or education in the technical and/or specialist knowledge of handling vehicles with alternative drive systems. We assume no liability for the topicality, correctness, completeness or quality of the following instructions. Liability claims against Mercedes-Benz AG relating to (im)material damage caused by the use of any information provided, will therefore be rejected, unless it can be proven that Mercedes-Benz AG acted with intent or gross negligence.

Mercedes-Benz AG
Retail Operations (GSP/ORD)

The digital Mercedes-Benz rescue assistant

Accessing rescue sheets via QR code

Having the right rescue sheet quickly to hand is crucial in the event of an emergency because it shows the location of airbags, stored gas inflators, batteries, high-voltage components and fuel tanks in addition to the position of body reinforcements.
For making sure that you have all this information as quickly as possible, Mercedes-Benz has developed the rescue sticker with QR code. Vehicle-specific rescue sheets for new Mercedes-Benz, Mercedes-AMG, Mercedes-Maybach and smart vehicles can be accessed quickly by scanning a QR code attached to the vehicle. The rescue stickers with QR codes are attached to the inside of the fuel filler cap and the opposite B pillar of the vehicles and also help with clear identification of the drive type.

rk.mb-qr.com

Progressive Web App (PWA)

Rescue personnel can find more information on the Mercedes-Benz digital rescue assistant website: rk.mb-qr.com. The website functions as a progressive web app (PWA) and therefore feels like a native app owing to several useful additional functions, but does not need to be downloaded from the app store. The PWA can be accessed normally via the browser. The PWA can be installed on a device (desktop PC, tablet, smartphone) in just a few steps. Detailed installation information can be found on the website above.

Offline availability of information which is relevant for rescue

Installation of the PWA has the advantage that safety-related information, such as all rescue sheets, can also be accessed offline. As soon as the device gets Internet access again, the PWA is automatically updated. As a result, rescue personnel always have access to the latest information.

1. Identification/recognition

General distinguishing features

Mercedes-Benz AG currently offers vehicles with the following drive types:

ICE – Internal Combustion Engine
The vehicles are divided into the following engine types:
· Petrol engine (Otto engine)
· Diesel engine
· Natural gas engine
Vehicles with the model designation NGT (Natural Gas Technology) and NGD (Natural Gas Drive) are driven by compressed natural gas (CNG).

BEV – Battery Electric Vehicle in the EQ-Class
Vehicles driven solely by a battery-powered electric motor. These always have a connection for charging the battery from an external power supply.

HEV – HYBRID Electric Vehicle
Vehicles with two combined drive types.
The electric drive is coupled with the combustion engine.

PHEV – Plug-in HYBRID Electric Vehicle
Vehicles with two integrated drive types.
The vehicles can be driven both by the battery-powered electric motor and by the conventional combustion engine. They are equipped with a connection for charging the battery from an external power supply.

F–CELL (Fuel-CELL)
Vehicles with fuel cells in which the energy for the engine and the battery is generated through the conversion of hydrogen into electricity. Vehicles in the F-CELL (also referred to as Fuel-CELL) Plug-in HYBRID category are equipped with a connection for charging the battery from an external power supply.

Drive type	Type of energy storage system	Possible energy source
Vehicle with combustion engine	Fuel tank, gas tank	Petrol, diesel, CNG
Hybrid Electric Vehicle (HEV)	Fuel tank, high-voltage battery	Petrol, diesel, electricity
Plug-in Hybrid Electric Vehicle (PHEV)	Fuel tank, high-voltage battery	Petrol, diesel, electricity
Battery Electric Vehicle (BEV)	High-voltage battery	Electric current
Fuel cell electric vehicle (F-CELL)	Hydrogen fuel tank, high-voltage battery	Hydrogen, electricity

Licence number

Depending on the country-specific legislation, the licence number may be marked with an “E” at the end for the following vehicles:

- Battery electric powered vehicle
- Vehicle with electric motor, HYBRID or plug-in hybrid drive
- Vehicle with fuel cell system

During the course of motor vehicle registration in the Federal Republic of Germany, the vehicle owner is not required to apply for an E licence plate and thus identify their vehicle.

Identifying features by drive type

Vehicles with combustion engines

Vehicles which are driven solely by a conventional combustion engine currently account for the majority of road traffic.
There are various Mercedes-Benz hybrid vehicles (HEV, PHEV) that make use of a combustion engines in conjunction with an electric motor.

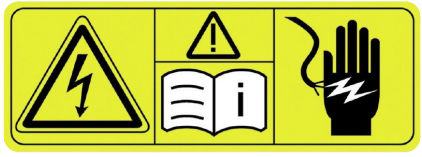
Pictograms

Vehicle with class 1 fuel (diesel)

Vehicle with class 2 fuel (petrol, ethanol, etc.)

Warning sticker

Vehicles with a 48-V electrical system have a warning sticker which pertains to the components in the vehicle which carry high voltage.

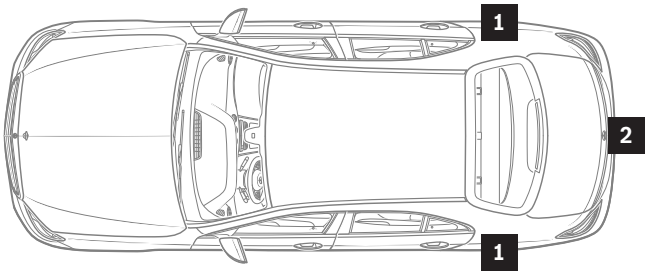


Filler pipe (1)

The filler pipe (1) for petrol or diesel, with an additional filler pipe for AdBlue® where applicable, is located under the fuel filler cap. A sticker with the indication “Premium petrol” or “Diesel” is attached to the inside of the fuel filler cap. The fuel filler cap is located on the left-hand or right-hand side of the vehicle, depending on the vehicle variant.

Type designation (2)

The type designation (2) on the boot lid does not have an “e” at the end. There are no additional designations such as EQ, CNG, NGD, NGT, or F-CELL on the vehicle, either.



1 Filler pipe
2 Type designation

Vehicles with natural gas engines

The natural gas engine is always a dual-fuel design and can be fuelled with natural gas as well as petrol. A natural gas vehicle has both a fuel tank and the gas tank. A Mercedes-Benz vehicle with a natural gas engine can be recognised from the following features:

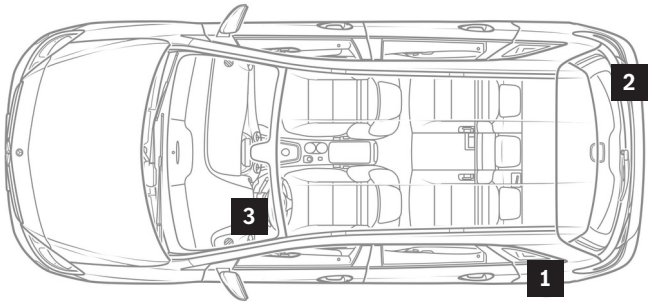
Pictograms

Vehicles fuelled by natural gas

Overview of models

· E-Class saloon, Type 211
· E-Class saloon, Type 212
· B-Class tourer, Type 242
· B-Class tourer, Type 245

The electronic instrument cluster has a separate range indicator for petrol and natural gas operation and the lettering CNG, NGT, or NGD.



1 Natural gas filler pipe
2 NATURAL GAS type designation
3 Electronic instrument cluster display

Vehicles with (plug-in) hybrid drives

Hybrid vehicles (HEV, PHEV) have both a fuel tank and a high-voltage battery pack installed. A Mercedes-Benz or smart vehicle with a hybrid drive can be recognised from the following features:

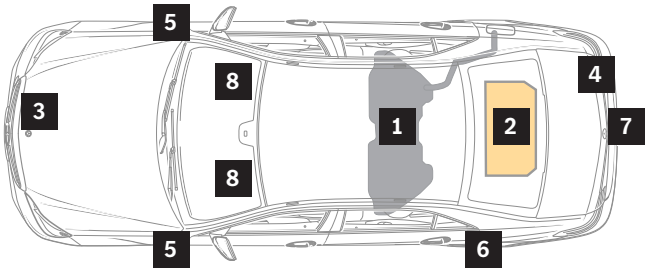
Pictograms

Hybrid electric vehicles with class 1 fuel (diesel)

Hybrid electric vehicles with class 2 fuel (petrol, ethanol, etc.)

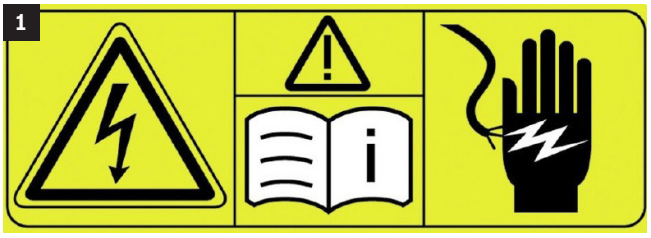
The following variants are possible for the type designation (4): “HYBRID”, “h”, “mild hybrid”, “micro hybrid drive”, “mhd” and “e”.

Depending on the country-specific legislation, the licence number (7) may be marked with an “E”.
There are separate charge indicator/fuel gages on the electronic instrument cluster (8). For vehicles with a plug-in HYBRID drive, there is also a status indicator for the operating status of the vehicle (“Ready”).
Components in the vehicle which carry high voltage are indicated by a warning sticker (3). High-voltage cables have orange insulation.



1 Fuel tank
2 High-voltage battery
3 Warning sticker
4 Type designation (on the boot lid)
5 Badge (on the fenders or front doors)
6 Charging socket cap with charging current supply socket
7 Licence number
8 Electronic instrument cluster display

1



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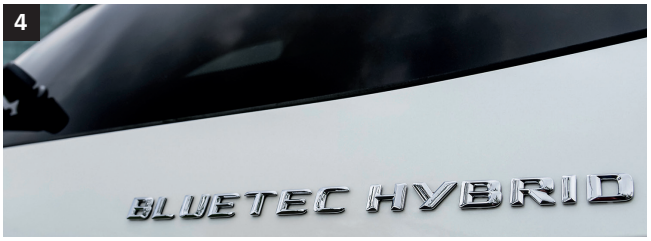


5

6

8

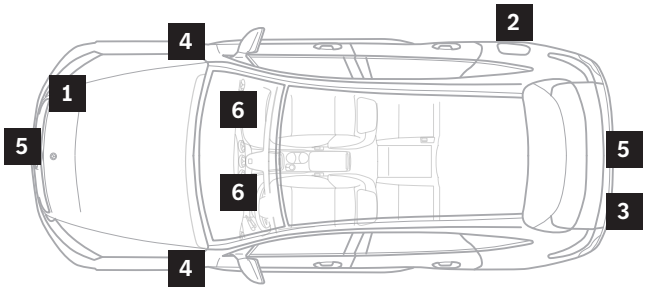
Vehicles with electric drives

Vehicles with electric drives are driven solely by battery electric power. A Mercedes-Benz or smart vehicle with an electric drive can be recognised from the following features:

Pictograms

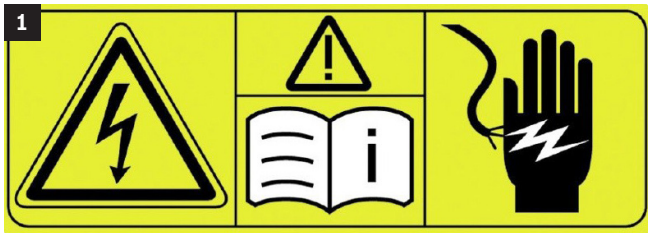
Vehicles with electric drives

Depending on the country-specific legislation, the licence number (5) may be marked with an “E”. Components in the vehicle which carry high voltage are indicated by a warning sticker (1). High-voltage cables have orange insulation. There is a charge indicator and the status indicator for the operating status of the vehicle (“Ready”) on the electronic instrument cluster (6).



1 Warning sticker
2 Charging socket cap with charging current supply socket
3 Type designation (on the boot lid)
4 Badge (on the front fenders)
5 Licence number
6 Electronic instrument cluster display

1

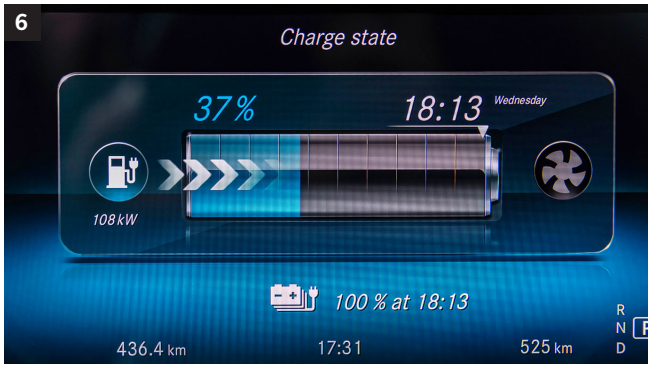


2

3

4

6



Vehicles with fuel cell systems

Vehicles with fuel cell systems are equipped with a hydrogen fuel tank and a high-voltage battery. A Mercedes-Benz vehicle with a fuel cell system can be recognised from the following features:

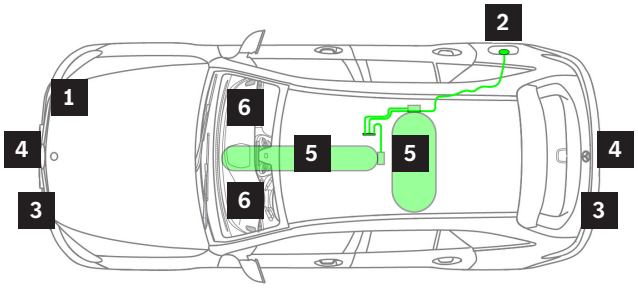
Pictograms

Vehicles with fuel cell systems

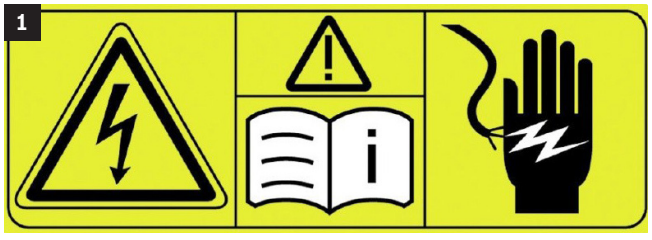
Overview of models

· B-Class tourer, Type 245
· GLC SUV, Type 253

The electronic instrument cluster shows a power availability indicator instead of the tachometer and the status indicator for the operating status of the vehicle (“Ready”) (6). Components in the vehicle which carry high voltage are indicated by a warning sticker (1). High-voltage cables have orange insulation. The following variants are possible for the type designation (3): “EQ”, “f”, “Fuel-CELL”.



1 Warning sticker
2 Cap with charging current supply socket and TN1 filler pipe for hydrogen
3 Type designation (on the boot lid, on radiator grill, or on the front fenders)
4 Licence number
5 Hydrogen fuel tank in the underbody
6 Indication in the Audio/COMAND display



2. Drive concepts

Overview

High-voltage systems in alternative drives

Components in motor vehicles that are supplied with an AC voltage above 30 V or a DC voltage above 60 V are referred to as high-voltage components or high-voltage systems. High-voltage systems are used at Mercedes-Benz in hybrid vehicles ("HYBRID", "h"), in fuel cell vehicles ("F-CELL", "f") and in battery electric vehicles ("E-CELL", "e"). The latter drive variant is also used in smart vehicles.

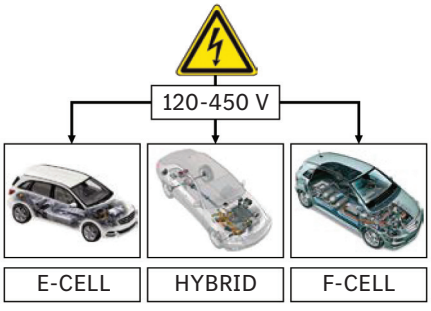
The basic structure of the high-voltage system in the various vehicle types is very similar. Therefore, the derived instructions and measures for towing services are applicable to all electric drive concepts. The QR code below can be used to access an overview of vehicles with alternative drives, which includes all vehicles with electric drives. The overview can also be accessed at: http://rk.mb-qr.com/de/alternative_engines

Note

High voltage in vehicles:

> 30 V AC voltage

> 60 V DC voltage



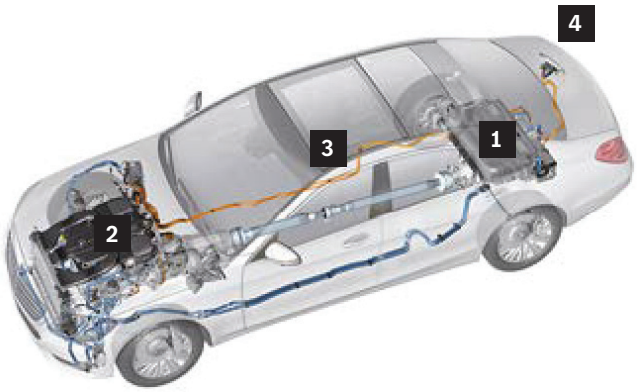
Hybrid vehicles

Overview

There are various Mercedes-Benz series production vehicles that make use of a combustion engine in conjunction with an electric motor. These hybrid vehicles are differentiated according to their share of electric drive power and their range.
The basic design of the drive train is the same as for a conventional vehicle. The electric drive is coupled with the combustion engine and powered by the high-voltage battery.

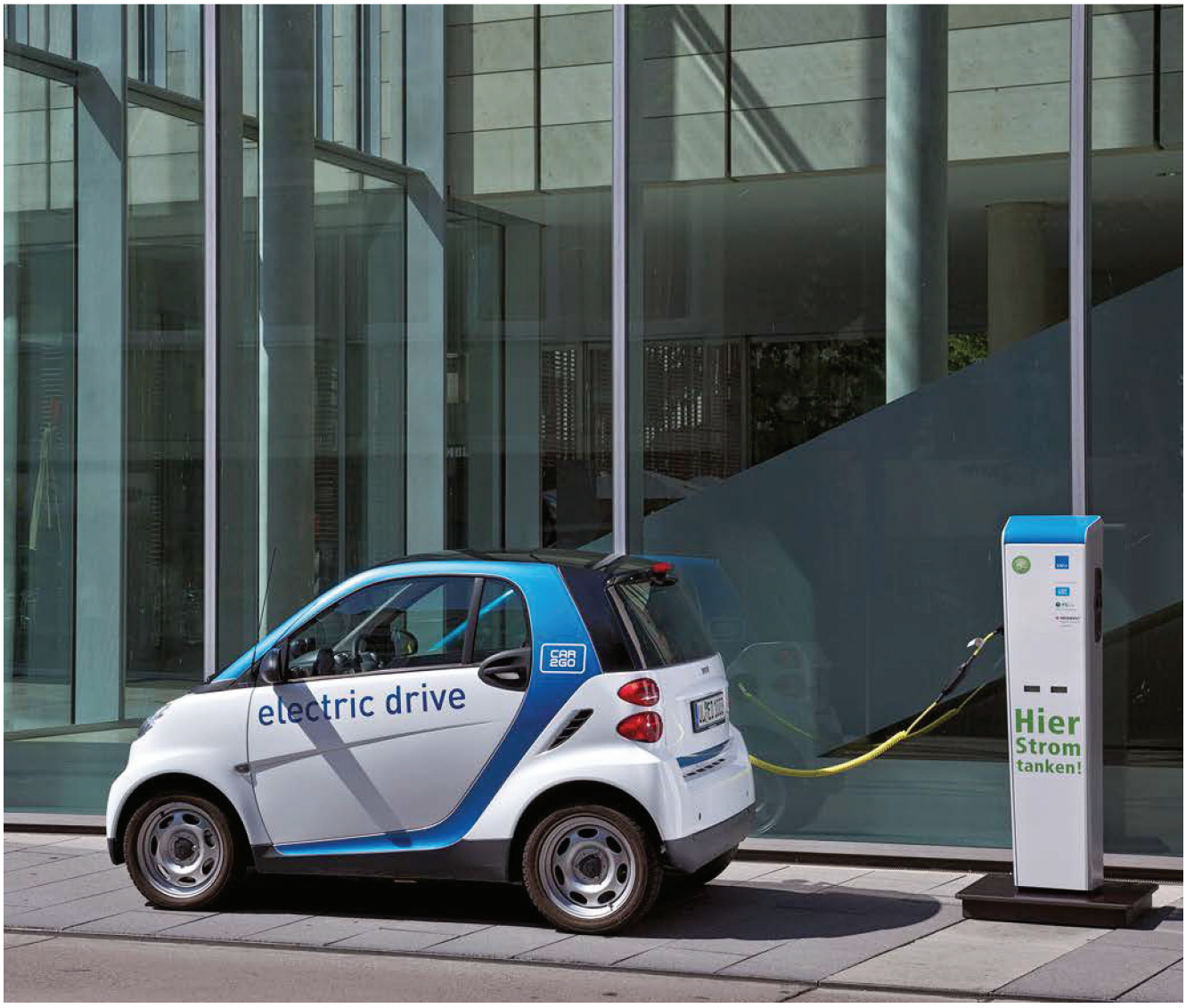
The battery is charged via the generator function of the electric motor by a generator driven by the combustion engine, via a recuperative braking system or also, in the case of the plug-in hybrid, via a charging port. The electric coolant compressor (high-voltage component) and a high-voltage heating element ensure the optimum operating temperature of the high-voltage battery. A description of the high-voltage components can be found in the "Emergency response guide for alternative drives" (ref. p.7).

Note
The installation positions of the high-voltage components of a hybrid vehicle can be found in the vehicle-specific rescue data sheets (ref. p.7).



S500 PLUG-IN HYBRID as an example

1 High-voltage battery
2 Combustion engine and electric motor
3 High-voltage cables (orange)
4 Charging port (plug-in hybrid)


electric drive
Hier
Strom
tanken!

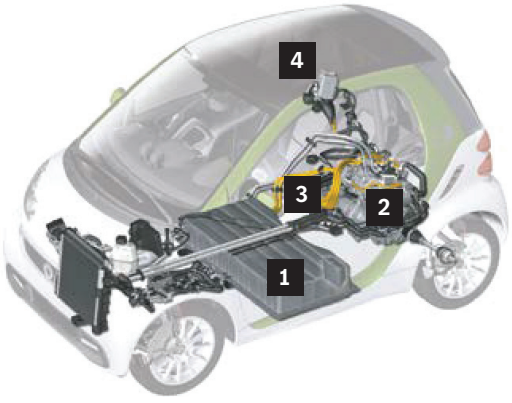
Electric vehicles

Overview

Various vehicles from the Mercedes-Benz and smart brands are powered purely by battery electricity. All of the drive power is generated by one or more electric motors. The high-voltage battery supplies the necessary energy for the drive. It is charged via the charging port and via a recuperative braking system.

In addition to the electric drive motor, other units such as the electric coolant compressor (high-voltage component), the high-voltage heating element and the 12 V battery are supplied or charged. As in a conventional vehicle, the 12 V battery supplies convenience systems (radio, interior lighting, etc.), lighting elements, control units and 12 V units (such as power steering). A description of the high-voltage components can be found in the "Emergency response guide for alternative drives" (ref. p.7).

Note
The installation positions of the high-voltage components of an electric vehicle can be found in the vehicle-specific rescue data sheets (ref. p.7).



smart fortwo Coupé electric drive as an example

1 High-voltage battery
2 Electric motor and transmission
3 High-voltage cables (orange)
4 Charging port

Vehicle identification

Hybrid and electric vehicles

The type designations at the rear of the vehicle, e.g. HYBRID", "ED", "h" (hybrid), "e" (electric vehicle, plug-in hybrid) or "E-CELL" indicate a vehicle with electric drive. Often there are also additional written markings, for example, on the fender. If the vehicle does not have a type designation on the bodywork, a look behind the fuel filler cap or on the B pillar (QR code), in the manual, on markings on the dashboard or on charge indicators/fuel gage in the electronic instrument cluster can provide information about the drive type.
High-voltage components in the vehicle always have a warning sticker. High-voltage cables are orange.

Typical identifying features for hybrid and electric vehicles are:

- Orange high-voltage cables (1)
- Charge indicator in the electronic instrument cluster (2)
- QR code for emergency service (3)
- High-voltage charging port behind the fuel filler cap (elctric vehicle) or in the rear bumper (plug-in hybrid) (4)
- Type plate on the right side of the boot lid (5)
- "BLUE HYBRID", "electric drive" written on fender/A pillar right/left (6)
- High-voltage components with warning sticker (7)
- "electric drive" symbol on the B pillar on the right and left (only on smart)
- No exhaust system (only for electric vehicles)
- Manual

Note
The vehicle-specific identifying features can be found in the respective rescue data sheets (ref. p.7).


1
2
3
A 222 584 31 01
Rescue Card
4
5
BLUETEC HYBRID
E-CELL
6
BLUE HYBRID
7

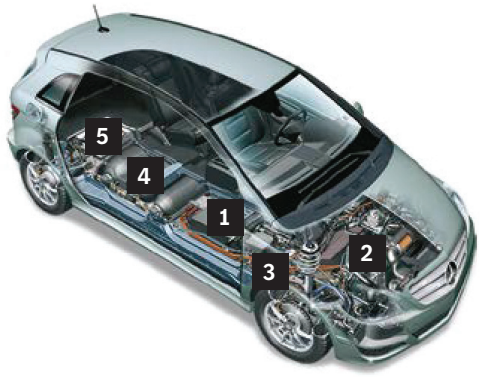
Fuel cell vehicles

Overview

Various Mercedes-Benz production vehicles use fuel cell systems to generate drive energy. In the B-Class, for example, the entire fuel cell system is located on the vehicle floor. Instead of a conventional fuel tank, the cylindrical hydrogen tanks are mounted on the vehicle floor in front of the rear axle.

The fuel cell stack is a highly efficient energy converter that generates the required electrical energy for the electric motor via an electrochemical process.
The high-voltage battery is housed in the boot floor. It stores the electrical energy generated in the fuel cell system and the electrical energy obtained from recuperation.
A description of the high-voltage components can be found in the "Emergency response guide for alternative drives" (ref. p.7).

Note
The installation positions of the high-voltage components of a fuel cell vehicle can be found in the vehicle-specific rescue data sheets (ref. p.7).



B-class F-CELL as an example

1 Fuel cell stack
2 Transmission and electric motor
3 High-voltage cables (orange)
4 Hydrogen tanks
5 High-voltage battery

Vehicle identification

Fuel cell vehicles

The type designations "F-CELL" or "f" at the rear of the vehicle indicate a vehicle with a fuel cell system. If the vehicle does not have a type designation on the bodywork, a look behind the fuel filler cap or on the B pillar (QR code), in the manual, on markings on the dashboard or on charge indicators/fuel gage in the electronic instrument cluster can provide information about the drive type.
High-voltage components in the vehicle always have a warning sticker. High-voltage cables are orange.

The following identifying features indicate that the Mercedes-Benz vehicle encountered at the scene is a vehicle with a fuel cell system:

- Orange high-voltage cables (1)
- Power display in the electronic instrument cluster instead of the tachometer (2)
- Charge indicator in the electronic instrument cluster (2)
- QR code for emergency service (3)
- Filler neck for hydrogen behind the fuel filler cap, marked with a label "H2" (4)
- Type plate on the right side of the boot lid (5)
- High-voltage components with warning sticker (6)
- Hydrogen tank in the underbody area
- Manual

Note
The vehicle-specific identifying features can be found in the respective rescue data sheets (ref. p.7).


1
2
3
A 245 584 02 00
Rescue Card
4
5
F-CELL
6

3. Safety information

High-voltage system

Safety information

All high-voltage components are marked with an appropriate warning sticker to indicate the presence of increased electric voltage. High-voltage cables for supplying components are orange.

Personal protective equipment
Contact with high-voltage components in a vehicle should be strictly avoided. This applies in particular for vehicles which were involved in an accident or have broken down owing to a technical problem.

The following protective measures must be observed:
- Do not touch high-voltage cables (orange).
- Do not sever high-voltage cables (orange).
- Do not touch any high-voltage components with a damaged or broken housing, as these may in principle constitute an electrical risk.

Work on high-voltage components or high-voltage cables may only be carried out in specialist workshops equipped for this purpose and by persons qualified to work on vehicles with high-voltage systems. This also applies if high-voltage components are damaged or found to be damaged during the breakdown service.

Note
The location of the high-voltage cables and the corresponding high-voltage components can be seen in the respective rescue data sheets of the vehicles (ref. p.7).

Preparations

Overview

Securing the vehicle
To remove a vehicle from a directly dangerous situation, e.g. from a highway construction site, a tow bar or tow rope can be used to move the vehicle a short distance. This is to be done no faster than walking speed. At the beginning of the work, the vehicle must be secured against rolling away. To do this, apply the parking brake and activate the parking lock. If necessary, use additional wheel chocks.

Visual inspection
If defects are detected on the high-voltage system, high-voltage components and high-voltage cables should not be touched, as these can always pose a hazard. The exact location of the high-voltage components can be found in the corresponding rescue data sheet (ref. p.7).

In the event of a damaged high-voltage battery
Battery liquids are usually flammable, irritant and corrosive. Therefore, skin contact and inhalation of the vapours must be avoided. If there is any suspicion of "outgassing" of the high-voltage battery, the recovery process must be stopped immediately and the further procedure discussed with the fire brigade. Vehicles with a damaged high-voltage battery should be transported to the nearest specialist workshop or to a safe location.

Safety precautions

Towing or transportation of a vehicle should always be done in accordance with the manufacturer's specifications, see the manual for the vehicle. Towing or transportation of a vehicle should preferably always be done with a flatbed vehicle. The vehicle may otherwise be damaged. This applies in particular for vehicles with automatic transmission, with 4MATIC 4-wheel drive and for hybrid and electric vehicles. The vehicle should be transported in accordance with the applicable guidelines for towing/recovery companies.

Always observe the national regulations/standards during loading and for transportation. Country-specific and/or operator-specific provisions, e.g. tunnel regulations or guidelines for storage in enclosed spaces, must be observed for vehicles with alternative drives in particular. Observe the information in section 2 of the "Guidelines for car towing services" and in the manual for the vehicle.

Removing a vehicle from the danger zone

In principle, removal of the vehicle from the immediate danger zone at walking speed is always permitted.

Always adjust the personal protective equipment as appropriate for the situation.

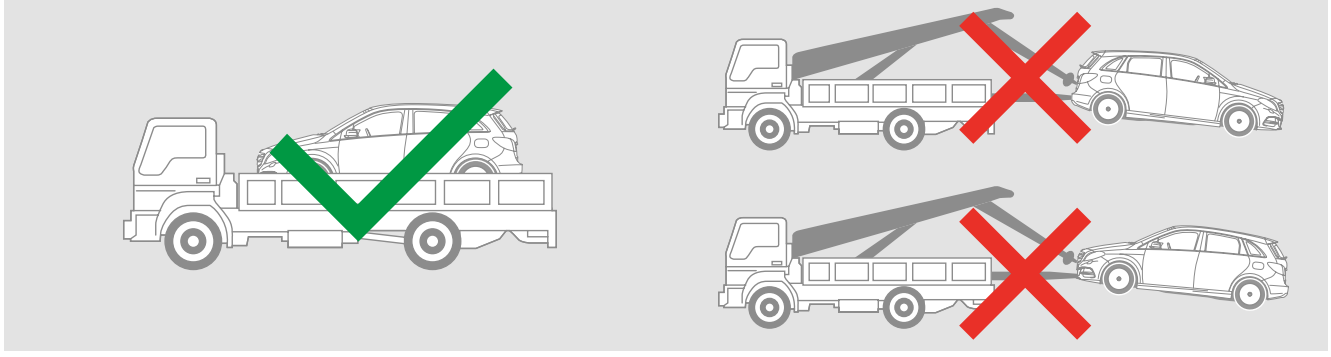
Towing/transportation

Danger

Danger of death owing to electric voltage when towing vehicles with an electric drive.
Do not tow the vehicle by the drive axle. Tow the vehicle with a flatbed vehicle.

Loading of the vehicle onto a tow truck is normally recommended. The limitations in the manual for the vehicle to be towed must be observed when towing with the vehicle in contact with the ground. In the event of electrical system faults, the transmission may be jammed in the “P” position. The electrical system must be supplied with power for a short time in order to switch to the “N” gearbox setting.

Observe the information in the “Guidelines for car towing services”.



Recommendation for loading of a vehicle with a high-voltage electrical system

The subsequent emergency services (e.g. police, tow truck) may only be given access to the vehicle once the high-voltage battery has been demonstrably free from fire, smoke and heat for up to 1 hour. The high-voltage battery must be fully cooled before the subsequent emergency services are given access to the vehicle or it leaves the scene of the incident. Always inform the subsequent emergency services that the battery may reignite.

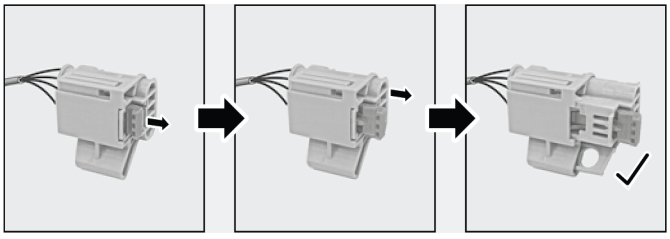
- When handing over the vehicle, e.g. to the authorities, towing/recovery contractor, workshop, or disposal company, they must be informed of the vehicle's drive type and the fire fighting measures taken (e.g. deactivation of the high-voltage electrical system). In particular, they must be informed of a possible risk owing to damaged high-voltage components or high-voltage components which have come into contact with water (e.g. electric shock or fire risk, even delayed, from the high-voltage battery).
- The national provisions/standards (in Germany: DGUV Information 214–010 and DGUV Information 205–022, DGUV Information 200–005 and DGUV Information 214–081, as well as the provisions of the Accord européen relatif au transport international des marchandises Dangereuses par Route (ADR) – Agreement concerning the International Carriage of Dangerous Goods by Road) must be observed for loading and transportation.
- The towing/recovery contractor must ensure road safety during transportation, taking the measures which have already been taken and the extent of the damage to the vehicle into consideration. Attention must be paid to possible risks owing to damaged high-voltage components (e.g. electric shock or fire risk owing to the high-voltage battery).
- When lifting with a crane/jack, working with a winch, or loading, care must be taken to ensure that no high-voltage components are or become damaged.

Deactivation

High-voltage system

The following is recommended for the manual deactivation of the high-voltage system:

1. Remove the ignition key, for KEYLESS-GO remove the transmitter from the vehicle.
2. Operate the respective manual high-voltage disconnect device to deactivate the high-voltage electrical system.
3. Disconnect the 12 V battery(ies). (More detailed information is provided in the "Guidelines for car emergency services for Mercedes-Benz vehicles", ref. p.7).



S-Class HYBRID saloon as an example

Deactivation

High-voltage system

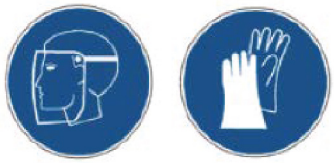
In the event of serious accidents

When one of the restraint systems (airbag or seat belt pretensioner) is triggered, the high-voltage system is automatically switched off and discharged in less than 5 seconds. This means that there is no risk of electric shock for either the emergency service or the occupants. In addition, two manual high-voltage disconnect devices are installed in all high-voltage vehicles of the Mercedes-Benz and smart brands. The vehicle-specific location and operation of the manual disconnect devices can be found in the respective rescue data sheets (ref. p.7).

The manual disconnect device should be preferred over the alternative manual disconnect device because the alternative disconnect device mechanically and irreversibly cuts cables. Whereas the manual disconnect device can be reset at any time. Owing to the wide range of damage scenarios, it is not possible to directly indicate the absence of voltage after an accident. Therefore, before starting work on vehicles involved in an accident and defective vehicles, it is recommended to deactivate the high-voltage system manually via the high-voltage disconnect device in addition to switching off the ignition.

Personal protective equipment

For work on the vehicle in the context of recovery and towing work, especially with damaged high-voltage components, it is recommended to wear personal protective equipment. This should consist of oil and acid-resistant electrician's gloves, a face protection and an arc-fault jacket.



Deactivation

High-voltage system

In the event of minor accidents

In the event of minor accidents in which the restraint systems have not been triggered, or when the vehicle is parked, it cannot automatically be assumed that the high-voltage system is deactivated. Some vehicles have functions in which the high-voltage system can be active when the ignition is switched off. This is the case, for example, in charging mode or with programmable parking climate control.

Note
The ignition must always be switched off before operating the high-voltage disconnect device.

Before starting work on damaged vehicles or in the vicinity of high-voltage components, it is recommended to deactivate the high-voltage system using the manual high-voltage disconnect device. This disconnect device is a 12 V disconnection point and can also be operated by non-specialised high-voltage expert. The high-voltage energy storage system is disconnected from the high-voltage energy system, but not discharged.

Note
Regardless of the method of disconnection, the high-voltage battery remains charged after the high-voltage system is deactivated.

Deactivation

Hydrogen system

The hydrogen system operates at pressures of up to 700 bar. In the event of an accident in which a restraint system is triggered, all gas valves are closed mechanically, thus stopping the gas supply.

Overpressure protection
In the event of a hydrogen pressure regulator malfunction in the fuel system, the overpressure valve opens and allows the hydrogen to escape into the open air via the discharge line. The overpressure valve opens from a pressure of approx. 16 bar. The protective cap on the outlet opening of the discharge line is ejected by the pressure of the escaping hydrogen.

Overtemperature protection
A shut-off valve with integrated overtemperature protection is fitted to each hydrogen tank.
The overtemperature protection prevents the hydrogen tanks from bursting when exposed to heat. The overtemperature protection opens at temperatures of > 110 °C and allows the hydrogen to escape in a controlled manner via the discharge line.

Deactivation

Hydrogen system

Discharge line of the high-pressure tanks
The discharge line leads from the three shut-off valves of the tank system to the rear. The outlet opening is located at the rear centre of the mounting frame of the hydrogen tanks and is closed with a protective cap. The discharge of gas may temporarily result in large explosive flames. This may occur multiple times one after another.

Hydrogen burns colourlessly, so that it may not be possible to detect the explosive flames. A detached protective cap on the outlet opening may indicate that hydrogen was or is being discharged to the outside via the discharge line. Also pay attention to loud noises of escaping gas (“hissing”) which are caused by gas escaping under high pressure.

Note
Be especially careful of gas discharge from vehicles that are on their roofs.

4. Procedure at the scene

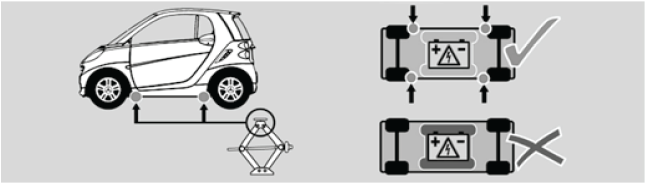
Breakdown service for stranded vehicles

Measures

Fast charging
In vehicles with electric drive, the 12 V vehicle electrical system battery can be charged in the same way as with conventional drives. In some hybrid series, this allows the high-voltage battery to be charged until it is ready to start (see respective manual). The high-voltage battery of electric vehicles or plug-in vehicles can only be charged via a corresponding charging infrastructure.

Jump starting
If a vehicle with electric drive is to jump-started, the provisions of the vehicle-specific manual must be observed, as for vehicles with conventional drives. The jump-starting aid is given to the 12 V battery. In addition, for vehicles with electric drives, the electric drive may not be available for about 30 minutes for vehicles that have been jump-started.

Flat tire
When lifting the vehicle, care must be taken to ensure that the jack is attached to the correct attachment points. The attachment point must not be in the direct vicinity of high-voltage components, especially the high-voltage battery. On vehicles with fuel cells, the jack must not be positioned in the area of the hydrogen tanks. Information on the location of the critical components and the correct attachment points can be found in the rescue data sheet and the manual of the respective vehicle.



smart fortwo Coupé electric drive as an example

Recovery

General

If a vehicle has to be recovered with the aid of a winch, no high-voltage components may be located in the area of the attachment points. The same applies when lifting with a jack or loading crane.

Water recovery

In order to safely handle a vehicle with electric drive that is completely or partially submerged in water, the high-voltage system and the airbags should be deactivated as soon as possible.

Note

The towing eye is not suitable for recovering vehicles!

Recommended procedure:

- Retrieve the vehicle from the water
- Remove the ignition key, for KEYLESS-GO remove the transmitter from the vehicle
- Operate the respective high-voltage disconnect device to deactivate the high-voltage electrical system
- Disconnect the 12 V battery(ies) (more detailed information is provided in the "Guidelines for car emergency services for Mercedes-Benz vehicles", ref. p.7).

The high-voltage system generally does poses no increased risk of electric shock compared to a hybrid or electric vehicle on land.

Parking vehicles

At the charging station

The high-voltage system of vehicles with electric drive can also be active when the vehicle is stationary. This applies firstly during the charging process at a charging station (electric vehicles and plug-in hybrids) and secondly if certain vehicle systems are activated when the vehicle is stationary, such as the stationary air conditioning.

The following procedure is recommended for breakdown service, recovery or towing of parked cars at charging stations:

1. Visually check if the charging cable, the charging station or a plug are damaged
2. Unlock the vehicle with the key
3. If possible, remove the charging cable from the charging station
4. Remove the charging cable from the vehicle
5. Deactivate the high-voltage system (see page 23)

If the charging station's cable cannot be disconnected from the vehicle, support can be requested via the hotline noted on the charging station.

5. Removal

Towing/towing equipment

Specifics

In vehicles with electric drive, towing via the drive axle may generate voltage in the high-voltage system. Therefore, towing on the drive axle is only permitted under certain conditions. Further information on this can be found in the vehicle-specific manual.

Towing protection
Some Mercedes-Benz vehicles are equipped with towing protection. If the inclination of the vehicle changes, a visual and audible alarm is triggered when the towing protection is switched on. This may be the case if the vehicle is lifted on one side, for example.

This alarm can be deactivated when the vehicle is unlocked with the key. Instructions for deactivating the towing protection can be found in the manual of the respective vehicle.

Steering wheel lock
The instructions in the manual must be observed when towing vehicles with steering wheel lock. If the vehicle is transported with the rear axle raised, the front wheels must be straight. If the steering wheel lock is not to engage during towing, the key may remain in the ignition lock.

Towing eye
Before towing vehicles using a tow rope or tow bar, the towing eye must be screwed in. Information on the position of the screw-in points and the stowage location of the towing eye can be found in the manual.

Note
The towing eye is not suitable for recovering vehicles!

Towing strategies

Tow truck or second car

Towing with a tow truck

In principle, it is recommended that the vehicle be loaded onto a tow truck or towed with the drive axle raised. After loading onto a flatbed vehicle, the vehicle can generally be transported without restriction to the nearest specialist workshop and handed over there. The usual safety measures for transporting an (unroadworthy) vehicle must be observed.

The limitations in the respective manuals for the vehicle to be towed must be observed when towing with the vehicle in contact with the ground. Towing with the drive axle raised and the non-driven wheels in contact with the ground is always permitted.
Towing with ground contact of the wheels of the drive axle is permitted only under the following conditions:

- The electronic instrument cluster is functional.
- There is no electronic instrument cluster display for a towing ban.
- The high-voltage system is intact.
- No restraint system was triggered.

When towing a vehicle with electric drive whose wheels of the drive axle are in contact with the ground, the ignition should be switched on.

Towing strategies

Tow truck or second car

The respective national rules and regulations for loading and transportation must be observed. In Germany, these are:

· BGI 800
· BGI 8664
· BGI 8686
· BGI 5065

The towing company must ensure the road safety of the transportation. Vehicles with electric drives are not generally subject to the rules of the ADR during transport. Country- and operator-specific tunnel regulations must be observed.

Towing with a second car

Towing with a second vehicle is only permitted if this is allowed in accordance with the vehicle-specific manual, if the high-voltage system is not damaged, if the electronic instrument cluster is functional and if no display for a towing ban is shown. The guideline value for the permissible towing distance is a maximum of 50 km with a maximum speed of 50 km/h.

Note

Removal of a vehicle from the immediate danger zone is always permitted.

Parking of the vehicle

Storage

Various measures must be taken to safely park a vehicle that has been involved in an accident. If the vehicle is brought to a workshop, the responsible specialists must be informed about the measures which have already been taken (e.g. high-voltage disconnect device has been actuated). Before the vehicle is parked, it must be inspected for possible damage, heat development, odour development and electrolyte leakage, as the residual risk of delayed fire development cannot be ruled out, as in the case of conventional vehicles involved in an accident. This applies in particular to damaged high-voltage batteries, and the same applies to the storage of the vehicle. In the event of smoke development or a fire, the fire brigade must be notified immediately. If liquids leak from the high-voltage battery, a metal collection container should be placed underneath.

The vehicle must then be parked as follows:

- Park the vehicle in an open area with sufficient distance (> 5 m) to other vehicles and buildings.
- Remove the ignition key, for KEYLESS-GO remove the transmitter from the vehicle.
- Operate the respective high-voltage disconnect device to deactivate the high-voltage electrical system
- Disconnect the 12 V battery(ies). (More detailed information is provided in the "Guidelines for car emergency services for Mercedes-Benz vehicles", ref. p.7).
- Secure the open area against access by unauthorised persons and mark it with locally valid warning signs indicating the danger of the accident vehicle (e.g. high voltage).

Legal notice

You can also find detailed information about our complete product portfolio on our Internet portal:
aftersales.daimler.com

Questions, comments and suggestions

If you have questions, comments, or suggestions regarding this product, please write to us.
E-mail: rescue-assist@daimler.com