AH54.10-P-0001-01A	Notes on battery		

Model all

Modification notes

14.08.2019	Document contents updated.		

The following battery types can be installed as standard in Mercedes-Benz cars, cross-country vehicles, vans, trucks, Unimogs, buses, and smart brand vehicles:

- Lead-acid battery with free electrolyte in the following versions:
  - Conventional lead-acid battery with free electrolyte
  - Maintenance free lead-acid battery with free electrolyte
- VRLA lead-acid battery (**V**alve-**R**egulated **L**ead-**A**cid) with bound electrolyte in the following versions:
  - AGM (absorbent glass mat) fleece battery
  - Gel battery
- 12 V lithium-ion battery
- 48 V lithium-ion battery
- High voltage lithium-ion battery

General information on all types of lead-acid batteries

- Do not place any tools or other conducting objects on the battery (risk of short-circuit).
- To prevent unintentional sparking, turn off all switchable current consumers and switch off the engine before removing and installing lead-acid batteries.
- Always **disconnect the negative terminal first** and always **connect the positive terminal first** .
- Switch on charger only after connecting it to the positive/negative pole and switch off before disconnecting it.
- When charging lead-acid batteries, a highly-explosive oxyhydrogen gas mixture can occur, therefore, fire, sparks, naked flames and smoke are prohibited. Avoid any sparking when handling cables and electrical devices. The relevant documentation on the topic in WIS, TIPS, EVA and, where applicable, country-specific sources must be observed before starting work.
- When quick charging, make sure that the battery housing does not heat up too much, otherwise damage may occur.
- If the battery is to remain in a parked vehicle for an extended period, disconnect the negative terminal. High-voltage vehicles are excepted.

General information on all lithium-ion batteries

- If there is an acute risk of smoke, fire, heat development, electrolyte leakage (visible/smellable) on a lithium-ion battery, send an emergency call immediately to the relevant location and country-specific emergency call number. Do not touch lithium-ion batteries and clear the hazard area.
- A qualification is required for handling lithium-ion batteries. The required qualification can also be obtained from Mercedes-Benz Global Training. Your local MPC can notify you whether or not additional country-specific directives and legislation require any further special agreements/instructions.
  For work involving lithium-ion batteries, the necessary protective measures must be observed before starting work in accordance with the country-specific directives and legislation. The corresponding qualifications/instructions as in accordance with the relevant documentation on the topic in WIS, TIPS, EVA, XENTRY Diagnosis and, where applicable, any country-specific sources must be conducted before starting work and during work.
  The protective measures or personal protective equipment (PSA) required are available in the respective documentation on the topic in WIS, TIPS, EVA and, where applicable, country-specific sources and they must be determined before starting work.

General information on all battery types

- Do not expose battery to fire or heat (battery cell temperature not > 80 °C/176 °F).
- Do not expose batteries to any mechanical pressure. There is a risk of short circuits, leakage, overheating, and fire/explosion.
- Batteries must not be damaged or modified in any way.
- Insert batteries in correct manner only. Improper use may result in leakages, electrolyte smoke gas evaporation, fire or explosion.
- Do not store batteries over a longer period at a storage point with direct solar radiation.
- Do not connect batteries the wrong way round or short circuit them under any circumstances.
- Do not disconnect battery clamps or plug couplings when under load. If, after improper disconnection under load, any sparking is generated, the battery terminals, battery clamps or plug couplings must be checked for damage and any damaged ones must be replaced.
- Check to ensure that the degassing system/electrolyte openings are not improperly sealed, and check that the corresponding fixtures for dissipating the gas/electrolyte are connected correctly.
- Discharged or defective batteries can freeze, therefore store free from frost.

Information on lead-acid batteries with free electrolyte

- Always store or install lead-acid batteries with free electrolyte in horizontal position to protect against electrolyte leakage and do not tilt during transportation. This also applies to lead-antimony batteries.

Information on VRLA lead-acid battery with bound electrolyte (gel-type battery or AGM fleece battery)

- The lead-acid battery is maintenance free.
- The lead-acid battery is leakproof.
- The lead-acid battery has a pressure relief valve that opens outwards when the battery internal pressure is too high due to gas generation.

- Lithium-ion batteries always contain high electrical and chemical energy. It must therefore be ensured that all requirements for handling, storage and transport are observed.
- The lithium-ion battery is hazardous material and it is classified in accordance with the international dangerous goods regulations as: UN 3480 lithium-ion battery.
  The storage and transportation of lithium-ion batteries is contingent not only on the specifications listed here, but also any applicable differing country-specific directives and legislation.
- Before storing or transporting any lithium-ion batteries their ability to be stored or transported safely must be assured. When determining if storage/transport safety is given, the relevant documentation on the topic in WIS, TIPS, EVA, XENTRY Diagnosis and, where applicable, country-specific sources must be observed.
- Various type-specific safety containers are available for storage/ transportation of all lithium-ion batteries. These can be requested from the Global Logistics Association (GLC).
- Removed lithium-ion batteries may not be cleaned using the high pressure cleaner.

- If an acute danger on the lithium-ion battery can be ruled out, any lithium-ion battery in the vehicle diagnosed to be unsafe for transportation may only be removed after consulting first with the MPC in charge. Until the lithium-ion batteries are removed when outdoors, the vehicle is to be parked at a sufficient distance (> 5 m) from other vehicles and buildings.
- The battery housing of the lithium-ion battery must not be opened.

Lithium-ion batteries in the workshop

- Lithium-ion batteries that are safe to transport can remain in the workshop until they are reinstalled. The fire protection measures in the workshop apply.

Requirements for storage spaces and containers for all lithium-ion batteries

Generally, the requirements listed here apply to storage spaces and containers for lithium-ion batteries. Deviating requirements from country-specific directives and laws must be observed.

The requirements with regard to storage depend on the condition of the battery as indicated in the analysis sheet for assessing transportability. A differentiation is made between:

- Storage of lithium-ion batteries that are damaged or not safe for transport.
- Storage of lithium-ion batteries that are safe-to-transport and not damaged.

A differentiation is made in terms of fire protection requirements between batteries that are safe to transport and undamaged as follows:

- Storage with a sprinkler system
- Storage without a sprinkler system

Storage of lithium-ion batteries that are not safe to transport or damaged

- Once an acute hazard has been ruled out, damaged or non-transportable lithium-ion batteries must be moved outdoors.
- The requirements on the storage area for non-transportable or damaged lithium-ion batteries are:
  - The area is outside the building.
  - Weather protection (roof) may not be required where a quarantine/secure container or secure area is used.
  - Store at a distance of > 5 m from buildings or combustible materials. If a distance of > 5 m cannot be maintained, a fire-resistant wall may then be erected (F90).
  - *Fluid impervious floor or surface or collection bowl must be given.*
  - *In Germany, the requirements of the VAwS regulation (requirements on leak tightness as well as test requirements on sealing surfaces) are also taken into consideration.*
  - *The storage of fire-extinguishing water (as per LöRüRL) must be regulated on a location-specific basis.*

General information on the transportation of all lithium-ion batteries

Generally, the requirements listed here apply for the transportation of lithium-ion batteries. Deviating requirements from country-specific directives and laws must be observed.

Valid means of transport: Road (ADR).

Lithium-ion batteries may only be transported in compliance with the international and national dangerous goods regulations applicable for each particular mode of transport.

Each lithium-ion battery must be checked at the workshop with regard to its suitability for transport. Transportation safety is to be confirmed with a valid evaluation protocol. Faulty or damaged batteries are deemed unsuitable for transport if the following apply in connection with transportation:

- A hazardous increase in heat is possible.
- Lithium-ion battery fires or short circuits may be caused.
- In any other manner a hazard may exist, e.g. through release of liquid electrolyte or combustible, caustic or hazardous fumes.

Information on 48 V batteries (lithium-ion batteries)

- Battery change: Once any acute hazard is ruled out, the old lithium-ion battery is removed and it is then stored/transported in accordance with the transport safety rating. The new lithium-ion battery remains in the workshop until it is installed.

Storage of lithium-ion batteries that are safe to transport in storage areas fitted with sprinklers

The following requirements must be taken into consideration when storing lithium-ion batteries in storage areas fitted with sprinklers:

For open storage:

- Storage at a distance of 2.50 m from other storage materials. Alternatively, installation of a partition wall made of non-combustible materials.
  The partition wall must protrude above the mounting height of the adjacent mounting by at least 1 m.
- Divided storage areas with a maximum area of 150 m².
- Maximum storage height 1.60 m.
- Configuration of roof protection water application in accordance with respective applicable basis of assessment for sprinkler systems with regard to storage of hazardous materials as per UN3480.

For shelf storage:

- Storage in protected shelves with regard to storage of hazardous areas in accordance with UN3480.

Storage of safe-to-transport lithium-ion batteries in other instances

If a sprinkler system is not available, then fire protection requirements require that lithium-ion batteries be stored in the manner described below:

- In fire-resistant separated areas or hazardous substances cabinets (F90). No other combustible materials may be stored there.
- If there is no fire-resistant separated storage area available, storage can take place outside the building at a distance of > 5 m to other construction-related systems. If a distance of > 5 m cannot be assured, a fire-resistant wall can be erected (F90) (case-by-case consideration).
- The following must still be observed for storage outside the building:
  - Presence of weather protection (roof) to protect against wet or direct sunlight.
  - *Floor or underground to be impermeable to fluids or collection bowl.*
  - *In Germany, the requirements of the VAwS regulation (requirements on leak tightness as well as test requirements on sealing surfaces) must also be taken into consideration.*
  - *The storage of fire-extinguishing water (as per LöRüRL) must be regulated on a location-specific basis.*

Transporting lithium-ion batteries that are not safe to transport

i Lithium-ion batteries that are not deemed to be safe to transport are not allowed to be transported without special authorization (required for each specific individual case).

In all cases, the responsible MPC must be contacted immediately, and temporary storage as per the information on the handling and storing of batteries that are not safe to transport must be provided on site.

Transporting lithium-ion batteries that are safe to transport

Lithium-ion batteries that are safe to transport may only be transported in the new battery's original packaging.

All requirements with regard to flawless condition of the packaging, sealing of the packaging, the identification of the packaging as per the relevant dangerous goods regulations, as well as additional requirements with regard to transport must be observed.

i A shipment must be conducted or authorized by a qualified logistics staff member.

Additional information on transport is available at:
http://gms.aftersales.daimler.com

48 V components, that exhibit internal (contact protected) voltages

- A 48 V connector may only be unplugged in de-energized state. The 48 V on-board electrical system is de-energized if the 12 V battery is disconnected for longer than 10 s.
- A discharged 12 V lithium-ion battery can be charged by the 48 V on-board electrical system. This recharge function is stopped 10 s after disconnecting the 12 V ground line. When replacing the 12 V battery, **wait for 10 s before disconnecting the positive line**.
- The 48 V lithium-ion battery is not connected directly when charging is conducted externally, but charged through the 12 V on-board electrical system using a given/approved 12 V charger.
- If a jump start is required, the external voltage source is to be connected as usual to the jump-start connection point. A brief period must however then be allowed until the 48 V battery is charged far enough to enable an engine start to be made (3 to 4 minutes).

- above the contact protection limit, are to be labeled with appropriate hazard symbols. These components may not be opened and in the event of any damage or if there are any exposed parts conducting current, a voltage supply (e.g. engine running) is not permitted.
- After an irreversible crash switch-off situation, the restart procedure may only be conducted after thoroughly checking the complete 48 V on-board electrical system.
- 48 V ground lines (circuit 41) are to be connected to their own ground bolt separate from the 12 V ground lines.
- 48 V ground lines (circuit 41) are brown/violet.
- With 48 V positive lines (circuit 40), the same rules apply as for 12 V positive lines (red with additional color).

Information on high voltage lithium-ion batteries

When handling/working on high voltage lithium-ion batteries, the qualification and protective measures for working on high voltage on-board electrical systems are also essential. The qualification and safety measures required are available in the relevant documentation on the topic in WIS, TIPS, EVA, XENTRY Diagnosis and, where applicable, country-specific sources.