



# Technical quarantine areas for damaged vehicles with lithium-ion batteries

Leaflet

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The content of this leaflet agrees completely with the following pages of the „*Technical quarantine areas for damaged vehicles with lithium-ion batteries*“, as of August 2022, issued by: Verband der deutschen Automobilindustrie e.V. und Verband der Internationalen Kraftfahrzeugehersteller e.V..

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**Technical and Scientific Advisory Board (TWB)  
of the Association for the Promotion of German Fire Protection e.V.**

**P.O. Box 4967, 48028 Münster**

# Technical quarantine areas for damaged vehicles with lithium-ion batteries



# Technical quarantine areas<sup>1</sup> for damaged vehicles with lithium-ion batteries

## Preliminary remarks and disclaimer

This document was developed and coordinated in a joint project group of the institutions and associations listed at the end of the document.

Lithium-ion batteries in the sense of this document are high-voltage batteries based on lithium-ions used in vehicles with battery-electric drives with a nominal voltage  $\geq 60$  and  $\leq 1000$  V.

It answers typical questions on the design of technical quarantine areas that arise when handling vehicles with damaged lithium-ion batteries, gives recommendations and reflects the state of the art at the time the document was prepared. In case of doubt, the respective manufacturer's specifications apply. Information can also be found in operating manuals and/or operating instructions as well as in the vehicle-specific rescue data sheets.

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The present document is non-binding. In individual cases, other safety precautions that do not comply with these technical specifications or guidelines can also be accepted in consultation with the respective property insurer.

Cover image:

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<sup>1</sup> also called "secured resting area" at the BG

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# 1.Introduction

A technical quarantine area is intended to park a vehicle with a potentially damaged lithium-ion battery in such a way that, in the event of a vehicle fire breaking out with delay, it can be prevented from spreading to neighboring objects (vehicles, buildings, vegetation, etc.). At the same time, possible risks to the environment from any operating materials that may escape from the battery are avoided. The quarantine area is not intended to prevent fire, but to stop it from spreading.

**The following document contains the description of such a technical quarantine area for vehicles of the EC vehicle classes M1 and N1.**

## **2. Indicators of an increased risk from a potentially damaged lithium-ion battery**

**These are for example:**

- Reports of faults in the high-voltage (HV) system in the driver's display on the dashboard/panel (orange or red warning light), possibly warning notices on the instrument panel
- Severe damage, especially in the battery area. An assessment of the damage/detection of the damaged area can be made based on the rescue data sheet of the vehicle.
- Underbody damage, such as intrusion and/or deformation
- Deployed airbags
- Steady increase in temperature or greatly increased temperature ( $> 60^{\circ}\text{C}$ ) of the battery, unusual aromatic smell, leakage of liquids or smoke from the housing (the fire brigade must be alerted immediately)
- If necessary, battery diagnosis for risk assessment according to manufacturer specifications

**A significantly delayed ignition of such a vehicle is also possible!**

## 3. Technical quarantine areas

### 3.1 Basics

Setting up and maintaining a technical quarantine area is necessary when handling electric vehicles with a potentially damaged lithium-ion battery.

To minimize risk, the e-vehicle will be kept safe until it is picked up or processed. This can be several days.

The vehicles concerned must be parked in a paved parking area - the technical quarantine area – with sufficient distance to protect buildings, other vehicles, sources of danger or combustible materials.

E-vehicles that have been damaged or involved in an accident potentially also affecting the battery, pose a fire hazard due to their different, generally delayed, cyclic fire behavior and should therefore not be permanently parked in garages or workshops.

These e-vehicles are to be parked outside separately, see appendix for details.

**In analogy to vehicles with conventional drive systems, the following is also recommended for vehicles with lithium-ion battery:**

- Protection against access by unauthorized persons
- Secure the vehicle against rolling away
- If the company is located within a water protection area/drinking water protection area, the local lower water protection authority must be contacted. In this case, the area must be sealed and measures to retain extinguishing water must be set up or provided.
- The local official building regulations must be observed.
- It may be necessary to have access to the fire brigade and set-up areas in accordance with DIN 14090 Areas for the Fire Brigade on Properties or the locally applicable building regulations.
- The extinguishing water supply must be coordinated with the local department responsible for fire protection.
- A fire brigade plan for the physical structure with a depiction of the quarantine area in accordance with DIN 14095 Fire Brigade Plans for Physical Structures may be required.
- Fire protection regulations (e.g. according to DIN 14096 Fire Protection Regulations - Rules for Drafting and Placarding) must be drawn up, in which the measures for handling e-vehicles with potentially damaged lithium-ion batteries are specified. Employees must be instructed regularly on how to implement these measures and how to behave in the event of a fire.

## 3.2 Design

**The following conditions have proven to be most suitable for technical quarantine areas:**

- Outdoor location (in the open air), due to possible fire development and outgassing of the energy storage device
- Subsoil with non-combustible and sealed surfaces such as asphalt <sup>2</sup>, concrete or clinker surfaces with a drainage connection, to catch escaping operating materials or to retain contaminated extinguishing water and rainwater
- Marking of e-vehicles and quarantine area (DGUV requirement)
- Possibly collection trays for any leaking operating materials (e.g. coolants containing glycol)
- Prohibit smoking and other sources of ignition
- Usual **floor space required** for vehicles alone (length x width) - without surrounding area, for instance
  - M1/N1: 5.0 m x 2.5 m
- Observance of the technical specifications for the parked e-vehicle by the vehicle manufacturer or information from the vehicle-specific rescue data sheet.
- Without additional fire protection measures, a **minimum** distance of 5 meters to combustible objects / other vehicles etc. must be maintained from the parked e-vehicle.
- This 5 m distance recommendation is derived from the model building code (MBO) §30, as of September 25th, 2020, and applies in the event that a direct or immediate fire spread/fire flashover is not assumed.
- The specified distances to buildings are guideline values. In individual cases, other distances or other regulations may be necessary to ensure adequate fire protection (heat radiation, impact on buildings, walls made of combustible building materials). It is recommended to coordinate this with the property insurer (fire insurance) if necessary.
- Marking with black and yellow (permanent)/red and white (temporary) chains or black and yellow/red and white warning tape and marking of the vehicle indicating a damaged e-vehicle with a potentially damaged lithium-ion battery, see also Workplace Rules (ASR) 1.3.
- It is recommended to provide training/instructions for the operating personnel, including any security service.
- Further information on the parking and storage of lithium-ion batteries can also be found in ASR 2.2 and VdS 3103.
- Attention must also be paid to the sufficient qualification of the employees in accordance with DGUV<sup>3</sup> Information 209-093 and DGUV Rule 103-011. Further qualification for safety-critical battery technologies must be sought.

If no area meeting the fire protection requirements is available on the premises, alternative operating concepts for a quarantine area must be provided.

Examples of this are fire containment blankets/protective blankets, suitable mobile barrier walls (in each case at least in fire-retardant design/analogous to F30), automatic fire extinguishing systems e.g. sprinkler systems, suitable containers with sufficient ventilation/compressed gas relief, etc. (also see appendix).

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<sup>2</sup> For the fire behavior of asphalt, see also:

[https://download.gussasphalt.de/sonderdruck/106%20Brandschutz\\_kompakt\\_04-2020\\_web.pdf](https://download.gussasphalt.de/sonderdruck/106%20Brandschutz_kompakt_04-2020_web.pdf)

<sup>3</sup> DGUV: Deutsche Gesetzliche Unfallversicherung/German Social Accident Insurance



When using fire containment blankets, escaping gases can accumulate underneath. It should be noted that these could suddenly ignite when the fire containment blanket is removed.

**If such alternative concepts are used, the distance can be adjusted accordingly, if necessary, while complying with the fire protection requirements.**

### 3.3 Additional measures

**The following measures are recommended during quarantine parking:**

- Documentation of the accompanying circumstances (operation number, date, owner, contact details, pick-up date).
- If the fire brigade has not already done so, disconnect the high-voltage system from the power supply. See also the respective rescue data sheet for the vehicle.
- Ensuring early fire detection by regularly checking the e-vehicle.
  - During use, carry out remote monitoring with a video/thermal imaging camera. If necessary, prepare a measuring report with a check of the battery temperatures at regular intervals.
  - Alternatively, adequate technical solutions can be used for monitoring.
- In the event of a rise in temperature or increased temperature of the battery, an unusual odour, the occurrence of smoke or vapours, or liquids escaping from the housing, the fire brigade must be alerted immediately by dialing the emergency number 112.
- It is recommended that the vehicle owner be contacted immediately for a risk assessment by a specialist workshop or by the vehicle manufacturer/importer, if necessary, by a specialized inspector.

## 4. References

Technical Rule for Workplaces (ASR) 1.3 Safety and Health Protection Marking

Technical Rule for Workplaces (ASR) 2.2 Measures Against Fire

DGUV Information 209-093 Qualification for the Work on Vehicles with High-Voltage Systems

DGUV German Social Accident Insurance Rule 103-011 Live Work on Electrical Systems and Equipment

DIN 14090 Areas for the Fire Brigade on Properties

DIN 14095 Fire brigade Plans for Physical Structures

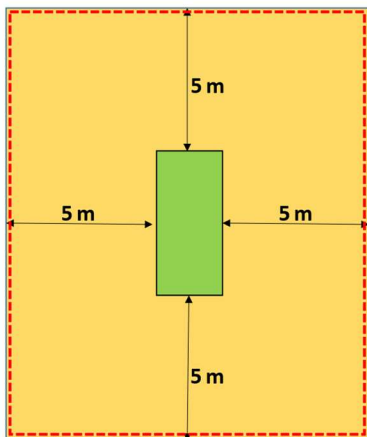
DIN 14096 Fire Protection Regulation - Rules for Drafting and Placarding

Model Building Regulation (MBO)

VdS 3103 Fire Protection Regulation - Rules for Drafting and Placarding

# Appendix – Examples for technical quarantine areas

## Examples for quarantine areas (in the open air)



Usual floor space required (L x W):  
class: (M1/N1) 5,0m x 2,5m



Safety zone barrier:



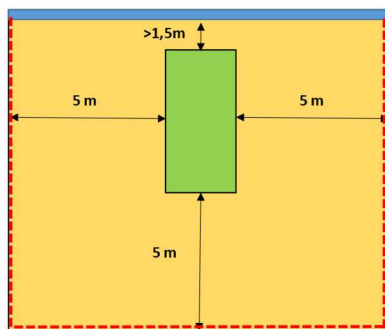
Markings:



Measures for early fire detection, for instance:

- Regular observation (e.g. temperature)
- Monitoring by personnel or video surveillance

## Examples for quarantine areas (in the open air)



= Firewall or adequate measures such as suitable fire containment blanket (at least fire resistant/ consistent with F30)

Usual floor space required (L x W):  
class: (M1/N1) 5,0m x 2,5m



Safety zone barrier:



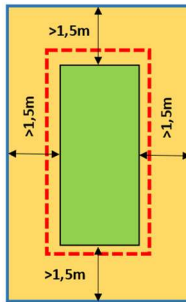
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Measures for early fire detection, for instance:

- Regular observation (e.g. temperature)
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Examples for quarantine areas (in the open air)



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Usual floor space required (L x W):  
class: (M1/N1) 5,0m x 2,5m



Safety zone barrier:



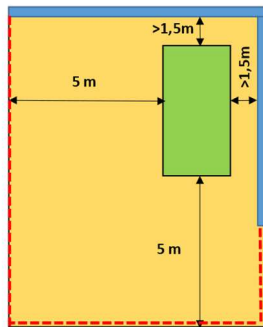
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Examples for quarantine areas (in the open air)



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Usual floor space required (L x W):  
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Safety zone barrier



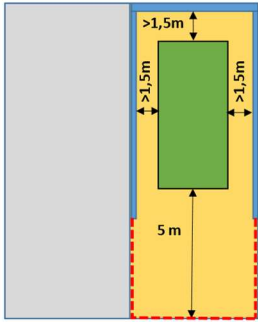
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Measures for early fire detection, for instance:

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## Examples for quarantine areas (in the open air)



= Firewall or adequate measures such as suitable fire containment blanket (at least fire resistant / consistent with F30)

Usual floor space required (L x W):  
class: (M1/N1) 5,0m x 2,5m



Safety zone barrier:



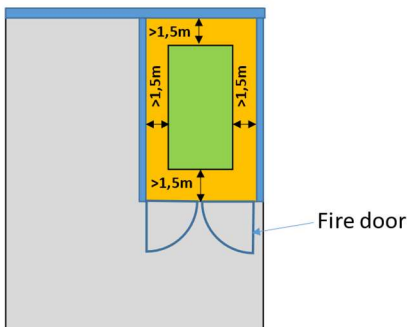
Markings:



Measures for early fire detection, for instance:

- Regular observation (e.g. temperature)
- Monitoring by personnel or video surveillance

## Examples for quarantine areas (in the open air)



= Firewall or adequate measures such as suitable fire containment blanket (at least fire resistant / consistent with F30)

Usual floor space required (L x W):  
class: (M1/N1) 5,0m x 2,5m



Safety zone barrier:



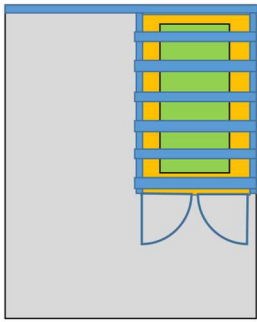
Markings:




Measures for early fire detection, for instance:

- Regular observation (e.g. temperature)
- Monitoring by personnel or video surveillance

Examples for quarantine areas (ventilated sea container)



 = Firewall or adequate measures such as suitable fire containment blanket (at least fire resistant/ consistent with F30)

Usual floor space required (L x W):  
class: (M1/N1) 5,0m x 2,5m



Safety zone barrier:



Markings:



Measures for early fire detection, for instance:

- Regular observation (e.g. temperature)
- Monitoring by personnel or video surveillance

# Contributing associations/organizations, acknowledgements

We would like to thank the following institutions and associations for their cooperation and support (in alphabetic order):

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Verband der Bergungs- und Abschleppunternehmen e.V. (VBA)/Association of Salvage and Towing Companies (VBA)

German Association of the Automotive industry (VDA)

Association of the International Motor Vehicle Manufacturers e.V. (VDIK)

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