LITHIUM BATTERIES
NOT AS HARMLESS AS THEY SEEM
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LITHIUM-ION BATTERIES –
NOT AS HARMLESS AS THEY SEEM

Lithium-ion batteries are very powerful energy storage solutions, and are being used more and more in tools, gardening equipment and vehicles – especially bicycles – and many other applications thanks to their compact design.

As practical and efficient as this battery technology is, and as harmless as it seems to use, it does harbour safety risks that shouldn’t be underestimated.

In particular, lithium-ion batteries pose an increased risk of fire and bursting thanks to their very high energy density; they can spontaneously combust or become unstable in certain circumstances, and can explode if heated.

CONCLUSION
The risk of a fire increases when lithium-ion batteries are left unattended to charge!

NEWS

Fire in apartment building causes roughly 90,000 € in damages

The lithium-ion batteries used in model planes can be great fun. However, one such battery in Switzerland recently caused a fire in an underground garage. Property damage in the fire is now estimated to be at least 90,000 €.

Source: 24min.ch

NEWS

Lithium batteries: A hazardous material?

A lithium-ion battery — which was connected to a charger overnight — ignited a fire in the basement of a residential building in Lower Franconia.

The owner used the basement rooms for his online shop, where he sold a variety of batteries and offered repair services. The fire quickly created clouds of smoke and unpleasant, harmful odours. The defective batteries emitted harsh, aggressive acids, forcing the fire department, police, and residence to take extensive safety precautions.

Source: main-echo.de
CURRENT NEWS

Electric bike battery causes major fire in 2,000 m² commercial space

A lithium-ion battery exploded on a test track for E-bikes in the Netherlands. The fire spread quickly and caused a huge plume of smoke in a very short time. Residents were cautioned to keep doors and windows closed. The fire department’s response was severely curtailed due to the unpredictability of the battery. Their primary goal: To prevent the fire from spreading to neighbouring buildings. After allowing the commercial space to burn in a controlled manner, they delivered the devastating news: The building was unrecoverable and could not be saved.

Source: omroepgelderland.nl

Exploding E-cigarette causes death

In the USA, the fire department finds a dead man in his burning bedroom. The cause of the fire, and the death, is not known for two weeks. A defective e-cigarette exploded, turning its fragments into projectiles.

Some of these struck the man in the head, killing him. The flames resulting from the explosion ignited the room, causing severe burns to the victim’s body.

Source: focus.de

DAILY NEWS

Man dies of smoke inhalation after smartphone battery ignites

The Malaysian man was surprised by an exploding smartphone battery as he slept. The mobile device was beside his bed, and the explosion turned it into a fatal projectile. The man suffered a head wound which left him incapacitated. Unable to burn, he suffered poisoning due to smoke inhalation and severe

Source: n-tv.de

For more incidents related to lithium-ion batteries, please visit:
Technical expertise — Lithium-ion batteries

**WHAT THE EXPERTS SAY**

With the increasing use of medium power lithium-ion batteries, the dangers related to storing and in particular charging these batteries increase in both commercial and private environments.

Property insurers, therefore, are highly interested in ensuring available protective equipment (such as type 90 safety storage cabinets) are used to minimise risks and avoid damage claims.

The recommendations of the property insurers, for example in Germany, for the use of safety cabinets are clear:

“In order to effectively protect against damages from lithium batteries, there are certainly conventional protective concepts using classical measures that have proven useful in manufacturing, handling and storing flammable materials.”

Lithium batteries – fire hazards and safety risks
Dr. Michael Buser, Dr. Jochen Mähliß

“We tell customers to store, batteries in hazardous goods storage cabinets.”

Underwriter for a German property insurer

“The VdS data sheet offers very good instructions for implementation here. No insurer will block itself off or add more requirements than the VdS recommends”.

German Insurance

“(…) it is generally recommended to only allow storage and handling of lithium batteries only in fire-resistant separate areas or if an appropriate safety distance is ensured. Based on past damages, an international standard of 90 minutes fire resistance (...) or a safety distance of at least 20 meters has proven effective here”.

Lithium batteries – fire hazards and safety risks
Dr. Michael Buser, Dr. Jochen Mähliß
SAFETY REGULATIONS FOR THE
MEDIUM POWER CLASS

(according to VdS 3103:2016 (Publication of German insurers for loss prevention))

Pedelecs, E-bikes, E-scooters, large gardening equipment

SAFETY REGULATIONS

- Compliance with manufacturer specifications (technical product data sheets)
- Protection against battery pole short circuits
- Protection against mechanical damages
- Do not expose to high temperatures or heat sources directly or for a long period of time (this includes direct sunlight)
- Compliance with structural or spatial separation (at least 2.5 m) from other flammable materials if no automatic extinguishing system is available
- Immediately remove damaged or defective batteries from storage and production areas (interim storage until disposal at a safe distance or in a separate fire-protected area)
- Exclusive storage of batteries with test certificate in accordance with UN 38.3 (prototypes only in exceptional cases and with risk assessment)
- Storage in separate fire-resistant areas or in compliance with a safety distance (spatial separation of 5 m)
- Avoidance of mixed storage with other products which are fire accelerants
- Monitoring the storage area with a suitable fire alarm system wired to a constantly occupied office
- If fire extinguishing systems are present: Compliance with information on suitable extinguishing agents in the technical product data sheets

CONCLUSION

Store lithium-ion batteries in a safety storage cabinet!
In normal operation, using lithium batteries is considered safe. However, according to the VDE this is true only if they are handled properly. If there is a technical defect or a battery is damaged, the situation can quickly become critical. The German Insurance Association (GDV), therefore, requires that lithium batteries “generally be treated like a hazardous material”.

The situation becomes especially dangerous when a lithium battery discharges its stored energy in an uncontrolled manner. Once the heat produced exceeds the melting point of the lithium, this causes an unstoppable chain reaction, the dreaded “thermal runaway”. The battery then burns up in an explosive manner.

Such fires with lithium-ion batteries are difficult to manage, and the fire spreads quickly. Often, all the fire department can do is protect neighbouring areas.

### Lithium-ion Batteries and Fire

Lithium-ion batteries can cause a fire. Causes include:

<table>
<thead>
<tr>
<th><strong>ELECTRICAL OVERLOAD</strong></th>
<th><strong>MECHANICAL DAMAGE</strong></th>
<th><strong>THERMAL OVERLOAD</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• During charging and discharging</td>
<td>• In combination with the high energy density of the battery</td>
<td>• Caused by external heat or energy sources</td>
</tr>
</tbody>
</table>

In normal operation, using lithium batteries is considered safe. However, according to the VDE this is true only if they are handled properly. If there is a technical defect or a battery is damaged, the situation can quickly become critical. The German Insurance Association (GDV), therefore, requires that lithium batteries “generally be treated like a hazardous material”.

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Such fires with lithium-ion batteries are difficult to manage, and the fire spreads quickly. Often, all the fire department can do is protect neighbouring areas.
When storing lithium-ion batteries, we can differentiate between passive and active storage.

**STORAGE OF LITHIUM-ION BATTERIES**

**PASSIVE STORAGE**

In passive storage, new or used lithium-ion batteries are stored over a certain time period.

**CONCLUSION**

We recommend for new and used lithium-ion batteries to be stored separately (different storage levels) in the BATTERY STORE or BATTERY STORE PRO safety storage cabinets.

**ACTIVE STORAGE**

In active storage, lithium-ion batteries or battery packs are charged in a cabinet with a charger or partially discharged (60—70%).

Heat is generated when a lithium-ion battery charges. If this heat output is too high, a fire may occur, for instance if the lithium battery, the charger or the connection cable is defective.

Another major risk factor is the risk of thermal runaway of lithium-ion batteries, for instance caused by internal short circuits.

**CONCLUSION**

The risk increases when lithium-ion batteries are left unattended to charge outside of work hours. We recommend active storage in the asecos BATTERY CHARGE safety storage cabinet.
Certified fire protection — The ION-LINE

SAFETY, SIGNED AND SEALED

PROTECTION FROM THE OUTSIDE TO THE INSIDE

Lithium-ion batteries stored in ION-LINE cabinets are protected against overheating from external fires for a period of 90 minutes.

This prevents lithium-ion batteries stored in the cabinet from spontaneously combusting, becoming unstable, or exploding.

Fire testing in compliance with the testing conditions of EN 14470-1 certifies that the cabinets fulfil fire resistance requirements (type 90).

Safety storage cabinets with a fire resistance of at least 90 minutes are considered a storage section. These cabinets thus fulfill the requirements of a separated, structurally fire-resistant, storage area according to the German VdS 3103:2016 or further similar international guidelines.
Certified fire protection — The ION-LINE

PROTECTION FROM THE INSIDE TO THE OUTSIDE

To test fire protection from inside to the outside, ION-LINE cabinets also underwent fire testing in accordance with EN 1363-1:2012-10.

The test results show that the cabinets achieve a fire resistance of up to over 90 minutes. Cabinets in the ION-LINE, therefore, offer excellent protection against fires from the interior.

The BATTERY STORE PRO and BATTERY CHARGE models are also equipped with a 3-stage warning / fire suppression system. That means perfect protection for storage and in particular for unattended charging.

The clever, multi-stage concept with an active upstream fire suppression unit in the cabinet adds extra safety:

- possibility of connection to a permanently staffed building services or fire alarm central office
- sufficient time for rescue personnel and fire fighters to carry out an evacuation or extinguish the blaze
- sufficient time for personnel to escape
- protection for rescue responders and personnel in case of a fire

A full system description is provided on pages 12 and 13 of this brochure.
THE ascos ION-LINE
### Overview of the ION-LINE

<table>
<thead>
<tr>
<th>BATTERY CHARGE</th>
<th>BATTERY STORE PRO</th>
<th>BATTERY STORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORE:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>CHARGE:</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>FIRE PROTECTION FROM OUTSIDE (TYPE 90):</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>FIRE PROTECTION FROM INSIDE:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3-STAGE AUTOMATIC WARNING/FIRE SUPRESSION SYSTEM:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>PLUG-IN DESIGN:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EARTHED SOCKET FOR CONNECTING CHARGERS:</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>INTEGRATED TECHNICAL VENTILATION:</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
The following components are included in the system for both models:

1. Electronic controller incl. potential-free alarm contact to building services management
2. Fire suppression unit
3. Function indicator (green LED)
4. 2-Stage warning light (red LED)
5. 2-Stage acoustic alarm signal
6. Smoke detector
7. Temperature sensor
8. Plug-in design to connect to mains supply

BATTERY CHARGE model also offers:

9. High-quality outlet strip with metal housing and 10 earthed sockets for each storage / charging level mounted complete and ready for operation inside the cabinet
10. All electrical lines to the outlet strip are centrally installed in a junction box via cable ducts in the head of the cabinet.
11. Technical ventilation (to avoid heat build-up in the interior)

Overall power BATTERY CHARGE model
Standard: 1-phase, fuse 16 A, power max. 3.68 kW
Optional: 3-phase, fuse 3 x 16 A (each phase 16 A), power max. 11.04 kW
With an integrated 3-stage warning/fire suppression system, the BATTERY STORE PRO and BATTERY CHARGE cabinets offer a high level of safety for storing and charging lithium-ion batteries. Any fires which occur inside the cabinet are detected promptly, and employees can be evacuated immediately. The warning/fire suppression system is also connected to a permanently staffed building services management or fire alarm central station, ensuring that trained rescue personnel can be alarmed quickly and be on site in a short amount of time

- can initiate further measures immediately after completing an initial assessment of the situation
- can transport the cabinet out of the building, for instance. This prevents further major damage to the building, and protects against personal injury.

The cabinets are equipped with a transport base to ensure fast transportation. Cabinets are automatically unplugged from mains supply during transportation. Once the cabinet is outside of the building at a safe location, rescue personnel can identify any further measures necessary.

EXPERT TIP: React quickly in case of a fire
Safe active storage of lithium-ion batteries with integrated 3-stage warning and fire suppression system

Function / construction:

- **Robust construction and longevity:** triple hinged door, safety elements assembled outside the storage compartment for increased protection against corrosion, scratch- and impact-resistant surface, easy to clean
- **Easy handling with comfort:** Smooth doors with permanent self-closing function and oil-dampened door closer. Open doors with a minimum amount of force
- **No unauthorised use:** doors lockable with cylinder lock (locking system compatible) and locking state indicator (red/green)
- **Easy transport:** integrated transport base for internal transportation, base cover available as an option
- **Easy alignment:** adjusting aids to compensate for uneven floor

- **Ventilation:** integrated technical ventilation to avoid heat build-up, turning wheel in the exhaust grate as an indicator of sufficient technical ventilation
- **Safe storage and charging:** installed 3-stage warning and fire suppression system including smoke detector, temperature sensor, visual and acoustic alarms and fire suppression unit; triggers automatically in case of a fire; plug-in ready for connection to mains supply.
- **All-around protection:** 90 minute fire protection from outside to inside (type 90 / type tested in accordance with EN 14470-1) and for more than 90 minutes fire resistance for fires from inside to outside

Available equipment:

- Height-adjustable grid shelves with load capacity of 180 kg
- Bottom collecting sump
- High-quality outlet strip with metal housing for each storage / charging level

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**EXPERT TIP**

Fire and risk minimisation

Lithium-ion batteries with obvious damage should generally not be stored inside buildings.

Dispose of them promptly in appropriate disposal containers suitable for transportation, outside of buildings.
### Technical specifications

| External dimensions W x D x H | mm 1193 x 615 x 2224 |
| Internal dimensions W x D x H | mm 1050 x 522 x 1647 |
| Weight of empty cabinet | kg 424 |
| Maximum load | kg 600 |
| Distributed load | kg/m² 531 |

#### Transport base

- Entry width transport base | mm 1120 |
- Entry height transport base | mm 90 |

### Total power

#### 1-phase

- **Fuse**
  - A 16
- **Power max.**
  - kw 3.68

#### 3-phase

- **Fuse**
  - A 3 x 16
- **Power max.**
  - kw 11.04
ION-CLASSIC-90  •  120 cm  •  BATTERY STORE PRO

BATTERY STORE PRO storage cabinet
ION-CLASSIC-90 Model IO90.195.120.K2.WDC
Body colour anthracite grey (RAL 7016) with wing doors in gentian blue (RAL 5010), interior equipment with 6 x grid shelves (sheet steel powder-coated), 1 x bottom collecting sump (sheet steel powder-coated)
Order no. 38055-047-37266
(Image shows optional base cover)

price upon request

Safe passive storage of lithium-ion batteries with integrated 3-stage warning and fire suppression system

Function / construction:
• Robust construction and longevity:
   triple hinged door, safety elements assembled outside the storage compartment for increased protection against corrosion, scratch- and impact-resistant surface, easy to clean
• Easy and comfortable handling:
   smooth doors with permanent self-closing feature using oil-dampened door closer; open doors with a minimum of force
• No unauthorised use:
   doors lockable with cylinder lock (locking system compatible) and locking state indicator (red/green)
• Easy transport:
   integrated transport base for internal transportation, base cover available as an option

• Easy alignment:
   adjusting aids to compensate for uneven floor
• Safe storage:
   installed 3-stage warning and fire suppression system including smoke detector, temperature sensor, visual and acoustic alarms and fire suppression unit; triggers automatically in case of a fire; plug-in ready for connection to the mains network.
• All-around protection:
   90 minute fire protection from outside to inside (type 90 / type tested in accordance with EN 1363-1) and for more than 90 minutes fire resistance for fires from inside to outside

Available equipment:
• Height-adjustable grid shelves with load capacity of 180 kg
• Bottom collecting sump

EXPERT TIP
Fire and risk minimisation
Lithium-ion batteries with obvious damage should generally not be stored inside buildings. Dispose of them promptly in appropriate disposal containers suitable for transportation, outside of buildings.

Model Information / equipment W x D x H (mm) Order no.
IO90.195.120.K2.WDC without interior equipment, including warning/fire suppression system 1193 x 615 x 1953 38055

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<thead>
<tr>
<th>Body colour</th>
<th>Door colour</th>
<th>Order no.</th>
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<tbody>
<tr>
<td>Anthracite grey RAL 7016</td>
<td>gentian blue RAL 5010</td>
<td>order no. 047</td>
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<table>
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<tr>
<th>Interior equipment package</th>
<th>Material</th>
<th>Order no.</th>
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<tbody>
<tr>
<td>3x grid shelves, 1x bottom collecting sump (V=33.0L)</td>
<td>sheet steel powder-coated RAL 7016</td>
<td>37254</td>
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<tr>
<td>4x grid shelves, 1x bottom collecting sump (V=33.0L)</td>
<td>sheet steel powder-coated RAL 7016</td>
<td>37255</td>
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<td>5x grid shelves, 1x bottom collecting sump (V=33.0L)</td>
<td>sheet steel powder-coated RAL 7016</td>
<td>37265</td>
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<td>6x grid shelves, 1x bottom collecting sump (V=33.0L)</td>
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<th>Interior equipment</th>
<th>Material</th>
<th>Order no.</th>
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</thead>
<tbody>
<tr>
<td>Base cover</td>
<td>sheet steel powder-coated textured RAL 7016</td>
<td>38036</td>
</tr>
</tbody>
</table>

Ready for dispatch within
• Days
• Weeks

Warning/fire suppression system
High-quality 3-stage warning/fire suppression system inside the cabinet triggers automatically in case of a fire.

Bottom collecting sump
The bottom collecting sump is used to catch any leakage which may occur from burning batteries.
### Technical specifications

**IO90.195.120.K2.WDC**

- **External dimensions W x D x H mm**: 1193 x 615 x 1953
- **Internal dimensions W x D x H mm**: 1050 x 522 x 1647
- **Weight of empty cabinet kg**: 424
- **Maximum load kg**: 600
- **Distributed load kg/m²**: 531

**Transport base**

- **Entry width transport base mm**: 1120
- **Entry height transport base mm**: 90
ION-CLASSIC-90 060/120 cm BATTERY STORE

Safe passive storage of lithium-ion batteries

Function / construction:
- Robust construction and longevity: triple hinged door, safety elements assembled outside the storage compartment for increased protection against corrosion, scratch- and impact-resistant surface, easy to clean
- Easy and comfortable handling: smooth doors with permanent self-locking via oil-dampened door closer. Open doors with a minimum amount of force
- No unauthorised use: doors lockable with cylinder lock (locking system compatible) and locking state indicator (red/green)
- Easy transport: integrated transport base for internal transportation, base cover available as an option
- Easy alignment: adjusting aids to compensate for uneven floor
- All-around protection: 90 minute fire protection from outside to inside (type 90 / type tested in accordance with EN 14470-1) and for more than 90 minutes fire resistance for fires from inside to outside

Available equipment:
- Height-adjustable grid shelves with load capacity of 180 kg
- Bottom collecting sump

EXPERT TIP
Fire and risk minimisation
Lithium-ion batteries with obvious damage should generally not be stored inside buildings. Dispose of them promptly in appropriate disposal containers suitable for transportation, outside of buildings.

## Model Information / equipment W x D x H (mm) Order no.
<table>
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<th>Model</th>
<th>Information / equipment</th>
<th>W x D x H (mm)</th>
<th>Order no.</th>
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<td>1193 x 615 x 1953</td>
<td>37254</td>
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<tr>
<td>IO90.195.060.K1.WDC</td>
<td>without interior equipment, left hinged</td>
<td>599 x 615 x 1953</td>
<td>38067</td>
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## Body colour Door colour Order no.
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Anthracite grey</td>
<td>Gentian blue RAL 5010</td>
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</table>

## Interior equipment package
(can only be ordered in combination with cabinet)

<table>
<thead>
<tr>
<th>Model</th>
<th>Material</th>
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<tr>
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<tr>
<td>IO90.195.060.K1.WDC</td>
<td>sheet steel powder-coated RAL 7035</td>
<td>38066</td>
</tr>
</tbody>
</table>

Grid shelves as storage / charging levels
made of sheet steel powder-coated (load capacity max. 180 kg) offer a high storage capacity and ensure optimal ventilation inside the cabinet to avoid heat build-up during charging.

Price upon request

(Battery Store)

Storage cabinet
ION-CLASSIC-90 Model IO90.195.120.K1.WDC
Body colour anthracite grey (RAL 7016) with swing doors in gentian blue (RAL 5010), interior equipment with 6 x grid shelves (sheet steel powder-coated), 1 x bottom collecting sump (sheet steel powder-coated)
Order no. 37254-047-37266
(Image shows optional base cover)
Technical specifications IO90.195.060.K1.WDC

- External dimensions W x D x H: mm 599 x 615 x 1953
- Internal dimensions W x D x H: mm 450 x 522 x 1647
- Weight of empty cabinet: kg 265
- Maximum load: kg 600
- Distributed load: kg/m² 894

Technical specifications IO90.195.120.K1.WDC

- External dimensions W x D x H: mm 1193 x 615 x 1953
- Internal dimensions W x D x H: mm 1050 x 522 x 1647
- Weight of empty cabinet: kg 424
- Maximum load: kg 600
- Distributed load: kg/m² 531

Transport base

- Entry width transport base: mm 526
- Entry height transport base: mm 90

- Grid shelf with load capacity of 180 kg
- Bottom collecting sump