



Rental House Battery Safety Guide



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As leaders in the design and manufacture of premium batteries for the film and broadcast industry, we recognize the critical importance of safety when it comes to handling and storing lithium-ion batteries. This guide is designed to equip rental houses with the best practices for ensuring the safe storage, handling, and management of these powerful energy sources.

Lithium-ion batteries have become the standard in the industry due to their high energy density, long life, and reliable performance. However, their potent energy capacity also requires meticulous care and management. Improper handling and storage can lead to safety hazards such as overheating, fire, or even explosions.

This guide will provide you with essential information and actionable steps to mitigate these risks, ensuring a safe environment for your staff and customers. The information contained in this guide is based on the latest industry standards, our extensive experience, and our commitment to safety and innovation. We cover a range of topics, including:

- **Storage Guidelines:** Proper storage is crucial for maintaining the safety and longevity of lithium-ion batteries. We will discuss optimal storage conditions, including temperature and humidity controls, and how to organize and monitor your battery inventory.
- **Handling Procedures:** Safe handling practices are essential to prevent damage and reduce the risk of accidents. We will outline the correct procedures for charging, discharging, transporting, and maintaining lithium-ion batteries.
- **Safety Measures:** Implementing safety measures such as regular inspections, appropriate storage containers, and emergency protocols can significantly reduce the risk of incidents. We will provide recommendations for creating a safe working environment.
- **Regulatory Compliance:** Understanding and adhering to local and international regulations is vital for legal and safe battery management. We will highlight key regulations and standards that apply to the storage and transportation of lithium-ion batteries.

By following the guidelines in this document, rental houses can not only ensure the safety of their operations but also enhance the reliability and performance of their battery inventory. At Anton/Bauer, we are dedicated to supporting our partners in the industry with the knowledge and tools they need to manage their power solutions safely and effectively.

Facility Structure Considerations

When it comes to incorporating battery storage in your facility, the best approach depends on your specific needs and risk tolerance. There is a spectrum of risk aversion that directly correlates with cost. Here are a few scenarios to consider:

- **Separate Facility:** Some rental houses opt to store batteries in a separate building, detached from the main facility. This setup ensures complete isolation in case of a failure, significantly reducing the risk to the main building and its occupants.
- **Integrated Storage:** Others store batteries alongside their gear in standard office environments. This approach is more convenient but may require additional safety measures to mitigate risk.
- **Storage of Equipment in the Room**

For optimal safety, it's recommended to isolate your batteries from other equipment.

- **Prototypes:** These are stored in metal fire cabinets when not in use, clearly marked and kept separate from production batteries. During testing, prototypes are contained within metal fireboxes or small drums filled with vermiculite or sand for added safety.
- **Standard Production Batteries:** These are either kept on chargers when in use or stored on wire racks, away from other equipment.
- **Warehouse Storage:** All batteries are stored together in their standard UN shipping boxes. Specialized fire extinguishers are placed near the batteries, but no extra handling or care is deemed necessary due to the minimal risk of fire in this setup.
- **Production Storage:** Lithium cells are stored in their own UN boxes or in lithium-ion battery fire cabinets when exposed. This ensures an added layer of safety during storage.

Key Risk Considerations

The primary risk for lithium-ion batteries is thermal runaway, which is often associated with overcharging. To mitigate this risk, we implement the following measures:

Testing

- During the production test process, a fire alert system and fire extinguishers are positioned near the testing equipment.
- Collaboration of testing equipment: Whenever charging batteries, accurate voltage and current parameters are key. Anton/Bauer MACCOR systems are calibrated by MACCOR to ensure they are always operating at peak accuracy.

Installation

- Fire Extinguishers: An alternative for manual fire extinguishers is a Class B fire extinguisher (powder, foam, CO₂) but these can only suppress the fire on the combustible materials around the battery, and the thermal runaway remains largely unaffected.

Containment

- Fire Blankets: We recommend keeping a fire blanket near your battery testing or charging area. Specifically designed for lithium-ion batteries, these blankets are an essential safety tool, allowing you to quickly and effectively smother small fires if they occur.
- Sand Buckets: If a battery becomes overheated or shows signs of potential danger, we recommend placing it in a bucket of sand as a precaution. This simple safety measure helps contain any risks and ensures a safer environment for your team and equipment.

Storage

- Do not store the battery packs in places where the temperature exceeds 35 degrees or under direct sunlight as this can affect the battery performance. Try to avoid storing the batteries in areas where large temperature changes occur.

- Avoid storing the batteries in places of humidity and not expose the battery pack to condensation or water drops.
- Do not store in frozen environments.
- Avoid storing the battery pack in places where it can be exposed to static electricity to not damage the protection circuit of the battery pack.

Storage of large amounts:

- Follow the recommendations of the German Insurance Association (GDV - "Gesamtverband der Deutschen Versicherungswirtschaft e.V.") concerning lithium batteries: VdS 3103.
- In case of storage of large amounts (used storage volume > 7 m³ and/or more than 6 pallets) batteries shall be stored in fire-resistant or separated rooms or areas (e.g. warehouse or container for hazardous materials). Mixed storage with other products is not allowed. The storage area shall be monitored by an automatic fire detection system, connected to a permanently manned place

Implementing these best practices will help ensure the safety and efficiency of your battery storage. By considering the structure of your facility and the specific storage needs of your batteries, you can minimize risks and protect your investment. At Anton/Bauer, we are committed to supporting you with the knowledge and tools necessary for safe battery management.

Safe handling practices are essential to prevent damage and reduce the risk of accidents when dealing with lithium-ion batteries. Below are the recommended procedures for charging, discharging, transporting, and maintaining your batteries.

Charging

1. **Use Approved Chargers:** Always use chargers specifically designed for your lithium-ion batteries. Unapproved chargers may deliver incorrect voltage or current, increasing the risk of overheating or overcharging.
2. **Monitor Charging:** Never leave batteries unattended while charging. Regularly check for signs of overheating, swelling, or other abnormalities. If any issues are detected, disconnect the battery immediately and inspect it for damage.
3. **Charge in a Safe Environment:** Ensure the charging area is well-ventilated and free from flammable materials. Ideally, use a dedicated charging station with fire-resistant surfaces to minimize risks.
4. **Avoid Overcharging:** For non-Anton/Bauer batteries, remove them from the charger as soon as they reach full charge. Overcharging can lead to thermal runaway, significantly increasing the risk of fire.
5. **Anton/Bauer Safety:**

For Anton/Bauer batteries, we recommend leaving them on the charger to allow the intelligent charging system to monitor and maintain the batteries at optimal levels safely and efficiently.

When an Anton/Bauer battery is placed on an Anton/Bauer charger, the charger will handle the battery safely, only charging when necessary. This process eliminates the risk of overcharging and other potential safety hazards mentioned above.

For more information on our battery and charger three-level of protection, please visit: <https://www.antonbauer.com/en/three-level-protection/>

Please note that when using non-Anton/Bauer products within this ecosystem, we cannot guarantee the same safety measures or protections.

Discharging

1. **Avoid Deep Discharges:** Try not to discharge batteries completely, as this can shorten their lifespan. Aim to recharge them when they reach around 20-30% capacity.
2. **Monitor Temperature:** Batteries can heat up during use. If a battery becomes excessively hot, stop using it immediately and allow it to cool down before recharging.
3. **Use in Recommended Devices:** Ensure that the battery is compatible with the device you are using. Incompatible devices can draw incorrect currents, leading to potential damage or hazards.

Transporting

1. **Use Original Packaging:** Transport batteries in their original packaging or in a UN-certified container to prevent physical damage and short circuits.
2. **Avoid Excessive Movement:** Secure batteries during transport to minimize movement. Sudden impacts or vibrations can damage the cells or connectors.
3. **Comply with Regulations:** Follow local and international regulations for transporting lithium-ion batteries. This includes labelling, documentation, and quantity limits.
4. **Separate from Metal Objects:** Ensure batteries are not transported alongside metal objects that could cause short circuits. Use non-conductive padding materials if necessary.

Maintenance

1. **Regular Inspections:** Routinely check batteries for any signs of damage, such as dents, cracks, or swelling. Damaged batteries should be removed from service immediately and disposed of according to safety regulations.
2. **Keep Clean and Dry:** Store batteries in a clean, dry environment. Moisture and dust can penetrate the battery casing, leading to potential failures or short circuits.

3. Rotate Stock: Use older batteries first to ensure all batteries are cycled regularly. This practice helps maintain their performance and extends their lifespan. Anton/Bauer chargers will indicate the best battery to use for a customer by either providing a solid LED or a green check mark. This means the charger has identified which battery will provide a customer the longest possible runtime, helping to rotate their stock.
4. Follow Manufacturer's Guidelines: Always adhere to the maintenance guidelines provided by the battery manufacturer. This includes recommended storage conditions, shelf life, and handling procedures.

By following these handling procedures, you can significantly reduce the risk of accidents and ensure the longevity and performance of your lithium-ion batteries. These practices are not only essential for safety but also for maintaining the reliability of your equipment.

Implementing robust safety measures is crucial to reducing the risk of incidents when working with lithium-ion batteries. This section provides recommendations for regular inspections, appropriate storage containers, and emergency protocols to create a safe working environment.

Regular Inspections

1. **Routine Visual Checks:** Inspect batteries regularly for signs of physical damage, such as cracks, dents, swelling, or corrosion. Damaged batteries should be immediately removed from service, quarantined and disposed of properly.
2. **Check Connection Points:** Ensure all connection points, terminals, and contacts are clean and free from debris. Dirty or corroded connections can cause poor performance or short circuits.
3. **Monitor Battery Performance:** Keep track of battery performance and usage cycles. Batteries that show a significant decline in performance or have been through many charge cycles may need to be replaced.
4. **Inspection Logs:** Maintain a log of inspections, noting the condition of each battery and any actions taken. This helps in tracking the health of your battery inventory and ensures accountability. Best practice is to use a BIST (Built in Self-Test) feature on new products such as the Anton/Bauer VCLX NM2 and VCLX LI1600. These batteries can provide a report and check all internal components for proper operation before and after use.

Appropriate Storage Containers

1. **Fire-Resistant Cabinets:** Store batteries in fire-resistant cabinets, especially those designed for lithium-ion battery storage. These cabinets help contain any potential fires and prevent them from spreading.



2. **Ventilated Storage:** Ensure storage areas are well-ventilated to prevent heat buildup, which can lead to thermal runaway. Proper ventilation helps maintain safe temperature levels.
3. **Segregation of Batteries:** Store batteries separately based on their charge status and condition. For example, isolate fully charged batteries from those that are discharged or damaged.
4. **UN-Certified Containers:** Use UN-certified containers for storing and transporting batteries. These containers are designed to withstand physical impacts and prevent short circuits.

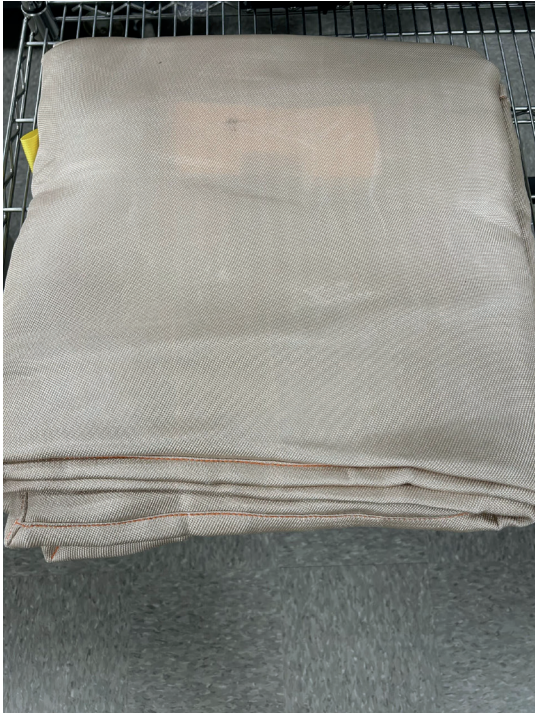
Emergency Protocols

1. **Fire Suppression Systems:** Install appropriate fire suppression systems in areas where batteries are stored and used. This includes fire extinguishers rated for electrical fires (Class C) and possibly specialized fire suppression systems for lithium-ion fires.

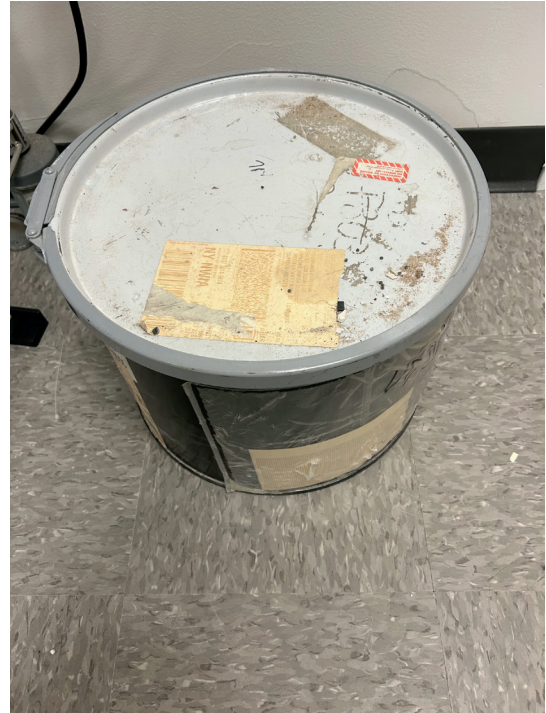
Fire Extinguishers Nearby:
Appropriately placed fire extinguishers for electrical and battery fires within reach for an emergency.



2. **Emergency Response Plan:** Develop and communicate an emergency response plan that includes procedures for dealing with battery fires, spills, and other incidents. Ensure all staff are trained and regularly drilled on this plan.



Fire Blanket: Held nearby our battery testing for if a small fire breaks out, you can toss the blanket over the fire to extinguish it. These are made specifically for lithium ion batteries.



Metal Container with sand: We keep this nearby in case of a small fire were to break out on a pack while handling it and it was deemed safe to place in a bucket to sand so that the fire could burn out on its own.



24-7 Cameras: Surveillance can make sure products are stored safely and alert to a failure or issue.

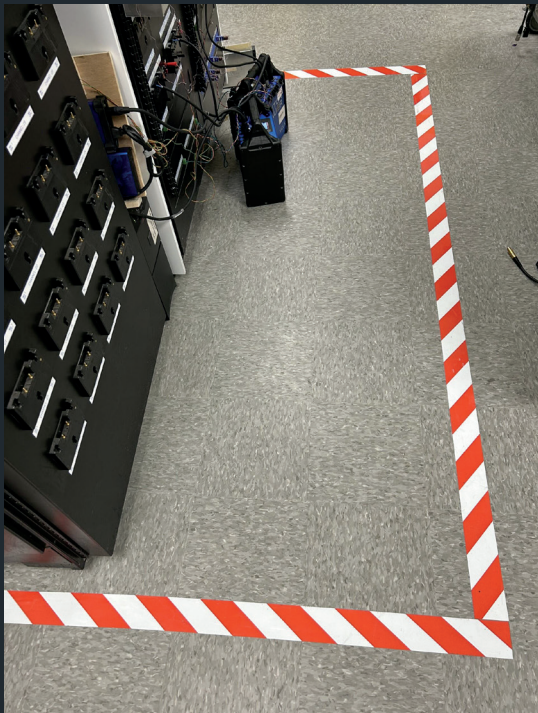


Smoke Alarms: Tied in with our cameras, we will get alerted if there is any smoke detected in the battery test area which could be a result of a battery failure.

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3. First Aid Kits: Have first aid kits readily available in areas where batteries are handled. Ensure they are stocked with materials to treat burns and other injuries that could result from battery incidents.
 4. Spill Containment: Equip storage and handling areas with spill containment materials, such as absorbent pads and neutralizing agents, to manage leaks or spills from damaged batteries.
 5. Safety Signage: Clearly label all battery storage areas with appropriate safety signage. This includes warning signs for fire risk, high voltage, and emergency exit routes.



General signage on the outside of all our battery cabinets alerting people to the nature of their contents.



Markings used where battery testing is performed to make sure flammable materials are not placed within this boundary. In the rare instance that a battery under test was to catch on fire, we make sure that it would have clearance to burn freely without the risk of spreading to something else placed in the vicinity.

Additional Recommendations

1. **Training and Education:** Regularly train staff on safe handling practices, emergency procedures, and the specific risks associated with lithium-ion batteries. Keep them updated with the latest safety protocols and industry standards.
2. **Safety Audits:** Conduct regular safety audits of your facility to ensure compliance with all safety measures and regulations. Address any identified deficiencies promptly.
3. **Personal Protective Equipment (PPE):** Provide appropriate PPE for staff handling batteries, such as gloves, safety glasses, and flame-resistant clothing. Ensure PPE is used consistently and correctly.
4. **Battery Management System (BMS):** Utilize a Battery Management System to monitor the state of health and charge of your batteries. A BMS can provide real-time data and alerts, helping to prevent overcharging and other dangerous conditions. Our advice is to only use Anton/Bauer batteries with an internal BMS, to reduce the risk of any possible errors accurately track information and reduce the risk of possible safety issues.

By incorporating these safety measures into your operations, you can significantly reduce the risk of incidents and create a safer working environment for everyone involved. These practices not only protect your staff but also ensure the reliability and longevity of your battery inventory.

First Aid Measures

This product contains organic electrolyte and in case of leakage the required actions are described below.

- Skintouch – Remove all contaminated clothing and flush extraneous matter with soap and plenty of water immediately for at least 15 minutes. Get medical aid.
- Eyes contact – In case of electrolyte contact with eyes, rinse immediately with plenty of water. Have the victims remove contact lenses if they are wearing them before rinsing. Do not let the victims rub their eyes. Get medical aid. If appropriate procedures are not taken loss of sight may occur.
- Inhalation – Remove to fresh air. Give oxygen or artificial respiration if needed. Get medical aid.
- Ingestion – Swallowing is not anticipated in normal condition. If accidentally eaten seek medical attention immediately, dilute by giving plenty of water. Assure that mucus does not obstruct the airway. Do not give anything by mouth to an unconscious person.

Fire-Fighting Measures

- Clear the fire area of all non-emergency personnel. Clear away any combustible substances from near the fire area.
- Extinguishing method – Vapour generated from burning battery packs causes irritation of the eyes, nose and throat so when extinguishing any fire note the direction of the wind. Wear respiratory protective equipment.
- Fire extinguishing agents – Plenty of water, CO₂, dry chemical foam and alcohol resistant foam are recommended.

Measures for Electrolyte Leakage

If accidental electrolyte leakage occurs move the battery packs away from the fire area immediately. Avoid contact with any spilled or released material. Immediately remove any contaminated clothing.

- Person related measures – Wear personal protective equipment adapted to the situation (protection gloves, face protection, breathing protection)
- Environment protection measures – In the event of battery rupture, prevent skin contact and collect all released material in a plastic lined container. Bind released ingredients with powder (rock salt, sand). Dispose of according to the local law and rules. Avoid leached substances to penetrate into the earth, canalization or water. Do not dispose of in drains.
- Methods for cleaning up – If battery casing is dismantled, small amounts of electrolyte may leak. Package the battery tightly including ingredients together with sand, acid binder, universal binder or rock salt and if possible, pick up and transfer to properly labelled containers. Reduction of gasses/fumes can be achieved with water dilution.

Exposure controls (in case of electrolyte leakage from the battery)

Personal protective equipment:

- Respiratory protection: Respirator with air cylinder, dust mask.
- Hand protection: Protective rubber gloves.
- Eye protection: Safety goggles or protective glasses designed to protect against liquid splashes.
- Skin and body protection: Rubber apron and protective clothing, long sleeve and long trousers.

Understanding and adhering to local and international regulations is vital for legal and safe battery management. Compliance with these regulations ensures the safety of your operations and helps avoid legal penalties. This section highlights key regulations and standards that apply to the storage and transportation of lithium-ion batteries.

Key Regulations and Standards

1. UN Regulations

UN Manual of Tests and Criteria: Lithium-ion batteries must pass the UN 38.3 tests to be legally transported. These tests include thermal, vibration, shock, external short circuit, and overcharge tests to ensure the safety of batteries during transport.

UN Number and Proper Shipping Name: Lithium-ion batteries are assigned specific UN numbers (e.g., UN3480 for standalone lithium-ion batteries and UN3481 for batteries packed with or contained in equipment). Proper labelling with these UN numbers is required for transportation.

2. International Air Transport Association (IATA) Regulations

IATA Dangerous Goods Regulations (DGR): These regulations govern the air transport of lithium-ion batteries. Key requirements include battery testing, packaging, labelling, and documentation. Only batteries that comply with the IATA DGR can be transported by air.

State of Charge Limits: For air transport, lithium-ion batteries must be shipped with a state of charge (SOC) not exceeding 30% of their rated capacity to reduce the risk of thermal incidents.

3. International Maritime Dangerous Goods (IMDG) Code

IMDG Code: Governs the sea transport of dangerous goods, including lithium-ion batteries. Compliance with the IMDG Code is necessary for shipping batteries by sea. This includes specific packaging, marking, and documentation requirements.

4. Department of Transportation (DOT) Regulations

Hazardous Materials Regulations (HMR): In the United States, the DOT's HMR outlines the requirements for the safe transport of hazardous materials, including lithium-ion batteries. These regulations cover classification, packaging, labelling, and handling practices.

Special Permits: Certain battery configurations or sizes may require special permits for transportation. Ensure you are aware of any special permits that may apply to your batteries.

5. Occupational Safety and Health Administration (OSHA)

OSHA Standards: In the workplace, OSHA standards provide guidelines for the safe handling and storage of hazardous materials, including lithium-ion batteries. These standards emphasize the importance of training, proper storage conditions, and emergency preparedness.

Storage Regulations

1. Local Fire Codes

Fire Safety Standards: Many local jurisdictions have specific fire safety standards for the storage of lithium-ion batteries. These may include requirements for fire suppression systems, fire-resistant storage cabinets, and ventilation.

2. Environmental Regulations

Hazardous Waste Management: Ensure compliance with local environmental regulations concerning the disposal and recycling of lithium-ion batteries. Batteries should be disposed of as hazardous waste if they are damaged or no longer usable.

Transportation Requirements

1. Packaging

Proper Packaging: Lithium-ion batteries must be packaged in a manner that prevents short circuits and physical damage. This often involves using inner packaging, such as plastic bags or non-conductive materials, and outer packaging that is sturdy and durable.

Testing and Certification: Ensure that all packaging used for shipping lithium-ion batteries is tested and certified according to applicable regulations.

2. Labelling and Documentation

Dangerous Goods Labels: Packages containing lithium-ion batteries must be labelled with appropriate dangerous goods labels, including handling instructions and hazard warnings.

Shipping Documentation: Accurate and complete shipping documentation is required, including a declaration of dangerous goods and any special permits or certifications.

Compliance Tips

1. **Stay Updated:** Regulations can change frequently. Stay informed about updates to relevant regulations by subscribing to industry newsletters, attending training sessions, and consulting with regulatory experts.
2. **Training:** Provide regular training for your staff on regulatory compliance. Ensure they understand the importance of adhering to regulations and are familiar with the specific requirements.
3. **Documentation:** Maintain detailed records of your compliance efforts, including testing certifications, training records, inspection logs, and shipping documents. This documentation can be crucial in case of regulatory audits.
4. **Consult Experts:** When in doubt, consult with regulatory experts or legal counsel to ensure full compliance with all applicable regulations.

By understanding and adhering to these key regulations and standards, you can ensure the legal and safe management of lithium-ion batteries, thereby protecting your staff, customers, and the environment.

Key Resources for Rental Houses on Lithium-Ion Battery Safety

- UN Manual of Tests and Criteria: Detailed information on the tests that lithium-ion batteries must pass for safe transportation. [UN Manual of Tests and Criteria](#)
- IATA Dangerous Goods Regulations (DGR): Guidelines for the safe air transport of lithium-ion batteries. [IATA Dangerous Goods Regulations](#)
- IMDG Code: International guidelines for the sea transport of dangerous goods, including lithium-ion batteries. [IMDG Code](#)
- OSHA Standards for Hazardous Materials: Occupational safety standards for handling hazardous materials, including lithium-ion batteries. [OSHA Hazardous Materials](#)
- DOT Hazardous Materials Regulations (HMR): U.S. Department of Transportation regulations for the transport of hazardous materials. [DOT Hazardous Materials Regulations](#)
- NFPA 855: Standard for the Installation of Stationary Energy Storage Systems: Fire safety standards for the installation and use of energy storage systems. [NFPA 855](#)
- Battery University: Comprehensive resource for understanding battery technology, safety, and maintenance. [Battery University](#)
- European Union Battery Directive: Regulations governing the disposal and recycling of batteries within the EU. [EU Battery Directive](#)
- Call2Recycle: Battery recycling program with information on safe disposal and recycling practices. [Call2Recycle](#)
- Denios Lithium Battery Storage Cabinets: Specialized storage solutions for lithium-ion batteries. [Denios Battery Storage Cabinets](#)

These resources provide essential guidelines, regulatory information, and best practices to ensure the safe handling, storage, and transportation of lithium-ion batteries in rental houses.

- Anton/Bauer Service & Support: <https://www.antonbauer.com/en/product-support/schedule-a-service-or-repair/>
- Anton/Bauer Service Centres: <https://www.antonbauer.com/en/product-support/service-centers/>
- Anton/Bauer Online Help Centre: <https://help.antonbauer.com/?lang=en>