

MANAGING LI-ION BATTERY RECALLS: A COMPREHENSIVE GUIDE

White Paper



Americase®

TABLE OF CONTENTS

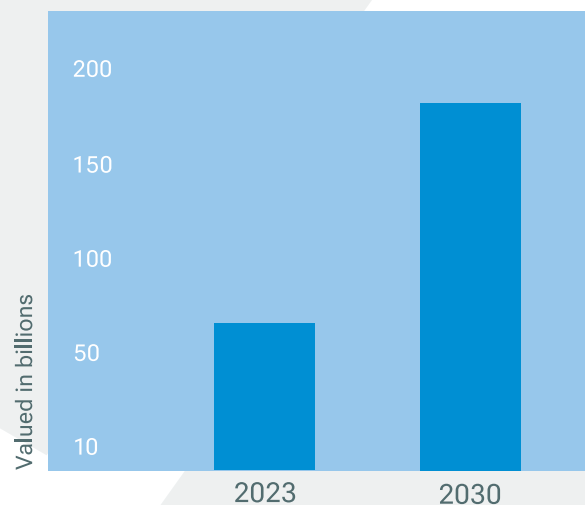
• Meeting the Challenge	3
• Understanding Lithium-Ion Battery Recalls	4
• Regulatory Framework and Compliance for Battery Recalls	5
• Case Study: The Samsung Galaxy Note 7 Recall	7
• Key Steps for Handling a Lithium-Ion Battery Recall	8
• Planning Ahead: Mitigating the Risks of Future Recalls	11

MEETING THE CHALLENGE

The Growing Challenge of Lithium-Ion Battery Recalls

Lithium-ion (Li-ion) batteries are everywhere. They power everything from smartphones and laptops to electric vehicles and renewable energy storage systems. As of 2023, the global lithium-ion battery market was valued at over \$60 billion, with projections reaching \$180 billion by 2030 due to increasing demand across industries. Their lightweight design, high energy density, and long lifespan make them the preferred choice for portable and high-performance energy storage.

GLOBAL LITHIUM-ION BATTERY MARKET WORLDWIDE



Source: Statista

When manufactured correctly and handled properly, Li-ion batteries are a safe and efficient power source. However, defects in design and production, or mishandling and misuse, can lead to serious consequences. If a battery suffers physical damage, or is exposed to extreme conditions, it can enter thermal runaway. In recent years, high-profile recalls have highlighted the need for proper recall procedures, making recall management an important responsibility for manufacturers, distributors, and regulatory agencies.

The Importance of Proper Recall Management

A lithium-ion battery recall is a complex, critical process. Companies must act swiftly to ensure customer safety, comply with hazardous materials regulations, and manage logistics for the return, storage, and disposal of recalled batteries. Mishandling a recall can lead to:

- **Severe financial losses** from replacement costs, legal liabilities, and damaged brand reputation.
- **Safety risks** for consumers, employees, and assets.
- **Regulatory penalties** for failing to comply with transportation, storage, and disposal laws for hazardous materials.

Why This White Paper Matters

This white paper provides a step-by-step guide to handling a lithium-ion battery recall efficiently and safely. Whether you are a manufacturer, distributor, product safety officer, or logistics coordinator, understanding the best practices for managing damaged, defective, or recalled (DDR) batteries is crucial. In this guide, you will learn:

- The **common reasons** why Li-ion batteries may be recalled.
- The **regulatory landscape** governing the transportation, storage, and disposal of recalled batteries.
- A **real-world case study** on one of the largest Li-ion battery recalls in history.
- The **key steps** to managing a recall effectively while minimizing risks and costs.
- **Proactive strategies** to prepare your business for potential future recalls.

Following the guidance in this white paper, you can help ensure compliance, protect your customers, and safeguard your company's reputation in the face of a battery recall.

UNDERSTANDING LITHIUM-ION BATTERY RECALLS

Lithium-ion batteries are an integral part of modern technology, but when manufacturing defects, design flaws, or physical damage cause them to fail, the consequences can be severe. Fires, explosions, and hazardous material leaks have prompted numerous high-profile recalls, affecting everything from consumer electronics to electric vehicles. In fact, between 2012 and 2022, there were at least 78 lithium-ion battery recalls in the U.S. alone, with safety defects impacting millions of devices. Understanding the causes of these recalls is important for companies looking to prevent, manage, and respond to safety concerns effectively.

4

Why Are Li-Ion Batteries Recalled?

Battery recalls typically result from manufacturing defects, design flaws, physical damage, or regulatory non-compliance.

Manufacturing Defects: The Risk of Flawed Production

Production errors can introduce contaminants or misaligned components, leading to internal short circuits, which can trigger thermal runaway, a self-sustaining chain reaction of overheating.

The 2016 Samsung Galaxy Note 7 recall affected over two million devices. Learn more: [Americase Case Study: Samsung Galaxy Note 7 Recall](#)

Design Defects: When Flawed Engineering Puts Safety at Risk

Even when a battery is manufactured correctly, design flaws can create hidden risks. One major issue is inadequate separator thickness, which increases the likelihood of internal short circuits.

Another common design issue is a flawed battery management system (BMS). The BMS regulates charging cycles, voltage, and temperature, ensuring the battery operates safely. If a BMS is poorly programmed, it can allow overcharging or excessive heat buildup.

Physical Damage and Improper Handling: An Often-Overlooked Risk

Unlike design and manufacturing flaws, physical damage often occurs after a battery has left the factory.

Crushing, puncturing, or dropping a Li-ion battery can cause its internal components to deform, leading to short circuits. Extreme temperatures, moisture exposure, or improper storage can also accelerate battery degradation and failure.

Boeing's 2013 Dreamliner 787 fleet was grounded after onboard battery fires linked to internal short circuits.

Regulatory Non-Compliance: A Costly Mistake

Because Li-ion batteries are classified as hazardous materials, they must meet strict safety and transportation standards. If a manufacturer fails to comply with UN 38.3 testing requirements, Department of Transportation (DOT) regulations, or International Air Transport Association (IATA) shipping protocols, a recall may be necessary to prevent accidents in transit.



A failure to comply with these regulations not only poses significant safety risks but can also lead to legal consequences and financial penalties. In 2019, a major electronics company was fined millions of dollars for shipping lithium-ion batteries without proper labeling and documentation.

REGULATORY FRAMEWORK AND COMPLIANCE FOR BATTERY RECALLS

Managing a lithium-ion battery recall is not just about logistics—it's about compliance. Since Li-ion batteries are classified as hazardous materials, their transportation, storage, and disposal are tightly regulated at both national and international levels. Failure to comply with these regulations can result in fines, legal action, and safety risks. Understanding the regulatory landscape is essential for any company involved in the manufacturing, distribution, or transportation of Li-ion batteries.

5

U.S. Regulations and Oversight

Several federal agencies oversee the safe handling of Li-ion batteries in the United States, including:

Department of Transportation (DOT) and Pipeline and Hazardous Materials Safety Administration (PHMSA)

The DOT, through PHMSA, regulates the transportation of hazardous materials, including lithium-ion batteries. Companies must comply with the **Hazardous Materials Regulations (HMR, 49 CFR Parts 171-180)**, which outline packaging, labeling, and shipping requirements.



Key DOT regulations for recalled batteries include:

- **DOT Special Permits (SPs)** – Batteries that are damaged, defective, or recalled (DDR) require special packaging and handling under DOT Special Permits. These permits dictate specific containment and transport procedures to prevent fires and explosions during transit.
- **Packaging and Labeling** – Recalled batteries must be transported in UN-certified containers, properly labeled with hazard class identifiers, and accompanied by shipping papers detailing the recall.

Consumer Product Safety Commission (CPSC)

For consumer electronics and household devices, the CPSC oversees recalls of defective Li-ion batteries. If a safety issue is identified, companies must:

- **Report the hazard to the CPSC** within 24 hours of discovery.
- **Develop a recall action plan** that includes consumer notification, collection logistics, and proper disposal.
- **Ensure proper consumer education** about the risks of continued use.



International Regulations

For companies shipping or selling Li-ion batteries across borders, international regulations must also be followed.

United Nations (UN) Model Regulations and UN 38.3 Testing

Before a Li-ion battery can be transported globally, it must pass UN 38.3 testing, which evaluates its safety under extreme conditions. This test ensures that batteries:

- Withstand pressure, temperature fluctuations, and impact without leaking or igniting.
- Do not enter thermal runaway under normal transportation stresses.
- Remain stable in high-vibration environments.

International Air Transport Association (IATA) Dangerous Goods Regulations

Li-ion battery recalls often require global transport. However, IATA rules state that:

- Damaged or defective Li-ion batteries **cannot be transported by aircraft**.

Failure to meet IATA requirements can result in denied shipments, regulatory fines, and increased liability risks.

European Union (EU) Battery Regulations

The EU has some stringent battery safety and environmental laws. The **EU Battery Directive (2006/66/EC)** and the newer **EU Battery Regulation (2023/1542)** impose strict guidelines on:

- **Battery safety and eco-design** – Manufacturers must ensure Li-ion batteries meet minimum safety and recyclability standards.
- **End-of-life disposal** – Companies selling batteries in the EU must collect and recycle a percentage of their products, reducing landfill waste.
- **Proper handling** – Recalled batteries must be disposed of in compliance with EU hazardous materials laws.

The Consequences of Non-Compliance

Ignoring or failing to comply with these regulations can lead to serious consequences, including:

- **Hefty fines and legal penalties** – In 2019, a major electronics company was fined millions of dollars for mislabeling recalled Li-ion batteries during transport.
- **Shipment delays or rejections** – Non-compliant shipments may be refused by freight carriers, delaying recall efforts and increasing costs.
- **Increased safety risks** – Improperly stored or transported DDR batteries can lead to fires posing risks to personnel, equipment, and assets.
- **Injuries/Loss of life** – Non-compliance can lead to thermal events, causing severe injuries and even loss of life.

CASE STUDY: THE SAMSUNG GALAXY NOTE 7 RECALL

When discussing lithium-ion battery recalls, one of the most significant cases in history is the Samsung Galaxy Note 7 recall of 2016. This incident not only led to a complete product withdrawal but also reshaped how the industry approaches battery safety, transportation, and regulatory compliance. Examining what happened, the challenges faced, and the lessons learned provides valuable insight for companies preparing for or responding to a Li-ion battery recall.

Background: A Promising Device with a Critical Flaw

Samsung introduced the Galaxy Note 7 in 2016, marketing it as a premium smartphone with cutting-edge features. However, shortly after its release, reports began surfacing of devices overheating, catching fire, and even exploding. By early September, Samsung acknowledged the issue and voluntarily recalled over 2 million devices, citing a battery defect as the cause.

Recall Process and Its Challenges

Samsung initially attempted to resolve the issue by replacing defective phones with new units. However, after replacement devices also began catching fire, the company had no choice but to issue full recall and permanent discontinuation of the product.



Managing a recall of this scale came with significant logistical and regulatory challenges:

- **Coordinating Global Recall:** With millions of devices already in the hands of consumers across multiple countries, Samsung had to work with regulatory agencies worldwide to organize returns and ensure proper disposal.
- **Air Travel Ban:** The Federal Aviation Administration (FAA) banned people who owned Galaxy Note 7 phones from bringing their phones on-board due to fire risks.

- **Safe Transportation of Recalled Batteries:** The U.S. Department of Transportation (DOT) required special permits and packaging to return the recalled batteries. The batteries were to be shipped via ground transport only.
- **Compliance with Hazardous Materials Regulations:** Because damaged and defective Li-ion batteries pose an increased risk of thermal runaway, special packaging was required to transport them safely. Samsung partnered with third-party packaging and logistics companies to ensure compliance with all applicable regulations, including DOT Hazardous Materials Regulations and IATA Dangerous Goods Regulations.
- **Consumer Communication and Trust Recovery:** Companies handling recalls have to manage massive public relations efforts to explain the issue, offer refunds and/or exchanges, and rebuild consumer confidence in their brand.

Lessons Learned and Best Practices for Future Recalls

The Galaxy Note 7 recall serves as a cautionary tale and highlights several key takeaways for companies dealing with lithium-ion battery recalls:

1. Early Detection and Proactive Response Are Crucial

To quickly address and resolve issues with potential battery defects, companies should prioritize swift action and transparency.

2. Proper Packaging and Transportation Are Non-Negotiable

The restrictions placed on transporting the Note 7 underscored the importance of UN-certified packaging for recalled Li-ion batteries. Businesses must work with logistics partners that specialize in hazardous materials handling.

3. Collaboration with Regulatory Agencies Helps Prevent Delays

Samsung had to navigate multiple layers of regulatory approval, from the CPSC in the U.S. to international agencies.

4. Comprehensive Battery Testing Must Be a Priority

The recall led Samsung to overhaul its battery testing protocols, introducing an industry-leading eight-point battery safety check for all future devices. Implementing rigorous safety testing and quality control can prevent defects before they reach consumers.

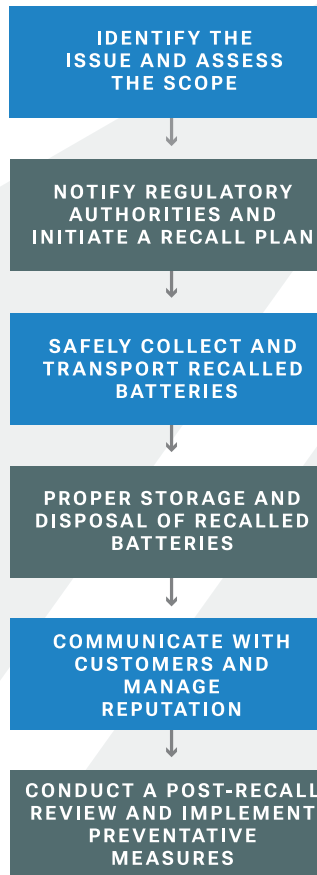
5. A Strong Recall Plan Protects a Company's Reputation

While the recall was costly, Samsung's transparent handling of the issue, consumer refunds, and long-term commitment to safety helped it recover. A well-executed recall strategy can mitigate brand damage and rebuild customer trust over time.

KEY STEPS FOR HANDLING A LITHIUM-ION BATTERY RECALL

A lithium-ion battery recall is a complex, high-stakes process that requires immediate action, regulatory compliance, and meticulous coordination. Companies must act swiftly to ensure customer safety, comply with hazardous materials laws, and manage logistics for the return, storage, and disposal of recalled batteries. A well-executed recall minimizes financial losses, legal liabilities, and reputational damage.

KEY STEPS FOR HANDLING A LITHIUM-ION BATTERY RECALL



Below is a step-by-step guide for effectively managing a Li-ion battery recall.

1. Identify the Issue and Assess the Scope

Early detection is critical. Companies should have quality control measures, customer feedback systems, and safety monitoring protocols in place to catch potential battery defects before they escalate. If a battery-related issue is identified, companies must quickly assess:

- **The root cause of the defect** (manufacturing error, design flaw, damage in transit, etc.).
- **The number of affected units** and their locations.
- **Potential safety risks** associated with continued use.

2. Notify Regulatory Authorities and Initiate a Recall Plan

Once a safety issue is confirmed, companies must notify the appropriate regulatory bodies. Requirements vary by country and industry but often include:

In the U.S.: The Consumer Product Safety Commission (CPSC) for consumer electronics, the Department of Transportation (DOT) for hazardous materials, and the National Highway Traffic Safety Administration (NHTSA) for electric vehicle batteries.

Internationally: Compliance with the European Commission's battery regulations and the United Nations (UN) hazardous goods transportation rules.

A recall action plan should include:

- **Public and customer communication strategies** to prevent further use of defective batteries.
- **Logistics for collecting and safely transporting** recalled batteries.
- **Storage and disposal solutions** that meet hazardous waste regulations.

Companies must act quickly and transparently to maintain trust and avoid regulatory penalties.

3. Safely Collect and Transport Recalled Batteries

DDR Li-ion batteries can pose a serious risk of fire and explosion if improperly handled. Safe collection and transport require:

- **Specialized packaging** – DOT regulations mandate that recalled batteries be shipped in UN-certified containers designed to contain thermal runaway and prevent external damage.
- **DOT Special Permits for DDR (Damaged, Defective, and Recalled) Batteries** – These permits outline strict requirements for containment and shipment of defective batteries. Companies must ensure compliance with these regulations or risk shipment rejections and legal penalties.
- **Controlled logistics and carrier compliance** – Not all carriers accept hazardous materials. Companies must coordinate with carriers that have the proper certifications to transport recalled batteries.

10

4. Proper Storage and Disposal of Recalled Batteries

Once collected, recalled batteries must be stored in compliance with applicable regulations. Best practices include:

- **Separating DDR batteries** from other units.
- **Using climate-controlled storage** to prevent overheating.
- **Partnering with certified recycling and disposal facilities** to ensure proper handling. Companies must never dispose of recalled batteries in regular landfills.

5. Communicate with Customers and Manage Reputation

A well-managed recall requires clear and transparent communication. Companies should:

- **Notify customers immediately** through direct emails, website announcements, and press releases.
- **Provide instructions on how to return recalled batteries** safely.
- **Offer refunds or replacement programs** to maintain customer loyalty.

Mishandling public communication can lead to widespread consumer distrust and negative press. In contrast, companies that take swift, responsible action can turn a crisis into an opportunity to demonstrate their commitment to safety.

6. Conduct a Post-Recall Review and Implement Preventative Measures

Once a recall is complete, companies should conduct a thorough review to prevent future incidents. This includes:

- **Analyzing the root causes** and identifying manufacturing or design changes needed to prevent recurrence.
- **Updating quality control and testing procedures** to catch potential defects earlier.
- **Enhancing regulatory compliance training** for employees and partners.

PLANNING AHEAD: MITIGATING THE RISKS OF FUTURE RECALLS

No company wants to face a lithium-ion battery recall, but proactive planning can reduce the likelihood of one occurring and minimize damage if it does. Many recalls stem from preventable issues, such as inadequate quality control, poor battery design, or failure to comply with safety regulations. A well-prepared company can avoid these pitfalls by strengthening safety measures, improving recall readiness, and staying ahead of evolving industry standards.

A recall can be devastating—both financially and reputationally—but companies that take preventive action can significantly lower the risk of an incident and respond effectively if one occurs.

Implement Rigorous Testing and Quality Control

The first and most critical step in recall prevention is ensuring that lithium-ion batteries meet or exceed all safety and durability requirements before they reach consumers. This starts with comprehensive testing and strict quality control protocols at every stage of development and production.

Industry Safety Standards and Best Practices

All lithium-ion batteries should comply with UN 38.3 testing protocols, which evaluate a battery's ability to withstand extreme conditions as described earlier in this white paper. Batteries that fail these tests pose a heightened risk of thermal runaway, making them unsuitable for market release.

Beyond Regulatory Compliance: Internal Testing Improvements

Many companies go beyond standard testing requirements by developing their own in-house quality control measures. As mentioned earlier in this white paper, after the Galaxy Note 7 recall, Samsung introduced its eight-point battery safety check, which includes additional durability tests, real-time battery monitoring, and improved stress testing.

Other manufacturers are following suit by investing in:

- **Advanced battery monitoring systems (BMS)** that prevent overheating and overcharging.
- **Improved separator materials** to reduce the likelihood of internal short circuits.
- **AI-driven defect detection** that uses machine learning to identify battery abnormalities before shipment.

By integrating these additional layers of protection, manufacturers can catch potential battery failures before they become widespread issues.

Develop a Comprehensive Recall Response Plan

Even with rigorous quality control, unforeseen issues can still arise. A well-prepared company should have a structured recall plan in place long before any problems surface. This plan should be detailed, up to date, and regularly tested through internal drills or simulations.



Key Elements of a Strong Recall Plan

- 1. Establish a dedicated recall response team.** This cross-functional team should include representatives from engineering, legal, logistics, compliance, and public relations to ensure a coordinated response.
- 2. Define clear roles and responsibilities.** A structured chain of command allows for faster decision-making and consistent communication with regulators, customers, and partners.
- 3. Predefine recall procedures.** Companies should have step-by-step guidelines for how defective batteries will be collected, contained, transported, and disposed of.
- 4. Develop customer communication protocols.** Clear, transparent messaging is essential to maintain trust and prevent panic. The plan should include pre-drafted customer notices, press releases, and FAQ materials.
- 5. Run recall simulations.** Conducting mock recalls can help a company test its plan and identify potential weaknesses before a real event occurs.

Stay Ahead of Regulatory Changes

The regulatory landscape surrounding lithium-ion batteries is constantly evolving, with new safety standards emerging as technology advances. Companies must stay informed and proactively adapt to avoid compliance violations that could lead to a recall.

Monitoring Regulatory Developments

Regulations governing lithium-ion batteries vary across industries and regions. In the U.S., manufacturers and distributors should closely follow guidance from:

- **The Consumer Product Safety Commission (CPSC)** for consumer electronics recalls.
- **The Department of Transportation (DOT) and Pipeline and Hazardous Materials Safety Administration (PHMSA)** for hazardous materials transport regulations.
- **The National Highway Traffic Safety Administration (NHTSA)** for automotive and electric vehicle battery safety.

Internationally, companies should comply with **IATA Dangerous Goods Regulations (DGR)** and **European Union (EU) Battery Regulations**.

Partner with Industry Experts for Recall Preparedness

Navigating the complexities of lithium-ion battery recalls and compliance can be challenging. Partnering with experts in hazardous materials regulations, containment, and handling can help companies prepare for potential recalls before they happen.

Americase is Here to Help

Americase is an industry-leading expert in safe and regulatory compliant packaging solutions for lithium-ion batteries. We partner with the entire value chain, from battery OEMs to distributors to recyclers, providing protective containers to ship and store lithium-ion batteries in any condition. Our expertise includes:

- **Custom-engineered, UN-certified packaging** designed, tested, and proven to safely transport damaged, defective, and recalled batteries.
- **Regulatory compliance support and expertise** to ensure businesses meet all applicable safety standards.
- **Comprehensive logistics and storage solutions industry partnerships** for the proper transport, containment and disposal of recalled batteries.

By planning ahead and working with experienced industry partners, businesses can mitigate risks, streamline recall processes, and ensure full compliance with evolving safety regulations. Whether your company is facing a recall today or preparing for the future, Americase can provide the expertise and solutions needed to handle lithium-ion battery recalls with confidence.

Contact Americase today to learn how our specialized battery packaging and compliance solutions can help your company stay prepared for any recall scenario. For more information, visit [Americase.com](https://www.americase.com) and reach out to our team of experts.

Additional Resources

COSTHA — Council on Safe Transportation of Hazardous Articles

COSTHA, founded in 1972, is a not-for-profit industry association devoted to promoting regulatory compliance and safety in the international and domestic transportation of dangerous goods.

DGAC — Dangerous Goods Advisory Council

DGAC is an international, non-profit educational organization that promotes safe and efficient transportation of hazardous materials in domestic and international commerce.

MDTC — Medical Device Transport Council

The MDTC was formed to promote the safe transport of medical devices and their components. Our mission is to contribute to developing and advocating for responsible regulations for the transportation of medical devices.

PRBA — The Portable Rechargeable Battery Association

PRBA serves as the voice of the rechargeable power industry, representing its members on legislative, regulatory and standards issues at the state, federal and international level.

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