zeus

Battery Products

Power Your World

Your Guide to Shipping Lithium Batteries

Regulatory Compliance

US Department of Transportation (DOT):

Phone: 202-366-4000

Federal Aviation Administration (FAA):

Phone: 866-835-5322

Pipeline and Hazardous Materials Safety Administration (PHMSA):

Phone: 202-366-4433

Email: phmsa.hmhazmatsafety@dot.gov

DISCLAIMER:

This guide is written to help you understand the requirements for the transportation of Lithium batteries. It is not a replacement to the regulatory compliance documents published by the DOT, FAA, PHMSA, IATA, ICAO and IMDG. The regulatory departments are the final authority for defining proper shipping procedures.

If you have questions, please contact Kevin Bergrud at 1-877-469-4255.

The FAA & PHMSA are sub agencies of U.S. DOT

The regulations that govern the transport of lithium metal and lithium ion cells and batteries can be very confusing. Whether you are shipping a single battery, a palletized load of batteries or a battery powered device, the safety of your package and of the people who handle it along the way, depends on compliance with these regulations.

Is your Lithium Battery Small, Medium or Large ?

The regulation for shipping a lithium battery (custom pack) is based on the size of the battery to be shipped. A battery is made up of one or more connected cells. These size categories depend on the lithium metal or alloy (Li) content of a non-rechargeable battery or cell, or the equivalent lithium content (ELC) for rechargeable lithium batteries or cells.

Small Battery

Gram Limit: less than 8

Examples:

Cell Phone

Photo & Video Cameras

Medium Battery

Gram Limit: 8-24.9

Examples:

Extended Life Notebooks

Lighting Equipment

Professional Video Equip.

Large Battery

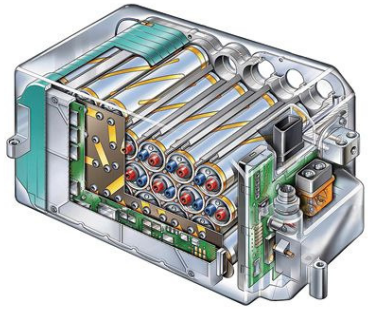
Gram Limit: 25 +

Examples:

Electric Vehicles

Hybrid Vehicles

Mobility Devices



These limits are applicable to domestic shipments in accordance to 49CFR.

Lithium metal and lithium ion cells and batteries are listed as Class 9 Miscellaneous hazardous materials in the U.S. and international hazardous materials regulations and thus are subject to specific packaging, marking, labeling, and shipping paper requirements.

Batteries or Cells must be separated so as to prevent short circuits and must be packed in a strong outer packaging:

Cardboard	Dividers
Bubble Wrap	Vermiculite
Dividers	Bag
Steel Drum	Special Labeling

Exceptions exist for batteries / cells that meet set criteria.

In order to qualify for these exceptions, batteries and cells must meet certain testing requirements and contain a limited amount of lithium metal or “equivalent lithium content” or Watt Hours.

Wh = (mAh / 1,000) x Volts

A battery or cell made available for transport must meet the

UN/DOT 38.3 test requirements. The only cells or batteries that can ship without that testing completed are samples/prototypes for customer evaluation and samples / prototypes that going to the testing facility for the UN38.3 testing.

This material must be declared and ship as fully regulated Class 9 hazardous material with an approved carrier certified to transport Class 9.

UN38.3 Series of Conducted Tests

PRIMARY / Non Rechargeable

Test #1 **Altitude Simulation**

Simulates air transport under low pressure conditions.

Test #2 **Thermal Test**

Assesses cell and battery seal integrity & internal electrical connections. Conducted using extreme and rapid temperature changes.

Test #3 **Vibration**

Simulates vibration during transport.

Test #4 **Shock**

This simulates possible impacts during transport.

Test #5 **External Short Circuits**

Simulates an external short circuit and no rupture or fire within six hours of the test.

Test #6 **Impact**

Battery is laid on a flat surface, a 15.8mm bar placed across center of sample and 9.1kg mass is dropped from 61+/-2.5cm onto the sample.

Test #7: **Not Applicable**

Test #8: **Forced Discharge (Cells)**

Ability of primary or rechargeable cell to withstand a forced discharge condition.

SECONDARY / Rechargeable

Test #1 **Altitude Simulation**

Simulates air transport under low pressure conditions.

Test #2 **Thermal Test**

Assesses cell and battery seal integrity & internal electrical connections. Conducted using extreme and rapid temperature changes.

Test #3 **Vibration**

Simulates vibration during transport.

Test #4 **Shock**

This simulates possible impacts during transport.

Test #5 **External Short Circuits**

Simulates an external short circuit and no rupture or fire within six hours of the test.

Test #6 **Impact**

Battery is laid on a flat surface, a 15.8mm bar placed across center of sample and 9.1kg mass is dropped from 61+/-2.5cm onto the sample.

Test #7: **Overcharge**

Evaluates the ability of a rechargeable battery to withstand an overcharge condition.

Test #8: **Forced Discharge (Cells)**

Ability of primary or rechargeable cell to withstand a forced discharge condition.

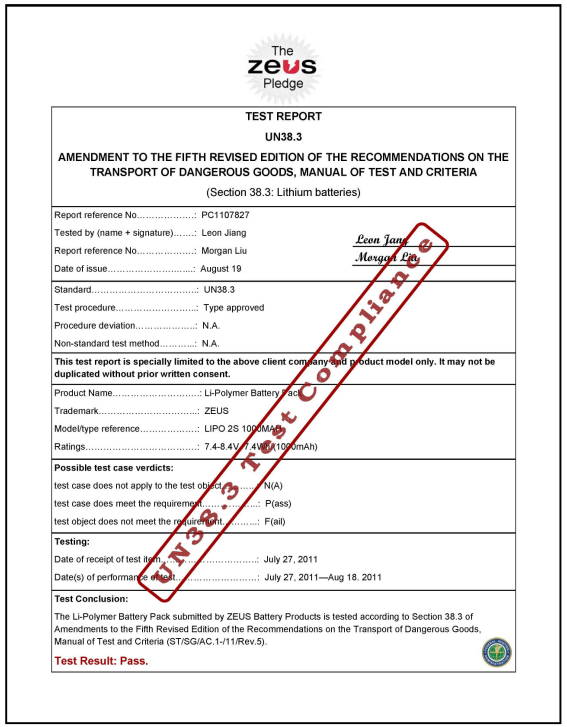
Items Needed for Submission for UN38.3 Compliance

PRIMARY / Non Rechargeable

Battery (Custom Packs):	8 + (2 Spares)
Mating Connectors:	8
Non Prismatic Cells:	40 + (10 Spares)
Prismatic Cells:	40 + (10 Spares)
Lead Time for Testing:	35-40 days after materials arrive at test lab
MSDS Sheet:	Required

SECONDARY / Rechargeable

Battery (Custom Packs):	16 + (4 Spares)
Mating Connectors:	8
Non Prismatic Cells:	35 + (10 Spares)
Prismatic Cells:	40 + (10 Spares)
Lead Time for Testing:	35-40 days after materials arrive at test lab
MSDS Sheet:	Optional



The Zeus Pledge

TEST REPORT

UN38.3

AMENDMENT TO THE FIFTH REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MANUAL OF TEST AND CRITERIA

(Section 38.3: Lithium batteries)

Report reference No.....: PC1107827
Tested by (name + signature).....: Leon Jiang
Report reference No.....: Morgan Liu
Date of issue.....: August 19

Leon Jiang
Morgan Liu

Standard.....: UN38.3
Test procedure.....: Type approved
Procedure deviation.....: N.A.
Non-standard test method.....: N.A.

This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent.

Product Name.....: Li-Polymer Battery Pack
Trademark.....: ZEUS
Model/type reference.....: LIPO 2S 1000MAH
Ratings.....: 7.4-8.4V, 7.4V/2A(1000mAh)

Possible test case verdicts:

test case does not apply to the test object.....: N(A)
test case does meet the requirement.....: P(ass)
test object does not meet the requirement.....: F(ail)

Testing:

Date of receipt of test item.....: July 27, 2011
Date(s) of performance of test.....: July 27, 2011—Aug 18, 2011

Test Conclusion:

The Li-Polymer Battery Pack submitted by ZEUS Battery Products is tested according to Section 38.3 of Amendments to the Fifth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.1-/11/Rev.5).

Test Result: Pass.

UN38.3 Test Compliance

The UN38.3 certificate must remain on record and be available for the FAA / DOT personnel to access during regulatory compliance audit.

ZEUS Battery Products

The information and guidelines set forth are made in good faith and are believed to be accurate at the date of preparation. ZEUS Battery Products make no warranty expressed or implied.

ZEUS Battery Products is committed to protecting our environment, keeping batteries out of our landfills and preserving our natural resources.

Please call the RBRC at 877-723-1297 for a recycling center near you or visit their website at: www.call2recycle.org.

Glossary of Terms

Aggregate lithium content means the sum of the grams of lithium content or equivalent lithium content contained by the cells comprising a battery.

Battery means one or more cells which are electrically connected together by permanent means, including case, terminals, and markings.

Button cell or battery means a round small cell or battery when the overall height is less than the diameter.

Cell means a single encased electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals.

Component cell means a cell contained in a battery.

Cycle means one sequence of fully charging and fully discharging a rechargeable cell or battery.

Lithium content is applied to lithium metal and lithium alloy cells and batteries, and for a cell means the mass of lithium in the anode of a lithium metal or lithium alloy cell, which for a primary cell is measured when the cell is in an un-discharged state and for a rechargeable cell is measured when the cell is fully charged. The lithium content of a battery equals the sum of the grams of lithium content contained in the component cells of the battery.

Primary means a cell or battery which is not designed to be electrically charged or recharged.

Prismatic cell or battery means a cell or battery whose ends are similar, equal and parallel rectilinear figures, and whose sides are parallelograms.

Protective devices means devices such as fuses, diodes and current limiters which interrupt the current flow, block the current flow in one direction or limit the current flow in an electrical circuit.

Rated capacity means the capacity, in ampere-hours, of a cell or battery as measured by subjecting it to a load, temperature and voltage cut-off point specified by the manufacturer.

Rechargeable means a cell or battery which is designed to be electrically recharged.

Rupture means the mechanical failure of a cell container or battery case induced by an internal or external cause, resulting in exposure or spillage but not ejection of solid materials.

Short circuit means a direct connection between positive and negative terminals of a cell or battery that provides a virtual zero resistance path for current flow.

Undercharged means a primary cell or battery that has not been wholly or partly discharged.

Venting means the release of excessive internal pressure from a cell or battery in a manner intended by design to preclude rupture or disassembly.

Reference: United Nations Committee of Experts on the Transport of Dangerous Good, Report of the Committee of Experts on Its Twenty First Session, Geneva, 4-13 December 2000.