Shipping Lithium Ion Batteries and Lithium Ion Batteries in/with equipment: Implementation of Dangerous Goods Transport Regulations

General

Transport of lithium ion batteries is in the scope of Dangerous Goods Transport Regulations. Therefore many specific requirements have to be respected for their transport. The safe carriage of dangerous goods is important to shippers and transport companies and not least for every party involved in the chain of lithium ion battery transport.

The following notes, based on recommendations of ZVEI, have been produced to provide initial practical guidance to the regulations for the carriage of lithium ion batteries and lithium ion batteries in/with equipment.

In any case it is necessary to consult the regulations themselves for details. The applicable regulations are listed below. They must be fulfilled by the shipper for every commercial shipment of lithium ion batteries.

Especially the energy content and diverse conditions classify which dangerous goods regulations must be taken into account for the transport of lithium ion batteries. Due to exemption regulations, simplified requirements apply for instance to lithium ion batteries with a nominal energy up to maximum 100 Wh.

Whereas lithium ion batteries with a nominal energy of more than 100 Wh are always to be treated as fully regulated Class 9 Dangerous Goods.

This guidance refers to the commercial transport by:

- road/rail: ADR/RID
- sea freight: IMDG Code
- air freight: IATA DGR.

The regulations are subject to change on an annual or biennial basis.

Lithium ion batteries are classified as follows:

- UN 3480 Lithium ion batteries
- UN 3481 Lithium ion batteries contained in equipment
- UN 3481 Lithium ion batteries packed with equipment

In individual cases, a dangerous goods expert should be consulted.

Local authorities are responsible for the interpretation and implementation of the relevant regulations. They can, at their discretion, make decisions differing from this guideline.

Despite the greatest possible care during the revision and composition, no liability can be assumed for the content and the completeness of this document.

This information leaflet has been developed by the Batteries Division in ZVEI – Zentralverband Elektrotechnik- und Elektronikindustrie e. V.,
<table>
<thead>
<tr>
<th>Legend:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADR</strong></td>
</tr>
<tr>
<td><strong>RID</strong></td>
</tr>
<tr>
<td><strong>IMDG Code</strong></td>
</tr>
<tr>
<td><strong>IATA DGR</strong></td>
</tr>
<tr>
<td><strong>PI</strong></td>
</tr>
<tr>
<td><strong>SP</strong></td>
</tr>
<tr>
<td><strong>n/a</strong></td>
</tr>
</tbody>
</table>
Flow chart to determine the appropriate Packing Instruction

Battery to be shipped

Battery UN tested?

yes

no

Shipment under SP 310, P910 (p. 8)

Battery defective/damaged? (p. 9)

yes

no

Shipment under SP 376, P908 (p. 9 left column)

Battery „critical”? (p. 9)

yes

no

Shipment under SP 376, P911 (p. 9 right column)

Battery for disposal or recycling?

yes

Shipment under SP 377, P909 (p. 10); contact local collection point for batteries or a recycler

no

no

Shipment under SP 377, P909 (p. 10); contact local collection point for batteries or a recycler

Energy$^2$ ≤ 100 Wh?

yes

Transport by airfreight?

yes

Shipment under PI 965 Section IB, II PI 966 Section II, PI 967 Section II (p. 6)

no

„exempted” dangerous goods; shipment under SP 188 (p. 4)

no

Transport by airfreight?

yes

Shipment under PI 965 Section IA PI 966 Section I, PI 967 Section I (p. 7)

no

„fully regulated” dangerous goods shipment under P903 (p. 5))

Energy$^2$ > 100 Wh?

yes

Transport by airfreight?

yes

no

Note: Please also take into consideration the information on page 1 and further requirements on page 11.

1) In case of doubt consult the manufacturer

2) (Nominal) Energy [Wh] = Capacity [Ah] x Voltage [V] (see name plate)
<table>
<thead>
<tr>
<th>Transportation Mode</th>
<th>Road / Rail (ADR/RID), Sea Freight (IMDG Code)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Energy</td>
<td>≤ 100 Wh (per battery)</td>
</tr>
</tbody>
</table>
| Description                                                                        | **Batteries** (without equipment)  
Batteries packed with equipment 3) (at least one battery which is not attached)  
Batteries contained in equipment 3) (contained/plugged-in) |
| Special Provision / Packing Instruction                                            | ADR/RID SP 188, IMDG Code SP 188                                                                                                                                 |
| Max. Quantity                                                                      | n/a                                                                                                           |
| Weight Limit                                                                       | 30 kg gross weight (per package)  
n/a                                                                                          |
| Packaging                                                                          | Batteries must be placed in inner packagings that completely enclose the battery, batteries must be protected so as to prevent short circuits.  
Strong outer packaging, e.g. fibreboard box (Drop test passed: content shall not be damaged or shifted.)  
strong outer packaging protection against unintentional activation  
short circuit protection                                                                 |
| Marking                                                                            | Lithium battery mark  
**UN 3480**  
Lithium battery mark  
**UN 3481**  
Lithium battery mark  
**UN 3481**  
not applicable if no more than two batteries are installed and if there are no more than two packages in the consignment |
| Sea Freight Container-Marking                                                      | none                                                                                                          |
| Transport Document                                                                 | n/a  
n/a                                                                                     |
| Miscellaneous                                                                      | Personnel shall be trained commensurate with responsibilities |

3) “Equipment” means apparatus for which the lithium batteries will provide electrical power for its operation.
<table>
<thead>
<tr>
<th>Transportation Mode</th>
<th><strong>Road / Rail (ADR/RID), Sea Freight (IMDG Code)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Energy</td>
<td>&gt; 100 Wh (per battery)</td>
</tr>
<tr>
<td><strong>Name and Description</strong></td>
<td>Batteries (without equipment)</td>
</tr>
<tr>
<td>Special Provision / Packing Instruction</td>
<td>P903, LP903</td>
</tr>
<tr>
<td>Max. Quantity</td>
<td>ADR 1.1.3.6: max. 333 kg (per transport unit, e.g. truck incl. trailer)</td>
</tr>
<tr>
<td></td>
<td>If exceeded, further requirements for vehicle equipment and driver</td>
</tr>
<tr>
<td>Weight Limit</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Packaging</strong></td>
<td>Batteries must be placed in inner packagings that completely enclose the battery, batteries must be protected to prevent short circuits. Batteries must be secured against movement within the outer packaging. UN approved packaging (Packaging Group II: e.g. UN/4G/Y30/...)</td>
</tr>
<tr>
<td></td>
<td>strong outer packaging protection against unintentional activation short circuit protection</td>
</tr>
<tr>
<td><strong>Marking</strong></td>
<td>Hazard label No. 9A (10 cm x 10 cm)</td>
</tr>
<tr>
<td></td>
<td>ADR: UN 3480 IMDG Code: LITHIUM-ION BATTERIES UN 3480</td>
</tr>
<tr>
<td>Sea Freight Container-Marking</td>
<td>Container Plackards (min. 25 cm x 25 cm)</td>
</tr>
<tr>
<td></td>
<td>Hazard label No. 9A (10 cm x 10 cm)</td>
</tr>
<tr>
<td></td>
<td>ADR: UN 3481 IMDG Code: LITHIUM-ION BATTERIES PACKED WITH EQUIPMENT UN 3481 or LITHIUM-ION BATTERIES CONTAINED IN EQUIPMENT UN 3481</td>
</tr>
<tr>
<td>Transport Document</td>
<td>UN 3480 LITHIUM ION BATTERIES, 9, (E)</td>
</tr>
<tr>
<td></td>
<td>Number of packages and packaging type (e.g. 1 Fibreboard box)</td>
</tr>
<tr>
<td></td>
<td>weight (e.g. xx kg)</td>
</tr>
<tr>
<td></td>
<td>Shipper’s &amp; consignee’s address</td>
</tr>
<tr>
<td></td>
<td>Sea freight (IMDG Code): (Language English)</td>
</tr>
<tr>
<td></td>
<td>IMO-DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDG-CODE)</td>
</tr>
<tr>
<td></td>
<td>UN 3481 LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, 9, (E)</td>
</tr>
<tr>
<td></td>
<td>Number of packages and packaging type (e.g. 1 Fibreboard box)</td>
</tr>
<tr>
<td></td>
<td>weight (e.g. xx kg)</td>
</tr>
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<td></td>
<td>Shipper’s &amp; consignee’s address</td>
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</tr>
<tr>
<td></td>
<td>UN 3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT, 9, (E)</td>
</tr>
<tr>
<td></td>
<td>Number of packages and packaging type (e.g. 1 Fibreboard box)</td>
</tr>
<tr>
<td></td>
<td>weight (e.g. xx kg)</td>
</tr>
<tr>
<td></td>
<td>Shipper’s &amp; consignee’s address</td>
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<td></td>
<td>Sea freight (IMDG Code): (Language English)</td>
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</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td>Personnel shall be trained commensurate with responsibilities</td>
</tr>
</tbody>
</table>

4) The picture shows a battery contained in equipment as well as packed with equipment. For such combinations, SP 390 and P903 since ADR 2021 contain detailed regulations aiming at harmonization with SP A 181 in the IATA DGR for air transport.
**Transportation Mode**  
Airfreight (IATA)

**Nominal Energy**  
≤ 100 Wh (per battery)

**Name and Description**  
Batteries (without equipment)

**Packing Instructions**  
IATA PI965 Section II

**Max. Quantity**  
none (more than 2 batteries per package)

**Weight Limit**  
PAX: forbidden

**Packaging**  
Strong outer packaging (fibreboard box).
Batteries must be placed in inner packaging that completely encloses the battery;
Batteries must be secured against movement within the outer packaging;
Batteries must be protected to prevent short circuits

**Marking**  
UN 3480 LITHIUM ION BATTERIES,  
(battery weight (e.g. net qty xx kg)  
Shipper’s / Consignee’s address

**Transport Document**  
Shipper’s Declaration for Dangerous Goods:
UN 3480 lithium ion batteries, 9, [__ Fiberboard box(es)] x __ kg // 965 // IB, see example 1.
Delete the “PASSENGER AND CARGO AIRCRAFT” box

**Information on the Air Waybill (AWB)**  
In the “Handling Information” box:
"Dangerous Goods as per Shipper’s Declaration CAO"

**Miscellaneous**  
Official IATA-Training by authorized trainer required, if not available, please contact IATA authorized expert.
Battery ≤ 2,7 Wh:
Max. quantity: 2,5 kg
Adequate instruction commensurate with responsibilities.
State of charge (SoC) must not exceed 30 %.

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5) “Equipment” means apparatus for which the lithium batteries will provide electrical power for its operation.
## Transportation Mode

**Airfreight (IATA)**

## Nominal Energy

> 100 Wh (pro Batterie)

## Name and Description

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Battery Icon" /></td>
<td><img src="image2" alt="Battery with Equipment Icon" /></td>
<td><img src="image3" alt="Battery in Equipment Icon" /></td>
</tr>
</tbody>
</table>

## Packing Instructions

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IATA PI 965 Section IA</td>
<td>IATA PI 966 Section I</td>
<td>IATA PI 967 Section I</td>
</tr>
</tbody>
</table>

## Max. Quantity

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>As required for operation, plus 2 for replacement</td>
<td>n/a</td>
</tr>
</tbody>
</table>

## Weight Limit

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAX: forbidden</td>
<td>PAX: 5 kg net battery weight per package</td>
<td></td>
</tr>
<tr>
<td>CAO: 35 kg net battery weight per package</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Packaging

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries must be placed in inner packagings that completely enclose the battery, batteries must be protected to prevent short circuits</td>
<td>Batteries must be placed in inner packagings that completely enclose the battery, batteries must be protected so as to prevent short circuits</td>
<td>Equipment containing batteries must be secured and packed to prevent accidental operation during transport</td>
</tr>
<tr>
<td>UN approved packaging (Packing Group II: e.g. UN 4G/Y30/...)</td>
<td>UN approved packaging (Packing Group II: e.g. UN 4G/Y30/...)</td>
<td>Batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging.</td>
</tr>
<tr>
<td>Strong outer packaging (e.g. cardboard box)</td>
<td>Strong outer packaging (e.g. cardboard box)</td>
<td>Strong outer packaging (e.g. cardboard box)</td>
</tr>
<tr>
<td>UN approved packaging not required (SP A48)</td>
<td>UN approved packaging not required (SP A48)</td>
<td>UN approved packaging not required (SP A48)</td>
</tr>
</tbody>
</table>

## Marking

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LITHIUM ION BATTERIES, UN 3480</td>
<td>LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, UN 3481</td>
<td>LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT, UN 3481</td>
</tr>
<tr>
<td>Net weight (NET QTY)</td>
<td>Net weight (NET QTY)</td>
<td>Net weight (NET QTY)</td>
</tr>
<tr>
<td>Shipper’s/Consignee’s address</td>
<td>Shipper’s/Consignee’s address</td>
<td>Shipper’s/Consignee’s address</td>
</tr>
</tbody>
</table>

## Transport Document

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shopper’s Declaration for Dangerous Goods: UN 3480, Lithium ion batteries, 9 // 965, delete the “PASSENGER AND CARGO AIRCRAFT” box</td>
<td>Shopper’s Declaration for Dangerous Goods: UN 3481, Lithium ion batteries packed with equipment, 9 // 966</td>
<td>Shopper’s Declaration for Dangerous Goods: UN 3481, Lithium ion batteries contained in equipment, 9 // 967</td>
</tr>
</tbody>
</table>

## Information on the Air Waybill (AWB)

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the “Handling Information” box: “Dangerous Goods as per Shipper’s Declaration CAO”</td>
<td>In the “Handling Information” box: “Dangerous Goods as per Shipper’s Declaration”, see example 3</td>
<td>In the “Handling Information” box: “Dangerous Goods as per Shipper’s Declaration”, see example 3</td>
</tr>
<tr>
<td>When a shipment contains both dangerous goods and non-dangerous goods, the number of packages containing dangerous goods shall be added in the “Handling Information” box.</td>
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<td>When a shipment contains both dangerous goods and non-dangerous goods, the number of packages containing dangerous goods shall be added in the “Handling Information” box.</td>
</tr>
</tbody>
</table>

## Miscellaneous

<table>
<thead>
<tr>
<th>Batteries (without equipment)</th>
<th>Batteries packed with equipment (at least one battery which is not attached)</th>
<th>Batteries contained in equipment (contained/plugged-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official IATA-Training required. If not available, please contact IATA authorized expert.</td>
<td>Official IATA-Training required. If not available, please contact IATA authorized expert.</td>
<td>Official IATA-Training required. If not available, please contact IATA authorized expert.</td>
</tr>
<tr>
<td>State of charge (SoC) must not exceed 30 %.</td>
<td>State of charge (SoC) must not exceed 30 %.</td>
<td>State of charge (SoC) must not exceed 30 %.</td>
</tr>
</tbody>
</table>

Example 3: Air Waybill containing 5 packages with lithium batteries packed with or contained in equipment together with 20 packages with non-dangerous goods (such as conventional, corded equipment).
<table>
<thead>
<tr>
<th>Transportation Mode</th>
<th>Prototypes</th>
<th>Prototypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road / Rail / Sea Freight</td>
<td><strong>Prototypes</strong></td>
<td><strong>Airfreight</strong></td>
</tr>
</tbody>
</table>

**Description**
Prototypes: Lithium batteries without testing according to UN Manual of Tests and Criteria, Chapter 38.3; Lithium batteries; Lithium batteries packed with or contained in equipment. Only for transport of:
- small production series of max. 100 batteries (IATA: annual production)
- prototypes for testing reasons only

**Special Provision, Packing Instruction**
ADR/RID/IMDG Code SP 310, P910

IATA DGR SP A88, PI 910 (Approval required from the Competent Authority of the state of origin)
Note: to/across/via USA additional approval required from US Authority (DOT)

**Packing Instructions**
See above as defined in approval

**Max. Quantity**
n/a as defined in approval

**Weight Limit**
UN approved packaging: e.g. fibreboard box
(Packing Group II: e.g. UN 4G/Y30/…)
- Each battery shall be individually packed in an inner packaging, e.g.
in a plastic bag
- Non-combustible, non-conductive thermal insulation material, e.g. Vermiculite
- Must be secured against movement within the outer packaging

**Packaging**
ADR/RID: UN 3480
IMDG Code: LITHIUM-ION BATTERIES UN 3480 (100 x 100 mm)

as defined in approval

**Marking**
Shipper’s & consignee’s address
UN 3480 LITHIUM ION BATTERIES, 9, (E)
Number of packages and packaging type (e.g. 1 fibreboard box)
Battery weight (e.g. xx kg)
“CARRIAGE IN ACCORDANCE WITH SPECIAL PROVISION 310”
IMDG Code: IMO DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDG-CODE

Sonstiges
Personnel shall be trained commensurate with responsibilities

as defined in approval
<table>
<thead>
<tr>
<th>Transportation Mode</th>
<th>Damaged or Defective Batteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road / Rail / Sea</td>
<td>SP 376, P908 SP 376, P911</td>
</tr>
</tbody>
</table>

**Special Provision, Packing Instruction**

**Criteria for "Damaged or Defective"**

- **"Non-critical"** (no possible danger during transport)
  Such Batteries do not conform to the tested type according to the applicable provisions of the UN Manual of Tests and Criteria, 38.3. This includes:
  - Batteries identified as being defective for safety reasons;
  - Batteries that have leaked or vented;
  - Batteries that cannot be diagnosed prior to carriage; or
  - Batteries that have sustained physical or mechanical damage.

In assessing a cell or battery as damaged or defective, an assessment or evaluation shall be performed based on safety criteria from the cell, battery or product manufacturer or by a technical expert with knowledge of the cell's or battery's safety features. An assessment or evaluation may include, but is not limited to, the criteria mentioned in SP 376.

- **"Critical"** (possible danger during transport)
  Batteries liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours.

<table>
<thead>
<tr>
<th>Max. Quantity</th>
<th>n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight Limit</td>
<td>A battery with a net mass of more than 30 kg shall be limited to one battery per outer packaging.</td>
</tr>
</tbody>
</table>

**Packaging**

- Each damaged or defective battery or equipment containing such batteries must be packed separately in leak-proof inner packaging to prevent release of electrolyte.
- UN approved packaging required for all battery types.
- (Packing Group II), e.g. fibreboard box.
- Must be secured against movement within the package.
- Sealed packagings shall be fitted with a venting device.
- Must be packed with non-combustible and non-conductive thermal insulation material, material class A1 or A2 (non-combustible, e.g. rockwool, glass wool, foamglass, Vermiculite).
- Absorbing material to absorb leaking electrolyte from leaking batteries.
- Batteries shall be protected against short circuit.
- The packaging shall be capable of meeting certain performance requirements in case of rapid disassembly, dangerous reaction, production of a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours of the cells or batteries, as specified in P911.
- The additional packaging performance requirements shall be verified by a test as specified by the competent authority.
- A verification report shall be available on request as specified in P911.
- Cells or batteries shall be protected against short circuit.
- Alternative packing and/or carriage conditions may be authorized by the competent authority (in Germany: Federal Institute for Materials Research and Testing, BAM); detailed requirements as stated in the authorization.

**Marking**

- UN 3480 DAMAGED / DEFECTIVE LITHIUM ION BATTERIES.
- UN 3481 DAMAGED / DEFECTIVE LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT.

**Transport Document**

- Shipper’s & consignee’s address.
- UN 3480 LITHIUM ION BATTERIES, 9, (E) Number of packages and packaging type (e.g. 1 Aluminium box).
- Battery weight (e.g. xx kg).
- "Transport in accordance with special provision 376."

**Miscellaneous**

- Personnel shall be trained commensurate with responsibilities.
- The batteries are assigned to transport category 0.7)

### Air Transport of damaged or defective batteries

Damaged or defective cell or batteries, whether they have been identified as “non-critical” or as “critical”, are forbidden for air transport (IATA DGR SP A154).

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6) In assessing a battery as damaged or defective, the type of battery and its previous use and misuse shall be taken into account. In case of doubt consult the manufacturer.

7) i.e. no exemption related to quantities carried per transport unit.
### Batteries for Disposal & Recycling

**Transportation Mode**
Road / Rail / Sea

<table>
<thead>
<tr>
<th>Nominal Energy</th>
<th>≤ 100 Wh (per battery)</th>
<th>&gt; 100 Wh (per battery)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria for “Damaged or Defective”</td>
<td>SP 377, P909</td>
<td></td>
</tr>
<tr>
<td>Max. Quantity</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Weight Limit</td>
<td>30 kg gross weight per package</td>
<td>n/a</td>
</tr>
</tbody>
</table>
| Packaging | For batteries >100 Wh UN-approved packaging required (Packing Group II)  
For batteries ≤ 100 Wh and for batteries contained in equipment, UN-approved packaging is not required. Strong outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use. Batteries shall be packed to prevent short circuits and dangerous evolution of heat. 
Protection against short-circuits and dangerous evolution of heat. This can be achieved by:  
• individual protection of the battery terminal  
• inner packaging to prevent contact between batteries  
• batteries with recessed terminals designed to protect against short-circuits or  
• the use of non-conductive and non-combustible cushioning material to fill empty space between the batteries in the package  
Batteries shall be secured within the outer packaging to prevent excessive movement during carriage (e.g. by using a non-conductive and non-combustible cushioning material or through the use of a tightly closed plastic bag) | |
| Marking | UN 3480 LITHIUM BATTERIES FOR DISPOSAL  
or  
UN 3480 LITHIUM BATTERIES FOR RCYCLING | |
| Transportation Document | Shipper’s & consignee’s address  
UN 3480, WASTE LITHIUM ION BATTERIES, 9, (E)  
Number of packages and packaging type (e.g. 1 Fibreboard box (4G)) Battery weight (e.g. xx kg) | |
| Miscellaneous | Personnel shall be trained commensurate with responsibilities | |

### Damaged / defective batteries
Batteries identified as being damaged or defective shall be carried in accordance with SP 376, see page 9.

### Air transport of waste batteries
Waste batteries and batteries being shipped for recycling or disposal are prohibited from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator (IATA DGR SP A183).

### Batteries for Disposal & Recycling
Alternatively, lithium batteries for disposal and recycling can also be carried (like unused lithium batteries) under ADR SP 230 and SP 188, as appropriate, or – up to the intermediate processing facility – under ADR SP 636).

More exemptions for lithium cells and batteries installed in equipment from private households are regulated in SP 670.
Additional Information:

Dangerous Goods Safety Advisor (DGSA)

Each undertaking, the activities of which include the carriage, or the related packing, loading or unloading, of dangerous goods by road shall appoint one or more safety advisers for the carriage of dangerous goods.

These requirements do not apply to undertakings the activities of which concern quantities in each transport unit smaller than those referred to in ADR 1.1.3.6 (see below).

UN Test 38.3 as Precondition for Transport

Only those batteries that fulfill the requirements of "UN Manual of Tests and Criteria, chapter 38.3" are allowed for transportation. If there should arise any doubts or questions, the manufacturer should be contacted.

For transport of prototypes (without UN test 38.3) and defective batteries, specific instructions have to be applied, see pages 9 and 10.

Test summary

Manufacturers and subsequent distributors of cells or batteries shall make available the test summary as specified below.

(a) Name of cell, battery, or product manufacturer, as applicable;
(b) Cell, battery, or product manufacturer’s contact information to include address, phone number, email address and website for more information;
(c) Name of the test laboratory to include address, phone number, email address and website for more information;
(d) A unique test report identification number;
(e) Date of test report;
(f) Description of cell or battery to include at a minimum:
   (i) Lithium ion or lithium metal cell or battery;
   (ii) Mass of cell or battery;
   (iii) Watt-hour rating, or lithium content;
   (iv) Physical description of the cell/battery; and
   (v) Cell or battery model number or, alternatively, if the test summary is established for a product containing a cell or battery, the product model number;
(g) List of tests conducted and results (i.e., pass/fail);
(h) Reference to assembled battery testing requirements, if applicable (i.e. 38.3.3 (f) and 38.3.3 (g));
(i) Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any; and
(j) Signature with name and title of signatory as an indication of the validity of information provided.

UN Manual of Tests and Criteria 38.3.5

More information is available under:

Quality Management Programme

The requirements for quality management programmes need to be respected by cell and battery manufacturers as well as those who modify batteries. Please refer to the original literature for details.

What should be considered by customers for return shipments?

The consigner, carrier and – if applicable – also a third party on whose behalf the consigner is acting are responsible for the proper shipment.

As a matter of principle, for returns or re-shipment the same rules apply like mentioned above. If possible, the original packaging should be used for transport. If the original packaging, the marking or even the necessary transport documents are not available for the shipper, they must be provided by the manufacturer or supplier or forwarder to the shipper or the carrier prior transportation.

Exemptions from Dangerous Goods Transport Regulations (ADR)

The provisions of ADR do not apply to companies carrying goods as ancillary process to their main business activity (e.g. deliveries or returns from building sites or demonstration purposes) ("Craftsman Regulation" ADR 1.1.3.1c).

ADR rules do not apply to private individuals where the batteries are packaged for retail sale and if the transport is intended for their personal use (ADR 1.1.3.1a).

Exemptions related to quantities carried per transport unit

For lithium ion batteries or devices with lithium ion batteries > 100 Wh a weight limit of 333 kg (battery weight) normally applies in connection with reduced requirements on transport devices (lorry equipment, driver’s qualification) (ADR 1.1.3.6).

Cargo securing

Where applicable, cargo shall be secured by suitable means (ADR 7.5.7).

Cells and single cell batteries

This document refers only to batteries comprising two or more cells. Different exemption limits exist for cells and single cell batteries
Appendix

Class 9 hazard
Miscellaneous dangerous substances and articles (ADR 5.2.2.2.2)
Hazard label No 9A

Full-scale template for labelling of the package

UN 3480 Lithium Ion Batteries (without equipment)
Class 9 hazard
Miscellaneous dangerous substances and articles (ADR 5.2.2.2)
Hazard label No 9A

Full-scale template for labelling of the package

UN 3481 Lithium Ion Batteries packed with equipment or contained in equipment
Lithium Battery Label  
(ADR 5.2.1.9.2, IATA DGR 7.1.5.5, Fig. 7.1.C)  

Full-scale template for labelling of the package
Lithium Battery Label
(ADR 5.2.1.9.2, IATA DGR 7.1.5.5, Fig. 7.1.C)

Full-scale template for labelling of the package

UN 3481 Lithium Ion Batteries packed with or contained in equipment
- cut outside the red hatching
- insert telephone number below the UN number