

# Shipping of Lithium Ion Batteries for Cordless Power Tools and Electric Garden Equipment: Implementation of Dangerous Goods Transport Regulations

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 EPTA and ZVEI, have been produced to provide initial practical guidance to the regulations for the carriage of lithium ion batteries especially for cordless power tools and gardening equipment.

These provisions 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 energy content up to 100 Wh. Whereas lithium ion batteries with 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)
- air freight (IATA)

Lithium ion batteries are classified as follows:

- UN3480 Lithium ion batteries
- UN3481 Lithium ion batteries contained in equipment
- UN3481 Lithium ion batteries packed with equipment

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

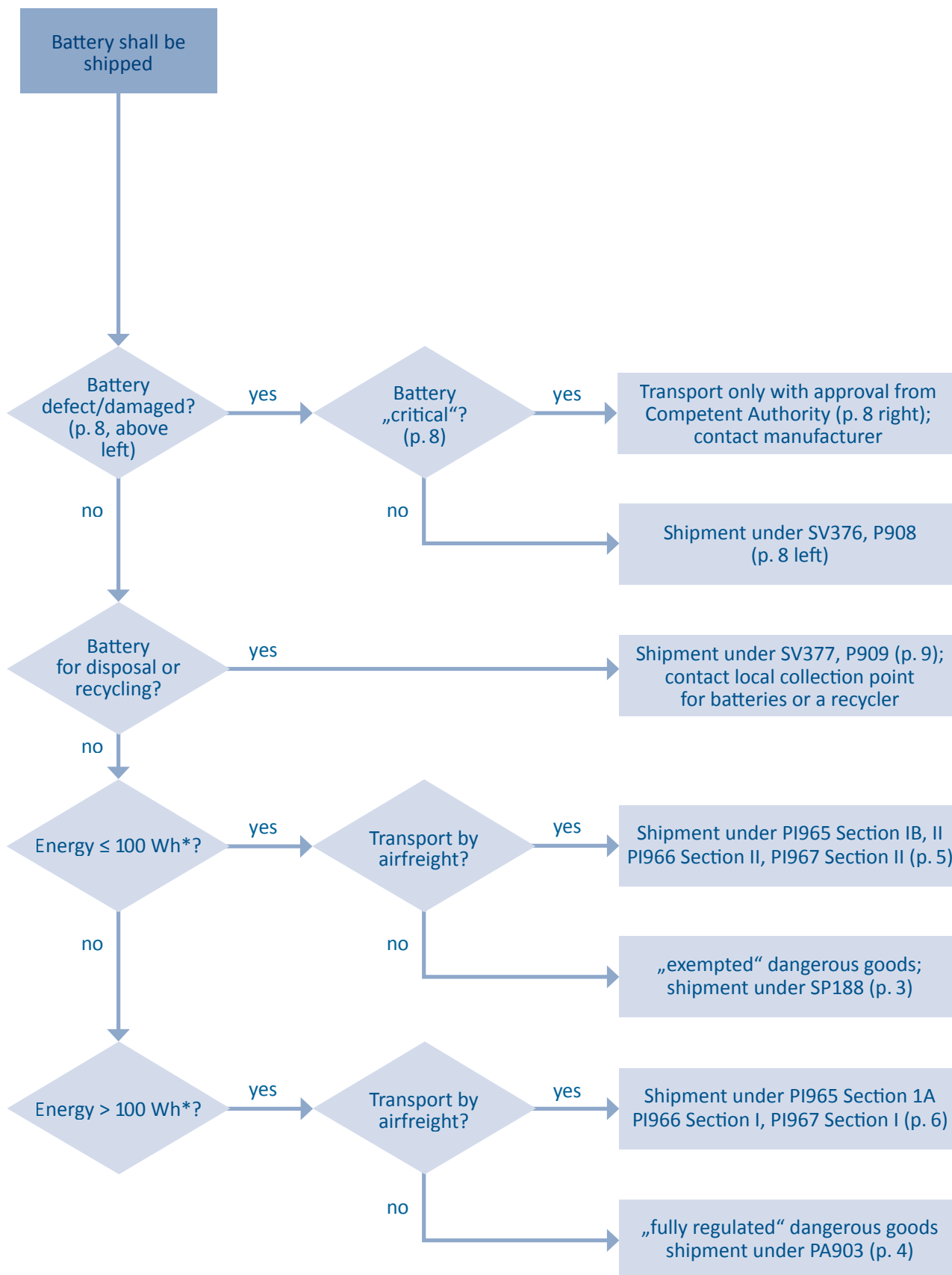
This document represents the status as of 01.01.2015. Local authorities are responsible for the interpretation and implementation of the relevant regulations.

They can, at their discretion, make decisions differing from this guideline. Therefore, despite the greatest possible care during the revision and composition, no liability can be assumed for the content and the completeness of this document.

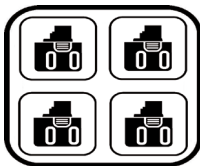
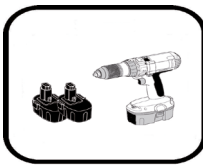

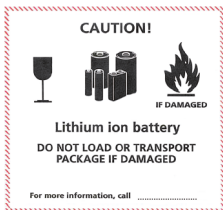
## Legend

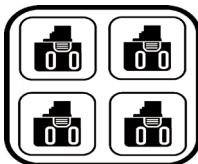
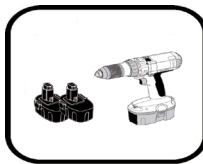
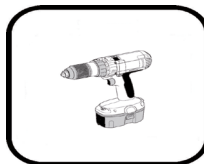
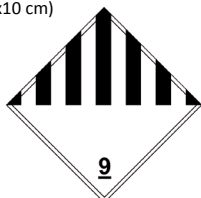
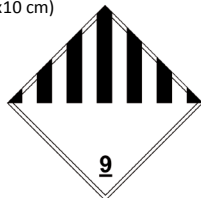
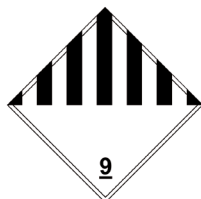
<b>EPTA</b>	European Power Tool Association
<b>ZVEI</b>	Zentralverband Elektrotechnik- und Elektronikindustrie e.V.
<b>IVG</b>	Industrieverband Garten e.V.
<b>ADR</b>	Accord européen relatif au transport international des marchandises Dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
<b>RID</b>	Règlement concernant le transport international ferroviaire de marchandises dangereuses (Regulations concerning the International Carriage of Dangerous Goods by Rail)
<b>IMDG</b>	International Maritime Code for Dangerous Goods
<b>IATA</b>	International Air Transport Association

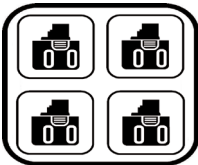
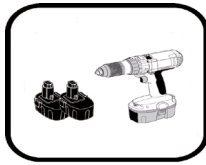
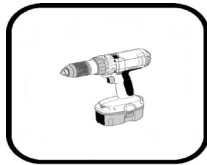

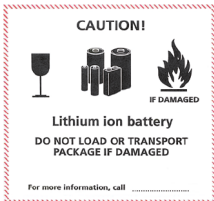
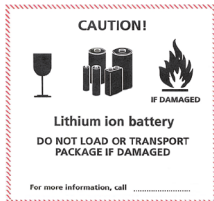
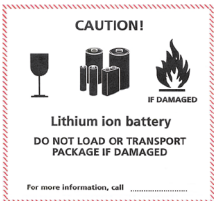
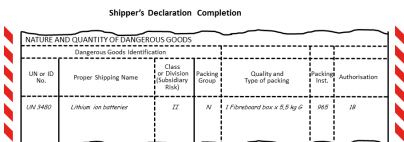
## Flow chart for determin the right packing instruction


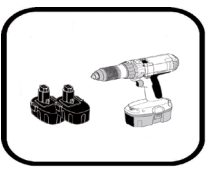
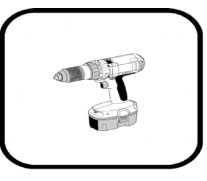
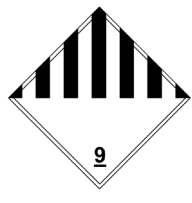

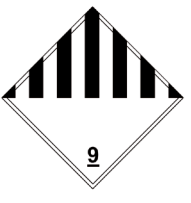


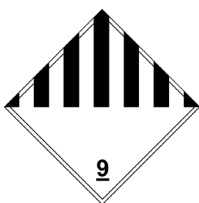
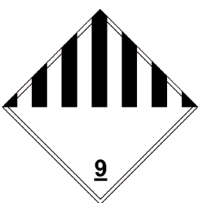
\* Wh = capacity [Ah] x Voltage [V] (see name plate)

	Truck/Rail (ADR/RID), Sea Freight (IMDG)		
Transportation Mode	≤ 100 Wh (per battery)		
	<b>Batteries</b> (without equipment)  	<b>Batteries packed with equipment</b> (at least one battery which is not attached to tool)  	<b>Batteries contained in equipment</b> (contained/plugged-in in tool)  
Packing Instructions	ADR/RID SP188, IMDG SP188		
Max. Quantity	none		
Weight Limit	30 kg gross weight per packaging	none	
Packaging	Batteries must be placed in inner packagings that completely enclose the battery, batteries must be protected to prevent short circuits.  Strong outer packaging, e.g. cardboard box (drop test passed: content shall not be damaged or shifted)		none
Marking	language: variabel or  <i>"Shipment contains lithium ion batteries - Transport acc. SP188 - package shall be handled carefully, in case of damage a risk of flammability exists. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)"</i> 		none
Sea Freight Container-Marking	none		
Transport Document	ADR: Caution statement (language variable, informal, e.g. shipping note)  <i>"Shipment contains lithium ion batteries - Transport acc. SP188 - package shall be handled carefully, in case of damage a risk of flammability exists. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)"</i>  IMDG: Caution statement (language English, informal, e.g., shipping note)  <i>"Shipment contains lithium ion batteries - Transport acc. SP188 - package shall be handled carefully, in case of damage a risk of flammability exists. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)"</i>		none
Miscellaneous	Work instruction of involved staff		

	Truck/ Rail (ADR/RID), Sea Freight (IMDG)		
Transportation Mode	> 100 Wh (per battery)		
	<div>Batteries (without equipment)</div> <div></div>	<div>Batteries packed with equipment (at least one battery which is not attached to tool)</div> <div></div>	<div>Batteries contained in equipment (contained/plugged-in in tool)</div> <div></div>
Packing Instructions	ADR/RID P903 IMDG P903		
Max. Quantity	none		
Weight Limit	ADR 1.1.3.6: max. 333 kg / per transport unit (truck incl. trailer) If exceeding weight limit, additional requirements to the carrier required		
Packaging	Batteries must be placed in inner packaging that completely encloses the battery, batteries must be protected to prevent short circuits  Batteries must be secured against movement within the outer packaging  UN approved packaging (Packing Group II: e.g. UN/4G/Y30/...)		strong outer packaging  protection against unintentionally activation  short circuit protection
Marking	<div>Label (10x10 cm)</div> <div>ADR: UN 3480</div> <div></div> <div>IMDG: UN 3480 LITHIUM ION BATTERIES</div>	<div>Label (10x10 cm)</div> <div>ADR: UN 3481</div> <div></div> <div>IMDG: UN 3481 LITHIUM ION BATTERIES PACKED WITH EQUIPMENT or UN 3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT</div>	
Sea Freight Container-Marking	<div>CONTAINER-PLACARDS (min. 25x25 cm)</div> <div></div>		
Transport Document	UN 3480, LITHIUM ION BATTERIES, 9, (E)  Number of packages and packaging type (e.g. 1 Fibreboard box) Battery weight (e.g. xx kg), Transport category 2 Shipper & consignee's address  Sea freight (IMDG): (language English) IMO-DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDG-CODE)	UN 3481, LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, 9, (E) Number of packages and packaging type (e.g. 1 Fibreboard box) Battery weight (e.g. xx kg) Transport category 2 Shipper & consignee's address  Sea freight (IMDG): (language English) IMO-DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDG-CODE)	UN 3481, LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT, 9, (E) Number of packages and packaging type (e.g. 1 Fibreboard box) Battery weight (e.g. xx kg) Transport category 2 Shipper & consignee's address  Sea freight (IMDG): (language English) IMO-DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDG-CODE)
Miscellaneous	Work instruction of involved staff		

	Airfreight (IATA)			
Transportation Mode	≤ 100 Wh (per battery)			
	<div>Batteries (without equipment)</div> <div></div>		<div>Batteries packed with equipment (at least one batterie which is not attached to tool)</div> <div></div>	<div>Batteries contained in equipment (contained/plugged-in in tool)</div> <div></div>
Packing Instructions	IATA PI965 Section IB	IATA PI965 Section II	IATA PI966 Section II	IATA PI967 Section II
Max. Quantity	none (more than 2 batteries per packaging)	2 batteries per packaging	No as required for operation, plus 2 for replacement	none
Weight Limit	10 kg net battery weight per packaging	none	PAX/CAO: 5 kg net battery weight per packaging	
Packaging	Batteries must be placed in inner packaging that completely encloses the battery, batteries must be protected to prevent short circuits (only for batteries or batteries packed with equipment) Batteries must be secured against movement within the outer packaging Equipment containing batteries must be secured and packed to prevent unintended operation during transport Strong outer packaging (cardboard box)			
Marking	UN 3480, Lithium ion batteries, battery weight (e.g net qty xx kg) Shipper-/Consignee's address <div></div>	<div></div>	<div></div>	Up to 2 batteries per packaging: no battery handling label required  More than 2 batteries per packaging: battery handling label required <div></div>
Transport Document	Caution statement: (language English) “Transport according IATA-DGR, PI965 Section IB - package shall be handled carefully, in case of damage a risk of flammability exists. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)”	Caution statement: (language English) “Transport according IATA-DGR, PI965 Section II - package shall be handled carefully, in case of damage a risk of flammability exists. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)”	Caution statement: (language English) “Transport according IATA-DGR, PI966 Section II- package shall be handled carefully, in case of damage a risk of flammability exists. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)”	Up to 2 batteries per packaging: no caution statement required. More than 2 batteries per packaging: caution statement required “Transport according IATA-DGR, PI967 Section II - package shall be handled carefully, in case of damage a risk of flammability exists. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)”
Information on Air Waybill (AWB)	Shipper's Declaration for Dangerous Goods: UN 3480 Lithium ion batteries, 9, //..... Fibreboard box(es) x ..... kg // 965 // IB <div></div> <div>The appropriate method of describing a lithium ion battery in accordance with Section IB</div>	“Lithium ion batteries in compliance with Section II of PI965”	„Lithium ion batteries in compliance with Section II of PI966”	only if more than 2 batteries per package: „Lithium ion batteries in compliance with Section II of PI967”
Miscellaneous	Official IATA-Training by authorized trainer required If not available, please contact IATA authorized expert	Work instruction of involved staff Batteries < 2.7 Wh can be shipped according PI965 Section II in unlimited quantities. Max. weight per packaging 2.5 kg (battery weight)		
Special Provisions: A88, A99, A154, A164, A181, A182, A183, A185				

	<b>Airfreight (IATA)</b>		
<b>Transportation Mode</b>	<b>&gt; 100 Wh (per battery)</b>		
	<b>Batteries</b> (without equipment)  	<b>Batteries packed with equipment</b> (at least one battery which is not attached to tool)  	<b>Batteries contained in equipment</b> (contained/plugged-in in tool)  
<b>Packing Instructions</b>	IATA PI965 Section IA	IATA PI966 Section I	IATA PI967 Section I IATA SP A48
<b>Max. Quantity</b>	none	No as required for operation, plus 2 for replacement	none
<b>Weight Limit</b>	PAX: 5 kg net battery weight per packaging CAO: 35 kg net battery weight per packaging		
<b>Packaging</b>	Batteries must be placed in inner packaging that completely encloses the battery, batteries must be protected to prevent short circuits  UN approved packaging (Packing Group II: e.g. UN 4G/Y30/...)	Batteries must be placed in inner packaging that completely enclose the battery, batteries must be protected so as to prevent short circuits  UN approved packaging (Packing Group II: e.g. UN 4G/Y30/...)	Equipment containing batteries must be secured and packed to prevent unintended operation during transport  Batteries must be protected to prevent short circuits due to contact to further conductible materials within the same packaging  Strong outer packaging (e.g. cardboard box) UN approved packaging not required
<b>Marking</b>	<u>PAX</u> UN 3480, Lithium ion batteries Net weight (NET QTY) Shipper-/Consignee's address  	<u>PAX</u> UN 3481, Lithium ion batteries packed with equipment Net weight (NET QTY) Shipper-/Consignee's address  	<u>PAX</u> UN 3481, Lithium ion batteries contained in equipment Net weight (NET QTY) Shipper-/Consignee's address  
<b>Transport Document</b>	Shipper's Declaration for Dangerous Goods: UN 3480 Lithium ion batteries, 9 // 965	Shipper's Declaration for Dangerous Goods: UN 3481 Lithium ion batteries packed with equipment, 9 // 966	Shipper's Declaration for Dangerous Goods: UN 3481 Lithium ion batteries contained in equipment, 9 // 967
<b>Information on Air Waybill (AWB)</b>	"Dangerous Goods as per Shipper's Declaration"		
<b>Miscellaneous</b>	Official IATA-Training by authorized trainer required. If not available, please contact IATA authorized expert		

Transportation Mode	Prototypes Truck/Rail/Sea Freight	Prototypes Airfreight
	Prototypes: Batteries not tested according UN Test 38.3 Only for transport of <ul style="list-style-type: none"> <li>• small production series of max. 100 batteries (IATA: p.a.)</li> <li>• prototypes for testing reasons only</li> </ul>	
Packing Instructions	ADR/RID/IMDG SP310	IATA A88: Approval from Aviation Authority of State of origin required (Note: to/across/via USA additionally approval from US Authority (DOT) required)
Max. Quantity	n/a	as defined in approval
Weight Limit	n/a	as defined in approval
Packaging	UN approved packaging:(Packing Group I) <ul style="list-style-type: none"> <li>• Each battery shall be packed e.g. in a plastic bag</li> <li>• Pad out box with Vermiculite</li> <li>• ADR/RID/IMDG: see SP230</li> <li>• Must be secured against movement within the outer packaging</li> </ul>	UN approved packaging: (Packing Group I) <ul style="list-style-type: none"> <li>• Each battery has to be packed in a plastic bag</li> <li>• Pad out box with Vermiculite</li> </ul> (Note: German Luftfahrtbundesamt LBA accept metal packaging and cargo aircraft shipments only)
Marking	ADR/RID: UN 3480 IMDG: UN 3480 LITHIUM ION BATTERIES (100 x 100 mm) 	UN 3480 Lithium ion batteries Net weight (NET QTY) Shipper-/Consignee's address 
Transport Document	Shipper & consignee's address: UN 3480 LITHIUM ION BATTERIES, 9, (E) Number of packages and packaging type (e.g. 1 Aluminum box) Battery weight (e.g. xx kg) Transport category 2 Special Provision SP310 IMDG: IMO-DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDG-CODE	Shipper's Declaration for Hazardous Goods: UN 3480 Lithium ion batteries, 9, PI 965 // A88 Copy of A88 Approval UN 3481, Lithium ion batteries packed with equipment, 9, (E)
Miscellaneous	Work instruction of involved staff	Official IATA-Training by authorized trainer required; if not available, please contact IATA authorized expert/forwarder



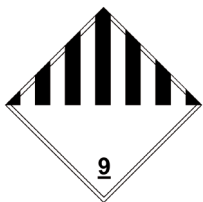
e. g. Alu-Box



Marking Packing Group I



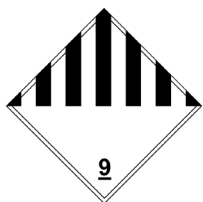
Cushion with Vermiculite

Transportation Mode	<b>Damaged or Defective Batteries</b> <b>Truck/Rail/Sea</b> <b>(not comply to UN Test 38.3 anymore)</b>	
Packing Instructions	SP376 P908	
Criteria for "Damaged or Defective"	<p><b>"Non-critical" (no possible danger during transport)</b></p> <p>Batteries such that they do not conform to the tested type according to the applicable provision of the UN Manual of Tests and Criteria, 38.3 This includes</p> <ul style="list-style-type: none"> <li>• Batteries identified as being defective for safety reasons</li> <li>• Batteries that have leaked or vented</li> <li>• Batteries that cannot be diagnosed prior to carriage, or</li> <li>• Batteries that have sustained physical or mechanical damage</li> </ul> <p>If there is no danger in transportation possible (see criteria for "critical" damaged or defective batteries on right side), then requirements for transport as stated below:</p>	<p><b>"Critical" (possible danger during transport)</b></p> <ul style="list-style-type: none"> <li>• Batteries that tend to break down quickly</li> <li>• Batteries react dangerously, producing smoke and flames</li> <li>• Batteries produce the dangerous heat</li> <li>• Batteries releasing dangerous toxic, corrosive or flammable gases</li> </ul> <p>(Note: In order to assess the type of battery, its previous use and misuse shall be taken into account)</p> <p><b>Transport only with approval from Competent Authority in Germany: Federal Institute for Materials Research and Testing (BAM)</b>  <b>(Detailed requirements as stated in approval)</b></p>
Max. Quantity	none	
Weight Limit	none	
Packaging	<ul style="list-style-type: none"> <li>• Each battery must be packed separately in close inner packaging (preventing leakage and short-circuit)</li> <li>• UN approved packaging required for all battery types (Packing Group II), e.g. fibreboard box</li> <li>• Must be secured against movement within the outer packaging</li> <li>• If packed hermetically, air venting contrivance required</li> <li>• Must be packed with non-combustible and non-conductive insulating material, material class A1 or A2 („non-combustible“, e.g. rockwool, glass wool, foamglas, Vermiculite)</li> <li>• Absorbing material to absorb leaking electrolyte</li> </ul>	
Marking	UN 3480 DAMAGED / DEFECTIVE LITHIUM-ION BATTERIES 	
Transport Document	Shipper & 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 category 2	
Miscellaneous	Work instruction of involved staff	

### Air Transport of Damaged or Defective Batteries

Batteries, that have been identified as defective for safety reasons by the manufacturer, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit, are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons) (IATA A154).



Transportation Mode	<b>Batteries for Disposal &amp; Recycling</b> <b>Truck/Rail/Sea</b>	
	< 100 Wh (per battery)	> 100 Wh (per battery)
Packing Instructions	SP377 P909	
Max. Quantity	none	
Weight Limit	30 kg per packaging	none
Packaging	<p>For batteries &gt;1 00 Wh UN-approved packaging required (Packing Group II)</p> <p>&lt; 100 Wh for batteries contained in equipment, UN-approved packaging is not required (strong outer packaging or collection boxes)</p> <p>Batteries shall be packed to prevent short circuits and dangerous evolution of heat</p> <p>This can be achieved by:</p> <ul style="list-style-type: none"> <li>• individual protection of the battery terminal</li> <li>• inner packaging to prevent contact between batteries</li> <li>• batteries with recessed terminals designed to protect against short-circuits or</li> <li>• the use of non-conductive and non-combustible cushioning material to fill empty space between the batteries in the packaging</li> </ul> <p>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)</p>	
Marking	<p>UN 3480 LITHIUM BATTERIES FOR DISPOSAL or LITHIUM BATTERIES FOR RECYCLING</p> 	
Transport Document	<p>Shipper &amp; consignee's address</p> <p>UN 3480, WASTE LITHIUM ION BATTERIES, 9, (E)</p> <p>Number of packages and packaging type (e.g. 1 Fibreboard box (4G))</p> <p>Battery weight (e.g. xx kg)</p> <p>Transport Category 2</p>	
Miscellaneous	Work instruction of involved staff	

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.

## Further Informations:

### UN-Test 38.3 as Precondition for Transport

Basically, 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 defect batteries, specific packing instructions have to be applied.

### What Should be Considered by Customers for Returns or Reshipment of Goods?

The sender and freight forwarder of the transport process are responsible for the proper shipment.

As a matter of principle, for returns or reshipment 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 sender, they must be provided by the manufacturer or supplier or forwarder to the sender or the carrier prior transportation.

### Disposal and Recycling

For the transport of lithium ion batteries > 100 Wh on road or rail for disposal or recycling, SP377 applies (package according to P909, Packing Group II).

For lithium ion batteries ≤ 100 Wh a non-UN-certified packaging can also be used, provided that

- the packaging does not exceed 30 kg gross mass,
- the content is packed in a way that short circuits are prevented and
- damage and movement of the content within the package is not possible under normal conditions of carriage (use of padding / filling material).

Notice to IMDG Code 2015 (sea):

New Special Provision and Packing Instruction for lithium batteries transported for disposal or recycling"

SP377 and P909: Always to be shipped as fully-regulated Class 9 dangerous goods.

### 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).

Further the 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).

### Transport Requirements

For lithium ion batteries > 100 Wh a weight limit of 333 kg (battery weight) applies in connection with reduced requirements on transport devices (lorry equipment, driver's qualification). Cargo protection has to be assured.

### Packaging of Several Packages (without Labelling Requirements)

Packages with batteries (≤ 100 Wh) only "contained in equipment", are not subject to labeling requirements and requirement for accompanying documents. If several of these packages, shall be packed in an over-packaging cardboard box or on a pallet, the over-packaging or pallet also does not need be label or accompanying document.

Attention: In case of air freight, different rules can apply in some states and airlines for this exemption. There are airlines which prescribe e.g. an accompanying document and an Air Waybill (AWB) entry anyway (e.g. lithium ion batteries in compliance with Section II of PI967).



Publisher:

EPTA – European Power Tool Association

Rue du Commerce 31

1000 Brussels, Belgium

Contact: Christian Eckert

Phone: +32 2 892 46 23

E-Mail: eckert@epta.eu

In collaboration with:

ZVEI - German Electrical and Electronic

Manufacturers' Association

Electric Power Tools Division

German Garden Industry Association (IVG)

Although all possible care has been taken, EPTA cannot accept any liability for the content.

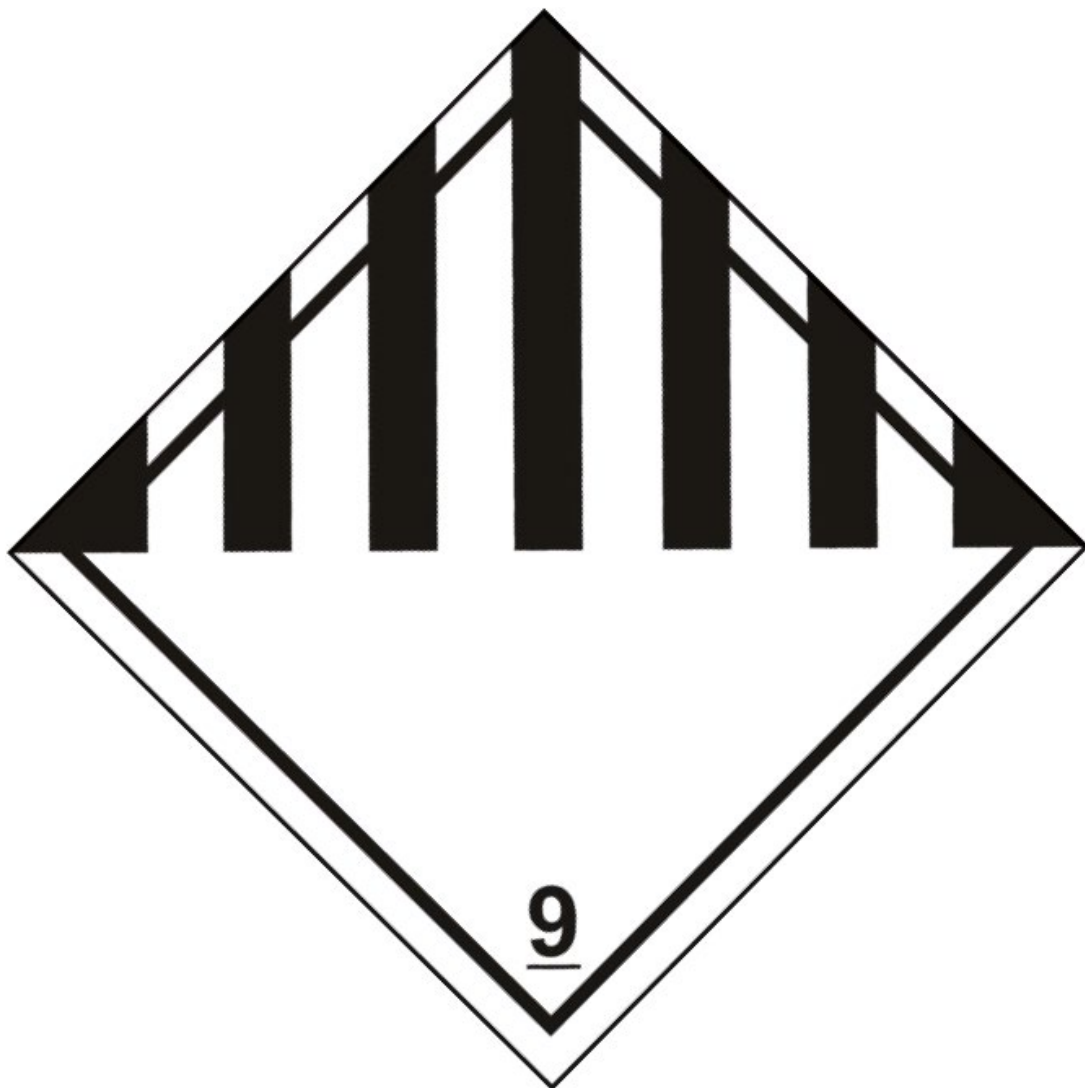
Pictures: Copyright by EPTA

May 2015

### Full-scale template for marking

Lithium Ion Battery  
packed with equipment or  
contained in equipment

*please cut here*



**UN 3481**

## Full-scale template for marking

Lithium Ion Battery  
(without equipment)

*please cut here*



# UN 3480

## Full-scale template for marking

- cut out outside the red line
- insert telephone number

