

Guidance for the Transport of Lithium-Ion Batteries for Cordless Power Tools and Electric Garden Equipment: Implementation of Hazardous Goods Requirements

Lithium-Ion Batteries are classified as dangerous goods in European transport law. Therefore many regulations for the carriage of dangerous goods are relevant to them. The safe carriage of dangerous goods is important to shippers and transport companies.

The following notes, based on recommendations of EPTA and ZVEI, have been produced to provide practical guidance to the regulations for the carriage of Lithium-Ion Batteries for cordless power tools and gardening equipment.

These provisions must be fulfilled by the sender for every commercial shipment of Lithium-Ion Batteries.

The energy content classifies which dangerous goods regulations must be taken into account for the transport of Lithium-Ion Batteries. Due to an exemption regulation in the dangerous goods regulation, simplified requirements apply to Lithium-Ion Batteries with energy up to 100 Wh. Whereas Lithium-Ion Batteries with energy of more than 100 Wh are always to be treated as Class

9 Dangerous Goods. This classification needs extensive additional safety requirements in terms of packaging, labeling and accompanying documents.

This guidance concerns the commercial transport by

- road / rail (ADR / RID)
- sea freight (IMDG)
- air freight (IATA)

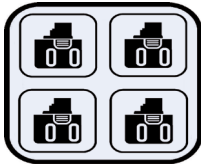
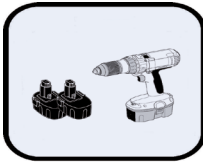
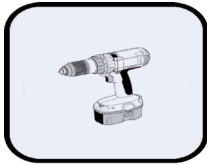
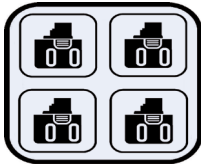
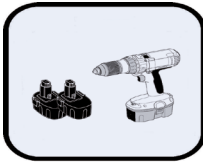
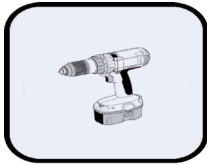
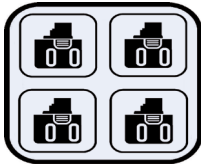
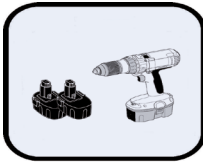
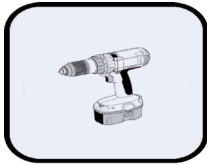

In individual cases, a dangerous goods expert should be consulted.

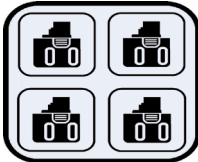
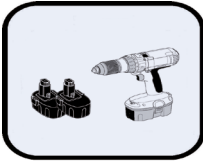
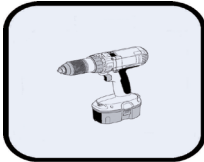
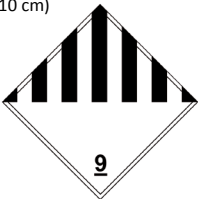
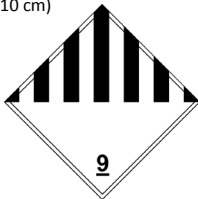
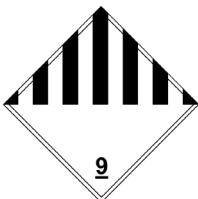
This document represents the status as of April 1, 2014. Local authorities are responsible for the interpretation and implementation of the relevant regulations.

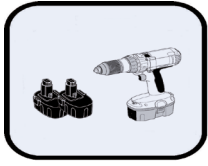
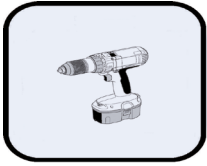
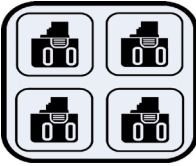



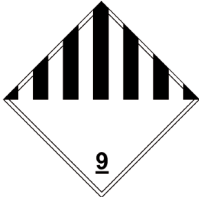

They can, at their discretion, make decisions differing from this guideline. Therefore, despite the greatest possible care during the revision and composition, no liability can be assumed for the content and the completeness of this document.

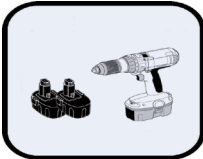
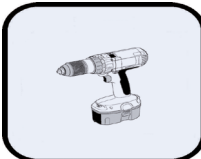
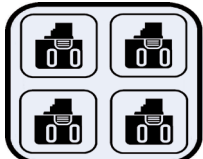
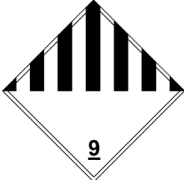

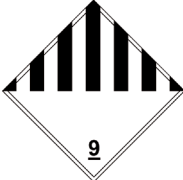

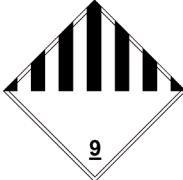

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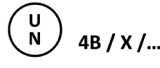
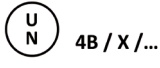
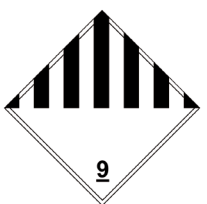
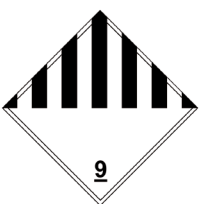

EPTA	European Power Tool Association
ZVEI	Zentralverband Elektrotechnik- und Elektronikindustrie e.V.
IVG	Industrieverband Garten e.V.
ADR	Accord européen relatif au transport international des marchandises Dangereuses par Route, (European Agreement concerning the International Carriage of Dangerous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

Truck / Rail (ADR/RID), Sea Freight (IMDG)				
Transportation Mode	≤100 Wh per battery			
	<table border="1"> <tr> <td> Batteries (without equipment)  </td> <td> Batteries packed with equipment (at least one battery which is not attached to tool)  </td> <td> Batteries contained in equipment (contained/plugged-in in tool)  </td> </tr> </table>	Batteries (without equipment) 	Batteries packed with equipment (at least one battery which is not attached to tool) 	Batteries contained in equipment (contained/plugged-in in tool) 
Batteries (without equipment) 	Batteries packed with equipment (at least one battery which is not attached to tool) 	Batteries contained in equipment (contained/plugged-in in tool) 		
Packing Instructions	ADR/RID SV188, IMDG SP188			
Max. Quantity	none			
Weight Limit	30 kg gross weight per packaging none			
Packaging	<p>Batteries must be placed in inner packaging that completely enclose the battery, batteries must be protected like this to prevent short circuits (batteries only, batteries packed with equipment)</p> <p>Strong outer packaging (cardboard box)</p>			
Marking	<p>language: variabel or</p> <div style="border: 1px dashed red; padding: 5px; text-align: center;"> <p>CAUTION!</p>  <p>LITHIUM ION BATTERY DO NOT LOAD OR TRANSPORT PACKAGE IF DAMAGED</p> <p><small>For more information, call</small></p> </div> <p><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></p>			
Sea Freight Container-Marking	none			
Transport Document	<p>ADR: general warning notice (language variable, informal, e.g. shipping note)</p> <p><i>"Shipment contains Lithium-Ion Batteries - Transport acc. SP188 - package shall be handled with care, flammability exist if f the package is damaged. If the package is damaged, it must be quarantined, inspected and repacked. For more information, please call ... (phone number)"</i></p> <p>IMDG: general warning notice (language English, informal, e.g., shipping note)</p> <p><i>"Shipment contains Lithium-Ion Batteries - Transport acc. SP188 - package shall be handled with care, flammability exist if f the package is damaged. If the package is damaged, it must be quarantined, inspected and repacked. For more information please call ... (phone number)"</i></p>			
Miscellaneous	Work instruction of involved staff			

Truck/Rail (ADR/RID), Sea Freight (IMDG)			
Transportation Mode	>100 Wh per battery		
	Batteries (without equipment) 	Batteries packed with equipment (at least one battery which is not attached to tool) 	Batteries contained in equipment (contained/plugged-in in tool) 
Packing Instructions	ADR/RID P903 (P903a for returns of used batteries) IMDG P903		
Max. Quantity	none		
Weight Limit	ADR: max. 333 kg / per transport unit (truck incl. trailer) In exceeding weight limit, additional requirements to the carrier required (marking truck, dangerous goods license etc.)		
Packaging	Batteries must be placed in inner packaging that completely encloses the battery, batteries must be protected - to prevent short circuits (batteries only and batteries packed with equipment) Batteries must be secured against movement within the outer packaging UN approved packaging (Packing Group II: e.g. UN/4G/Y30/...) around battery only and - in cardboard box alternatively as overpack		standard cardboard box
Marking	Label (10x10 cm) ADR: UN 3480  IMDG: UN 3480 LITHIUM-ION BATTERIES	Label (10x10 cm) ADR: UN 3481  IMDG: UN 3481 LITHIUM-ION BATTERIES PACKED WITH EQUIPMENT or UN 3481 LITHIUM-ION BATTERIES CONTAINED IN EQUIPMENT	
Sea Freight Container-Marking	CONTAINER-PLACARDS (min. 25x25 cm) 		
Transport Document	UN 3480, LITHIUM-ION BATTERIES, 9,II, (E), Number of packages and packaging type (e.g. Fibreboard box (4G)) Transport category 2 Battery weight 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,II, (E), Number of packages and packaging type (e.g. Fibreboard box (4G)) Transport category 2 Battery weight Sea freight (IMDG): (Language English) IMO-DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDE-CODE)	UN 3481, LITHIUM-ION BATTERIES CONTAINED IN EQUIPMENT, 9,II, (E), Number of packages and packaging type (e.g. Fibreboard box (4G)) Transport category 2 Battery weight Sea freight (IMDG): (Language English) IMO-DANGEROUS GOODS DECLARATION (SOLAS 74, KAP. VII, REG 5, MARPOL 73/79, ANNEX III REG. 4 OF IMDE-CODE)
Miscellaneous	Work instruction of involved staff		

Airfreight (IATA)				
Transportation Mode	≤100 Wh per battery			
	Batteries packed with equipment (at least one batterie which is not attached to tool) 	Batteries contained in equipment (contained/plugged-in in tool) 	Batteries (without equipment) 	
Packing Instructions	IATA PI 966 Section II	IATA PI 967 Section II	IATA PI 965 Section II	IATA PI 965 Section IB
Max. Quantity	3 batteries per packaging	none	2 batteries per packaging	none (more than 2 batteries per packaging)
Weight Limit	PAX/CAO: 5 kg net battery weight per packaging		none	10 kg gross 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		Up to 2 batteries per packaging: no battery handling label required More than 2 batteries per packaging: Handling label required 		UN 3480, LITHIUM-ION BATTERIES Gross weight (kg G) Shipper-/Consignee's address 
Transport Document	General warning statement: (Language English) <i>"Transport according IATA-DGR, PI966 Section II, Package must be handle with care. amnability exists if the package is damaged. If the package is damaged it must be quarantined, inspected and repacked. For more information, please call ... (phone number)"</i>	Up to 2 batteries per packaging: no warning statement required, More than 2 batteries per packaging-general warning Statement <i>"Transport according IATA-DGR, PI967 Section II, Package must be handle with care. Flammability exists if the package is damaged. If the package is damaged it must be quarantined, inspected and repacked. For more information, please call ... (phone number)"</i>	General warning statement: (Language English) <i>"Transport according IATA-DGR, PI965 Section II. (or IB) Package must be handle with care. damage a risk of flammability exists if the package is damaged. If the package is damaged it must be quarantined, inspected and repacked. For more information, please call ... (phone number)"</i>	
Information on Air Waybill (AWB)	„Lithium-Ion Batteries in compliance with section II of PI 966“	only if more than 2 batteries per package: „Lithium-Ion Batteries in compliance with section II of PI 967“	<i>"Lithium-Ion Batteries in compliance with section II of PI 965"</i> Shipper's Declaration for Dangerous Goods: UN 3480 LITHIUM-ION BATTERIES, 9, II // __ Fibreboard box(es) x __ kg G // 965 // IB 	
Miscellaneous	Work instruction of involved staff Batteries <2.7Wh can be shipped according PI965 Section II in unlimited quantities. Max. weight per packaging 2.5 kg (battery weight)		Official IATA-Training by authorized trainer required (personnel category 1) If not available, please contact IATA authorized expert	

	Airfreight (IATA)		
Transportation Mode	>100 Wh per batteries		
	Batteries packed with equipment (at least one battery which is not attached to tool) 	Batteries contained in equipment (contained/plugged-in in tool) 	Batteries (without equipment) 
Max. Quantity	none		
Weight Limit	PAX: 5 kg net battery weight per packaging CAO: 35 kg net battery weight per packaging		
Packing Instructions	IATA PI 966 Section I	IATA PI 967 Section I IATA Special Provision A48	IATA PI 965 Section IA
Packaging	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/...)	Equipment containing batteries must be secured and packed to prevent unintended operation during air 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	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/...)
Marking	<u>PAX</u> UN 3481, LITHIUM-ION BATTERIES PACKED WITH EQUIPMENT Net weight (NET QTY) Shipper-/Consignee's address  Transport by CAO → additional CAO Label 	<u>PAX</u> UN 3481, LITHIUM-ION BATTERIES CONTAINED IN EQUIPMENT Net weight (NET QTY) Shipper-/Consignee's address  Transport by CAO → additional CAO Label 	<u>PAX</u> UN 3480, LITHIUM ION BATTERIES Net weight (NET QTY) Shipper-/Consignee's address Transport by Cargo aircraft → additionally CAO Label  
Transport Document	Shipper's Declaration for Dangerous Goods: UN 3481 LITHIUM-ION BATTERIES PACKED WITH EQUIPMENT, 9, II // 966	Shipper's Declaration for Dangerous Goods: UN 3481 LITHIUM-ION BATTERIES CONTAINED IN EQUIPMENT, 9, II // 967	Shipper's Declaration for Dangerous Goods: UN 3480 LITHIUM ION BATTERIES 9 II PI 965
Information on Air Waybill (AWB)	"Dangerous Goods as per Shipper's Declaration"		
Miscellaneous	Official IATA-Training required (category personnel 1) If not available, please contact IATA authorized expert		

Transportation Mode	Prototypes Truck/Rail/Sea Freight (no UN-Test 38.3)	Prototypes Airfreight (no UN-Test 38.3)
Max. Quantity	Production series of max. 100 lithium cells and batteries p.a.	
Weight Limit	n/a	35 kg gross weight per packaging
Packing Instructions	ADR/RID/IMDG SP310	IATA A88 (Approval from Aviation Authority of departure country) Note: to/across/via USA additionally approval from US Authority (DOT) required
Packaging	UN approved: e.g. Aluminium box (Packing Group I)  <ul style="list-style-type: none"> Each battery shall be packed e.g. in a plastic bag Pad out box with Vermiculite ADR/RID/IMDG: see SP230 Must be secured against movement within the outer packaging 	UN approved packaging: Aluminium box (Packing Group I)  <ul style="list-style-type: none"> Each battery has to be packed in a plastic bag Box has to be pad out with Vermiculite
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 Note: German Luftfahrtbundesamt LBA accept metal packaging and cargo aircraft shipments only  
Transport Document	<ul style="list-style-type: none"> Shipper (address) Consignee (address) 1 Aluminium box UN 3480 LITHIUM-ION BATTERIES, 9, II, (E) Special Provision SP310 Gross weight: xx,x kg 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, II, PI 965 // A88 + Copy of A88 Approval
Miscellaneous	Only for transport of <ul style="list-style-type: none"> small production series of max. 100 batteries prototypes for testing reasons only Work instruction of involved staff	Only for transport of <ul style="list-style-type: none"> small production series of max. 100 batteries prototypes for testing reasons only Official IATA-Training (category personnel 1) by authorized trainer required If not available, please contact IATA authorized expert



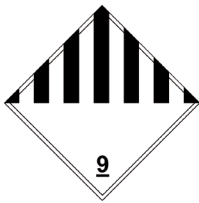
e. g. Alu-Box



Marking Packing Group I



Cushion with Vermiculite

Transportation Mode	Damaged or defective batteries Truck/Rail (not comply to UN Test 38.3 anymore)
Max. Quantity	none
Weight Limit	none
Packing Instructions	ADR P908 (in ADR from 2015 but applicable from 2013 according multilateral agreement M 259, follow up by SP376)
Packaging	<p>Inner packaging:</p> <ul style="list-style-type: none"> • Each battery must be packed in close inner packaging (preventing leakage) • Must be secured against movement within the outer packaging <p>Outer packaging:</p> <ul style="list-style-type: none"> • UN approved packaging (Packing Group II), e.g. fibreboard box • If packed hermetically, air venting contrivance required • Packed with incombustible and conductive insulating material, material class A1 or A2 (incombustible, e.g.. rockwool, glass wool, foamglas, Vermiculite) • Absorbing material to absorb leaking electrolyte
Marking	<p>UN 3480 DAMAGED / DEFECTIVE LITHIUM-ION BATTERIES</p> 
Transport Document	<ul style="list-style-type: none"> • Shipper (address) • Consignee (address) <p>1 Fibreboard box, UN 3480 LITHIUM-ION BATTERIES, 9, II, (E), Gross weight: xx,x kg Transport category 2, Transport according chapter 1.5.1 ADR (M259) and Special Provision SP661 (Disposal)</p>
Miscellaneous	<p>Dangerous Goods training according job instructions required</p> <p>ADR SP661 (disposal): Transport approval from national authorities must accompany each shipment</p> <p>ADR P908/SP376: Information from appropriate national authorities (e.g. BAM, Germany) about Transportation (Detailed information of relevant goods and reasons for usage of M259)</p>

Applicable for batteries which no longer fulfill the UN 38.3 test requirements (also applicable for cells). This includes:

- batteries which have been identified as defective
- leaked or venting batteries
- batteries which cannot be diagnosed as safe before transportation or
- cells or batteries with exterior or mechanical damage

Air Transport of damaged or defective batteries

Batteries, that have been declared as defective for safety reasons by the manufacturer or damaged in a way that the batteries may produce a dangerous evolution of heat, fire or short circuit, are PROHIBITED for transport (e.g., those that shall be sent back to the manufacturer for safety reasons).

Not applicable for transport by international sea freight

Detailed Criteria for Diagnosis

	No	Yes
battery cells have a damaged or heavily deformed housing	<input type="checkbox"/>	<input type="checkbox"/>
fluid is leaking	<input type="checkbox"/>	<input type="checkbox"/>
abnormal gas smell of gas occurs	<input type="checkbox"/>	<input type="checkbox"/>
measurable increase in temperature in off mode (more than lukewarm)	<input type="checkbox"/>	<input type="checkbox"/>
melted or deformed plastic parts	<input type="checkbox"/>	<input type="checkbox"/>
melted wires	<input type="checkbox"/>	<input type="checkbox"/>
battery management system (if available) identifies defective cells	<input type="checkbox"/>	<input type="checkbox"/>

*If any of these questions is answered with YES, the packaging and transport regulations for **defective** batteries must be applied*

Further Requirements:

UN-Test 38.3 as precondition for transport

Principally only those batteries that fulfil 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.

What should be considered by customers for returns or reshipment of goods?

The sender and also the client 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 in this guidance. If possible, the original packaging should be used for transport. If the prescribed original packaging (incl. battery + case), the marking or even the necessary transport documents are not available for the sender, they must be provided by the by the manufacturer or supplier to the sender or the carrier before the return transport starts.

For the return transport of Lithium-Ion Batteries >100Wh on road or rail (ADR / RID), a UN-certified packaging is required, as described in this guideline. However, for used Lithium-Ion Batteries 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).

Carriage of Lithium-Ion batteries, power tools and electric garden tools in connection with the main activity of the carrier (Craftsman regulation - ADR 1.1.3.1c)

The provisions of ADR do not apply to companies carrying goods in connection with their main business activities (e.g. deliveries or returns in relation to measuring, repair and maintenance, or demonstration purposes). For Lithium-Ion Batteries or devices with Lithium-Ion Batteries

>100Wh a weight limit of 333 kg (battery weight) applies in connection with this exemption. Measures must be taken to ensure a risk-free transportation (cargo protection).

However, customer deliveries do not fall under this exemption.

Packaging of several packages (without labelling requirements)

Packages containing power tools or electric garden tools, where max. 2 batteries (≤ 100 Wh) are inserted or installed, are not subject to labelling requirements. There is also no requirement for accompanying documents. If several packages, which are not subject to labelling requirements, are packed in an over-packaging or on a pallet, the over-packaging or pallet also does not need be marked.

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 PI 967).



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ZVEI - German Electrical and Electronic
Manufacturers' Association
Electric Power Tool Division

German Garden Industry Association

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