

Transport and Storage of Lithium Batteries: A Multi Modal Guide



How to find the **applicable UN number** for Lithium Batteries?

How to find the **applicable provision** for the transport?

Mode of Transport:

- ADR/RID/ADN
- IMDG Code
- IATA DGR

Storage:

- Regulations for sprinkler protection

This guide will help to find a path in the jungle of the dangerous goods regulations to find the correct applicable provision for the resp. transport case and includes standards for the sprinkler protection to get an impression about what is expected by the insurance industry.

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Imprint

Publishing company

Verlag Heinrich Vogel
Springer Fachmedien München GmbH
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Price of digital booklet incl. VAT

Art. Nr. 3335323, www.gg-log.de
21,29 € (inkl. MwSt. | *VAT included*)

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Front page foto

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Springer Fachmedien München

Introduction

Lithium batteries have become the most popular energy storage system. They need to be transported

- stand alone
- contained in equipment and vehicles
- packed with equipment and vehicles
- contained in and packed with equipment and vehicles.

Lithium batteries are dangerous goods without any exemption; as a consequence their transport is under the very different dangerous goods regulations.

This guide will help to find a path in the jungle of the dangerous goods regulations to find the correct applicable provision for the resp. transport case; recommendation: check first the flow chart “How to find the applicable UN number” of this guide to identify the applicable regulation for all modes of transport.

Storage is very often an unavoidable necessity in the supply chain. The provisions for the storage of lithium batteries are differing from country to country. The European Association of Insurance Companies Associations and FM Global have set individual standards for the sprinkler protection of warehouses containing lithium (ion) batteries, stand alone and in equipment; this guide includes these standards to get an impression about what is expected by the insurance industry.

Companies which

- pack and/or mark and/or label packages and/or over-packages
- load
- consign
- transport
- unload

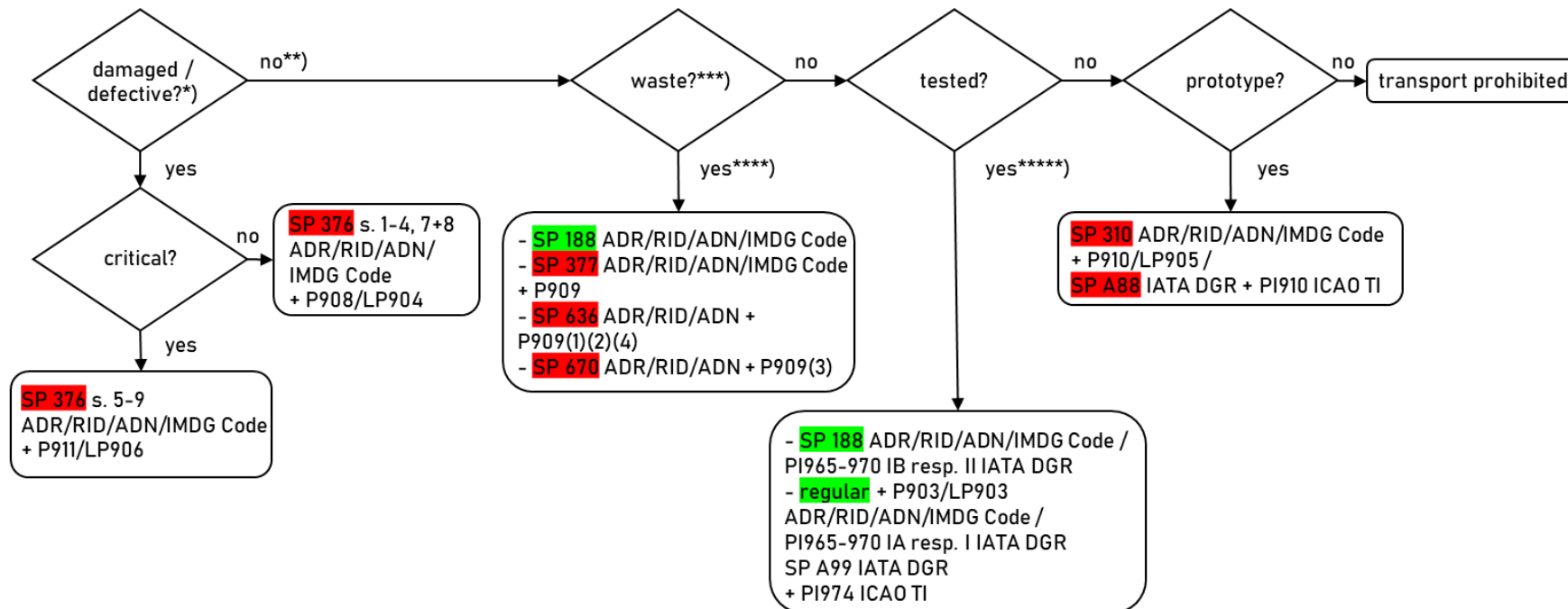
lithium batteries, stand-alone and/or contained in equipment and/or packed with equipment have to take care that their resp. employees, including the drivers, have undergone an appropriate training; in Air transport the training (and examination) is regulated under the CBTA.

In countries, which are contract parties of the ADR, RID and/or ADN, companies which

- pack and/or mark and/or label packages and/or over-packages
- load
- consign

How to find the applicable provision for the transport of a lithium cell / battery?

- stand alone (UN 3090, 3480)
- contained in equipment or packed with equipment or contained in & packed with equipment (UN 3091, 3481)



*) according to SP 376 ADR/RID/IMDG Code resp. SP A154 IATA DGR;

**) battery would pass all applicable tests according to chapter 38.3 of the UN Manual of Tests and Criteria;

***) for recycling (recovery, not reuse) or for disposal (elimination);

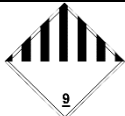
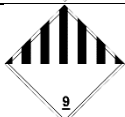
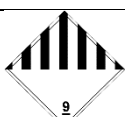
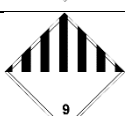
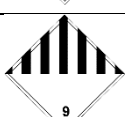
****) additionally regulations for the transport of waste apply;

*****) inclusive used batteries.

Test summary (section 38.3.5 of the UN Manual of Tests & Criteria) required

Test summary not required

Mode of Transport – ADR/RID/ADN

ADR / RID / ADN								
UN 3090 LITHIUM METAL BATTERIES								
Special Provision		Test Summary?	Package			Container		Transport document
(1a)	(1b)		Packaging	Marking	Labeling	Marking	Placarding	
(1a)	(1b)	(2)	(3a)	(3b)	(3c)	(4a)	(4b)	(5)
188	≤ 1 g per cell, ≤ 2 g per battery	Yes SP188(c)	SP188(d),(g),(h)		-	-	-	-
-	> 1 g per cell, > 2 g per battery	Yes 2.2.9.1.7(g)	P903(1),(2) LP903	UN 3090		-		UN 3090 LITHIUM METAL BATTERIES, 9, (E)
310	pre-production prototypes or production runs ≤ 100 cells or batteries	No	P910(1),(3) LP905(1)	UN 3090		-		UN 3090 LITHIUM METAL BATTERIES, 9, (E), CARRIAGE IN ACCORDANCE WITH SPECIAL PROVISION 310
376	damaged / defective, non critical	No	P908 LP904	UN 3090 DAMAGED / DEFECTIVE LITHIUM METAL BATTERIES		-		UN 3090 LITHIUM METAL BATTERIES, 9, (E), CARRIAGE IN ACCORDANCE WITH SPECIAL PROVISION 376
	damaged / defective, critical	No	P911 LP906	UN 3090 DAMAGED / DEFECTIVE LITHIUM METAL BATTERIES		-		UN 3090 LITHIUM METAL BATTERIES, 9, (E), CARRIAGE IN ACCORDANCE WITH SPECIAL PROVISION 376
377	waste	No	P909(1),(4)	UN 3090 LITHIUM BATTERIES FOR RECYCLING		-		UN 3090 WASTE LITHIUM METAL BATTERIES, 9, (E) Waste codes: - EU: 160605 or 200134 - Basel: B1090
636	waste	No	P909(2)	LITHIUM BATTERIES FOR RECYCLING	-	-	-	-

Appendix 2: Restrictions of IATA Airlines

[illegible]

FM Global Data Sheet “Commodity Classification” (DS 8-1, January 2023)
<https://www.fmglobal.com/research-and-resources/fm-global-data-sheets>

UN 3480 SoC	ceiling height	storage height	storage arrangement	packaging	ceiling protection (Quick Response sprinklers only)	in-rack protection
(1)	(2)	(3)	(4)	(5)	(6)	(7)
≤ 60 %	≤ 12 m	≤ 3 levels, ≤ 4.5 m	on-floor + in-rack	wood, metal or corrugated carton with cellulose and/or unexpanded plastic internal packaging only	K320 or K360, 12 sprinklers, 2.4 bar	-
				corrugated carton with expanded plastic internal packaging	CEP *) according to DS 8-9	
				plastic external packaging	UUP **) according to DS 8-9	
	> 12 m	-	in-rack	uncartonated	per surrounding occupancy	see section 2.4.2.2 of DS 8-1 (each second level).
> 60 %	-			cartonated or uncartonated		

*) = Cartonated Expanded Plastic; **) = Uncartonated Unexpanded Plastic.

UN 3481 SoC	ceiling height	storage height	storage arrangement	packaging	ceiling protection (Quick Response sprinklers only)	in-rack protection
(1)	(2)	(3)	(4)	(5)	(6)	(7)
≤ 60 %	According to the product commodity classification.					
> 60 %					per surrounding occupancy	see section 2.4.2.2 of DS 8-1 (each second level).