Tadiran
Batteries GmbH
Industriestrasse 22
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Distribution Class 1 General

Technical Notice

Transport Regulations for Lithium Batteries

Page

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Introduction to new transportation rules, effective starting 01. Jan. 2003

0.1. General

The transport of lithium batteries is regulated. Regulations are based on the United Nations Model Regulations on the Transport of Dangerous Goods, UN document ST/SG/AC.10-1. Major changes were introduced in the 12th edition in 2001. These were implemented in the dangerous goods regulations beginning 2003. These changes are explained below.

Based on the lithium content, lithium cells and batteries below a certain limit under certain conditions are exempted from the regulations.

0.2. Articles which are subject to the regulations (SP 230)

0.2.1 Exemptions for C- and D-size cells have been discontinued so that these batteries are subject to the regulations now.

0.2.2 Practically all battery packs are now subject to the regulations.
Only packs up to 3 AA size cells are exempted.

0.3. Exempted articles (SP 188)

The conditions for exemption have been revised substantially.

0.3.1 The limit for exemption has been extended to 2 g per battery, independent from the cathode type.

0.3.2 The gross mass of the package is limited to 30 kg.

0.3.3 Each package requires a special label to indicate that it contains lithium batteries and special procedures shall be followed when a package is damaged during transportation.
Similar information needs to be given in the shipping document. An example for the notice will be published in IEC standard 62281. It can also be obtained from Tadiran Batteries.

0.3.4 Each package must be capable of withstanding a 1.2 m drop test in any orientation.

0.3.5 For packages containing not more than 12 lithium batteries requirements 3.2-3.4 are not valid.

0.4. Requirement for UN Testing

0.4.1 The new revision requires that lithium cells and batteries of all kinds, exempted or not, be tested according to the UN test methods.

0.4.2 Tests must be performed for each type that deviates from a tested type by more than 20 % with regard to the electrode mass or if the design has changed from a tested design in a manner that would materially affect the test result.

0.4.3 Batteries that have not yet been tested may be transported under special conditions (see SP 310).

0.4.4 A copy of the test methods can be obtained from Tadiran batteries.

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Transport Regulations

1. Exemptions

Lithium batteries are dangerous goods, UN No. 3090. Therefore they are generally subject to transport regulations, depending on the transport mode. However, most Tadiran Lithium Batteries listed in the product data catalogue are exempted from the regulations if the following conditions are given:

- The batteries have not more than 2 g lithium content
- The batteries have passed the UN tests.
- The batteries have to be separated so as to prevent short circuits.
- The package and the shipping documents are marked with a notice indicating that it contains lithium batteries and shall - if damaged - be quarantined, inspected and repacked.
- The gross mass does not exceed 30 kg per package.

2. Classification of lithium batteries

Table 1 indicates which Tadiran Lithium Batteries are subject to the dangerous goods regulations and which are exempted. The regulations are summarized in table 2.

Size						Subject to the regulations	Lithium content	UN Tests passed
							g	
BEL	SL-340			SL-740	SL-840	No [1)]	0,13	YES
1/6 D	SL-386			SL-786	SL-886	No [1)]	0,5	YES
1/10 D	SL-389			SL-789	SL-889	No [1)]	0,3	YES
1/2 AA	SL-350		SL-550	SL-750	SL-850	No [1)]	0,35	YES
2/3 AA	SL-361		SL-561	SL-761	SL-861	No [1)]	0,5	YES
AA	SL-360	SL-460	SL-560	SL-760	SL-860	No [1)]	0,65	YES
C	SL-770	SL-2770			SL-2870	Yes	2,5	YES
D	SL-780	SL-2780			SL-2880	Yes	5	YES
DD	SL-790					Yes	10	YES
Hybrid Layer Capacitors	HLC-1520 (3.7 V) HLC-1520 (3.9 V) HLC-1550 (3.7 V) HLC-1550 (3.9 V)					No [1)] No [1)] No [1)] No [1)]	0,02 0,04 0,07 0,13	YES YES YES YES

[1)] If conditions mentioned in the text are fulfilled

Table 1
Classification of Tadiran Lithium Batteries

3. UN tests

Table 1 also shows the status of UN-tests for Tadiran Lithium batteries according to the UN Handbook of Tests and Criteria, part III, sub-section 38.3. Regarding Tadiran Lithium Batteries not listed in table 1, please apply to Tadiran Batteries for a confirmation.

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4. Overview dangerous goods by transport mode

Transport regulations for lithium batteries					
UN-No. and class	**Limitations and instructions**	**Passenger aircraft IATA DGR**	**Cargo aircraft IATA DGR**	**Road/Railway transport ADR/RID**	**Sea transport IMDG Code**
Lithium batteries					
UN 3090 Class 9	Maximum gross mass per package	5 kg	35 kg	according to packaging approval	according to packaging approval
	Packing group	II	II	II	II
	Packing instruction	903	903	P 903, P903a	
	Marking	Class 9 label	Class 9 label Handling Label For Cargo Aircraft only	Class 9 label	Class 9 label
	Further instructions	Batteries shall be separated so as to prevent short-circuit. Batteries shall have passed the tests described in the UN Manual of tests and criteria, Part III, sub-section 38.3			
Lithium batteries contained in equipment / packed with equipment					
UN 3091 Class 9	Maximum gross mass per equipment	5 kg / -	5 kg / -		
	Maximum gross mass per package	- / 5 kg	- / 35 kg		
	Packing group	II	II	II	II
	Packing instruction	912 / 918	912 / 918	P 903, P903a	P 903
	Marking	Class 9 label	Class 9 label Handling Label For Cargo Aircraft only	Class 9 label	Class 9 label

Table 2
Transport regulations for lithium batteries: more than 2 g lithium content (refer to table 1)

It is necessary to refer to the listed regulations and instructions for detailed information. They are revised on a regular basis. The tables are based on the revisions effective in January 2005.

The applicable documents are:

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road,

IATA DGR: International Air Transport Association, Dangerous Goods Regulations,

ICAO: International Civil Aviation Organization, Technical Instructions for the Safe Transport of Dangerous Goods by Air,

IMDG Code: International Maritime Dangerous Goods Code,

RID: International Statutory Order on the Conveyance of Dangerous Goods by Rail,

UN: United Nations Recommendations on the Transport of Dangerous Goods.

Class 9 label, reduced size, black on white

Handling Label for Cargo Aircraft Only, reduced size, black on orange

Transport Regulations for Road and Rail Transport

ADR 2005

Overview

UN 3090 LITHIUM BATTERIES

UN 3091 LITHIUM BATTERIES CONTAINED IN EQUIPMENT or
LITHIUM BATTERIES PACKED WITH EQUIPMENT

			see chapter (ADR 2003)
Class	9	Miscellaneous	2.2
Classification code	M4	Lithium batteries	2.2.9.1.7
Packing group	II	Medium danger	2.1.13
Labels	9	Class 9 label	5.2.2
Special provisions	188	Exempted if ...	3.3
	230	Class 9 if ...	
	310	Small lots	
	636	Used batteries etc.	
Limited quantities	LQ0	No	3.4.6
Packing instruction	P903 P903a P903b	Lithium batteries Used lithium batteries Used cells and batteries collected for disposal	4.1.4
Transport category	2	Exemptions under 333 kg	1.1.3.6
Special provisions for carriage	V1	Cosed or sheeted vehicles/containers	7.2.4

Special Provision 188

Lithium cells and batteries offered for transport are not subject to other provisions of these Regulations if they meet the following:

(a) For a lithium metal or lithium alloy cell, the lithium content is not more than 1 g, and for a lithium-ion cell, the equivalent lithium content is not more than 1.5 g;

(b) For a lithium metal or lithium alloy battery the aggregate lithium content is not more than 2 g, and for a lithium-ion battery, the aggregate equivalent lithium content is not more than 8 g;

(c) Each cell or battery is of the type proved to meet the requirements of each test in the Manual of Tests and Criteria, Part III, subsection 38.3;

(d) Cells and batteries are separated so as to prevent short circuits and are packed in strong packagings, except when installed in equipment; and

(e) Except when installed in equipment, each package containing more than 24 lithium cells or 12 lithium batteries shall in addition meet the following requirements:

  (i) Each package shall be marked indicating that it contains lithium batteries and that special procedures should be followed in the event that the package is damaged;

  (ii) Each shipment shall be accompanied with a document indicating that packages contain lithium batteries and that special procedures should be followed in the event a package is damaged;

  (iii) Each package is capable of withstanding a 1.2 m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents; and

  (iv) Except in the case of lithium batteries packed with equipment, packages may not exceed 30 kg gross mass.

As used above and elsewhere in these Regulations, "lithium content" means the mass of lithium in the anode of a lithium metal or lithium alloy cell, except in the case of a lithium-ion cell the "equivalent lithium content" in grams is calculated to be 0.3 times the rated capacity in ampere-hours.

Special Provision 230

This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries.

Lithium cells and batteries may be carried under this entry if they meet the following provisions:

(a) Each cell or battery is of the type proved to meet the requirements of each test of the Manual of Tests and Criteria, Part III, subsection 38.3;

(b) Each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under normal conditions of carriage;

(c) Each cell and battery is equipped with an effective means of preventing external short circuits;

(d) Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (such as diodes, fuses, etc.).

Special Provision 310

The testing requirements in Chapter 38.3 of the Manual of Tests and Criteria do not apply to production runs consisting of not more than 100 lithium cells and batteries, or to pre-production prototypes of lithium cells and batteries when these prototypes are transported for testing, if:

(a) the cells and batteries are transported in an outer packaging that is a metal, plastic or plywood drum or a metal, plastic or wooden box and that meets the criteria for packing group I packagings; and

(b) each cell and battery is individually packed in an inner packaging inside an outer packaging and is surrounded by cushioning material that is non-combustible, and non-conductive.

Special Provision 636

(a) Used lithium cells and batteries collected and presented for carriage for disposal between the consumer collecting point and the intermediate processing facility, together with other non-lithium cells or batteries or alone, are not subject to the other provisions of ADR if they meet the following conditions:

(i) The gross mass of each lithium cell or battery does not exceed 250 g;

(ii) The provisions of packing instruction P903b) (2) are complied with;

(b) Cells contained in equipment shall not be capable of being discharged during carriage to the extent that the open circuit voltage falls below 2 volts or two thirds of the voltage of the undischarged cell, whichever is the lower;

(c) Packages containing used cells or batteries in unmarked packagings shall bear the inscription: "**Used lithium cells**".

Packing instruction P903

This instruction applies to UN Nos. 3090 and 3091.

The following packagings are authorized, provided the general provisions of 4.1.1 and 4.1.3 are met:

Packagings conforming to the packing group II performance level.

When lithium cells and batteries are packed with equipment, they shall be packed in inner fibreboard packagings that meet the requirements for packing group II. When lithium cells and batteries included in Class 9 are contained in equipment, the equipment shall be packed in strong outer packagings in such a manner as to prevent accidental operation during carriage.

Additional requirement:

Batteries shall be protected against short circuit.

Packing instruction P903a

This instruction applies to used cells and batteries of UN Nos. 3090 and 3091.

The following packagings are authorized, provided the general provisions of 4.1.1 and 4.1.3 are met:

Packagings conforming to the packing group II performance level.

Non-approved packagings shall, however, be permitted provided that:

- they meet the general provisions of 4.1.1 and 4.1.3;
- the cells and batteries are packed and stowed so as to prevent any risk of short circuits;
- the packages weigh not more than 30 kg.

Additional requirement:

Batteries shall be protected against short circuit.

ADR Packing instruction P903b

This instruction applies to used cells and batteries of UN Nos. 3090 and 3091.

Used lithium cells and batteries, with a gross mass of not more than 250 g collected for disposal, together with other used non-lithium batteries or alone, may be carried, without being individually protected, under the following conditions:

(1) In 1H2 drums or 4H2 boxes conforming to the packing group II performance level for solids;

(2) In collecting trays with a gross mass of less than 30 kg made from non-conducting material meeting the general conditions of 4.1.1.1, 4.1.1.2 and 4.1.1.5 to 4.1.1.8.

Additional requirements:

The empty space in the packaging shall be filled with appropriate cushioning material so as to restrict the relative movements of the batteries during carriage.

Hermetically sealed packagings shall be fitted with a venting device according to 4.1.1.8. The venting device shall be so designed that an overpressure caused by gases does not exceed 10 kPa.

Transport Regulations Aircraft

IATA DGR 2006

Overview

UN 3090 LITHIUM BATTERIES

UN 3091 LITHIUM BATTERIES CONTAINED IN EQUIPMENT or
LITHIUM BATTERIES PACKED WITH EQUIPMENT

				see Chapter
Class		9	Miscellaneous dangerous goods	3.9
Sub Risk		-		
Packing Group		II	medium danger	3.0.3
Packing instructions		P903	Lithium batteries	5.9
		P912	Lithium batteries contained in equipment	5.9
		P918	Lithium batteries packed with equipment	5.9
Hazard label		9	Class 9	7.3.17
Limited Quantity		-	No	
Max. Gross mass		5 kg		
Cargo air-craft	Max. gross mass	35 kg		
	Handling label	Yes	Cargo Aircraft Only	7.4.2
Special Provisions		A45	Exemptions	4.4
		A88	Prototypes	
		A99	over 35 kg	
ERG [1] Code		9W		ICAO [2]

[1] Emergency Response Drill Code
[2] Doc 9481-AN/928

IATA Special Provision A 45

Lithium cells and batteries offered for transport are not subject to other provisions of these Regulations if they meet the following:

(a) For a lithium metal or lithium alloy cell, the lithium content is not more than 1 g, and for a lithium ion cell, the lithium-equivalent content is not more than 1.5 g;

(b) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g, and for a lithium ion battery, the aggregate lithium-equivalent content is not more than 8 g;

(c) Each cell or battery is of a type proved to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, sub-section 38.3;

(d) Cells and batteries are separated so as to prevent short circuits and are packed in strong packagings, except when installed in equipment; and

(e) Except when installed in equipment, each package containing more than 24 lithium cells or 12 lithium batteries must in addition meet the following requirements;

  (i) Each package must be marked indicating that it contains lithium batteries and that special procedures should be followed in the event that the package is damaged;

  (ii) Each shipment must be accompanied with a document indicating that the packages contain lithium batteries and that special procedures should be followed in the event a package is damaged;

  (iii) Each package is capable of withstanding a 1.2 m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents; and

  (iv) Except in the case of lithium batteries packed with equipment, packages may not exceed 30 kg gross mass.

As used above and elsewhere in the Regulations, "lithium content" means the mass of lithium in the anode of a lithium metal or lithium alloy cell, except in the case of a lithium-ion cell the "lithium-equivalent content" in grams is calculated to be 0.3 times the rated capacity in ampere-hours.

The words "Not Restricted" and the Special Provisions number must be included in the description of the substance on the Air Waybill as required by 8.2.6.

This does not apply where lithium batteries meeting A45 are contained in or packed with equipment.

IATA Special Provision A88

Prototype lithium batteries and cells that are packed with not more than 24 cells or 12 batteries per packaging that have not been tested to the requirements in subsection 38.3 of the UN Manual of Tests and Criteria may be transported, if approved by the appropriate authority of the State of origin and the following requirements are met:

(a) The cells and batteries must be transported in an outer packaging that is a metal, plastic or plywood drum or a metal, plastic or wooden box and that meets the criteria for Packing Group I packagings; and

(b) each cell and battery must be individually packed in an inner packaging inside an outer packaging and surrounded by cushioning material that is non-combustible, and non-conductive. Cells and batteries must be protected against short-circuiting.

IATA Special Provision A99

Irrespective of the limit specified in Column L of the List of Dangerous Goods (4.2), a lithium battery or battery assembly that has successfully passed the tests specified in the UN Manual of Tests and Criteria, Part III, subsection 38.3 and that meets the requirements of Packing Instruction 903 as prepared for transport may have a mass exceeding 35 kg G, if approved by the appropriate authority of the State of origin. A copy of the document of approval must accompany the consignment.

IATA Packing Instruction 903

- STATE VARIATIONS: USG-02/03
- OPERATOR VARIATIONS: BA02, FX-10, MX-09, UX-07

This instruction applies to UN 3090 on passenger and cargo aircraft and CAO.

The General Packing Requirements of Subsection 5.0.2 must be met.
This entry applies to cells and batteries containing lithium in any form, lithium polymer and lithium ion cells and batteries.
Lithium cells and batteries may only be transported under this Packing Instruction if they meet the following requirements:

(a) each cell or battery type has been determined to meet the criteria for assignment to Class 9 on the basis of tests carried out in accordance with the United Nations Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria (UN Document ST/SG/AC.10/11);

(b) each cell and battery must incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport;

(c) each cell and battery must be equipped with an effective means of preventing external short-circuits;

(d) each battery containing cells or a series of cells connected in parallel must be equipped with effective means as necessary to prevent dangerous reverse current flow (e.g. diodes, fuses, etc);

(e) cells and batteries must be packed in the inner packagings to effectively prevent short-circuits and to prevent movement which could lead to short-circuits;

(f) cells and batteries must be packed in one of the outer packagings below which meet Packing Group II performance standards.

(g) irrespective of the requirements in paragraphs (e) and (f) above, lithium batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings and protective enclosures not subject to the requirements of Section 6 of these Regulations, if approved by the appropriate authority of the State of origin. A copy of the document of approval must accompany the consignment.

Cells with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride which have been discharged to the extent that the open circuit voltage is less than the lower of:

- 2 Volts; or
- 2/3 of the voltage of the undischarged cell;

and batteries containing one or more cells, are forbidden from transport.

Outer Packagings of types 1A2, 1B2, 1D, 1G, 1H2, 3A2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2.

Packing Instruction 912

- STATE VARIATIONS: USG-02/03
- OPERATOR VARIATIONS: BA-02, MX-09, UX-07

This instruction applies to UN 3091, Lithium batteries contained in equipment on passenger and cargo aircraft and CAO. It applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries when contained in equipment.

The General Packing Requirements of 5.0.2 must be met.

Lithium batteries (liquid or solid cathode) contained in equipment must meet all the requirements of Packing Instruction 903 other than those related to packaging, be protected against short circuits and be securely held in place.

Cells with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride must not be capable of being discharged during transport to the extent that the open circuit voltage is less than the lower of:

(a) 2 volts; or

(b) 2/3 of the voltage of the undischarged cell.

Equipment containing lithium batteries must be contained in strong outer packaging. The outer packaging must be waterproof or made waterproof through the use of a liner, such as a plastic bag, unless the equipment is made waterproof by nature of its construction. The equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.

The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

Not more than 5 kg of lithium batteries may be contained in any piece of equipment.

Packing Instruction 918

- STATE VARIATIONS: USG-02/03
- OPERATOR VARIATIONS: KL-04, MX-09, UA-01.

This instruction applies to UN 3091, Lithium batteries packed with equipment on passenger and cargo aircraft and CAO. It applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries, when packed with equipment.

The General Packing Requirements of Subsection 5.0.2 must also be met.
This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries when packed with equipment.

Lithium cells and batteries must be packed, in such a manner as to effectively prevent movement which could lead to short circuits, in outer packagings meeting Packing Group II performance standards, listed below.

Lithium cells or batteries packed with equipment must meet the requirement of Packing Instruction 903 other than those related to packaging. Lithium cells and batteries must be packed, in such a manner as to effectively prevent movement which could lead to short circuits, in outer packagings meeting Packing Group II performance standards, listed below. Such packages must not exceed 5 kg gross mass for passenger aircraft or 35 kg gross mass for cargo aircraft.

The equipment and the packages of lithium cells or batteries must be overpacked.

For the purposes of this Packing Instruction, "equipment" means apparatus requiring the lithium batteries with which it is packed for its operation.

Outer Packagings of types 1G and 4G.

List of Variations (2006)

BA-02 (British Airways) UN 3090 and UN 3091 Lithium batteries. Primary (non-rechargeable) lithium batteries will not be accepted for carriage as cargo on passenger aircraft **(see Packing Instructions 903 and 912).**

Primary lithium batteries contained in equipment (UN 3091) must not exceed 25 grammes net of lithium per battery.

A declaration indicating battery type (primary non-rechargeable or rechargeable batteries) must be annotated on the shipper's declaration for dangerous goods in the Additional Handling Information. For UN 3091 the lithium content of the primary non-rechargeable battery must also be indicated in the Additional Handling Information box **(see 8.1.6.11).**

Packages containing primary lithium batteries (non-rechargeable) must be marked "PRIMARY LITHIUM BATTERIES, FORBIDDEN FOR TRANSPORT ON PASSENGER AIRCRAFT **(see 7.1.5).**

FX 10 (Federal Express) Lithium batteries , primary non-rechargeable UN 3090 which are shipped either fully regulated or under IATA Special Provision A45 require pre-approval. See www.fedex.com/us; dangerous goods; Dangerous Goods Transport for complete details. For additional requirements for UN 3090 rechargeable lithium batteries, refer to the web site.

KL-04 (KLM Royal Durch Airlines), not relevant for lithium batteries

MX-09 (Mexicana Airlines), Class 9, commodities pertaining to this class (including lithium batteries) will not be accepted for carriage.

UX-07 (Air Europa) UN 3090 lithium batteries and UN 3091 lithium batteries contained in equipment are prohibited from Air Europa flights.

USG-02/03 (United States of America), Primary lithium batteries may not be transported to, from, or within the United States aboard a passenger aircraft.

Primary (non-rechargeable) lithium batteries and cells, UN 3090, are forbidden for transportation aboard passenger-carrying aircraft. Equipment containing or packed with primary (non-rechargeable) lithium batteries and cells, UN 3091, are forbidden from transport aboard passenger carrying aircraft except if they meet the conditions of 49 CFR 172.102, Special Provision A101 or A102. Packages containing primary (non-rechargeable) lithium batteries and cells that meet the exceptions in 49 CFR 173.185 (b) or (c) or special provision A45 of these Regulations are forbidden for transport on passenger aircraft and must be marked "PRIMARY LITHIUM BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT".

Transport Regulations for Sea Transport

IMDG Code 2002

Overview

UN 3090 LITHIUM BATTERIES

UN 3091 LITHIUM BATTERIES CONTAINED IN EQUIPMENT or
LITHIUM BATTERIES PACKED WITH EQUIPMENT

			see chapter
Class	9	Miscellaneous dangerous substances and articles	2.9
Subsidiary risk	---		
Packing group	II	Medium danger	2.0.1.3
Special provisions	188	Exempted if	3.3
	230	Class 9 if	
	310	Small lots	
Limited Quantities	none		
Packing Instructions	P903	Lithium Batteries	4.1.4.1
EmS [1)]	F-A	Fire Schedule Alfa	
	S-I	Spillage Schedule India (flammable solids, repacking possible)	
Storage and segregation	Category A		
Properties and observations	Electrical batteries containing lithium or lithium alloy encased in a rigid metallic body. Lithium batteries may also be shipped in, or packed with, equipment. Electrical lithium batteries may cause fire due to an explosive rupture of the body caused by improper construction or reaction with contaminants.		

[1)] See "The EmS Guide-Emergency Response procedures for Ships Carrying Dangerous Goods", including Emergency Schedules".

Special Provision 188

Lithium cells and batteries offered for transport are not subject to other provisions of this Code if they meet the following:

.1 For a lithium metal or lithium alloy cell, the lithium content is not more than 1 g, and for a lithium-ion cell, the equivalent lithium content is not more than 1.5 g;

.2 For a lithium metal or lithium alloy battery the aggregate lithium content is not more than 2 g, and for a lithium-ion battery, the aggregate equivalent lithium content is not more than 8 g;

.3 Each cell or battery is of the type proved to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

.4 Cells and batteries are separated so as to prevent short circuits and are packed in strong packagings, except when installed in equipment; and

.5 Except when installed in equipment, each package containing more than 24 lithium cells or 12 lithium batteries shall in addition meet the following requirements:

  .1 Each package shall be marked indicating that it contains lithium batteries and that special procedures shall be followed in the event that the package is damaged;

  .2 Each shipment shall be accompanied with a document indicating that packages contain lithium batteries and that special procedures shall be followed in the event a package is damaged;

  .3 Each package is capable of withstanding a 1.2 m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents; and

  .4 Except for lithium batteries packed with equipment, packages may not exceed 30 kg gross mass.

As used above and elsewhere in this Code, "lithium content" means the mass of lithium in the anode of a lithium metal or lithium alloy cell, except in the case of a lithium-ion cell the "equivalent lithium content" in grams is calculated to be 0.3 times the rated capacity in ampere-hours.

Special Provision 230

This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries.

Lithium cells and batteries may be transported under this entry if they meet the following conditions:

.1 Each cell or battery is of the type proved to meet the requirements of each test of the UN Manual of Tests and Criteria, Part III, subsection 38.3;

.2 Each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under normal conditions of transport;

.3 Each cell and battery is equipped with an effective means of preventing external short circuits; and

.4 Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent revers current flow (such as diodes, fuses, etc.).

Special Provision 310

The testing requirements in Chapter 38.3 of the UN Manual of Tests and Criteria do not apply to production runs consisting of not more than 100 lithium cells and batteries, or to pre-production prototypes of lithium cells and batteries when these prototypes are transported for testing, if:

.1 the cells and batteries are transported in an outer packaging that is a metal, plastics or plywood drum or a metal, plastics or wooden box and that meets the criteria for packing group I packagings; and

.2 each cell and battery is individually packed in an inner packaging inside an outer packaging and is surrounded by cushioning material that is non-combustible, and non-conductive.

Packing Instruction P 903

This instruction applies to UN 3090 and UN 3091.

The following packagings are authorized, provided the general provisions of 4.1.1 and 4.1.3 are met:

Packaging conforming to the packing group II performance level.

When lithium cells and batteries are packed with equipment, they shall be packed in inner fibreboard packagings that meet the provisions for packing group II. When lithium cells and batteries included in class 9 are contained in equipment, the equipment shall be packed in strong outer packagings in such a manner as to prevent accidental operation during transport.

Additional provision

Batteries shall be protected against short circuit.

IMDG - Code 2002 (Amdt.31-02)

From: **IMDG - Code Supplement – The EmS Guide**

F-A: Fire Schedule Alfa
General Fire Schedule

General comments		In a fire, exposed cargoes may explode or their containment may rupture. Fight fire from a protected position from as far away as possible.
	Packages	Create water spray from as many hoses as possible.
Cargo on fire on deck	Cargo Transport Units	
Cargo on fire under deck		Stop ventilation and close hatches. Use cargo space fixed fire-extinguishing system. If this is not available, create water spray using copious quantities of water.
Cargo exposed to fire		If practicable, remove or jettison packages which are likely to be involved in fire. Otherwiese, keep cool using water.

S-I: Spillage schedule India
Flammable solids (Repacking possible)

General comments		Wear suitable protective clothing and self-contained breathing apparatus. Avoid all sources of ignition (e.g., naked lights, unprotected light bulbs, electric handtools, friction). Wear non-sparking footwear. Stop leak if practicable.
Spillage on deck	Packages (small spillage)	Collect spillage and repack if practicable. Otherwise, wash overboard with copious quantities of water. Keep clear of effluent.
	Cargo Transport Units (large spillage)	
Spillage under deck	Packages (small spillage)	Collect spillage and repack if practicable.
	Cargo Transport Units (large spillage)	