

Technical Notice

Transport Regulations for Lithium Batteries

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1. Exemptions

Lithium metal 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, each cell not more than 1 g lithium content (Table 1).
- The batteries have passed the UN tests (Table 1).
- The batteries shall be packed in inner packagings that completely enclose them. They shall be protected 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 (Example see Appendix B, page 12).
- The gross mass does not exceed 30 kg per package (2.5 kg for air transport).
- The packaging shall be strong and capable of withstanding a 1.2 m drop test.
- For more conditions see special provision 188 (ADR/RID/IMDG-Code) and section II of Packing Instructions 968-970 (IATA DGR).
- Special conditions apply to air transport of lithium cells batteries with more than 0.3 g but less than 1 g / 2 g lithium content (see PI 968, section IB).

2. Classification of lithium batteries

Tadiran Lithium Batteries are lithium metal batteries. Table 1 (shown on next page) indicates which Tadiran Lithium Batteries are exempted from the dangerous goods regulations and which are not. The regulations for not exempted batteries are summarized in table 2 .

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.



Table 1
Classification of Tadiran Lithium Batteries

	Size	Catalog Number				Exempted	Lithium Content (g)	UN Test Passed	UN #
Lithium Thionyl Chloride Li/SOCL ₂	1/10C		TLH-2450	TL-2450	TL-2450X	YES	0.18	YES	*3
	1/10D	TL-5134	TL-4934	TL-5934	TLH-5934	YES	0.3	YES	*3
	1/6D	TL-5135	TL-4935	TL-5935	TLH-5935	Yes ²	0.5	YES	*3
	1/2AA	TL-5101 TL-2150	TL-4902 TL-7902	TL-5902 TLL-5902	TLH-5902	Yes ²	0.35	YES	*3
	2/3AA	TL-5155 TL-2155	TL-4955	TL-5955	TLH-5955	Yes ²	0.5	YES	*3
	AA	TL-5104 TL-2100	TL-4903 TL-7903	TL-5903	TLH-5903	Yes ²	0.65	YES	*3
	C	TL-2200	TL-4920	TL-7920	TLH-5920	NO	2.5	YES	*3
	D	TL-2300	TL-4930	TL-7930	TLH-5930	NO	5	YES	*3
	DD	TL-5137	TL-5937			NO	10	YES	*3
Hybrid Layer Capacitors (HLC)	AAA	HLC-1020 (3,7 V und 3,9 V)				YES	0.01	YES	*3
	1/2AA	HLC-1520 (3.7V)				YES	0.02	YES	*3
	2/3AA	HLC-1530 (3.7V)				YES	0.02	YES	*3
	AA	HLC-1550 (3.7V)				YES	0.05	YES	*3
	1/2AA	HLC-1520 (3.9V)				YES	0.03	YES	*3
	2/3AA	HLC-1530 (3.9V)				YES	0.05	YES	*3
	AA	HLC-1550 (3.9V)				YES	0.10	YES	*3
Tadiran Lithium Metal Oxide (TLM)	1/2AA	TLM-1520HP				YES	0.04	YES	*3
	2/3AA	TLM-1530HP				YES	0.08	YES	*3
	AA	TLM-1550HP				YES	0.18	YES	*3
	AA	TLM-1550UHP				YES	0.16	YES	*3
	1/2AA	TLM-1520HE				YES	0.11	YES	*3
	2/3AA	TLM-1520HE				YES	0.20	YES	*3
	AA	TLM-1520HE				Yes ²	0.44	YES	*3

1) if conditions mentioned in the text are fulfilled

2) see also IATA DGR under UN 3090 / PI 968 / Table 968-II

3) Ships as UN 3090 as batteries only or UN 3091 as batteries in Equipment

4. Overview dangerous goods by transport mode

Transport regulations for lithium metal 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 metal batteries					
UN 3090 Class 9	Maximum mass per package	2.5 kg, metal packaging	35 kg	according to packaging approval	according to packaging approval
	Packing group	II	II	II	II
	Packing instruction	968	968	P 903, a, b	P 903
	Marking	Class 9 label	Class 9 label Handling Label "Cargo Aircraft only"	Class 9 label	Class 9 label
Lithium metal batteries contained in equipment / packed with equipment					
UN 3091 Class 9	Max. Qty. of batteries per piece of equipment	5 kg / -	35 kg / -		
	Max. Qty. of batteries per package, excluding equipment	- / 5 kg	- / 35 kg		
	Packing group	II	II	II	II
	Packing instruction	970 / 969	970 / 969	903, a, b	903
	Marking	Class 9 label	Class 9 label Handling Label For Cargo Aircraft Only	Class 9 label	Class 9 label
	Further instructions	see packing instructions		see special provision 230	

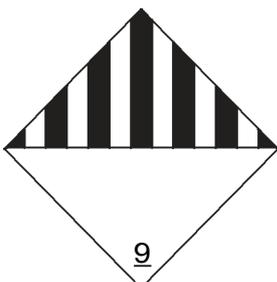
Table 2

Transport regulations for lithium metal cells / batteries: more than 1 g / 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 2013.

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 hazard label, reduced size, black on white



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

Transport Regulations for Road and Rail Transport
ADR 2013
Overview

UN 3090	LITHIUM METAL BATTERIES				
UN 3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT				
					see ADR chapter
Class	9	Miscellaneous	x	x	2.2
Classification code	M4	Lithium batteries	x	x	2.2.9.1.2
Classification		Quality Management program	x	x	2.2.9.1.7
Packing group	II	Medium danger	x	x	2.1.1.3
Labels	9	Class 9 Hazard label	x	x	5.2.2
Special provisions	188	Exempted if	x	x	3.3
	230	Class 9 if ...	x	x	
	310	Prototypes		x	
	360	Battery powered vehicles	x		
	636	Used batteries etc.	x	x	
	656	Equipment active during transport	x	x	
	661	Damaged lithium batteries	x	x	
Limited quantities	LQ0	No	x	x	3.4.6
Excepted Quantity	E0	No	x	x	3.5.1.2
Packing instructions	P903	Lithium batteries	x	x	4.1.4
	P903a	Used lithium batteries	x	x	
	P903b	Used cells and batteries collected for disposal	x	x	
Transport category	2	Exemptions under 333 kg	x	x	1.1.3.6
Tunnel restriction code	E	Forbidden in tunnels of category E	x	x	8.6

2.2.9.1.7

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form shall be assigned to UN Nos. 3090, 3091, 3480 or 3481 as appropriate. They may be carried under these entries 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, sub-section 38.3;

Note: *Batteries shall be of a type proved to meet the testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3, irrespective of whether the cells of which they are composed are of a tested type.*

- (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 (e.g., diodes, fuses, etc.);
- (e) Cells and batteries shall be manufactured under a quality management programme that includes:
- (i) A description of the organizational structure and responsibilities of personnel with regard to design and product quality;
 - (ii) The relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;
 - (iii) Process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;
 - (iv) Quality records, such as inspection reports, test data, calibration data and certificates. Test data shall be kept and made available to the competent authority upon request;
 - (v) Management reviews to ensure the effective operation of the quality management programme;
 - (vi) A process for control of documents and their revision;
 - (vii) A means for control of cells or batteries that are not conforming to the type tested as mentioned in (a) above;
 - (viii) Training programmes and qualification procedure for relevant personnel; and
 - (ix) Procedure to ensure that there is no damage to the final product.

Note: *In house quality management programmes may be accepted. Third party certification is not required, but the procedures listed in (i) to (ix) above shall be properly recorded and traceable. A copy of the quality management programme shall be made available to the competent authority upon request.*

Lithium batteries are not subject to the provisions of ADR if they meet the requirements of special provision 188 of Chapter 3.3.

Special Provision 188

Cells and batteries offered for carriage are not subject to other provisions of ADR 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 Watt-hour rating is not more than 20 Wh;
- (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 Watt-hour rating is not more than 100 Wh. Lithium ion batteries subject to this provision shall be marked with the Watt-hour rating on the outside case, except those manufactured before 1 January 2009;
- (c) Each cell or battery meets the provisions of 2.2.9.1.7 (a) and (e);
- (d) Cells and batteries, except when installed in equipment, shall be packed in inner packagings that completely enclose the cell or battery. Cells and batteries shall be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit. The inner packagings shall be packed in strong outer packagings which conform to the provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.5;
- (e) Cells and batteries when installed in equipment shall be protected from damage and short circuit, and the equipment shall be equipped with an effective means of preventing accidental activation. This requirements does not apply to devices which are intentionally active in carriage (radio frequency identification (RFID) transmitters, watches, sensors, etc.) and which are not capable of generating a dangerous evolution of heat. When batteries are installed in equipment, the equipment shall be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained;
- (f) Except for packages containing button cell batteries installed in equipment (including circuit boards), or no more than four cells installed in equipment or no more than two batteries installed in equipment, each package shall be marked with the following:
 - (i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
 - (ii) an indication that the package shall be handled with care and that a flammability hazard exists if the package is damaged;
 - (iii) an indication that special procedures shall be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - (iv) a telephone number of additional information;
- (g) Each consignment of one or more packages marked in accordance with paragraph (f) shall be accompanied with a document including the following:
 - (i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
 - (ii) an indication that the package shall be handled with care and that a flammability hazard exists if the package is damaged;
 - (iii) an indication that special procedures shall be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - (iv) a telephone number for additional information;
- (h) Except when batteries are installed in equipment, each package shall be 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
- (i) Except when batteries are installed in or packed with equipment, packages shall not exceed 30 kg gross mass.

As used above and elsewhere in ADR, "lithium content" means the mass of lithium in the anode of a lithium metal or lithium alloy cell.

Separate entries exist for lithium metal batteries and lithium ion batteries to facilitate the carriage of these batteries for specific modes of carriage and to enable the application of different emergency response actions.

Special Provision 230

Lithium cells and batteries may be carried under this entry if they meet the provisions of 2.2.9.1.7.

Special Provision 310

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

- (a) the cells and batteries are carried 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; 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 360

Vehicles only powered by lithium metal batteries or lithium ion batteries shall be classified under the entry UN 3171 battery-powered vehicle.

Special Provision 636

- (a) 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.
- (b) Up to the intermediate processing facility, used lithium cells and batteries with a gross mass of not more than 500 g each, whether or not contained in equipment, collected and handed over for carriage for disposal, together with or without other non-lithium cells or batteries are not subject to the other provisions of ADR if they meet the following conditions:
 - (i) The provisions of packing instruction P903b are complied with;
 - (ii) A quality assurance system is in place to ensure that the total amount of lithium cells or batteries per transport unit does not exceed 333 kg;
 - (iii) Packages shall bear the inscription: "USED LITHIUM CELLS".

Special Provision 656

(Deleted)

Special Provision 661

Carriage of damaged lithium batteries if not collected and presented for carriage for disposal according to special provision 636 is permitted only under additional conditions defined by the competent authority of any Contracting Party to ADR who may also recognise an approval granted by the competent authority of a country which is not a Contracting Party to ADR, provided that this approval has been granted in accordance with the procedures applicable according to ADR or RID.

Only packing methods which are approved for these goods by the competent authority may be used.

The competent authority may define a more restrictive transport category or tunnel restriction code, which shall be included in the competent authority approval.

A copy of the competent authority approval shall accompany each consignment or the transport document shall include a reference to the competent authority approval.

The competent authority of the Contracting Party to ADR granting an approval in accordance with this special provision shall notify the secretariat of the UNECE for the purpose of circulation of this information through its website.

NOTE: Any recommendations made by the United Nations for technical requirements for the carriage of damaged lithium batteries shall be considered when granting the approval

Damaged lithium batteries means in particular:

- Batteries identified by the manufacturer as being defective for safety reasons;
- Batteries with damaged or considerably deformed cases;
- Leaking or venting batteries; or
- Batteries with faults that cannot be diagnosed prior to carriage to a place of analysis

P903	PACKING INSTRUCTION	P903
This instruction applies to UN Nos. 3090, 3091, 3480 and 3481.		
The following packagings are authorized, provided the general provisions of 4.1.1 and 4.1.3 are met:		
<p>(1) For cells and batteries:</p> <p style="padding-left: 40px;">Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);</p> <p style="padding-left: 40px;">Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);</p> <p style="padding-left: 40px;">Jerricans (3A2, 3B2, 3H2).</p> <p>Cells or batteries shall be packed in packagings so that the cells or batteries are protected against damage that may be caused by the movement or placement of the cells or batteries within the packaging.</p> <p>Packagings shall conform to the packing group II performance level.</p> <p>(2) In addition for cells or batteries with a gross mass of 12 kg or more employing a strong, impact resistant outer casing, and assemblies of such cells or batteries:</p> <p style="padding-left: 40px;">(a) Strong outer packagings, in protective enclosures (e.g. in fully enclosed or wooden slatted crates); or</p> <p style="padding-left: 40px;">(b) Pallets or other handling devices.</p> <p>Cells or batteries shall be secured to prevent inadvertent movement, and the terminals shall not support the weight of other superimposed elements.</p> <p>Packagings need not meet the requirements of 4.1.1.3.</p> <p>(3) For cells or batteries packed with equipment:</p> <p>Packagings conforming to the requirements in paragraph (1) of this packing instruction, then placed with the equipment in an outer packaging; or</p> <p>Packagings that completely enclose the cells or batteries, then placed with equipment in a packaging conforming to the requirements in paragraph (1) of this instruction.</p> <p>The equipment shall be secured against movement within the outer packaging.</p> <p>For the purpose of this packing instruction, “equipment” means apparatus requiring the lithium metal or lithium ion cells or batteries with which it is packed for its operation.</p> <p>(4) For cells or batteries contained in equipment:</p> <p>Strong outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use. They shall be constructed in such a manner as to prevent accidental operation during carriage. Packagings need not meet the requirements of 4.1.1.3.</p> <p>Large equipment can be offered for carriage unpackaged or on pallets when the cells of batteries are afforded equivalent protection by the equipment in which they are contained.</p> <p>Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be carried when intentionally active in strong outer packagings.</p>		
Additional requirement:		
Cells or batteries shall be protected against short circuit.		

P903a	PACKING INSTRUCTION	P903a
This instruction applies to used cells and batteries of UN Nos. 3090, 3091, 3480 and 3481.		
<p>The following packagings are authorized, provided the general provisions of 4.1.1, except 4.1.3 are met:</p> <p>Packagings conforming to the packing group II performance level.</p> <p>Non-approved packagings shall, however, be permitted provided that:</p> <ul style="list-style-type: none"> - they meet the general provisions of 4.1.1 except 4.1.1.3 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. 		
<p>Additional requirement: Batteries shall be protected against short circuit.</p>		

P903b	PACKING INSTRUCTION	P903b
This instruction applies to used cells and batteries of UN Nos. 3090, 3091, 3480 and 3481.		
<p>Used lithium cells and batteries, with a gross mass of not more than 500 g each, collected for disposal, may be carried together with other used non-lithium batteries or alone without being individually protected, under the following conditions:</p> <p>(1) In 1H2 drums or 4H2 boxes conforming to the packing group II performance level for solids;</p> <p>(2) In 1A2 drums or 4A boxes fitted with a polyethylene bag and conforming to the packing group II performance level for solids. The polyethylene bag</p> <ul style="list-style-type: none"> - shall have an impact resistance of at least 480 grams in both parallel and perpendicular planes with respect to the length of the bag; - shall have a minimum of 500 microns of thickness with an electrical resistivity of more than 10 Mohms and a water absorption rate over 24 hours at 25 °C lower than 0.01 %; - shall be closed; and - may only be used once; <p>(3) 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.</p>		
<p>Additional requirements: The empty space in the packaging shall be filled with cushioning material. The cushioning material may be dispensed with when the packaging is entirely fitted with a polyethylene bag and the bag is closed.</p> <p>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.</p>		

Transport Regulations Aircraft

IATA DGR 2013

Overview

UN 3090	LITHIUM METAL BATTERIES					see Chapter
UN 3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or					
	LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT					
Class	9	Miscellaneous dangerous goods	x	x	x	3.9
Sub Risk	-					
Classification		Quality Management Program	x x	x x	x x	3.9.2.6 3.9.2.6 (e)
Packing Group	II	Medium danger	x	x	x	3.0.3
Packing instructions	968	Lithium batteries			x	5.9
	970	Lithium batteries contained in equipment		x		5.9
	969	Lithium batteries packed with equipment	x			5.9
Hazard label	9	Miscellaneous	x	x	x	7.3.18
Exempted Quantity	E0	No	x	x	x	2.7
Limited Quantity	-	Forbidden	x	x	x	
<u>Max. Net</u> mass	2.5 kg	see also packing instructions	¹⁾	¹⁾	x	
Cargo aircraft	<u>Max. Net</u> mass	35 kg	see also packing instructions	¹⁾	¹⁾	x
	Handling label	Yes	Cargo Aircraft Only	x	x	x
Special Provisions	A48	Packaging tests		x		4.4
	A88	Prototypes			x	
	A99	over 35 kg			x	
	A154	Defective batteries	x	x	x	
	A164	Heat development	x	x	x	
	A181, A182	Various combinations	x	x		
	A183	No waste batteries			x	
ERG ²⁾ Code	9FZ		x	x	x	ICAO ³⁾

1) see applicable packing instruction

2) Emergency Response Drill Code

3) Doc 9481-AN/928

3.9.2.6 Lithium Batteries

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form must be assigned to UN 3090, UN 3091, UN 3480 or UN 3481, as appropriate. They may be transported under these entries 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 UN *Manual of Tests and Criteria*, Part III, subsection 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the 5th revised edition of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3 may continue to be transported;

Note:

Batteries must be of a design type proved to meet the testing requirements of the Manual of Tests and Criteria, Part III, subsection 38.3, irrespective of whether the cells of which they are composed are of a tested design type.

- (b) each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally incident to transport;
- (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 (e.g., diodes, fuses, etc.);
- (e) cells and batteries must be manufactured under a quality management program that includes:
1. a description of the organizational structure and responsibilities of personnel with regard to design and product quality;
 2. the relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;
 3. process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;
 4. quality records, such as inspection reports, test data, calibration data and certificates. Test data must be kept and made available to the appropriate national authority upon request;
 5. management reviews to ensure the effective operation of the quality management programme;
 6. a process for control of documents and their revision;
 7. a means for control of cells or batteries that are not conforming to the type tested as mentioned in (a) above;
 8. training programmes and qualification procedures for relevant personnel; and
 9. procedures to ensure that there is no damage to the final product.

Note:

In house quality management programmes may be accepted. Third party certification is not required, but the procedures listed in 1. to 9. above must be properly recorded and traceable. A copy of the quality management programme must be made available to the appropriate national authority upon request.

IATA Special Provision A48

Packaging tests are not considered necessary

IATA Special Provision A88

Prototype or low production (i.e. annual production runs consisting of no more than 100 lithium cells or batteries) lithium cells or batteries that have not been tested to the requirements in subsection 38.3 of the *UN Manual of Tests and Criteria* may be transported aboard cargo aircraft, if approved by the appropriate authority of the State of origin and the following requirements are met:

- (a) except as provided in paragraph (c), the cells or 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;
- (b) except as provided in paragraph (c), each cell or 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 or batteries must be protected against short-circuiting;
- (c) 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 packed in strong outer packagings or protective enclosures not subject to the requirements of Section 6 of these Regulations. The batteries or battery assemblies must be protected against short circuiting; and
- (d) a copy of the document of approval showing the quantity limitations must accompany the consignment.

Irrespective of the limit specified in Column L of Table 4.2, the battery or battery assembly as prepared for transport may have a mass exceeding 35 kg G.

IATA Special Provision A99

Irrespective of the per package quantity limit for cargo aircraft specified in Column L of the List of Dangerous Goods (Subsection 4.2) and in Section I of Packing Instructions 965, 966, 967, 968, 969 or 970, a lithium battery or battery assembly (UN 3090 or UN 3480), including when packed with, or contained in equipment (UN 3091 or UN 3481) that meets the other requirements of Section I of the applicable packing instruction may have a mass exceeding 35 kg, if approved by the appropriate authority of the State of origin. A copy of the document of approval must accompany the consignment.

IATA Special Provision A154

Lithium batteries identified by the manufacturer as being defective for safety reasons, 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 Special Provision A164

Any electrical battery or battery powered device, equipment or vehicle having the potential of a dangerous evolution of heat must be prepared for transport so as to prevent:

- (a) a short circuit (e.g. in the case of batteries by the effective insulation of exposed terminals; or in the case of equipment, by disconnection of the battery and protection of exposed terminals); and
- (b) unintentional activation.

IATA Special Provision A181

When a package contains a combination of lithium batteries contained in equipment and lithium batteries packed with equipment, the package must be marked UN 3091 Lithium metal batteries packed with equipment, or UN 3481 Lithium ion batteries packed with equipment as appropriate. If a package contains both lithium ion batteries and lithium metal batteries, the package must be marked as required for both battery types. However, button cell batteries installed in equipment (including circuit boards) need not be considered.

IATA Special Provision A183

Waste batteries and batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

PACKING INSTRUCTION 968

STATE VARIATIONS: USG-02/03

OPERATOR VARIATIONS: 5X-02/04/07, AC-06, AM-09, BA-02, CI-01, CX-07, CZ-08, D0-03, DL-06, EY-04, FX-07, KA-07, LD-08, QR-04, QY-03, SK-01, US-01, UX-07

Introduction

This instruction applies to lithium metal or lithium alloy cells and batteries (UN 3090) on passenger and Cargo Aircraft Only.

The general requirements apply to all lithium metal batteries prepared for transport according to this packing instruction:

- Section IA applies to all lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, or to quantities of lithium metal cells or batteries in excess of those permitted in Section IB of this packaging instruction which must be assigned to Class 9 and are subject to all of the applicable requirements of these Regulations,
- Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
- Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

General Requirements

The following requirements apply to all lithium metal or lithium alloy cells and batteries:

- (a) each cell and battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the 5th revised edition of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3 may continue to be transported;

Note:

Batteries, including those which have been refurbished or otherwise altered, are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

- (b) cells and batteries must be manufactured under a quality management program as described in 3.9.2.6 (e);
- (c) cells and batteries identified by the manufacture as being defective for safety reasons, 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);
- (d) waste lithium batteries and lithium 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;
- (e) cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.

Section IA

These requirements apply to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g that have been determined to meet the criteria for assignment to Class 9.

The General Packing Requirements of 5.0.2 must be met.

Each cell or battery must:

1. meet the General Requirements, above;
2. incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.

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

Additional Requirements – Section IA

- lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance standards;
- 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 or protective enclosures (e.g. in fully enclosed or wooden slatted crates). The packagings need not meet the requirements of Section 6 of these Regulations. The packagings must be approved by the appropriate national authority of the State of origin. A copy of the document of approval must accompany the consignment.

Lithium metal and lithium alloy cells and batteries prepared for transport on Passenger Aircraft as Class 9:

- must be packed in either a rigid metal intermediate or a metal outer packaging;
- cells and batteries must be surrounded by cushioning material that is non-combustible and non-conductive before being placed in either the metal intermediate or metal outer packaging;

PACKING INSTRUCTION 968 (continued)

- when the package does not meet the above requirements, the package(s) must bear the “Cargo Aircraft Only” label and the Shipper’s Declaration must indicate “Cargo Aircraft Only”.

TABLE 968-IA

UN number	Net quantity per package Passenger aircraft	Net quantity per package Cargo Aircraft Only
UN 3090 Lithium metal batteries	2.5 kg	35 kg

OUTER PACKAGINGS																	
Type	Drums						Jerricans						Boxes				
Desc.	Steel	Alumi- nium	Ply- wood	Fibre	Plastic	Other metal	Steel	Alumi- nium	Plastic	Steel	Alumi- nium	Wood	Ply- wood	Recon- stituted wood	Fibre- board	Plastic	Other metal
Spec.	1A2	1B2	1D	1G	1H2	1N2	3A2	3B2	3H2	4A	4B	4C1 4C2	4D	4F	4G	4H2	4N

Section IB

Section IB requirements apply to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II.

Quantities of lithium metal cells or batteries that exceed the allowance permitted in Section II, Table 968-II must be assigned to Class 9 and are subject to all of the applicable provisions of these Regulations (including the General Requirements of this packaging instruction), except for the following:

- the provisions of Section 6; and
- a Shipper’s Declaration is not required, provided that the following information must be contained on the air waybill when used, or in the appropriate location on alternative transport documentation. The information required by 2, 3 and 4 below must be shown in the “Nature and Quantity of Goods” box of the air waybill. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:
 - the name and address of the shipper and consignee;
 - UN 3090;
 - Lithium metal batteries, PI 968, IB;
 - the number of packages and the gross weight of each package.

Lithium metal cells and batteries may be offered for transport if they meet all of the following:

- for cells, the lithium content is not more than 1 g; and
- for batteries, the aggregate lithium content is not more than 2 g.

Cells and batteries must be packed in strong outer packagings that conform to 5.0.2.4, 5.0.2.6.1 and 5.0.2.12.1

Additional Requirements - Section IB

Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.

Each package must be capable of withstanding a 1.2 m drop test in any orientation without:

- damage to cells or batteries contained therein;
- shifting of the content so as to allow battery to battery (or cell to cell) contact;
- release of contents.

Each consignment must be accompanied with a document with an indication that:

- the package contains lithium metal cells or batteries;
- the package must be handled with care and that a flammability hazard exists if the package is damaged;
- special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
- a telephone number for additional information.

Each package must be labelled with a lithium battery handling label (Figure 7.4.H) in addition to the Class 9 hazard label (Figure 7.3.V).

Each package must be marked in accordance with the requirements of 7.1.5.1 (a) and (b) and in addition the gross weight when required by 7.1.5.1(c) must be marked on the package.

PACKING INSTRUCTION 968 (continued)**TABLE 968-IB**

Lithium metal cells and batteries	Quantity per package Passenger aircraft 2.5 kg G	Quantity per package Cargo Aircraft Only 2.5 kg G
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OUTER PACKAGINGS

Type	Drums	Jerricans	Boxes
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Section II

Lithium metal or lithium alloy cells and batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for:

- (a) dangerous goods in passenger and crew baggage (Subsection 2.3). Only those lithium metal batteries as specifically permitted may be carried in carry-on baggage;
- (b) dangerous goods in air mail (Subsection 2.4);
- (c) reporting of dangerous goods accidents, incidents and other occurrences (9.6.1 and 9.6.2).

Lithium metal or lithium alloy cells and batteries offered for transport must meet the General Requirements of this packing instruction and:

1. for cells, the lithium content is not more than 1 g; and
2. for batteries, the aggregate lithium content is not more than 2 g;

Cells and batteries must be packed in strong outer packagings that conform to 5.0.2.4, 5.0.2.6.1 and 5.0.2.12.1.

Additional Requirements – Section II

Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.

Each package must be capable of withstanding a 1.2 m drop test in any orientation without:

- damage to cells or batteries contained therein;
- shifting of the contents so as to allow battery to battery (or cell to cell) contact;
- release of contents.

Each consignment must be accompanied with a document with an indication that:

- the package contains lithium metal cells or batteries;
- the package must be handled with care and that a flammability hazard exists if the package is damaged;
- special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
- a telephone number for additional information.

Each package must be labelled with a lithium battery handling label (Figure 7.4.H);

A Shipper's Declaration for Dangerous Goods is not required.

The words "Lithium metal batteries in compliance with Section II of PI 968" must be included on the air waybill, when an air waybill is used. The information should be shown in the "Nature and Quantity of Goods" box of the air waybill.

Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

Overpacks-Section II

Individual packages each complying with the requirements of Section II may be placed in an overpack. The overpack may also contain packages of dangerous goods or goods not subject to these Regulations provided that there are no packages enclosing different substances which might react dangerously with each other. An overpack must be marked with the word "Overpack" and labelled with the lithium battery label (Figure 7.4.H), unless the label(s) on the package(s) inside the overpack are visible.

PACKING INSTRUCTION 968 (continued)**TABLE 968-II**

Contents	Lithium metal cells and/or batteries with a lithium content of 0.3 g or less	Lithium metal cells with a lithium content of more than 0.3 g but not more than 1 g	Lithium metal batteries with a lithium content of more 0.3 g but not more than 2 g
1	2	3	4
Maximum number of cells/batteries per package	No limit	8 cells	2 Batteries
Maximum net quantity per package	2.5 kg	N/A	N/A

Cells and/or batteries specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

OUTER PACKAGINGS

Type	Drums	Jerricans	Boxes
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PACKING INSTRUCTION 969

STATE VARIATIONS: USG-02/03

OPERATOR VARIATIONS: 5X-07, AC-06, AM-09, CI-01, CZ-08, D0-03, EY-04, QR-04, QY-03, SK-01, US-01

Introduction

This instruction applies to lithium metal or lithium alloy cells and batteries packed with equipment (UN 3091) on passenger and Cargo Aircraft Only.

The general requirements apply to all lithium metal batteries packed with equipment prepared for transport according to this packing instruction:

- Section I applies where equipment is packed with lithium metal cells with a lithium metal content in excess of 1 g or lithium metal batteries with a lithium metal content in excess of 2 g which must be assigned to Class 9 and are subject to all of the applicable requirements of these Regulations; and
- Section II applies where equipment is packed with lithium metal cells with a lithium metal content not exceeding 1 g or lithium metal batteries with a lithium metal content not exceeding 2 g.

General requirements

The following requirements apply to all lithium metal or lithium alloy cells and batteries:

- (a) each cell and battery is of the type proven to meet the requirements of each test in the *UN Manual of Tests and Criteria*, Part III, subsection 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the 5th revised edition of the *UN Manual of Tests and Criteria*, Part III, subsection 38.3 may continue to be transported;

Note:

Batteries, including those which have been refurbished or otherwise altered, are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

- (b) cells and batteries must be manufactured under a quality management program as described in 3.9.2.6(e);
- (c) cells and batteries identified by the manufacturer as being defective for safety reasons, 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);
- (d) cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.

Section I

These requirements apply to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g that been determined to meet the criteria for assignment to Class 9

The General Packing Requirements of 5.0.2 must be met.

Each cell or battery must:

1. meet the General Requirements, above;
2. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.

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

PACKING INSTRUCTION 969 (continued)**Additional Requirements – Section I**

- lithium metal cells or batteries must:
 - be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance standards; or
 - be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance standards.
- the equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation;
- for the purpose of this packing instruction, "equipment" means apparatus requiring the lithium batteries with which it is packed for its operation.

Lithium metal and lithium alloy cells and batteries prepared for transport on Passenger Aircraft as Class 9:

- must be packed in either a rigid metal intermediate or a metal outer packaging;
- cells and batteries must be surrounded by cushioning material that is non-combustible and non-conductive, and being placed in either the metal intermediate or metal outer packaging.
- when the package does not meet the above requirements, the package(s) must bear the "Cargo Aircraft Only" label and the Shipper's Declaration must indicate "Cargo Aircraft Only".

TABLE 969-I

UN number	Net quantity per package Passenger aircraft	Net quantity per package Cargo Aircraft Only
UN 3091 Lithium metal batteries packed with equipment	5 kg	35 kg

OUTER PACKAGINGS

Type	Drums						Jerricans			Boxes							
	Steel	Aluminium	Ply-wood	Fibre	Plastic	Other metal	Steel	Aluminium	Plastic	Steel	Aluminium	Wood	Ply-wood	Reconstituted wood	Fibre-board	Plastic	Other metal
Spec.	1A2	1B2	1D	1G	1H2	1N2	3A2	3B2	3H2	4A	4B	4C1 4C2	4D	4F	4G	4H2	4N

Section II

Lithium metal or lithium alloy cells and batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for:

- (a) dangerous goods in passenger and crew baggage (Subsection 2.3). Only those lithium metal batteries as specifically permitted may be carried in carry-on baggage;
- (b) dangerous goods in air mail (Subsection 2.4);
- (c) reporting of dangerous goods accidents, incidents and other occurrences (9.6.1 and 9.6.2).

Lithium metal or lithium alloy cells and batteries offered for transport must meet the General Requirements of this packing instruction and:

1. for cells, the lithium content is not more than 1 g; and
2. for batteries, the aggregate lithium content is not more than 2 g;

Cells and batteries must be packed in strong outer packagings, that conform to 5.0.2.4, 5.0.2.6.1 and 5.0.2.12.1.

Additional Requirements – Section II

Lithium metal cells and batteries must:

- be placed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging; or
- be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a strong outer packaging.

The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.

The maximum number of batteries in each package must be the minimum number required to power the equipment plus two spares.

PACKING INSTRUCTION 969 (continued)

Each package of cells or batteries, or the completed package must be capable of withstanding a 1.2 m drop test in any orientation without:

- damage to cells or batteries contained therein;
- shifting of the contents so as to allow battery to battery (or cell to cell) contact;
- release of contents.

Each consignment must be accompanied with a document with an indication that:

- the package contains lithium metal cells or batteries;
- the package must be handled with care and that a flammability hazard exists if the package is damaged;
- special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
- a telephone number for additional information.

Each package must be labelled with a lithium battery handling label (Figure 7.4.H).

A Shipper's Declaration for Dangerous Goods is not required.

The words "Lithium metal batteries in compliance with Section II of PI 969 must be included on the air waybill, when an air waybill is used. The information should be shown in the "Nature and Quantity of Goods" box of the air waybill.

Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

Overpacks – Section II

Individual packages each complying with the requirements of Section II may be placed in an overpack. The overpack may also contain packages of dangerous goods or goods not subject to these Regulations provided that there are no packages enclosing different substances which might react dangerously with each other. An overpack must be marked with the word "Overpack" and labelled with the lithium battery label (Figure 7.4.H), unless the label(s) on the package(s) inside the overpack are visible.

TABLE 969-II

Net quantity of lithium metal cells or batteries per package	Passenger aircraft	Cargo Aircraft Only
	5 kg	5 kg

OUTER PACKAGINGS

Type	Drums	Jerricans	Boxes
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PACKING INSTRUCTION 970

STATE VARIATIONS: USG-02/03

OPERATOR VARIATIONS: 5X-07, AC-06, AM-09, CI-01, CX-08, CZ-08, D0-03, EY-04, KA-08, LD-07, QR-04, QY-03, SK-01, US-01, UX-07

Introduction

This instruction applies to lithium metal or lithium alloy cells and batteries contained in equipment (UN 3091) on passenger and Cargo Aircraft Only.

The general requirements apply to all lithium metal and lithium alloy cells and batteries contained in equipment prepared for transport according to this packing instruction:

- Section I applies where equipment contains lithium metal cells with a lithium metal content in excess of 1 g or lithium metal batteries with a lithium metal content in excess of 2 g which must be assigned to Class 9 and are subject to all of the applicable requirements of these Regulations; and
- Section II applies where equipment contains lithium metal cells with a lithium metal content not exceeding 1 g or lithium metal batteries with a lithium metal content not exceeding 2 g.

General requirements

The following requirements apply to all lithium metal or lithium alloy cells and batteries:

- each cell and battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the 5th revised edition of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3 may continue to be transported;

Note:

Batteries, including those which have been refurbished or otherwise altered, are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

- cells and batteries must be manufactured under a quality management program as described in 3.9.2.6(e);

PACKING INSTRUCTION 970 (continued)

- (c) cells and batteries identified by the manufacturer as being defective for safety reasons, 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);
- (d) cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- (e) equipment must be equipped with an effective means of preventing accidental activation;
- (f) equipment containing cells or batteries must be packed in strong outer packagings that conform to 5.0.2.4, 5.0.2.6.1 and 5.0.2.12.1.
- (g) the equipment containing the cells or batteries must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.

Section I

These requirements apply to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g that have been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

1. meet the General Requirements, above;
2. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.

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

Additional Requirements – Section I

- the equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained;
- the quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

TABLE 970-I

UN number	Net quantity per package Passenger aircraft	Net quantity per package Cargo Aircraft Only
UN 3091 Lithium metal batteries contained in equipment	5 kg	35 kg

OUTER PACKAGINGS – Strong outer packagings, such as:

Type	Drums						Jerricans			Boxes							
	Steel	Aluminium	Ply-wood	Fibre	Plastic	Other metal	Steel	Aluminium	Plastic	Steel	Aluminium	Wood	Ply-wood	Reconstituted wood	Fibre-board	Plastic	Other metal
Desc.																	

Section II

Lithium metal or lithium alloy cells and batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for:

- (a) dangerous goods in passenger and crew baggage (Subsection 2.3) Only those lithium metal batteries as specifically permitted may be carried in carry-on and checked baggage;
- (b) dangerous goods in air mail (Subsection 2.4);
- (c) reporting of dangerous goods accidents, incidents and other occurrences (9.6.1 and 9.6.2).

Lithium metal or lithium alloy cells and batteries offered for transport must meet the General Requirements of this packing instruction and:

1. for cells, the lithium content is not more than 1 g;
2. for batteries, the aggregate lithium content is not more than 2 g;

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

Additional Requirements – Section II

The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the cell of battery is afforded equivalent protection by the equipment in which it is contained.

Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 7.4.H), except for button cell batteries installed in equipment (including circuit boards);

PACKING INSTRUCTION 970 (continued)

Each consignment with packages bearing the lithium battery handling label must be accompanied with a document with an indication that:

- the package contains lithium metal cells or batteries;
- the package must be handled with care and that a flammability hazard exists if the package is damaged;
- special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
- a telephone number for additional information.

A Shipper's Declaration for Dangerous Goods is not required.

Where a consignment includes packages bearing the lithium battery handling label, the words "Lithium metal batteries in compliance with Section II of PI 970" must be included on the air waybill, when an air waybill is used. The information should be shown in the "Nature and Quantity of Goods" box of the air waybill.

Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

Overpacks – Section II

Individual packages each complying with the requirements of Section II may be placed in an overpack. The overpack may also contain packages of dangerous goods or goods not subject to these Regulations provided that there are no packages enclosing different substances which might react dangerously with each other. An overpack must be marked with the word "Overpack" and labelled with the lithium battery label (Figure 7.4.H), unless the label(s) on the package(s) inside the overpack are visible, or a label is not required.

TABLE 970-II

	Passenger aircraft	Cargo Aircraft Only
Net quantity of lithium metal cells or batteries per package	5 kg	5 kg

OUTER PACKAGINGS

Type	Drums	Jerricans	Boxes
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Figure 7.4.H
Lithium Battery Label



Name:	Lithium Battery Label
Cargo IMP Code:	ELM
Minimum dimensions::	120 mm x 110 mm Where the packages are of dimensions such that they can only bear smaller labels the label dimensions may be 74 mm x 105 mm
Colour:	The border of the label must have red diagonal hatchings. Text and symbols black on a contrasting background.

Note: The figure above shows the Lithium Battery Label when used with Lithium Metal Batteries only.

Transport Regulations for Sea Transport

IMDG Code 2012

Overview

UN 3090	LITHIUM METALL BATTERIES				
UN 3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT				
					see chapter
Class	9	Miscellaneous dangerous substances and articles	x	x	2.9
Subsidiary	---		x	x	
Classification		Quality Management Program	x	x	2.9.4
Packing group	II	Medium danger	x	x	2.0.1.3
Special provisions	188		x	x	3.3
	230		x	x	
	310	Small lots		x	
	957	Transition rule	x		
Limited Quantities	0	no	x	x	
Excepted quantities	E0	no	x	x	3.5
Packing Instructions	P903	Lithium Batteries	x	x	4.1.4.1
EmS ¹⁾	F-A	Fire Schedule Alfa	x	x	5.4.3.2
	S-I	Spillage Schedule India (flammable solids, repacking possible)	x	x	7.3
Storage and segregation	Category A	On deck or under deck	x	x	7.1 7.2
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".

2.9.4 Lithium batteries

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form shall be assigned to UN Nos. 3090, 3091, 3480 or 3481 as appropriate. They may be transported under these entries if they meet the following provisions:

- .1 Each cell or battery is of the type proved to meet the requirements of each test of the *Manual Tests and Criteria* Part III, sub section 38.3. However batteries and cells manufactured before 1 January 2014 and conforming to a design type tested according to requirements of the fifth revised edition of the *Manual of Tests and Criteria*, part III, sub section 38.3, may continue to be transported;
Note: Batteries shall be of a design type proved to meet the testing requirements of the *Manual of Tests and Criteria*, part III, sub section 38.3, irrespective of whether the cells of which they are composed are of a tested design type.
- .2 Each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally incident to transport;
- .3 Each cell and battery is equipped with an effective means of preventing external short circuits;
- .4 Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);
- .5 Cells and batteries shall be manufactured under a quality management programme that includes:
 - (i) a description of the organizational structure and responsibilities of personnel with regard to design and product quality;
 - (ii) the relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;
 - (iii) process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;
 - (iv) quality records, such as inspection reports, test data, calibration data and certificates. Test data shall be kept and made available to the competent authority upon request;
 - (v) management reviews to ensure the effective operation of the quality management programme;
 - (vi) a process for control of documents and their revision;
 - (vii) a means for control of cells of batteries that are not conforming to the type tested as mentioned in .1 above;
 - (viii) training programmes and qualification procedures for relevant personnel; and
 - (ix) procedures to ensure that there is no damage to the final product.

Note: In-house quality management programmes may be accepted. Third party certification is not required, but the procedures listed in (i) to (ix) above shall be properly recorded and traceable. A copy of the quality management programme shall be made available to the competent authority upon request.

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 watt-hour rating is not more than 20 W h;
- .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 watt-hour rating is not more than 100 W h.
Lithium-ion batteries subject to this provision shall be marked with the watt-hour rating on the outside case, except those manufactured before 1 January 2009;
- .3 Each cell or battery meets the provisions of 2.9.4.1 and 2.9.4.5;
- .4 Cells and batteries, except when installed in equipment, shall be packed in inner packagings that completely enclose the cell or battery. Cells and batteries shall be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit. The inner packagings shall be packed in strong outer packagings which conform to the provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.5;
- .5 Cells and batteries when installed in equipment shall be protected from damage and short circuit, and the equipment shall be equipped with an effective means of preventing accidental activation. This requirement does not apply to devices which are intentionally active in transport (radio frequency identification (RFID) transmitters, watches, sensors, etc.) and which are not capable of generating a dangerous evolution of heat. When batteries are installed in equipment, the equipment shall be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
- .6 Except for packages containing button cell batteries installed in equipment (including circuit boards), or no more than four cell installed in equipment or no more than two batteries installed in equipment, each package shall be marked with the following:
 - (i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries; as appropriate;
 - (ii) as indication that the package shall be handled with care and that a flammability hazard exists if the package is damaged;
 - (iii) an indication that special procedures shall be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - (iv) a telephone number for additional information.
- .7 Each consignment of one or more packages marked in accordance with paragraph .6 shall be accompanied with a document including the following:
 - (i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
 - (ii) an indication that the package shall be handled with care and that a flammability hazard exists if the package is damaged;
 - (iii) an indication that special procedures shall be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - (iv) a telephone number of additional information.

- .8 Except when batteries are installed in equipment, each package shall be 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
- .9 Except when batteries are installed in or packed with equipment, packages shall 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.

Separate entries exist for lithium metal batteries and lithium ion batteries to facilitate the transport of these batteries for specific modes of transport and to enable the application of different emergency response actions.

Special Provision 230

Lithium cells and batteries may be transported under this entry if they meet the provisions of 2.9.4.

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 cells and batteries, or to pre-production prototypes of cells and batteries when these prototypes are transported for testing if:

- .1 the cell 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.

Special Provision 957

Lithium cells and batteries manufactured before 1 January 2003 that have not been tested in accordance with the requirements in chapter 38.3 of the United Nations Manual of Tests and Criteria, as well as articles which contain such lithium cells or batteries, may be transported until 31 December 2013 if all applicable provisions of this Code are met.

P 903	PACKING INSTRUCTION	P 903
This instruction applies to UN Nos. 3090, 3091, 3480 and 3481.		
<p>The following packagings are authorized provided that the general provisions of 4.1.1 and 4.1.3 are met:</p> <p>(1) For cells and batteries: Drums (1A2, 1B 2, 1N2, 1H2, 1D, 1G); Boxes (4A, 4B, 4N 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2); Jerricans (3A2, 3B2, 3H2).</p> <p>Cells or batteries shall be packed in packagings so that the cells or batteries are protected against damage that may be caused by the movement or placement of the cells or batteries within the packaging.</p> <p>Packagings shall conform to the packing group II performance level.</p> <p>(2) In addition for cells or batteries with a gross mass of 12 kg or more employing a strong, impact resistant outer casing, and assemblies of such cells or batteries:</p> <p>(a) Strong outer packagings, in protective enclosures (e.g., in fully enclosed or wooden slatted crates); or</p> <p>(b) Pallets or other handling devices.</p> <p>Cells or batteries shall be secured to prevent inadvertent movement, and the terminals shall nor support the weight of other superimposed elements.</p> <p>Packagings need not meet the requirements of 4.1.1.3.</p> <p>(3) For cells or batteries packed with equipment:</p> <p>Packagings conforming to the requirements in paragraph (1) of this packing instruction, then placed with the equipment in an outer packaging; or</p> <p>Packagings that completely enclose the cells or batteries, then placed with equipment in a packaging conforming to the requirements in paragraph (1) of this instruction.</p> <p>The equipment shall be secured against movement within the outer packaging.</p> <p>For the purpose of this packaging instruction, “equipment” means apparatus requiring the lithium metal or lithium ion cells or batteries with which it is packed for its operation.</p> <p>(4) For cells or batteries contained in equipment:</p> <p>Strong outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use. They shall be constructed in such a manner as to prevent accidental operation during transport.</p> <p>Packagings need not meet the requirements of 4.1.1.3.</p> <p>Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.</p> <p>Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generation a dangerous evolution of heat, may be transported when intentionally active in strong outer packagings. When active, these devices shall meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.</p>		
<p>Additional requirement: Cells or batteries shall be protected against short circuit.</p>		

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. Otherwise, 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 hand tools, 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)	