

IMDG Code 2017 Transport Regulations for Sea Transport Overview

UN 3090	LITHIUM METALL BATTERIES				see chapter
UN 3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT				
Class	9	Miscellaneous dangerous substances and articles	x	x	2.9
Classification		Quality Management Program	x	x	2.9.4
Packing group					2.0.1.3
Special provisions	188	Exempted if...	x	x	3.3
	230	Class 9 if...	x	x	
	310	Prototypes		x	
	360	Battery powered vehicles	x		
	376	Damaged or defective lithium batteries	x	x	
	377	Lithium batteries for disposal or recycling	x	x	
	384	Label 9A	x	X	
Limited Quantities	0	No	x	x	3.4
Excepted quantities	E0	No	x	x	3.5
Packing Instructions	P903	Lithium batteries	x	x	4.1.4.1
	P908	Damaged or defective lithium batteries	x	x	4.1.4.1
	P909	Lithium batteries for disposal or recycling	x	x	4.1.4.1
	P910	Prototypes and small series			
	LP903	Large packaging for single battery	x	x	4.1.4.3
	LP904	LP for single damaged/defective batt	x	x	4.1.4.3
EmS ¹⁾	F-A	Fire Schedule Alfa	x	x	
	S-I	Spillage Schedule India (flammable solids, repacking possible)	x	x	
Storage and segregation	Category A SW 19	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.				

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. Cells and batteries manufactured according to a type meeting the requirements of subsection 38.3 of the Manual of Tests and Criteria, revision 3, amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in this Code.

Cell and battery types only meeting the requirements of the Manual of Tests and Criteria, revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before 1 July 2003 may continue to be transported if all other applicable requirements are fulfilled.

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.

.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:

.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 shall be kept and made available to the competent 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 of batteries that are not conforming to the type tested as mentioned in 2.9.4.1 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 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

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 Wh;

.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 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;

.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 packaging 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 packaging shall be packed in strong outer packaging 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 packaging 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 Each package shall be marked with the appropriate lithium battery mark, as illustrated in 5.2.1.10;
Note: The provisions concerning marking in special provision 188 of amendment 37-14 of the Code may continue to be applied until 31 December 2018.
This requirement does not apply to:
 - .1 packages containing only button cell batteries installed in equipment (including circuit boards); and
 - .2 packages containing no more than four cells or two batteries installed in equipment, where there are not more than two packages in the consignment.
- .7 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 cell 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
- .8 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.

- A single battery as defined in part III, subsection 38.3.2.3 of the Manual of Tests and Criteria is considered a "cell" and shall be transported according to the requirements for "cells" for the purpose of this special provision.

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 the Manual of Testing and Criteria, part III, subsection 38.3 do not apply to production runs, consisting of not more than 100 cells and batteries, or to pre-production prototypes of cells batteries when these prototypes are transported for testing when packaged in accordance with packing instruction P910 of 4.1.4.1.

This transport documents shall include the following statement: "Transport in accordance with special provision 310".

Damaged or defective cells, batteries, or cells and batteries contained in equipment shall be transported in accordance with special provision 376 and packaged in accordance with packing instructions P908 of 4.1.4.1 or LP904 of 4.1.4.3, as applicable.

Cells, batteries or cells and batteries contained in equipment transported for disposal or recycling may be packaged in accordance with special provision 377 and packing instruction P909 of 4.1.4.1.

Special Provision 360

Vehicles only powered by lithium metal batteries or lithium ion batteries shall be consigned under the entry UN 3171 BATTERY POWERED VEHICLE.

Special Provision 376

Lithium ion cells or batteries and lithium metal cells or batteries identified as being damaged or defective such that they do not conform to the type tested according to the applicable provisions of the Manual of Tests and Criteria shall comply with the requirements of this special provision.

For the purposes of this special provision, these may include, but are not limited to:

- Cells or batteries identified as being defective for safety reasons;
- Cells or batteries that have leaked or vented;
- Cells or batteries that cannot be diagnosed prior to transport; or
- Cells or batteries that have sustained physical or mechanical damage.

NOTE: In assessing a battery as damaged or defective, the type of battery and its previous use and misuse shall be taken into account.

Cells and batteries shall be transported according to the provisions applicable to UN 3090, UN 3091, UN 3480 and UN 3481, except special provision 230 and as otherwise stated in this special provision.

Packages shall be marked "DAMAGED/DEFECTIVE LITHIUM ION BATTERIES" or "DAMAGED/DEFECTIVE LITHIUM METAL BATTERIES", as applicable.

Cells and batteries shall be packed in accordance with packing instructions P908 of 4.1.4.1 or LP904 of 4.1.4.3, as applicable.

Cells and batteries liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours under normal conditions of transport shall not be transported except under conditions specified by the competent authority.

Special Provision 377

Lithium ion and lithium metal cells and batteries and equipment containing such cells and batteries transported for disposal or recycling, either packed together with or packed without non-lithium batteries, may be packaged in accordance with packing instruction P909 of 4.1.4.1.

These cells and batteries are not subject to section 2.9.4.

Packages shall be marked "LITHIUM BATTERIES FOR DISPOSAL" or "LITHIUM BATTERIES FOR RECYCLING".

Identified damaged or defective batteries shall be transported in accordance with special provision 376 and packaged in accordance with P908 of 4.1.4.1 or LP904 of 4.1.4.3, as applicable.

Special Provision 384

The label to be used in Model No. 9A, see 5.2.2.2.2.

Note: The class 9 label (Model No.9) may continue to be used until 31 December 2018.

P903	PACKING INSTRUCTION	P903
This instruction applies to UN Nos. 3090, 3091, 3480 and 3481.		
<p>The following packaging 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, 1B2, 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 packaging 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. Packaging 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: (a) Strong outer packaging, (b) Protective enclosures (e.g. fully enclosed or wooden slatted crates); or (c) 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. Packaging need not meet the requirements of 4.1.1.3.</p> <p>(3) For cells or batteries packed with equipment: Packaging conforming to the requirements in paragraph (1) of this packing instruction, then placed with the equipment in an outer packaging; or Packaging that completely enclose the cells or batteries, then placed with equipment in a packaging conforming to the requirements in paragraph (1) of this packing instruction. The equipment shall be secured against movement within the outer packaging. 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: Strong outer packaging 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. Packaging need not meet the requirements of 4.1.1.3. 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. 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 packaging.</p>		
Additional requirement: Cells or batteries shall be protected against short circuit.		

IMDG - Code
Packaging Instructions Lithium Batteries

LTN-065-72-c
15.02.2018
Page 6 of 11

P908	PACKING INSTRUCTION	P908
	<p>This instruction applies to damaged or defective lithium ion cells and batteries and damaged or defective lithium metal cells and batteries, including those contained in equipment, of UN Nos. 3090, 3091, 3480 and 3481.</p> <p>The following packaging are authorized provided the general provisions of 4.1.1 and 4.1.3 are met: For cells and batteries and equipment containing cells and batteries: Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G) Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2) Jerricans (3A2, 3B2, 3H2)</p> <p>Packaging shall conform to the packing group II performance level.</p> <ol style="list-style-type: none">(1) Each damaged or defective cell or battery or equipment containing such cells or batteries shall be individually packed in inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging shall be leakproof to prevent the potential release of electrolyte.(2) Each inner packaging shall be surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat.(3) Sealed packaging shall be fitted with a venting device when appropriate.(4) Appropriate measures shall be taken to minimize the effects of vibrations and shocks, prevent movement of the cells or batteries within the package that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may also be used to meet this requirement.(5) Non combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured. <p>For leaking cells or batteries, sufficient inert absorbent material shall be added to the inner or outer packaging to absorb any release of electrolyte.</p> <p>A cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging.</p>	
	<p><i>Additional requirement:</i> Cells or batteries shall be protected against short circuit.</p>	

P909	PACKING INSTRUCTION	P909
	<p>This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 transported for disposal or recycling, either packed together with or packed without non-lithium batteries:</p>	
	<p>(1) Cells and batteries shall be packed in accordance with the following:</p> <p style="margin-left: 20px;">(a) The following packaging are authorized, provided that the general provisions of 4.1.1 and 4.1.3, are met: Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H2); and Jerricans (3A2, 3B2, 3H2).</p> <p style="margin-left: 20px;">(b) Packaging shall conform to the packing group II performance level.</p> <p style="margin-left: 20px;">(c) Metal packaging shall be fitted with a non-conductive lining material (e.g. plastics) of adequate strength for the intended use.</p> <p>(2) However, lithium ion cells with a Watt-hour rating of not more than 20 Wh, lithium ion batteries with a Watt-hour rating of not more than 100 Wh, lithium metal cells with a lithium content of not more than 1 g and lithium metal batteries with an aggregate lithium content of not more than 2 g may be packed in accordance with the following:</p> <p style="margin-left: 20px;">(a) In strong outer packaging up to 30 kg gross mass meeting the general provisions of 4.1.1, except 4.1.1.3, and 4.1.3.</p> <p style="margin-left: 20px;">(b) Metal packaging shall be fitted with a non-conductive lining material (e.g. plastics) of adequate strength for the intended use.</p> <p>(3) For cells or batteries contained in equipment, strong outer packaging constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, may be used. Packaging need not meet the requirements of 4.1.1.3. Equipment may also 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>(4) In addition, for cells or batteries with a gross mass of 12 kg or more employing a strong, impact resistant outer casing, strong outer packaging constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use, may be used.</p> <p style="margin-left: 20px;">Packaging need not meet the requirements of 4.1.1.3.</p>	
	<p>Additional requirements:</p> <p>1 Cells and batteries shall be designed or packed to prevent short circuits and the dangerous evolution of heat.</p> <p>2 Protection against short circuits and the dangerous evolution of heat includes, but is not limited to:</p> <ul style="list-style-type: none"> - individual protection of the battery terminals, - inner packaging to prevent contact between cells and batteries, - batteries with recessed terminals designed to protect against short circuits, or - the use of a non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging. <p>3 Cells and batteries shall be secured within the outer packaging to prevent excessive movement during transport (e.g. by using a non-combustible and non-conductive cushioning material or through the use of a tightly closed plastics bag).</p>	

P910	PACKING INSTRUCTION	P910
	<p>This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells and batteries and to pre-production prototypes of cells and batteries when these prototypes are transported for testing.</p>	
	<p>The following packaging are authorized provided that the general provisions of 4.1.1 and 4.1.3 are met:</p> <p>(1) For cells and batteries, including when packed with equipment: Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2); Jerricans (3A2, 3B2, 3H2). Packaging shall conform to the packing group II performance level and shall meet the following requirements:</p> <p>(a) Batteries and cells, including equipment, of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;</p> <p>(b) Each cell or battery shall be individually packed in an inner packaging and placed inside an outer packaging;</p> <p>(c) Each inner packaging shall be completely surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat;</p> <p>(d) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may be used to meet this requirement;</p> <p>(e) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured;</p> <p>(f) A cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging.</p> <p>(2) For cells and batteries contained in equipment: Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2); Jerricans (3A2, 3B2, 3H2). Packaging shall conform to the packing group II performance level and shall meet the following requirements:</p> <p>(a) Equipment of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested.</p> <p>(b) The equipment shall be constructed or packaged in such a manner as to prevent accidental operation during transport;</p> <p>(c) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be a non-combustible and non-conductive; and</p> <p>(d) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging the designed or manufactured.</p> <p>(3) The equipment or the batteries may be transported unpackaged under conditions specified by the competent authority. Additional conditions that may be considered in the approval process include, but are not limited to:</p> <p>(a) The equipment or the battery shall be strong enough to withstand the shocks and loadings normally encountered during transport, including transshipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet for subsequent manual or mechanical handling; and</p> <p>(b) The equipment or the battery shall be fixed in cradles or crates or other handling devices in such a way that it will not become loose during normal conditions of transport.</p>	

Additional requirements:

The cells and batteries shall be protected against short circuit;

Protection against short circuits includes, but is not limited to,

- individual protection of the battery terminals,
- inner packaging to prevent contact between cells und batteries,
- batteries with recessed terminals designed to protect against short circuits or
- the use a non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.

LP903	PACKING INSTRUCTION	LP903
This instruction applies to UN Nos. 3090, 3091, 3480 and 3481.		
The following large packaging are authorized for a single battery, including for a battery contained in equipment, provided that the general provisions of 4.1.1 and 4.1.3 are met: Rigid large packaging conforming to the packing group II performance level, made of: <ul style="list-style-type: none">steel (50A);aluminium (50B);metal other than steel or aluminium (50N);rigid plastics (50H);natural wood (50C);plywood (50D);reconstituted wood (50F);rigid fibreboard (50G).		
The battery shall be packed so that the battery is protected against damage that may be caused by its movement or placement within the large packaging.		
Additional requirement: Batteries shall be protected against short circuit.		

LP904	PACKING INSTRUCTION	LP904
	<p>This instruction applies to single damaged or defective batteries for UN 3090, 3091, 3480 and 3481, including those contained in equipment.</p>	
	<p>The following large packaging are authorized for a single damaged or defective battery and for a single damaged or defective battery contained in equipment, provided the general provisions of 4.1.1 and 4.1.3 are met:</p> <p>For batteries and equipment containing batteries:</p> <ul style="list-style-type: none"> steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) plywood (50D) <p>Packaging shall conform to the packing group II performance level.</p> <ol style="list-style-type: none"> 1. Each damaged or defective cell or battery or equipment containing such battery shall be individually packed in an inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging shall be leak-proof to prevent the potential release of electrolyte. 2. Each inner packaging shall be surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat. 3. Sealed packaging shall be fitted with a venting device when appropriate. 4. Appropriate measures shall be taken to minimize the effects of vibrations and shocks, prevent movement of the battery within the package that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may also be used to meet this requirement. 5. Non combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured. <p>For leaking batteries, sufficient inert absorbent material shall be added to the inner or outer packaging to absorb any release of electrolyte.</p>	
	<p><i>Additional requirements:</i></p> <p>Batteries shall be protected against short circuit.</p>	

Stowage Code	Description
SW19	For batteries transported in accordance with special provisions 376 or 377, category C, unless transported on a short international voyage.

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)	