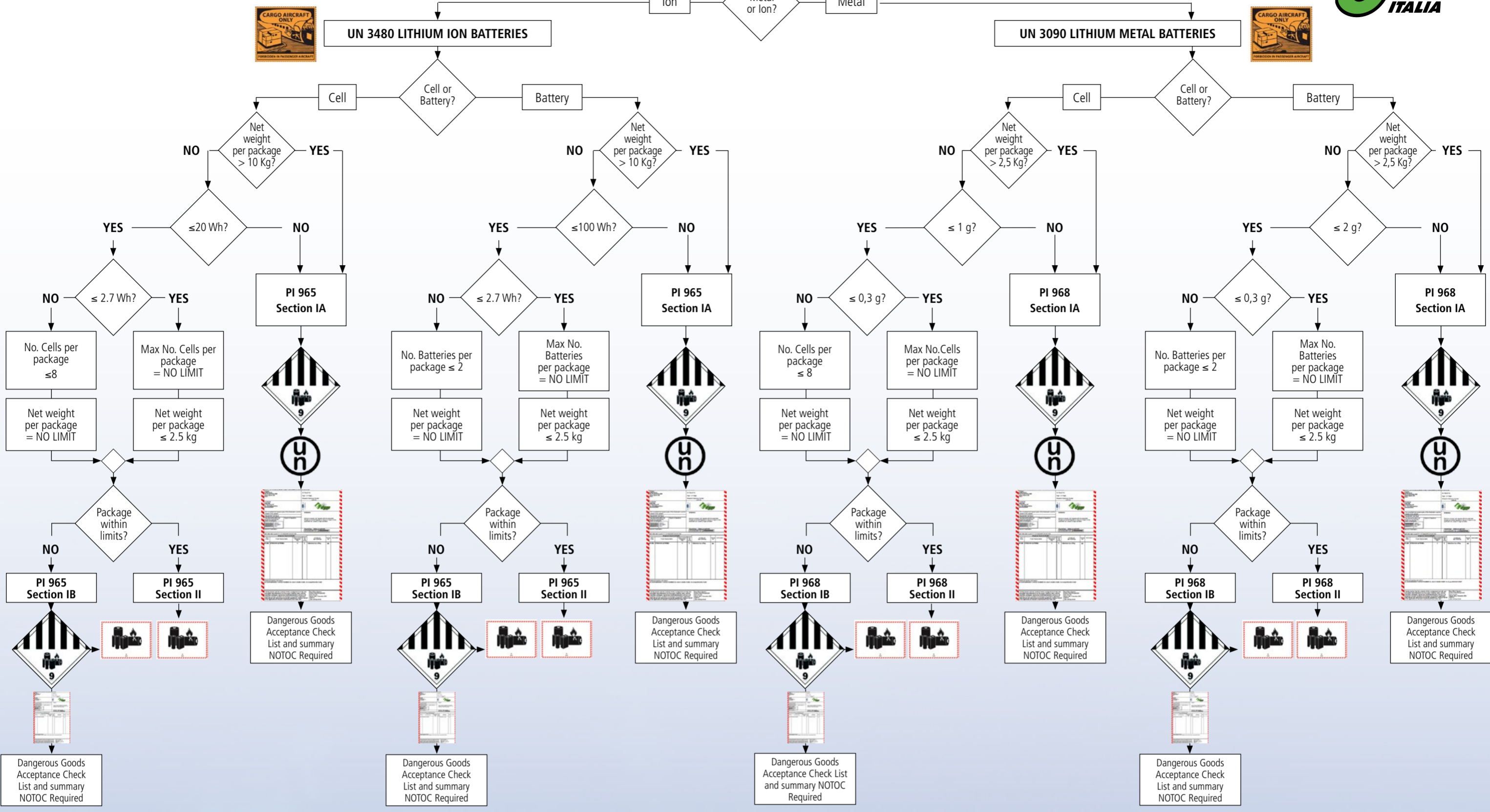


# DEFINITIONS, CLASSIFICATION, PACKING, LABELLING, MARKING AND DOCUMENTATION OF LITHIUM ION/METAL BATTERIES (UN 3480/UN 3090)



## DEFINITIONS

**BATTERY** means two or more cells or batteries which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking or protective devices. Units which have two or more cells that are commonly referred to as "battery packs", "modules" or "battery assemblies" having the primary function of providing a source of power to another piece of equipment are for the purposes of the Model Regulations and this Manual treated as batteries.  
**Note:** The term "lithium battery" refers to a family of different chemistries, comprising many types of cathodes and electrolytes. For the purposes of the Regulations they are separated into:  
• Lithium metal batteries are normally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. The most common type of lithium cell used in consumer applications uses metallic lithium as anode and manganese dioxide as cathode, with a salt of lithium dissolved in an organic solvent; and  
• Lithium ion batteries (sometimes abbreviated Li-ion batteries) are a type of secondary (rechargeable) battery commonly used in consumer electronics. Also included within lithium-ion batteries are lithium polymer batteries.  
**CELL** means a single enclosed electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals, and may contain protective devices.  
**COMPONENT CELL** means a cell contained in a battery. A component cell is not to be considered a single cell battery.  
**SINGLE CELL BATTERY** means a cell externally fitted with devices necessary for use in equipment or another battery which it is designed to power, for example protective devices.  
**Note:** A single cell battery is considered a "cell" and must be tested and transported according to the requirements for "cells" for the purposes of this Regulations.

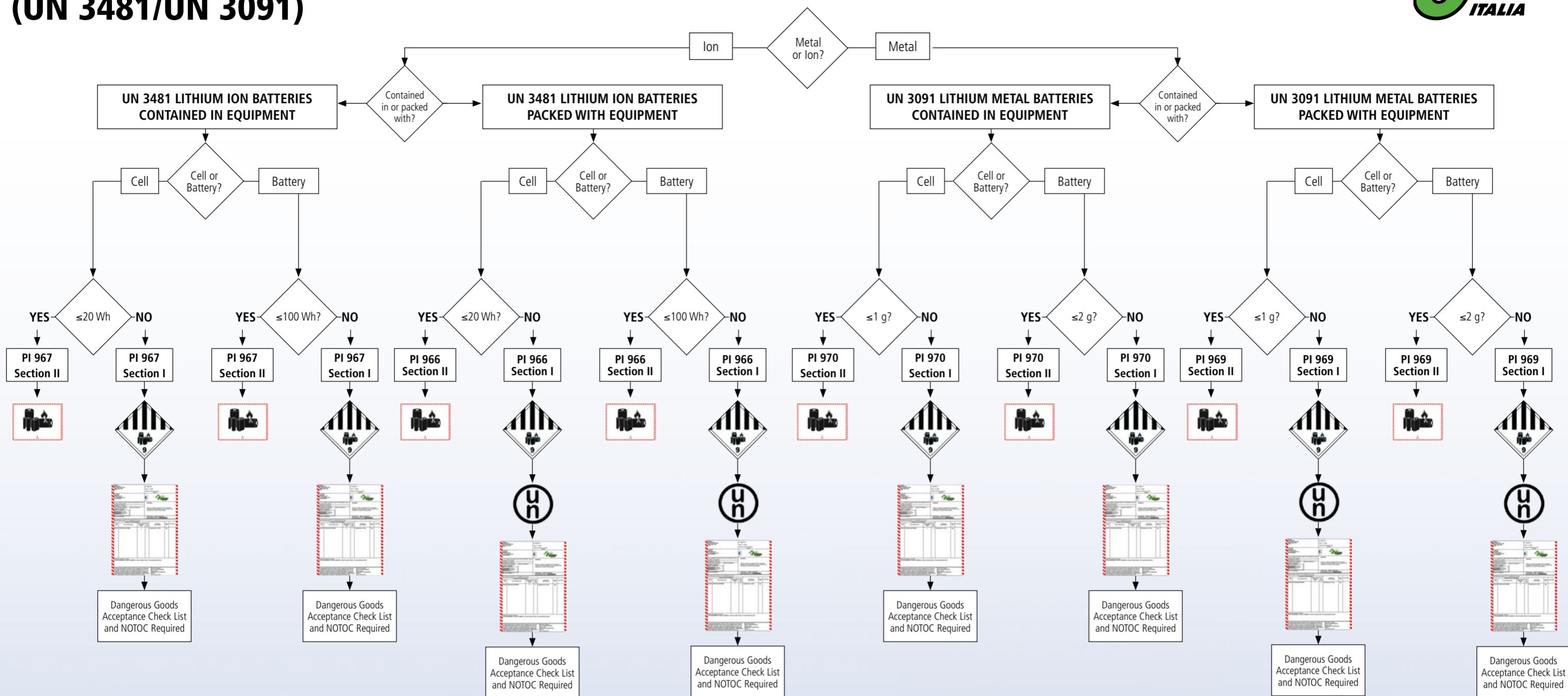
## GENERAL REQUIREMENTS

- a) 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);
- b) Waste batteries and 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;
- c) 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.
- d) Lithium ion cells and batteries must be offered for transport at a state of charge (SoC) not to exceed 30% of their rated design capacity. (for UN 3480 only)  
Cells and/or batteries at a SoC of greater than 30% of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities. (for UN 3480 only - Sections IA/IB only).

## ADDITIONAL REQUIREMENTS

SECTION IA	SECTION IB	SECTION II																																																															
<p>The General Packing Requirements of 5.0.2.2 must be met. Each cell and battery must meet the provisions of 3.9.2.6.</p>	<p>Each cell and battery must meet the provisions of 3.9.2.6 (a) and (e). Quantities of cells or batteries prepared in accordance with this section are subject to all of the applicable provisions of these Regulations (including the General Requirements of this packing instruction), except for the provisions of Section 6.</p>	<p>Each cell and battery must meet the provisions of 3.9.2.6 (a) and (e). Lithium cells or batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for: • restrictions on dangerous goods in consolidations (1.3.3.2.3 and 1.3.3.2.6); • provision of adequate instruction (1.6); • dangerous goods in passenger and crew baggage (Subsection 2.3). Only those lithium ion batteries as specifically permitted may be carried in carry-on baggage; • dangerous goods in air mail (Subsection 2.4); • use of unit load devices (5.0.1.3 and 9.1.4); • loading of cargo aircraft (9.3.4); • reporting of dangerous goods accidents, incidents and other occurrences (9.6.1 and 9.6.2).</p> <p>Package and overpacks of lithium batteries must be offered to the operator separately from other cargo and must not be loaded into a unit load device (ULD) before being offered to the operator. A shipper is not permitted to present for transport more than one (1) package prepared according to Section II in any single consignment.</p>																																																															
<p><b>TRAINING</b></p> <p>Any person preparing or offering cells or batteries for transport <b>must be trained</b> commensurate with their responsibilities.</p>	<p><b>TRAINING</b></p> <p>Any person preparing or offering cells or batteries for transport <b>must be trained</b> commensurate with their responsibilities.</p>	<p><b>TRAINING</b></p> <p>Any person preparing or offering cells or batteries for transport <b>must receive adequate instruction</b> on these requirements commensurate with their responsibilities. Information on adequate instruction can be found in subsection 1.6.</p>																																																															
<p><b>DOCUMENTATION</b></p> <p>A Shipper's declaration must contain: • UN number and PSN; • Class 9; • Number and kind of packages; • Net weight per package and PI.</p> <table border="1"><thead><tr><th>UN ID No.</th><th>Proper Shipping Name/Description</th><th>Class of Div. (Risk)</th><th>Hazard Label(s)</th><th>PG</th><th>LD</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th><th>PL</th></tr></thead><tbody><tr><td>3480</td><td>Lithium ion batteries (including lithium polymer batteries)</td><td>9</td><td>Miscellaneous Lithium batt</td><td>ED</td><td>Forbidden</td><td>Forbidden</td><td>Forbidden</td><td>965</td><td>35 kg</td><td>A88</td><td>A89</td><td>A154</td><td>A155</td><td>A156</td><td>A157</td><td>A158</td><td>A159</td><td>A160</td><td>A201</td><td>A202</td></tr><tr><td>3090</td><td>Lithium metal batteries (including lithium alloy batteries)</td><td>9</td><td>Miscellaneous Lithium batt</td><td>ED</td><td>Forbidden</td><td>Forbidden</td><td>Forbidden</td><td>968</td><td>35 kg</td><td>A88</td><td>A89</td><td>A154</td><td>A155</td><td>A156</td><td>A157</td><td>A158</td><td>A159</td><td>A160</td><td>A201</td><td>A202</td></tr></tbody></table>	UN ID No.	Proper Shipping Name/Description	Class of Div. (Risk)	Hazard Label(s)	PG	LD	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	3480	Lithium ion batteries (including lithium polymer batteries)	9	Miscellaneous Lithium batt	ED	Forbidden	Forbidden	Forbidden	965	35 kg	A88	A89	A154	A155	A156	A157	A158	A159	A160	A201	A202	3090	Lithium metal batteries (including lithium alloy batteries)	9	Miscellaneous Lithium batt	ED	Forbidden	Forbidden	Forbidden	968	35 kg	A88	A89	A154	A155	A156	A157	A158	A159	A160	A201	A202	<p>Cells or batteries shipped under the provisions of Section IB must be described on a Shipper's Declaration as set out in Section 8, and the air waybill, when used, must contain the applicable information required by 8.2.1 and 8.2.2. A Shipper's declaration must contain: • UN number and PSN; • Class 9; • Number and kind of packages; • Gross weight per package; • PI and "IB"</p>	<p>A Shipper's declaration for Dangerous Goods is not required. The words "Lithium metal batteries in compliance with Section II of PI 968" and "Cargo Aircraft Only" or "CAO" 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. (for UN 3090 only) The words "Lithium ion batteries in compliance with Section II of PI 965" and "Cargo Aircraft Only" or "CAO" 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. (for UN 3480 only)</p>
UN ID No.	Proper Shipping Name/Description	Class of Div. (Risk)	Hazard Label(s)	PG	LD	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL	PL																																													
3480	Lithium ion batteries (including lithium polymer batteries)	9	Miscellaneous Lithium batt	ED	Forbidden	Forbidden	Forbidden	965	35 kg	A88	A89	A154	A155	A156	A157	A158	A159	A160	A201	A202																																													
3090	Lithium metal batteries (including lithium alloy batteries)	9	Miscellaneous Lithium batt	ED	Forbidden	Forbidden	Forbidden	968	35 kg	A88	A89	A154	A155	A156	A157	A158	A159	A160	A201	A202																																													
<p><b>PACKING</b></p> <p>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; Batteries with a weight 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) not subject to the requirements of Section 6 of these Regulations, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.</p>	<p>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. Cells and batteries must be packed in inner packagings that completely enclose the cell or battery. To provide protection from damage or compression to the batteries, the inner packagings must be placed in a strong rigid outer packaging of one of following packaging types: drums, jerrycans or boxes. Each packaging 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. Limit per each package on Cargo Aircraft Only 10 kg net weight (for UN 3480 only). Limit per each package on Cargo Aircraft Only 2.5 kg net weight (for UN 3090 only).</p>	<p>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. Cells and batteries must be packed in inner packagings that completely enclose the cell or battery. To provide protection from damage or compression to the batteries, the inner packagings must be placed in a strong rigid outer packaging of one of following packaging types: drums, jerrycans or boxes. 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. <b>OVERPACKS:</b> No regulation provided that the packages do not contain substances which might react dangerously with each other. An overpack must be marked with the word "Overpack" and durably and legibly marked with the lithium battery mark and the Cargo Aircraft Only label unless the marks and labels on the package(s) inside the overpack are visible. <b>Note:</b> For this purpose of this Section, an overpack is an enclosure used by a single shipper that contains no more than one package of Section II batteries per overpack still applies.</p>																																																															
<p><b>MARKING AND LABELLING</b></p> <p>Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case (for UN 3480 only); Every package must be marked with UN number, PSN, Shipper, Consignee and net weight of cells/batteries contained in the package when required by 7.1.4.1 c). Class 9 and CAO labels and lithium batteries mark required.</p>	<p>The Watt-hour rating of lithium battery must be marked on the outside case except those manufactured before 1 January 2009 (for UN 3480 only). Each package must be marked with UN number, PSN, Shipper, Consignee and net weight of package when required by 7.1.4.1 c). Class 9 and CAO labels and lithium batteries mark required.</p>	<p>The Watt-hour rating must be marked on the outside case except those manufactured before 1 January 2009 (for UN 3480 only); CAO label and lithium batteries mark required. The package must be of such a size that there is adequate space to affix the mark on one side of the package without the mark being folded. When the package dimensions are adequate, the Cargo Aircraft Only label must be located on the same surface of the package near the lithium battery mark.</p>																																																															
<p><b>CHECK LIST AND NOTOC</b></p> <p>Acceptance Check List and summary NOTOC required containing only: UN number, PSN, class, total qty at each loading location and if is a CAO package.</p>	<p><b>CHECK LIST AND NOTOC</b></p> <p>Acceptance Check List and summary NOTOC required containing only: UN number, PSN, class, total qty at each loading location and if is a CAO package.</p>	<p><b>CHECK LIST AND NOTOC</b></p> <p>Acceptance Check list and Notoc not required.</p>																																																															

# DEFINITIONS, CLASSIFICATION, PACKING, MARKING, LABELLING AND DOCUMENTATION OF LITHIUM ION/METAL BATTERIES CONTAINED IN EQUIPMENT OR PACKED WITH EQUIPMENT (UN 3481/UN 3091)



## DEFINITIONS

**BATTERY** means two or more cells or batteries which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking or protective devices. Units which have two or more cells that are commonly referred to as "battery packs", "modules" or "battery assemblies" having the primary function of providing a source of power to another piece of equipment are for the purposes of the Model Regulations and this Manual treated as batteries.

**Note:** The term "lithium battery" refers to a family of different chemistries, comprising many types of cathodes and electrolytes. For the purposes of the Regulations they are separated into:

- Lithium metal batteries are normally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. The most common type of lithium cell used in consumer applications uses metallic lithium as anode and manganese dioxide as cathode, with a salt of lithium dissolved in an organic solvent; and
- Lithium ion batteries (sometimes abbreviated Li-ion batteries) are a type of secondary (rechargeable) battery commonly used in consumer electronics. Also included within lithium-ion batteries are lithium polymer batteries.

**CELL** means a single enclosed electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals, and may contain protective devices.

**COMPONENT CELL** means a cell contained in a battery. A component cell is not to be considered a single cell battery.

**EQUIPMENT:** means the device or apparatus for which the lithium cells or batteries will provide electrical power for its operation.

**SINGLE CELL BATTERY** means a cell externally fitted with devices necessary for use in equipment or another battery which it is designed to power, for example protective devices.

**Note:** A single cell battery is considered a "cell" and must be tested and transported according to the requirements for "cells" for the purposes of this Regulations.

**VEHICLE:** vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are electrically-powered cars, scooters, three- and four-wheeled vehicles or motorcycles, trucks, bicycles (pedal cycles with an electric motor - e bikes), and other vehicles of this type (e.g. self-balancing vehicles or vehicles not equipped with at least one seating position), wheel chairs, lawn tractors, self-propelled farming and construction equipment, boats and aircraft.

## GENERAL REQUIREMENTS

- 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);
- 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.
- Equipment must be equipped with an effective means of preventing accidental activation (**for "contained in" only**).
- Equipment containing 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 (**for "contained in" only**).
- 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 (**for "contained in" only**).

## ADDITIONAL REQUIREMENTS

### SECTION I

The General Packing Requirements of 5.0.2 must be met (**for "packed with" only**). Each cell and battery must meet the provisions of 3.9.2.6.

### SECTION II

Each cell and battery must meet the provisions of 3.9.2.6 (a) and (e). 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. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport. Lithium cells or batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for:

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

**TRAINING**  
Any person preparing or offering cells or batteries for transport **must be trained** commensurate with their responsibilities.

**TRAINING**  
Any person preparing or offering cells or batteries for transport **must receive adequate instruction** on these requirements commensurate with their responsibilities. "Information on adequate instruction can be found in subsection 1.6"

### DOCUMENTATION

A Shipper's declaration must contain:

- UN number and PSN;
- Class 9;
- Number and kind of packages;
- Net quantity per package and PI.

### DOCUMENTATION

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

Where a consignment includes packages bearing the lithium battery handling label, the words "**Lithium ion batteries in compliance with Section II of PI 966 or 967**" or "**Lithium metal batteries in compliance with Section II of PI 969 or 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 Way Bill.

Where a package contains a combination of lithium batteries contained in equipment and lithium batteries packed with equipment that meet the limits for lithium cells or batteries of Section II, the following additional requirements apply:

- the shipper must ensure that all applicable parts of both packing instructions are met. The total weight of lithium batteries contained in any package must not exceed 5 kg;
- the words "lithium ion batteries, in compliance with Section II of PI966" must be placed on the air waybill, when an air waybill is used (**for UN 3481**);
- the words "lithium metal batteries, in compliance with Section II of PI969" must be placed on the air waybill, when an air waybill is used (**for UN 3091**).

UN No.	Proper Shipping Name/Description	Class or Div. (Risk)	Hazard Labels	PG	Packaging		Capacity		S.P.	S.A.	S.B.
					Permit	Forbidden	Max Net Qty/Wh	Max Net Qty/Wh			
3481	Lithium ion batteries contained in equipment (including lithium polymer batteries)	9	Miscellaneous Lithium-batt	EO	Forbidden	067	5 kg	067	35 kg	A88	A92
3481	Lithium ion batteries packed with equipment (including lithium polymer batteries)	9	Miscellaneous Lithium-batt	EO	Forbidden	066	5 kg	066	35 kg	A88	A92
3091	Lithium metal batteries contained in equipment (including lithium alloy batteries)	9	Miscellaneous Lithium-batt	EO	Forbidden	070	5 kg	070	35 kg	A88	A92
3091	Lithium metal batteries packed with equipment (including lithium alloy batteries)	9	Miscellaneous Lithium-batt	EO	Forbidden	069	5 kg	069	35 kg	A88	A92

### PACKING

Cells and batteries must:

- be completely enclosed in inner packagings then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance standards; or
- be completely enclosed in inner packagings then placed with equipment in a package that meets the Packing Group II performance standards (**for "packed with" only**).

The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation (**for UN 3481 "packed with" only**).

The number of cells or batteries in each package must not exceed the appropriate number for the equipment's operations, plus two spares (**for "packed with" only**).

The equipment must be packed in strong rigid 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 (**for "contained in" only**).

The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery (**for UN 3091 "contained in" only**).

Lithium metal and lithium alloy cells and batteries prepared for transport on Passenger Aircraft as class 9 (**for UN 3091 "packed with" only**):

- must be packed in either 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";



### PACKING

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 (**for "packed with" only**).

Cells and batteries must:

- be completely enclosed in inner packagings then placed in a strong rigid outer packaging; or
- be completely enclosed in inner packagings then placed with equipment in a strong rigid outer packaging (**for "packed with" only**).

The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation (**for "packed with" only**).

The number of cells or batteries in each package must not exceed the appropriate number for the equipment's operations, plus two spares (**for "packed with" only**).

Each package must be capable of withstanding a 1.2 m drop test in any orientation without (**for "packed with" only**):

- 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.

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

Net weight of lithium ion/metal cells or batteries per package: **5 kg PAX, 5 kg CAO**

**OVERPACKS:** 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 the packages do not contain substances which might react dangerously with each other. An overpack must be marked with the word "Overpack" and durably and legibly marked with the lithium battery mark, unless the marks on the package(s) inside the overpack are visible, or the packages are not required to bear the lithium battery mark.

### MARKING AND LABELLING

Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case (**for UN 3481 only**); Every package must be marked with UN number, PSN, Shipper, Consignee and net weight of cells/batteries contained in the package when required by 7.1.4.1.c). Class 9 label required.

### MARKING AND LABELLING

The Watt-hour rating must be marked on the outside case except those manufactured before 1 January 2009 (**for UN 3481 only**). Lithium batteries mark required (**for "packed with" only**). Each package must be labelled with a lithium battery mark (Figure 7.4.H). This requirement does not apply to:

- packages containing only button cells batteries installed in equipment (including circuit boards); or
- consignments of two packages or less where each package contains no more than four cells or two batteries installed in equipment. (**for "contained in" only**).

The package must be of such size that there is adequate space to affix the mark on one side of the package without the mark being folded.

### CHECK LIST AND NOTOC

Acceptance check list and NOTOC required

### CHECK LIST AND NOTOC

Acceptance check list and NOTOC not required