

# Lithium Battery Summary

## SEA AND ROAD FREIGHT COMPLIANCE SUMMARY

*Reference: IMDG code 2016 and the ADG 7.5*

UN3480 Lithium Ion Batteries

UN 3481 Lithium Ion Batteries packed with equipment

UN 3481 Lithium Ion Batteries contained in equipment

UN 3090 Lithium Metal Batteries

UN3091 Lithium Metal Batteries packed with equipment

UN3091 Lithium Metal Batteries contained in equipment

*Refer to IMDG or ADG for definition of Lithium Ion & Metal Batteries*

**Note:** All lithium cells and batteries must be of a design tested in accordance with UN Manual of Tests and Criteria, part III, subsection 38.3 except for small production run and prototype batteries transported in accordance with Packing Instruction P910 or non-confirming batteries transported in accordance with P908 or P909.

Please remember: Commercial shippers of Lithium batteries are required to be trained under the AMSA Marine Orders 41.






Disclaimer: The intention of this document is not replace the IMDG, AMSA or ADG regulations, merely to aid with the interpretation of the 2016 Lithium battery requirements. No user should act on such information without reference to applicable Regulations. Every effort has been made to present accurate, current information but **AIRSAFE** shall not be held responsible for loss, damage or legal action due to errors or omissions, misprints or misinterpretation of the contents.






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## Applies to new, undamaged batteries

<b>UN3480 - Lithium Ion Batteries</b> <b>UN3090 - Lithium Metal Batteries</b>	<b>FULLY DECLARED DG</b> <b>(Packing Instruction P903)</b>	<b>Not subject to all aspects of the IMDG</b> <b>(Special provision 188)</b>
<p><b>Applicable to:</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Cell (Single unit)</p> </div> <div style="text-align: center;">  <p>Battery (Multiple cells connected)</p> </div> </div> <p>Note: single cell batteries are to be classified and packaged as cells</p>	<p>Ion Batteries <b>over 100 Watts</b> per hour (W/h) and Metal Batteries <b>over 2 grams</b> of Li metal</p> <p>Ion Cells <b>over 20 W/h</b> and Metal Cells <b>over 1 gram</b> of Li metal</p>	<p>Ion Batteries no more than 100 W/h and Metal Batteries under 2 grams of Li metal</p> <p>Ion Cells no more than 20 W/h and Metal Cells under 1 gram of Li metal</p>
<p><b>Packaging and marking requirements</b></p>	<p>Protect against short circuit, arcing, and damage that may occur through placement of the batteries in the package or movement during transport. Inner packages must completely enclose Cell/Battery</p> <ul style="list-style-type: none"> <li>UN Specification package to a PG II standard; or</li> <li>For individual batteries with a gross mass of 12 kg or more in a strong impact resistant outer casing packaging: strong outer packaging; protective enclosures; or pallets and handling devices</li> </ul> <p><b>Marking required on packages:</b> UN number and proper shipping name <b>UN3480 Lithium ion batteries;</b> or <b>UN3090 Lithium metal batteries</b></p>	<p>Strong Rigid outer packaging</p> <p>Inner packages must completely enclose Cell/Battery</p> <p>Protection against short circuit or arcing</p> <p><b>Marking required on packages (unless label below is used):</b></p> <ul style="list-style-type: none"> <li>- "Lithium ion battery" or "Lithium metal battery"</li> <li>- "Handle with care - flammability hazard if package is damaged"</li> <li>- Special procedure in the event of repacking or damage</li> <li>- Telephone number</li> </ul>
<p><b>Quantity allowed</b></p>	<p>Within the UN package tested limits.</p>	<p>Maximum of 30 kg Gross mass per package.</p>
<p><b>Label required</b></p>	<p>Class 9      or      Class 9 li-batt label</p> <div style="display: flex; justify-content: space-around;">   </div> <p>Either label may be used until 31st Dec 2018</p>	<div style="text-align: center;">  </div> <p>Until 31 Dec 2018 no label is required when the above markings are used</p> <p>Label mandatory from 1st Jan 2019</p>
<p><b>Shippers Declaration / Multi-Modal Form required</b></p>	<p>YES, see example on last page</p>	<p>NO</p>



## Applies to equipment with new, undamaged batteries

<p><b>UN3481 - Lithium Ion Batteries packed with equipment</b></p> <p><b>UN3091 - Lithium Metal Batteries packed with equipment</b></p>	<p><b>FULLY DECLARED DG</b> <b>(Packing Instruction P903)</b></p>	<p><b>Not subject to all aspects of the IMDG</b> <b>(Special provision 188)</b></p>
<p><b>Applicable to:</b></p> <p><i>Note: this information relates to equipment and the batteries required to power that equipment.</i></p>	<p>Ion Batteries <b>over 100 Watts</b> per hour (W/h) and Metal batteries <b>over 2 grams</b> of Li metal</p> <p>Ion Cells <b>over 20 W/h</b> and Metal Cells <b>over 1 gram</b> of Li metal</p>	<p>Ion Batteries no more than 100 W/h and Metal Batteries no more than 2 grams of Li metal</p> <p>Ion Cells no more than 20 W/h and Metal Cells no more than 1 gram of Li metal</p>
<p><b>Packaging and marking requirements</b></p>	<p>Either:</p> <ul style="list-style-type: none"> <li>PG II standard UN Specification package around the batteries, then placed in strong outer packaging with the equipment,; or</li> <li>Inner packages that completely enclose the cells or batteries, placed with the equipment into a PG II standard UN Specification package.</li> </ul> <p>Inner packages must completely enclose Cell/Battery. Protect against short circuit, arcing and movement during transport .</p> <p><b>Marking required on packages:</b> UN number and proper shipping name <b>UN3481 Lithium ion batteries packed with equipment;</b> or <b>UN3091 Lithium metal batteries packed with equipment</b></p>	<p>Strong outer packaging.</p> <p>Inner packages must completely enclose Cell/Battery</p> <p>Protection against short circuit or arcing.</p> <p><b>Marking required on packages (unless label below is used):</b></p> <ul style="list-style-type: none"> <li>- “Lithium ion battery” or “Lithium metal battery”</li> <li>- “Handle with care - flammability hazard if package is damaged”</li> <li>- Special procedure in the event of repacking or damage</li> <li>- Telephone number</li> </ul>
<p><b>Quantity allowed</b></p>	<p>No specified limit</p>	<p>No specified limit</p>
<p><b>Label required</b></p>	<p>Class 9                      or                      Class 9 li-batt label</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>Either label may be used until 31st Dec 2018</p>	 <p>Until 31 Dec 2018 no label is required when the above markings are used</p> <p>Label mandatory from 1st Jan 2019</p>
<p><b>Shippers Declaration / Multi-Modal Form required</b></p>	<p>YES, see example on last page</p>	<p>NO</p>

## Applies to equipment containing new, undamaged batteries



<b>UN3481 - Lithium Ion Batteries contained in equipment</b>  <b>UN3091 - Lithium Metal Batteries contained in equipment</b>	<b>FULLY DECLARED DG</b> <b>(Packing Instruction P903)</b>	<b>Not subject to all aspects of the IMDG</b> <b>(Special provision 188)</b>
<b>Applicable to:</b>  <i>Note: this information relates to the batteries required to power the equipment.</i>	Ion Batteries <b>over 100 Watts</b> per hour (W/h) and Metal batteries <b>over 2 grams</b> of Li metal  Ion Cells <b>over 20 W/h</b> and Metal Cells <b>over 1 gram</b> of Li metal	Ion Batteries no more than 100 W/h and Metal Batteries no more than 2 grams of Li metal  Ion Cells no more than 20 W/h and Metal Batteries no more than 1 gram of Li metal
<b>Packaging and marking requirements</b>	Strong outer packaging of adequate strength and design for it's intended use (UN specification packaging not required); or  For large equipment that provides the equivalent protection, the equipment may be unpackaged or on pallets  Protect against short circuit, arcing or accidental activation.  <b>Marking required on packages:</b> UN number and proper shipping name: <b>UN3481 Lithium ion batteries contained in equipment;</b> or <b>UN3091 Lithium metal batteries contained in equipment</b>	Strong Outer packaging or equipment that offers equivalent protection to packaging.  Protection against short circuit, arcing or activation  <b>Marking required on packages (unless label below is used):</b> - "Lithium ion battery" or "Lithium metal battery" - "Handle with care - flammability hazard if package is damaged" - Special procedure in the event of repacking or damage - Telephone number  <b>Note: This requirement does not apply to packages containing only button cell batteries installed in equipment (including circuit boards); and consignments of no more than 2 packages where each package contains no more than 2 batteries for 4 cells installed in equipment</b>
<b>Quantity allowed</b>	No specified limit	No specified limit
<b>Label required</b>	Class 9                      or                      Class 9 li-batt label   or   Either label may be used until 31st Dec 2018	  Until 31 Dec 2018 no label is required when the above markings are used  Label mandatory from 1st Jan 2019  (Except: See Note 1 above - no labelling/markings is required)
<b>Shippers Declaration / Multi-Modal Form required</b>	YES, see example on last page	NO

## Applies to damaged or defective batteries

<p style="text-align: center;"><b>UN3480 - Lithium Ion Batteries</b></p> <p><b>UN3481 - Lithium Ion Batteries packed with Equipment</b></p> <p><b>UN3481 - Lithium Ion Batteries contained in Equipment</b></p> <p style="text-align: center;"><b>UN3090 - Lithium Metal Batteries</b></p> <p><b>UN3091 - Lithium Metal Batteries packed with Equipment</b></p> <p><b>UN3091 - Lithium Metal Batteries contained in Equipment</b></p>	<p><b>FULLY DECLARED DG</b> <b>(Packing Instruction P908 &amp; SP376)</b></p>
<p><b>Applicable to:</b></p>	<p><b>All sizes of cells or batteries (including those contained in equipment) that:</b></p> <ul style="list-style-type: none"> <li>- are defective for safety reasons;</li> <li>- have leaked or vented;</li> <li>- cannot be diagnosed prior to transport; or</li> <li>- have sustained physical or mechanical damage</li> </ul>
<p><b>Packaging and marking requirements</b></p>	<p>UN Specification package to a PG II Standard as specified in Packing Instruction 908</p> <p>In addition:</p> <ul style="list-style-type: none"> <li>• Each battery, cell or piece of equipment must be individually packed in inner packages and placed into an approved outer. The inner or outer package must be leak-proof to prevent potential leakage;</li> <li>• Each inner package must be surrounded by sufficient non-combustible, non-conductive thermal insulation to protect against a dangerous evolution of heat; and</li> <li>• Leaking cells or batteries must have sufficient inert absorbent material added to inner or outer packagings to absorb the release of electrolyte.</li> </ul> <p><b>Marking required on packages:</b></p> <ul style="list-style-type: none"> <li>• UN number and proper shipping name (see top left corner of page)</li> <li>• <b>“DAMAGED/DEFECTIVE LITHIUM ION BATTERIES”</b> or <b>“DAMAGED/DEFECTIVE LITHIUM METAL BATTERIES”</b> as applicable.</li> </ul>
<p><b>Quantity allowed</b></p>	<p>Within the UN package tested limits.</p> <p><b>Note:</b> Batteries with a net mass of more than 30 kg are limited to one per outer package.</p>
<p><b>Label required</b></p>	<p>Class 9  or  Class 9 li-batt label</p> <p>Either label may be used until 31st Dec 2018</p>
<p><b>Shippers Declaration / Multi-Modal Form required</b></p>	<p>YES, see example on last page</p>



**Note:** SP 188 does not apply to damaged or defective batteries.

## Applies to recycled batteries or batteries transported for disposal

<p style="text-align: center;"><b>UN3480 - Lithium Ion Batteries</b>  <b>UN3481 - Lithium Ion Batteries packed with Equipment</b>  <b>UN3481 - Lithium Ion Batteries contained in Equipment</b>  <b>UN3090 - Lithium Metal Batteries</b>  <b>UN3091 - Lithium Metal Batteries packed with Equipment</b>  <b>UN3091 - Lithium Metal Batteries contained in Equipment</b></p>	<p><b>FULLY DECLARED DG</b>  <b>(Packing Instruction P909 &amp; SP377)</b></p>
<p>Applicable to:</p>	<p><b>Cells or batteries (including those contained in equipment) being sent for disposal or recycling but that are not defective</b></p> <p><b>Defective or damaged batteries must be sent under Packing Instruction 908 &amp; SP376</b></p>
<p>Packaging and marking requirements</p>	<p>Each battery, cell or piece of equipment must be packed to prevent short circuit and dangerous evolution of heat (See Packing Instruction 909 Additional requirements).</p> <p>UN Specification package to PG II Standard as specified in Packing Instruction 909. Except for:</p> <ul style="list-style-type: none"> <li>• Li ion batteries 100 W/H or less, Li ion cells 20 W/H or less, Li metal batteries 2 grams or less, and Li metal cells 1 gram or less, when in strong outer packaging with a gross mass of 30 kg or less;</li> <li>• Individual batteries with a gross mass of 12 kg or more with a strong impact resistant outer casing do not require UN specification packaging when packed in an outer package of adequate strength and design related to it's intended use; and</li> <li>• Batteries or cells contained in equipment in outer packaging of adequate strength and design for it's intended use; large equipment unpackaged or secured on pallets if equivalent protection is provided for the battery by the equipment itself.</li> </ul> <p><b>Markings required on packages:</b></p> <ul style="list-style-type: none"> <li>• UN number and proper shipping name (see top left corner of page)</li> <li>• <b>"LITHIUM BATTERIES FOR DISPOSAL"</b> or <b>"LITHIUM BATTERIES FOR RECYCLING"</b> as applicable.</li> </ul>
<p>Quantity allowed</p>	<p>Within the UN package tested limits or as excepted in packaging requirements above.</p>
<p>Label required</p>	<p>Class 9  or  Class 9 li-batt label</p> <p>Either label may be used until 31st Dec 2018</p>
<p>Shippers Declaration / Multi-Modal Form required</p>	<p>YES, see example on last page</p>

**Note:** SP 188 does not apply to recycled batteries or batteries transported for

## Applies to small production run (100 or less) cells and batteries, or pre-production prototype batteries

<p style="text-align: center;"><b>UN3480 - Lithium Ion Batteries</b></p> <p><b>UN3481 - Lithium Ion Batteries packed with Equipment</b></p> <p><b>UN3481 - Lithium Ion Batteries contained in Equipment</b></p> <p style="text-align: center;"><b>UN3090 - Lithium Metal Batteries</b></p> <p><b>UN3091 - Lithium Metal Batteries packed with Equipment</b></p> <p><b>UN3091 - Lithium Metal Batteries contained in Equipment</b></p>	<p><b>FULLY DECLARED DG</b> <b>(Packing Instruction P910 &amp; SP310)</b></p>
<p><b>Applicable to:</b></p>	<p><b>Untested cells or batteries (including those contained in or packed with equipment)</b></p>
<p><b>Packaging and marking requirements</b></p>	<p>Each battery, cell or piece of equipment must be packed to prevent short circuit and dangerous evolution of heat (See Packing Instruction 910 Additional requirements).</p> <p>UN Specification package to PG II Standard as specified in Packing Instruction 910.</p> <ul style="list-style-type: none"> <li>• Cells and batteries packed with equipment must be individually packed in inner packaging and placed inside an outer packaging of a type listed in PI910</li> <li>• Each inner package shall be completely surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat and appropriate measures taken to minimise effects of vibration, shocks and movement of the cells or batteries to prevent damage</li> <li>• For cells or batteries contained in equipment the equipment shall be constructed or packaged in such a manner as to prevent accidental operation during transport</li> <li>• The equipment or the batteries may be transported unpackaged under conditions specified by the competent authority. Additional conditions may be considered in the approval process</li> </ul> <p><b>Marking required on packages:</b></p> <ul style="list-style-type: none"> <li>• UN number and proper shipping name (see top left corner of page)</li> </ul>
<p><b>Quantity allowed</b></p>	<p>Within the UN package specification test limits or if a cell or battery has a net mass of 30kg or more, a limit of 1 cell or battery per package. <b>(Does not apply to Batteries or Cells contained in equipment).</b></p>
<p><b>Label required</b></p>	<p>Class 9  or  Class 9 li-batt label</p> <p>Either label may be used until 31st Dec 2018</p>
<p><b>Shippers Declaration / Multi-Modal Form required</b></p>	<p>YES, see example on last page, the applicable entry must also include the statement "Transport in accordance with special provision 310"</p>

**Note:** SP 188 does not apply to small production run and pre-production prototype batteries.

14. Shipping marks	No. and kind of packages; description of goods*		Gross Mass (kg)	Net Mass (kg)	Cube (m <sup>3</sup> )
	UN3480 Lithium ion batteries 9 5 boxes x 20 kg EmS: F-A, S-I			100 kg	
	UN3090 Lithium metal batteries 9 5 boxes x 20 kg EmS: F-A, S-I			100 kg	
	UN3481 Lithium ion batteries packed with equipment 9 10 boxes x 10 kg EmS: F-A, S-I			100 kg	
	UN3091 Lithium metal batteries packed with equipment 9 10 boxes x 10 kg EmS: F-A, S-I			100 kg	
	UN3481 Lithium ion batteries contained in equipment 9 10 boxes x 10 kg EmS: F-A, S-I			100 kg	
	UN3091 Lithium metal batteries contained in equipment 9 10 boxes x 10 kg EmS: F-A, S-I			100 kg	
	<i>Note: The number of packages and quantity are variables that will change shipment by shipment</i>				

**Note:** For small production run and pre-production prototype batteries "Transport in accordance with special provision 310" must be included on the transport document

#### Information relating to the new lithium battery labels:

Class 9 miscellaneous label to be used for larger batteries which require a multi-modal form.

- Either label may be used until 31st December 2018.
- The li-batt label will be mandatory as of 1st January 2019.
- The li-batt label must NOT display the word 'miscellaneous' on the label.



Lithium battery handling label or markings to be used for smaller batteries complying to Special Provision 188

- Either the markings **or** label below may be used until 31st December 2018.
- The li-batt handling label will be mandatory as of 1st January 2019, and the marks will no longer be applicable from that date.
- On the label, the single asterisk (\*) must be replaced with the UN number, and the double asterisk (\*\*) must be replaced with a contact telephone number.

- "Lithium ion battery" or "Lithium metal battery"
- "Handle with care - flammability hazard if package is damaged"
- Special procedure in the event of repacking or damage
- Telephone number



#### Additional Information

To calculate watts per hour for Lithium ion:

$$\text{Ah (Amperes per hour)} \times \text{V (Volt)} = \text{Wh}$$