

Material Safety Data Sheet

Version 2.8 / Revised August 2024: Section 1

SECTION 1: PRODUCT & COMPANY INFORMATION

Product Name: Lithium-Ion Rechargeable Battery Packs

Product Codes: L95, L96, PL96, PL94, PL150, L90, MPL50, MPL99,
MPL99 Cinergy & MPL150

Use of Product: Powering Digital Camcorders, NDT Tube Inspection Systems
& Handheld 3D Scanners

Company Name: PAG Limited

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Emergency Telephone Number: +44 (0)7768 736 553

SECTION 2: HAZARD IDENTIFICATION

Based on available information, this material is not classified as hazardous according to the criteria of Safe Work Australia GHS 7.

Poison Schedule: Not Applicable.

DANGEROUS GOODS CLASSIFICATION

Classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road and Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".

The rechargeable lithium-ion batteries described in this Material Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer and as long as their integrity is maintained. Do not short circuit, puncture, incinerate, crush, immerse in water, force discharge or expose to temperatures above the declared operating temperature range of the product.

RISK OF FIRE OR EXPLOSION

Under normal conditions of use, the active materials and liquid electrolyte contained in the cells and batteries are not exposed to the outside, provided the battery integrity is maintained and seals remain intact. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.

SECTION 3: COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients	%	CAS Number
Aluminium Foil	2-10	7429-90-5
Metal Oxide (proprietary)	20-50	
Polyvinylidene Fluoride (PVDF)	<5	24937-79-9
Copper Foil	2-10	7440-50-8
Carbon (proprietary)	10-30	7440-44-0
Electrolyte (proprietary)	10-20	
Stainless steel, Nickel and inert materials	Remainder	N/A

SECTION 4: FIRST AID MEASURES

The product contains organic electrolyte. In case of electrolyte leakage from the battery, actions described below are required.

Skin contact: Wash the contact areas immediately with plenty of water and soap for at least 15-20 minutes. Sores on the skin may result if appropriate action is not taken. Remove and wash contaminated clothing.

Eye contact:	Flush the eyes immediately with plenty of clean water, for at least 15-20 minutes, without rubbing. Seek medical treatment. Irritation to the eyes may result if appropriate action is not taken.
Inhalation:	Remove to fresh air immediately. Seek medical treatment.

SECTION 5: FIRE FIGHTING MEASURES

Lithium-Ion (rechargeable) batteries are capable of ignition and subsequent explosion due to overheating. Overheating the batteries results in thermal runaway, which can cause the release of either molten burning lithium or flammable electrolyte. When a cell goes into a thermal runaway it produces enough heat to cause thermal runaway in adjacent cells. The resulting fire can flare repeatedly as each cell ruptures and releases its contents.

The FAA therefore recommends a two step approach:

1. Extinguish the fire by utilising a Halon, a Halon replacement or a water extinguisher to prevent the spread of fire to other flammable materials.
2. Cool the remaining cells to prevent them from going into thermal runaway by dousing the device with water or other non-alcoholic liquids.

Do not use ice to cool the device, as this will insulate the device and assist the thermal runaway.

Do not cover the device, as this will insulate the device and assist the thermal runaway.

Do not pick up or move a smoking or burning device, as bodily injury can result.

Since vapour generated from burning batteries may irritate the eyes, nose and throat, be sure to extinguish the fire on the windward side. Wear respiratory equipment and protective clothing if possible.

SECTION 6: MEASURES FOR ELECTROLYTE LEAKAGE FROM THE BATTERY

Wear neoprene gloves (EN 374) or equivalent and wipe-up electrolyte with absorbent cloth.

Move the battery away from the fire.

SECTION 7: PRECAUTION FOR HANDLING AND STORAGE

When packing the batteries, do not allow battery terminals to contact each other, or contact other metals. Be sure to pack batteries providing partitions in the packaging, or pack them in separate plastic bags so that the contacts of each battery cannot touch directly. (1)(2)(3).

Use strong material for packaging boxes so that they are not damaged by vibration, impact, dropping and stacking during their transportation. (1)(2)(3).

Do not let water penetrate into packaging boxes during their storage and transportation.

The batteries should be stored at room temperature, and charged to 30 to 50% capacity.

Do not store the batteries in places of high-temperature exceeding 35°C, or under direct sunlight, or in front of a stove. Please also avoid places of high humidity. Be sure not to expose batteries to condensation or water droplets. Do not store batteries in conditions below 0°C.

Batteries should be packed in such a way to prevent short circuits under normal conditions of transport. (1)(2)(3).

Please avoid storing batteries in places where they are exposed to static electricity to avoid damage to the batteries' protection circuit.

SECTION 8: EXPOSURE CONTROL / PERSONAL PROTECTION (IN CASE OF ELECTROLYTE LEAKAGE FROM THE BATTERY)

Acceptable concentration:	Not specified in ACGIH. (4)
Facilities:	Provide an appropriate ventilation system such as a local ventilator in the storage place.
Protective clothing:	Gas mask for organic gases, safety goggles, safety gloves.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES OF SINGLE CELL

Appearance:	Single cell: Cylindrical or Prismatic cell
Nominal voltage:	Single cell: 3.7 volts

SECTION 10: STABILITY AND REACTIVITY

Batteries utilise a chemical reaction and are considered a chemical product. Battery performance will deteriorate if batteries are stored for a long period of time without being used. In addition, if the various usage conditions, such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges, the life expectancy of the battery may be shortened, or the device in which the battery is used may be damaged by electrolyte leakage.

SECTION 11: TOXICOLOGICAL INFORMATION (IN CASE OF ELECTROLYTE LEAKAGE FROM THE BATTERY)

Acute toxicity:	Oral (rat) LD ₅₀ >2g/kg (estimated)
Irritation:	Irritating to eyes and skin.
Mutagenicity:	Not specified.
Chronic toxicity:	Not specified.

SECTION 12: ECOLOGICAL INFORMATION

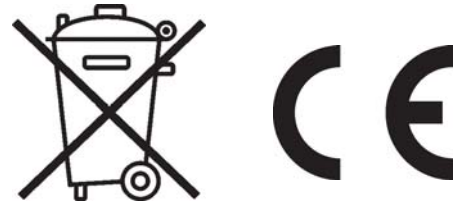
If the expired battery is disposed of in land, the battery case may become corroded and leak electrolyte. No ecological information is available.

Heavy metals such as Mercury (Hg) and Cadmium (Cd) are neither contained nor used in the battery.

SECTION 13: DISPOSAL CONSIDERATIONS (PRECAUTIONS FOR RECYCLING)

When the battery has expired, dispose of it in accordance with local government regulations or the law issued by the relevant government. If you are based in the UK and the battery is not damaged, you can return it to PAG Ltd. for recycling.

In accordance with the WEEE Batteries Directive 2012/19/EU, the batteries have to be marked with the crossed wheely bin symbol. Lithium-ion batteries, which contain electronic modules and which are subject to the EMC directive 93/97/EEC, must be approved and must have the CE marking.



SECTION 14: TRANSPORT INFORMATION - ADVICE BASED ON IATA REGULATIONS (JANUARY 2024)

Li-Ion batteries are classified as Dangerous Goods for transport according to the UN Model regulation for the transport of dangerous goods. They are classified under CLASS 9 Dangerous Goods due to their dual hazard properties associated with their chemical and electrical content.

UN 3480: Lithium-Ion Batteries.

UN 3481: Lithium-Ion Batteries contained in equipment or packed with equipment.

Prior to any shipment, compliance with the following points must be checked:

- The Transport of Li-Ion batteries (Dangerous Goods) is organized by appropriately trained persons and/or the shipment is accompanied by corresponding experts or qualified companies.
- The Lithium-Ion battery is of the type proved to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3:

http://www.unece.org/fileadmin/DAM/trans/danger/publi/manual/Rev5/English/ST-SG-AC10-11_-Rev5-EN.pdf

In accordance with the requirements of the UN Model Regulation, Chapter 2.9.4, the manufacturer of the battery or the battery pack shall make available on request of the Competent Authority the evidences that a Quality Certification program is in place in its manufacturing facility for Lithium-ion batteries.

UN-No: 3480 or 3481 Lithium-Ion Batteries and Lithium-Ion batteries contained in equipment or packed with equipment.

ADR/RID

Class 9 Packing group II, tunnel category E ADR/RID-Labels 9

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Proper shipping name Lithium-Ion batteries, UN 3480

ADR SP 188, 230, 310, 636 will apply and Packing Instruction P903, P903a and P903b.

Note: For ADR, see the following address:

www.unece.org/trans/danger/publi/adr/adr2011/11contentse.html

IMO

Class Packing group II IMO-Labels 9

Proper shipping name Lithium-Ion batteries, UN 3480

IMDG Code: 188, 230, 310, P903

EmS: F-A, S-I

Stowage category A

IATA-DGR

Class Packing group II ICAO-Labels 9

Proper shipping name Lithium-Ion batteries, UN 3480

IATA: A88, A99, A154, A164, P965, P966, P967, P968, P969, P970

Note: For the IATA Guidance Document on lithium batteries, see the address:

<http://www.iata.org/whatwedo/cargo/dgr/Pages/lithium-batteries.aspx>

Please, keep updated on the Transport Regulation by contacting your National Competent Authority.

For air passengers or crew:

- Where the batteries have individual capacities greater than 100Wh, but less than 160Wh, there are restrictions of two (2) batteries per passenger.
- Do not put batteries in the hold unless they are attached to equipment.
- For batteries of 100Wh or less there is a maximum quantity of 20 batteries allowed. This quantity can be reduced by the airline. Please check with the airline before booking.
- No more than 15 PED (Portable Electronic Devices) that contain Li-Ion batteries are allowed in hand-luggage.
- Only fly with Li-Ion batteries that have been tested to UN standards by an independent authority.
- Ensure that battery contacts are covered by tape or place batteries in individual plastic bags. If possible, bring a copy of the PAG Air Transport Certificate included in the instruction booklet or available to download from the PAG web site.

For shipping:

- All Li-Ion battery shipments by air must be made by cargo aircraft only. Batteries must not exceed 30% state-of-charge.
- Ensure the shipment has not been dropped or damaged in any way. IF THE SHIPMENT IS DAMAGED IT WILL NOT BE ALLOWED ON THE AIRCRAFT.

SECTION 15: REGULATORY INFORMATION

UN (United Nations): Recommendations on the Transportation of Dangerous Goods Model Regulations Eighteenth revised edition.

ICAO (International Civil Aviation Organization): Technical Instructions for the safe transport of dangerous goods by air, Doc 9284 2005-2006.

2017-2018 Edition

Addendum No. 2 21 June 2017 (Doc 9284-AN/905).

2015-2016 Edition

Addendum No. 2/Corrigendum No. 2 19 August 2015 (Doc 9284-AN/905)

Addendum No. 3 15 January 2016 (Doc 9284-AN/905)

Addendum No. 4 23 February 2016 (Doc 9284-AN/905)

2013-2014 Edition

Corrigendum No. 3. 31 December 2013 (Doc 9284-AN/905)

Addendum No. 3. 7 June 2013 (Doc 9284-AN/905)

Corrigendum No. 2. 7 May 2013 (Doc 9284-AN/905)

Addendum No. 2/Corrigendum No. 1. 5 April 2013 (Doc 9284-AN/905)

Addendum No. 1. 12 February 2013 (Doc 9284-AN/905)

IATA (International Air Transport Association): Dangerous Goods Regulations 65th Edition Effective 1 January 2024.

IMO (International Maritime Organization): International Maritime Dangerous Goods (IMDG)

- IMDG Code, 2020 Edition (inc. Amendment 40-20) (KM200E)
- IMDG Code, 2022 Edition (inc. Amendment 41-22) (IN200E)
- IMDG Code Supplement, 2022 Edition (IL210E)

SP188 now requires a standardized lithium battery mark for excepted shipments of lithium cells and batteries.

A new Class 9 Miscellaneous Dangerous Goods label has been adopted for use when shipping lithium metal and lithium-ion cells and batteries (SP384).

http://www.imo.org/en/Publications/Documents/IMDG%20Code/IMDG%20Code%202016%Edition/IK200E_changes.pdf

SECTION 16: OTHER INFORMATION

The information contained in this MSDS is based on the current legislation as of January 2023.

This MSDS provides guidance on health, safety & environmental aspects of the product and should not be construed as a guarantee of technical performance or suitability for particular applications.

References:

- (1) UN (United Nations): Recommendations on the Transportation of Dangerous Goods Model Regulations Eighteenth revised edition
- (2) IATA (International Air Transport Association): Dangerous Goods Regulations 64th Edition. Effective 1 January 2023
- (3) IMO (International Maritime Organization): International Maritime Dangerous Goods (IMDG) Code 2016 Edition (Amendment 36-12)
- (4) TLVs and BEIs 1999 ACGIH