

MATERIAL SAFETY DATA SHEET

AGM/MSDS/001

MAY 2005

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Lithium-ion Cells (Batteries)

Product Identification ICR36550HC, ICR36550, ICR34600HC, ICR34600, ICR34550, ICR34490

Manufacturer AGM Batteries Ltd
Denchi House
Thurso Business Park
Thurso
Caithness
KW14 7XW
Scotland

Telephone +44 (0)1847 808000

SECTION 2 - COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Weight % *	CHIP Classification	Risk Phrase **
Lithium Cobalt (III) Oxide (as bound solid)	12190-79-3	25 - 32		R42/43, S36
Carbon (as bound solid)	1333-86-4	15 - 19		R36/37, S22
Ethylene Carbonate (liquid)	96 - 49 - 1	1.5 - 3.5	Xi	R36,R41, S26,S36/37/39
Ethyl Methyl Carbonate (liquid)	623 - 53 - 0	8 - 13	Xi, F	R10, R36/37/38 S26
Lithium hexafluorophosphate (as dissolved solid)	21326-40-3	1.5 - 3.5	T	R20/21/22,R24, R34,R36/38, S26, S36/37/39,S45

* Nominal cell weights: ICR36550HC 146g, ICR36550 140g, ICR34600HC 144g, ICR34600 138g, ICR34550 126g, ICR34490 111g.

** See Section 15 for full details of R(isk) & S(afety) phrases.

SECTION 3 - HAZARD IDENTIFICATION

Each cell is hermetically sealed, but has a vent that will open under extreme mechanical, electrical or thermal abuse. This could allow the liquid and dissolved solid chemicals listed above to escape and exposure to harmful ingredients may occur.

The cells should not be short-circuited, force discharged, overcharged, punctured, crushed, heated or incinerated.

SECTION 4 - FIRST AID MEASURES

In the event of electrolyte leakage or escape of electrolyte through the vent:

Eyes	Flush with copious amounts of water for 15 minutes. Seek medical assistance if required.
Skin	Remove any excess material and wash skin with soap and copious amounts of water.
Inhalation	Remove to uncontaminated area, rest and keep warm. Seek medical assistance if required
Ingestion	Wash out mouth thoroughly with water and then give plenty of water to drink. Obtain medical assistance.
Further Treatment	Eye contamination, persistent skin irritation and casualties who have swallowed electrolyte or been affected by inhalation of vapour should be examined by a doctor.

SECTION 5 - FIRE FIGHTING MEASURES

Flammability	Battery electrolyte is a flammable liquid and may be ignited by heat, sparks or flame.
Means of Extinguishing	Dry chemical, CO ₂ or copious water spray (no lithium metal is present).
Hazardous Combustion Products	Carbon monoxide, carbon dioxide, lithium and cobalt oxides, hydrogen fluoride.
Special Protective Equipment	For fires involving large quantities of product, use self-contained breathing apparatus and full protective clothing.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Notify safety personnel of large spillages of electrolyte from ruptured or vented cells. Avoid inhaling vapours and increase ventilation. Avoid eye or skin contact. Prevent run-off to watercourses by absorbing liquid with an appropriate absorbent, and transfer to sealable containers together with ruptured cells. Dispose of as special waste as described in Section 13.

SECTION 7 – HANDLING AND STORAGE

Handling	Do not short circuit, force discharge, overcharge, puncture, crush, heat or incinerate.
Storage	Store in a cool place but prevent condensation forming on cells. Elevated storage temperatures (eg. above 40°C) will result in reduced cell life and degraded performance. Store such that mechanical damage cannot occur.

SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure	No exposure can occur during normal usage.
Personal Protection	For fires involving large quantities of product, use self-contained breathing apparatus and full protective clothing. In the event of leakage, wear gloves, safety glasses and chemical apron.

SECTION 9 - PHYSICAL DATA

1	Physical State	Solid – above materials contained within hermetically sealed, cylindrical stainless steel cell casing.
2	Odour and Appearance	N/A
3	Flashpoint (C)	N/A
4	Vapour Pressure (mm Hg)	N/A
5	Vapour Density	N/A
6	Volatility	N/A
7	Boiling Point(C)	N/A
8	Freezing Point (C)	N/A
9	pH	N/A
10	Spec. Gravity	N/A
11	Coefficient of water oil distribution	N/A

N/A = Not applicable unless individual components exposed

SECTION 10 – STABILITY AND REACTIVITY

Thermal Decomposition	Cells will vent and release hazardous decomposition products when exposed to fire.
Hazardous Combustion Products	Carbon monoxide, carbon dioxide, lithium and cobalt oxides, hydrogen fluoride.
Explosion	Each cell is fitted with a pressure release safety device, which will release electrolyte rendering the cell inactive and preventing an explosion.

SECTION 11 - TOXICOLOGICAL PROPERTIES

Signs and Symptoms	None unless cell ruptures.
Route of Entry	If electrolyte released – anticipated routes of entry, eye, skin contact and inhalation.
Effect of Acute Exposure	Electrolyte vapour is irritating to the pulmonary tract
Effect of Chronic Exposure	Electrolyte vapour in large volumes may cause suffocation and pulmonary oedema
Irritancy	Yes
Carcinogenicity	Cobalt compounds possible human carcinogens
Teratogenicity	N/A
Reproductive Toxicity	N/A
Mutagenicity	N/A
Synergistic Products	N/A

N/A = Not Applicable

SECTION 12 – ECOLOGICAL INFORMATION

No known environmental hazards at present.

SECTION 13 – DISPOSAL CONSIDERATIONS

Do not incinerate or expose cells to temperatures above 100°C. Such abuse may result in cell venting, electrolyte leakage and/or cell fire. Dispose of in accordance with appropriate local regulations.

SECTION 14 – TRANSPORT INFORMATION

The ICR36550HC, ICR36550, ICR34600HC and ICR34600 cells are classed as dangerous goods under the UN Recommendations on the Transport of Dangerous Goods Model Regulations, 12th Edition (ST/SG/AC.10/1/Rev.12) since they contain more than 1.5g of lithium equivalent. To enable them to be shipped as Class 9 goods, they have been tested in accordance with the third revised edition of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.3/Amend.1).

The ICR34550 and ICR34490 cells are classed as non-dangerous under the UN Recommendations on the Transport of Dangerous Goods Model Regulations, 12th Edition (ST/SG/AC.10/1/Rev.12) because they contain less than 1.5g lithium equivalent. These cells have also been tested in accordance with the third revised edition of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.3/Amend.1).

SECTION 14 – TRANSPORT INFORMATION (Continued)

ICR36550HC, ICR36550, ICR34600HC and ICR34600

Shipping Name	Lithium-ion Batteries
Hazard Classification	Class 9
UN Number	3090
Marine Pollutant	No

ICR34550 and ICR34490

Shipping Name	Lithium-ion Batteries (Non-hazardous)
Hazard Classification	None
UN Number	None
Marine Pollutant	No

SECTION 15 – REGULATORY INFORMATION

	CHIP Classification	EC Risk Phrases	
Lithium Cobalt (III) Oxide	Mark as: Harmful, may cause sensitisation	R42/43	May cause sensitisation by inhalation and skin contact
		S36	Wear suitable protective clothing
Carbon	Mark as: Irritating	R36/37	Irritant to eyes & respiratory system.
		S22	Do not breathe dust
Ethylene carbonate (1,3 dioxalan-2-one)	Xi	R36	Irritating to eyes
		R41	Risk of serious damage to eyes
		S26	In case of contact with eyes, rinse immediately with plenty of water, seek medical advice
		S36/37/39	Wear suitable protective clothing, gloves & eye/face protection
Ethyl methyl carbonate	Xi,F	R10	Flammable
		R36/37/38	Irritating to eyes, skin, respiratory system
		S26	In case of contact with eyes, rinse with plenty of water, seek medical advice
Lithium hexafluorophosphate	T	R20/21/22	Harmful by inhalation, in contact with skin and if swallowed
		R24	Toxic in contact with skin
		R34	Causes burns
		R36/37/38	Irritating to eyes, respiratory system & skin,
		S26	In case of contact with eyes, rinse immediately with plenty of water & seek medical advice
		S36/37/39	Wear suitable protective clothing, gloves & eye/face protection
		S45	In case of accident, or if you feel unwell, seek medical advice immediately (show label if possible)

SECTION 16 – OTHER INFORMATION

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable on the date compiled. However, no representation, warranty (either expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein.

This information relates to the specific materials designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use.

AGM does not accept liability for any loss or damage that may occur, whether direct, indirect or consequential, from the use of this information.

Document ref: AGM/MSDS/001

Revised by: D Hardiman, AEAT Battery Systems Ltd for AGM Batteries Ltd.

Telephone: +44 (0) 1847 808000

Fax: +44 (0) 1847 808080

Issue date: 05 May 2005