saft

UN 38.3 Test Summary Report

Lithium Cell or Battery Test Summary in Accordance with Section 2.9.4 UN Model Regulations and Sub-section 38.3 of the UN Manual of Tests and Criteria, Part III, subsection 38.3.5

[a] ☐ Cell ☒ Battery ☐ Product
☒ **Tested Type Part #:** 3726067300
☒ **Same Type Part #:** 9041N

[d] Unique report ID: 137

[e] Report date: 2005.02.16

[b] **Manufacturer**
Saft Civil Electronics Division
Saft America Inc.
313 Crescent St., Valdese, NC 28690
USA
T: 828-874-4111
lithium-sales@saftbatteries.com
https://www.saftbatteries.com/

[c] **Test Laboratory**
Saft Civil Electronics Division
Saft America Inc.
313 Crescent St., Valdese, NC 28690
USA
T: 828-874-4111
lithium-sales@saftbatteries.com
https://www.saftbatteries.com/

☒ **Same Type Part Numbers # (all):** 9141R-001 3726065000 9141N-201 3726065100 9141-002 3726065200 9147-201 3726065300 9141N-101 3726068000 9141-102 3726068200 9147-101 3726068300

[f] (i) ☐ Li-ion ☒ Li-metal.

(iv) **Description:** CSC 6 PACK
Primary (non-rechargeable) Lithium-Sulphur Dioxide (Li-SO2) Side 1: 4s1p. Side 2: 2s1p Battery Side 1: 12 Volts Side 2: 6 Volts, 7.5 Ah.

(ii) Mass: 728g.
(iii) ☐ Watt hour rating or ☒ Lithium content: 13.8g.
(v) ☐ Cell ☒ Battery ☐ Product. Model number/Part number: 3726067300

[g] List of Tests Conducted	Result (Pass / Fail / N.A.)	Test record reference
38.3.4.1 T.1: Altitude simulation	Pass	6386
38.3.4.2 T.2: Thermal test	Pass	6386
38.3.4.3 T.3: Vibration	Pass	6386
38.3.4.4 T.4: Shock	Pass	6386
38.3.4.5 T.5: External short circuit	Pass	6386
38.3.4.6 T.6: Impact/Crush (cell only test)	Pass	5837
38.3.4.7 T.7: Overcharge (N.A for Li-metal only)	N.A.	N.A.
38.3.4.8 T.8: Forced discharge (cell only test)	Pass	5837

[h] Battery assembly: ☒ Not Applicable. ☐ UN38.3.3 (f) ☐ UN38.3.3 (g)

[i] Test Reference: UN Manual of Tests and Criteria, Part III, sub-section 38.3. *Sixth revised edition* 2015

[j] Signatory A. Date: 2019.11.26
Name: Casey Fortune
Title: Test Lab Manager
Signature:

[j] Signatory B. Date: 2019.11.26
Name: Carlos Negrete
Title: Engineering Manager
Signature:

Important! *The above signatory / signatories affirm that this document is a true and correct summary of the original individual tests and test data. The original test data is confidential information available to competent State Authorities with valid identification and only upon their formal request. Disclosure of the original test data to any other entity upon its request will be considered by Saft and, should Saft consider this request is with merit, may be subject to the prior execution of a nondisclosure agreement.*

Battery Information Sheet

Primary Li-$SOCl_2$ single cells and multi-cell battery packs

According to REACH regulation (EC 1907/2006, Art 31) and to OSHA regulation (29 CFR 1910.1200), batteries are **ARTICLES** with no intended release. As such, they are not covered by legal requirements to generate and supply an SDS or an MSDS.

This Battery Information Sheet is provided solely as information document for the purpose of assisting our customers, as an "Article Safety Datasheet".

1. IDENTIFICATION

1.1 Product

Lithium-thionyl dichloride primary unit cells and multi-cell battery systems composed of these cells

1.2 Supplier

Headquarters Address Phone/Fax	**Saft S.A.S.** 26 quai Charles Pasqua, 92300 LEVALLOIS-PERRET – France Phone / Fax : +33 1 58 63 16 00/+33 1 58 63 16 18
Factory Address Phone/Fax	**Saft Poitiers** Rue Georges Leclanché, BP 1039, 86060 POITIERS Cedex 9 – France +33 (0)5 49 55 48 48 /+33 (0)5 49 55 48 50
Factory Address Phone/Fax	**Saft Ltd.** River Drive, Tyne & Wear, SOUTH SHIELDS, NE33 2TR – United Kingdom +1 44 191 456 1451/+1 44 191 456 6383
Factory Address Phone/Fax	**Saft America Inc.** 313 Crescent Street, VALDESE, NC 28690 – USA +1 828 874 4111/+1 828 874 2431
Factory Address Phone/Fax	**Saft Batteries Co., Ltd.** Zhuhai Free Trade Zone, Lianfeng Road, ZHUHAI 519030, Guangdong Province – China +86 756 881 9318/+86 756 881 9328
Factory Address Phone/Fax	**Tadiran Batteries Ltd.** 34 Y. Rabin Avenue – KIRYAT EKRON 76950 - Israel +972 894 44374/+972 894 13066
Factory Address Phone/Fax	**Tadiran Batteries GmbH** Industriestrasse 22, D-63654 BÜDINGEN – Germany +49 (0)6 042 954 599/+49 (0)6 042 954 190

1.3 Emergency contact

For chemical emergency ONLY (in case of spill, leak, fire, exposure or accident) call CHEMTREC at:
International: +1-703-527-3887 for English
Within the USA: +1-800-424-9300

2. HAZARD IDENTIFICATION

The Li-$SOCl_2$ batteries described in this Battery Information Sheet are sealed units which are not hazardous under normal operating conditions in accordance with manufacturer's recommendations, as stated in the user's manual or other similar documentation. Under normal use, the battery integrity is maintained and the active components it contains are isolated from the outside.
In particular, the battery should not be submitted to any mechanical (opening, puncture, immersion), thermal (burning, heating to temperatures above the normal temperature range of the product) or electrical abuse (short-circuit, recharge, forced discharge), which will lead to the activation of safety valves and/or the rupture of the battery container.
Any accidental release of the inner components of the cell, or their combustion products could be highly hazardous. Battery content exposition to air humidity/liquid water may be followed by severe battery vent/explosion/fire, depending on the hazard causes and circumstances.

Protection from charging:

Whenever lithium batteries are not the single power source in a circuit, the following measures recommended by Underwriters Laboratories are relevant. The cells should not be connected with an electrical power source that would increase the load through the cells. The electronic circuit shall include one of the following:

A. Two suitable diodes or the equivalent in series with the cells to prevent any reverse (charging) current. The second diode is used to provide protection in the event that one would fail. Quality control, or equivalent procedures, shall be established by the device manufacturer to check that the diode polarity is correct for each unit.

Or

B. A blocking diode or the equivalent to prevent any reverse (charging) current and a resistor to limit current in case of diode failure. The resistor should be sized to limit the reverse (charging) current to the maximum value according to the data sheet of the cell.

3. COMPOSITION, INFORMATION OR INGREDIENTS

Each unit cell consists of a hermetically sealed metallic can containing a number of chemicals and materials of construction of which the following are potentially hazardous upon release to air.

Component	CAS Number	EINECS/ELINCS	Content (wt. %)*
Lithium metal	7439-93-2	231-102-5	2-6
Thionyl dichloride	7719-09-7	231-748-8	18-47
Aluminium chloride	7446-70-0	231-208-1	1-5
Gallium chloride	13450-90-3	236-610-0	0-2
Lithium chloride	7447-41-8	231-212-3	1-2
Carbon	1333-86-4	215-609-9	2-5
PTFE	9002-84-0	N/A	0-1
Stainless steel, Nickel and inert material	N/A	N/A	remainder

* *Quantities may vary with cell model*

In the course of battery production, active substances detailed in the previous table are embedded in a mechanical substrate to form electrodes. These electrodes are then further assembled with the other battery components such as separator, electrolyte, connectors and casing to obtain a finished battery. This battery is defined in the REACH regulation as "an article with no intended release" meaning that, under normal and reasonably foreseeable conditions of use, no end-user of this battery will be exposed to any chemical substances.

4. FIRST AID MEASURES (not anticipated under normal use)

4.1 Electrolyte contact

EYE CONTACT: Immediately flush with plenty of water for at least 15 minutes and get medical attention.

SKIN CONTACT: Remove contaminated clothing and immediately flush with plenty of water for at least 15 minutes. In severe cases, get medical attention.

INHALATION: Contents of an opened cell may cause respiratory tract and mucus membrane irritation. Remove from exposure, rest and keep warm. Immediately inhale Cortisone spray. In severe cases, track medical surveillance for 48 hours.

INGESTION: Wash out mouth thoroughly with water and give plenty of water to drink. Get medical attention.

FURTHER TREATMENT: All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or have breathed its vapours should be seen by a Doctor.

4.2 Lithium metal contact

EYE CONTACT: Immediately flush with large quantities of water for at least 15 minutes, with open eyelids, and get medical attention.

SKIN CONTACT: Remove particles of lithium from skin as quick as possible. Immediately flush with plenty of water for at least 15 minutes and get medical attention.

INHALATION/INGESTION: Contents of an opened cell may cause respiratory tract and mucus membrane irritation. Remove from exposure, rest and keep warm. Immediately inhale Cortisone spray. In severe cases, track medical surveillance for 48 hours.

5. FIRE FIGHTING MEASURES (not anticipated under normal use)

ESTINGUISHING MEDIA:

- During a fire with lithium batteries, using large amounts of cold water or water-based foam has some cooling effect and is effective to prevent fire expansion as long as the extent of the fire has not progressed to the point that the lithium metal they contain is exposed (as marked by appearance of deep red flames). Do not use warm or hot water.
- Lith-X Class D extinguishers are effective on fires involving only a few lithium batteries.
- Do not use CO_2 or Halon-type extinguishers.
- Do not use sand, dry powder or soda ash, graphite powder or fire blankets.
- **Use only class D metal extinguishers on raw lithium metal.**

SPECIAL FIRE FIGHTING PROCEDURES:

- Fire fighters should wear approved/certified positive pressure self-contained breathing apparatus.
- Full protective clothing is necessary to prevent potential body contact with electrolyte solution.
- During water spraying, caution is advised as burning pieces of lithium may be ejected from the fire.
- It is permissible to use any class of extinguishing medium, specified above, on these batteries or their packing material. Cool exterior of batteries if exposed to fire to prevent rupture.
- If the cells or batteries are not located at the center of the fire, copious amounts of water may be supplied using a diffuser type nozzle so that the cells remain cool during the fire containment and extinction. A sprinkler system should be suitable for this purpose, the critical factor being that the lithium cells do not experience temperatures above the melting point of lithium (180°C).
- Small amounts of water should never be used such as the volumes contained within portable fire extinguishers. Standard dry powder extinguishers are ineffective. It should be kept in mind that a hazard of hydrogen formation exists whenever hot lithium metal comes into contact with water.

6. ACCIDENTAL RELEASE MEASURES (not anticipated under normal use)

INDIVIDUAL PRECAUTIONS: Evacuate the employees from area until fumes dissipate. In case of electrolyte leakage from a cell or battery, do not inhale vapors or touch liquid with bare hands. In case of skin or eye contact, inhalation or ingestion, follow the measured described in section 12.

ENVIRONMENTAL PRECAUTION: Avoid sewage, surface water and underground water contamination. Avoid ground and atmosphere contamination.

WAYS OF CLEANING: With protective glasses and gloves, use absorbent material (sand, earth, chalk ($CaCO_3$) or lime (CaO) powder or Vermiculite) to absorb any exuded material. Seal leaking battery (unless hot) and contaminated absorbent material tight in plastic bag, and dispose of as hazardous waste in accordance with local regulations. Electrolyte traces may be wiped off dryly using household paper. Rinse with water afterwards.

7. HANDLING AND STORAGE

IMPORTANT NOTICE: Lithium-thionyle chloride batteries are not rechargeable and should not be tentatively charged or recharged. Manufacturer's recommendations should be followed regarding maximum current and operating

temperature range. Applying pressure or deforming the battery may lead to disassembly and cause eye, skin and throat irritation.

STORAGE: Store in a cool, regulated (preferably below 21°C and in any case below 30°C), dry and ventilated area, away from possible sources of heat, open flames, food and drink. Avoid exposure to direct sunlight for long periods. Temperatures above 100°C (or higher for High Temperatures cells and batteries such as the LSH20-150 cell- refer to individual data sheets for maximum temperatures) may cause leakage and rupture, and result in shortened battery service life. Keep proper clearance space between batteries and walls. Since short circuit can cause burn hazard, leakage or explosion hazard, keep batteries in original packaging until use and do not mix them.

HANDLING:

- Do not open the battery system.
- Do not crush or pierce the cells.
- Do not short (+) or (-) terminal with conductors.
- Do not reverse the polarity.
- Do not submit to excessive mechanical stress.
- Do not mix batteries of different types or mix new and old ones together.
- Do not use the unit without its electronic management system.
- Do not expose the unit to water or condensation.
- Do not directly heat, solder or throw into fire. Such unsuitable use can cause leakage or spout vaporized electrolyte fumes and may cause fire or explosion.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION* (not anticipated under normal use)

	**Respiratory protection**	In all fire situations, use self-contained breathing apparatus
	**Hand protection**	In case of leakage wear protective gloves
	**Eye protection**	Safety glasses are mandatory during handling
	**Other**	In the event of leakage or ruptured cells, wear a rubber apron and protective clothes.

**AFNOR pictograms*

Occupational exposure standard:

Compound	8 hour TWA	15 min TWA	SK
Sulfur Dioxide	1 ppm	1 ppm	-
Hydrogen chloride	1 ppm	5 ppm	-

9. PHYSICAL AND CHEMICAL PROPERTIES

The lithium-thionyl chloride cell or battery described by this Battery Information Sheet is a sealed unit when offered for sale. It is a manufactured "article" and does not expose the user to hazardous chemicals when used in accordance with manufacturer specifications.

Appearance – Cylindrical shape
Odour – If leaking, gives off a pungent corrosive odour

Flash point – Not applicable	Flammability – Not applicable
Boiling Point – Not applicable	Melting Point – Not applicable
Vapor Pressure – Not applicable	Vapor Density – Not applicable
pH – Not applicable	Specific Gravity – Not applicable
Solubility (in water) – Not applicable	Solubility (other) – Not applicable

10. STABILITY AND REACTIVITY

The battery system is stable when handled and stored according to section 4.

MATERIALS TO AVOID: Oxidizing agents, bases, water. Avoid electrolyte contact with aluminium or zinc.

CONDITIONS TO AVOID: Do not heat above 100°C (or higher (150°C) for High Temperatures cells and batteries such as the LSH20-150 cell- refer to individual data sheets for maximum temperatures) or incinerate. Do not disassemble, crush, pierce, short, charge or recharge. Avoid mechanical or electrical abuse. Do not repair or maintain when not authorized.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen (H_2) as well as lithium oxide (Li_2O) and lithium hydroxide (LiOH) dust are produced in case of reaction of lithium metal with water (hydrolysis).
Chlorine (Cl_2), sulfur dioxide (SO_2) and disulfur dichloride (S_2Cl_2) are produced in case of thermal decomposition of thionyl dichloride above 100°C. Hydrochloric acid (HCl) and sulfur dioxide (SO_2) are produced in case of reaction of thionyl dichloride with water at room temperature.
Hydrochloric acid (HCl) fumes, lithium oxide (Li_2O), lithium hydroxide (LiOH) and aluminium hydroxide ($Al(OH)_3$) dust are produced in case of reaction of lithium tetrachloroaluminate ($LiAlCl_4$) with water.

11. TOXICOLOGICAL INFORMATION

There is no risk, unless the battery ruptures. In the event of accidental exposure to internal contents, corrosive fumes will cause severe skin, eye and mucous membrane irritation. Medical conditions are generally aggravated by exposure to battery internal contents: eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur. Overexposure may cause symptoms of non-fibrotic lung injury and ingestion can cause tissue damage to throat and gastro-respiratory tract.

12. ECOLOGICAL INFORMATION

The batteries do not contain mercury, cadmium or other heavy metals.

Eco-toxicity	None known if used/disposed of correctly.
Mammalian affects	None known if used/disposed of correctly.
Bioaccumulation potential	None known if used/disposed of correctly.
Environmental fate	None known if used/disposed of correctly.

13. DISPOSAL CONSIDERATIONS

Batteries do not contain hazardous materials according to EC Directives 91/157/EEC, 93/86/EEC, and 2002/95/EC (RoHS) Directive). Battery recycling is either mandatory or recommended: The European Directive 2006/66/EC has been implemented by most EC member states.
Dispose of in accordance with local laws and regulations. Store material for disposal as indicated in Section 4. A disposal service is offered upon request by Tadiran Batteries.
Do not incinerate, or subject cells to temperatures in excess of 100°C (or 150°C for LSH20-150 cells and the battery packs assembled from them). Such abuse can result in loss of seal, electrolyte leakage and/or violent disassembly with risk of material projections.

For additional information a Technical Notice is available upon request. See the section on "Sustainability & Environment" on https://www.saftbatteries.com/about-us/environmental-responsibility

14. TRANSPORTATION INFORMATION

Persons engaged in the transport of dangerous goods shall be trained in the contents of dangerous goods requirements commensurate with their responsibilities (Chapter 1.3, UN Recommendations on the Transport of Dangerous Goods Model Regulations).

To verify that the Saft cells or batteries have been tested for transport according to the UN Model Regulations, Manual of Tests and Criteria, Part III, subsection 38.3, please perform the below two steps ;

1. Go on-line to https://customerportal.saftbatteries.com/tsr or scan the QR Code:
2. Enter the cell or battery part number from the transport documents (Waybill or Packing Slip) and click "Search" to receive a PDF copy of the relevant UN 38.3 Test Summary Report for the product being shipped.

14.1 UN Class 9 Miscellaneous Dangerous Goods

Proper shipping Name	Class	UN No.
LITHIUM METAL BATTERIES	9	3090
LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT	9	3091
LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT	9	3091

14.2 International Agreements

By Air International:	IATA: DGR Edition 2021 (62nd)
By Sea International:	IMDG: Code 2020 Edition
European road transportation:	ADR: 1 January 2021
European rail transportation:	RID: Dangerous Goods by Rail 2021

15. REGULATORY INFORMATION

Regulations specifically applicable to the product:

- ACGIH and OSHA: see exposure limits of the internal components of the battery in section 14.
- IATA/ICAO (air transportation): UN 3090 or UN 3091.
- IMDG (sea transportation) : UN 3090 or UN 3091.
- Transportation within the US-DOT, 49 Code of Federal Regulations
- UK regulatory references: Classified under CHIP.
- Battery Directive (2006/66/EC): see section 9

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 as of the date compiled. However, neither exhaustively nor perfect reliability can be granted. Information does not imply implicit or specific warranty of it.

This information relates to the specific products designated and may not be valid for such products 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.

Saft does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this battery information sheet provided as a service to our customers. Saft does not offer warranty against patent infringement.

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A guidebook intended for use by first responders
during the initial phase of a transportation incident involving hazardous materials/dangerous goods

2020
EMERGENCY RESPONSE GUIDEBOOK

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

Transport Canada
Transports Canada

SCT
SECRETARÍA DE COMUNICACIONES Y TRANSPORTES

GUIDE 138 SUBSTANCES - WATER-REACTIVE (EMITTING FLAMMABLE GASES)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Produce flammable gases on contact with water.
- May ignite on contact with water or moist air.
- Some react vigorously or explosively on contact with water.
- May be ignited by heat, sparks or flames.
- May re-ignite after fire is extinguished.
- Some are transported in highly flammable liquids.
- Runoff may create fire or explosion hazard.

HEALTH

- Inhalation or contact with vapors, substance or decomposition products may cause severe injury or death.
- May produce corrosive solutions on contact with water.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may cause environmental contamination.

PUBLIC SAFETY

- **CALL 911. Then call emergency response telephone number on shipping paper.** If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Ventilate closed spaces before entering, but only if properly trained and equipped.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer **when there is NO RISK OF FIRE**.
- Structural firefighters' protective clothing provides thermal protection **but only limited chemical protection**.

EVACUATION

Immediate precautionary measure

- Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

Spill

- For highlighted materials: see Table 1 - Initial Isolation and Protective Action Distances.
- For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the ERAP Program Section (page 390).

EMERGENCY RESPONSE

FIRE

- **DO NOT USE WATER OR FOAM.**

Small Fire

- Dry chemical, soda ash, lime or sand.

Large Fire

- DRY sand, dry chemical, soda ash or lime or withdraw from area and let fire burn.
- If it can be done safely, move undamaged containers away from the area around the fire.

Fire Involving Metals or Powders (Aluminum, Lithium, Magnesium, etc.)

- Use dry chemical, DRY sand, sodium chloride powder, graphite powder or class D extinguishers; in addition, for Lithium you may use Lith-X® powder or copper powder. Also, see GUIDE 170.

Fire Involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- **DO NOT GET WATER on spilled substance or inside containers.**

Small Spill

- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Dike for later disposal; do not apply water unless directed to do so.

Powder Spill

- Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.
- **DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.**

FIRST AID

- Call 911 or emergency medical service.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air if it can be done safely.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.
- Keep victim calm and warm.