Travel with Alpride airbag system E2

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Updated: 02.09.2022

Alpride airbag system E2

The Alpride E2 airbag system is an electrical airbag system and is powered with 2 x AA battery (visible under the battery cover)

The Alpride E2 system has:

- No LI-Po or Li-ion Batteries
- No Pyrotechnics
- No Cylinders under pressure / cartridges of compressed gas
- The E1 airbag system is fitted with pressure relief valves.
- By switching OFF the system, there are no risks to be accidentally activated.
- The E1 system is CE certified following EN16716:2017 and the following standards are met:
    - Electrical safety:
        - EN 60335-2-80:2003+A1:2004+A2:2009
        - EN 60335-1:2012+A11:2014+A13:2017
    - Electromagnetic Field (EMF):
        - EN 62233:2008
    - Electromagnetic Compatibility (EMC):
        - EN 55014-1:2006 + A1:2009 + A2:2011
        - CISPR 14-1:2016
        - EN 55014-2:2015
        - CISPR 14-2:2015
        - EN 61000-6-3:2007 + A1:2011+AC:2012
        - IEC 61000-6-3:2011 (ed. 2.1)
        - EN 61000-6-2:2005
        - IEC 61000-6-2:2016 (ed3.0

- The E2 system contains 3 supercapacitors SECH C35S-3R0-0360 of 0.5 Wh but is **not considered as dangerous goods** because following the UN3499 special provision A186, the supercapacitors are protected against short circuit and are packaged in a strong outer packaging (see standards listed above) constructed of suitable material and of adequate strength and design in relation to the packaging's intended use and in such a manner as to prevent accidental functioning of capacitors during transport: Refer to SECH safety datasheet (SDS) Page 7.

  INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): *"This product is listed in the IATA Dangerous Goods Regulation under the listing for Capacitor, electric double layer with an energy storage capacity greater than 0.3Wh. However, Electric Double-layer Capacitors with an energy storage capacity of 10Wh or less, including when configured in a module, are not subject to other provisions of the Dangerous Goods Regulation and do not need to be shipped as dangerous goods…"*

- U.S. Department of Transportation has the same regulation:

  U.S. DEPARTMENT OF TRANSPORTATION: *This product is listed in the DOT Hazardous Materials Regulation (HMR) under the listing for Capacitor, electric double layer with an energy storage capacity greater than 0.3 Wh. However, Electric Double-layer Capacitors with an energy storage capacity of 10 Wh or less, including when configured in a module, are not subject to other provisions of the HMR and do not need to be shipped as hazardous material when they are packaged according the requirements of 49 CFR §173.176. Specifically, they must be packaged in a manner that protects them from short circuits or fitted with a metal strap connecting the terminals. Cells with a storage capacity greater than 10 Wh must be shipped as hazardous materials, per U.S. DOT regulations. Proper DOT Shipping name: UN3499, Capacitor, electric double layer, 9. Note that all SECH ultracapacitor cells currently have an energy storage capacity of 10 Wh or less.*

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Safety data sheet (SDS)

SCOPE

This document is prepared as a courtesy to provide persons using this product with additional safety and regulatory information. Users are also encouraged to access the applicable Safety Data Sheet (SDS) for the internal components referenced in Section 3 (Composition / information on ingredients).

This SDS follows the format of Regulation (EC) No 1907/2006 (REACH) and EC No 2015/830.

SECTION 1: Product Information	
Product name	SECH ultracapacitors
Chemical name	Ultracapacitor, supercapacitor, electric double layer capacitor
Product description	Commercial product
Company name and address	SECH SA
	Z.I. du Vivier 22
	CH-1690 Villaz-St-Pierre
	Switzerland
Contact details	T: +41 26 552 52 00 info@sechsa.com

SECTION 2: Hazard IDENTIFICATION AND Classification of Danger

This ultracapacitor is a manufactured electronic product that contains primarily non-hazardous materials, including metal and plastic. Ultracapacitors are sealed, aluminium containers, which enclose layers of activated carbon that is saturated with an electrolyte solution.

The electrolyte solution can contain a quaternary salt compound (tetraethylammonium tetrafluoroborate, TEABF4) dissolved in the solvent acetonitrile. The assembled layers of activated carbon are inserted into an outer metal container and are saturated with the above electrolyte solution and then are sealed and stored in an electrically uncharged state.

If the contents of these ultracapacitors remain sealed in the outer shell and they are kept uncharged, persons handling these products will avoid most of the risks associated with hazardous components of the electrolyte. As such, precautions should be taken to avoid rupture or overheating the sealed metal containers.

Capacitors containing electrolyte are considered to be articles under REACH-regulation. Therefore, substance registration requirements do not apply to the substances contained in capacitors. CLP- regulation compliant classification and REACH-regulation compliant SDS are to be provided for substances and mixtures only. The current product is an article, therefore classification, labelling and SDS are not a legal requirement.

- According EC regulation 1272/2008 (CLP): Not applicable. The product is not a substance or a mixture, but an article. Providing the SDS takes place on a voluntary basis for information purposes only.
- Labelling according to Regulation (EC) No. 1272/2008 [CLP] not applicable. There is no legal requirement for the product to be specially labelled.

EMERGENCY OVERVIEW: Product Description: This product is a solid article consisting of plastic and metal sealed case, which is filled with an electrolyte solution that has been almost completely adsorbed and or absorbed by the activated carbon layers.

HEALTH HAZARDS: This product is considered a manufactured article and presents negligible health hazards under typical use conditions. Misuse of this product, such as deliberate destruction, overcharging or heating, may release internal components contained within the sealed case. Skin contact with the carbon may cause mild irritation.

FLAMMABILITY HAZARDS: The internal components of this product are combustible and may be ignited if a particular failure mode occurs and they are exposed to an ignition source or if subjected to direct flame. If the article is involved in a fire, the chemicals contained in the case may decompose and produce toxic gases (e.g. nitrogen oxides, carbon oxides, hydrogen cyanide, hydrogen fluoride and other miscellaneous fluoride and boron compounds). During a fire involving this product, care

should be taken to avoid inhalation of fumes. Misuse of this product, such as overcharging, may cause the article to vent which could then cause the release of these toxic fumes as well.

REACTIVITY HAZARDS: Negligible.

ENVIRONMENTAL HAZARDS: Negligible.

EMERGENCY CONSIDERATIONS: Emergency responders must wear the proper personal protective equipment (and have appropriate fire-suppression equipment) suitable for the situation to which they are responding. Appropriate precautions should be taken in the event of a container rupture under emergency conditions including fire.

SECTION 3: Composition / Information on Ingredients

This product is a solid component consisting primarily of non-hazardous materials, including metal, plastic and rubber. Ultracapacitors are sealed, metal containers, which enclose layers of activated carbon saturated with an electrolyte solution. The electrolyte is composed of hazardous substances that are not intended for release during normal conditions of use.

The following information is for the components of the electrolyte solution and the activated carbon. As manufactured, exposure to individual electrolyte components is not expected. If this product is heated, cut or otherwise manipulated in such a way that will release the internal components or produce fumes, exposure to these components is possible.

CHEMICAL NAME	CAS	European EineCs #	Chinese IECSC 2007 Inventory	Japanese MITI	Korea ECL #	New Zealand NZIoC	% w/w	EU CLASSIFICATION FOR COMPONENTS*
DLC3702 (electrolyte for double-layer capacitor) Composed of AN** and DLC112	75-05-8	200-835-2	Listed	2-1508	KE-00067	HSR001071	10-35%	GHS CLASSIFICATION: Flam. Liq. 2; Acute Tox. 4; Skin Irrit 2; Eye Irrit. 2A ; Spec. Targ. Organ 3 HAZARD CLASSIFICATION:H225; H302; H312; H315; H319; H332; H335 RISK PHRASES: R:11, R:20/21/22, R:67
Activated Carbon	7440-44-0	231-153-3	Listed	Mineral Excepted	KE04671	HSR001271	8-25%	HAZARD CLASSIFICATION: Not applicable RISK PHRASES: Not applicable
Other components that comprise the balance of the capacitor, (e.g. aluminium, paper, plastic, foil, etc.)		Balance	HAZARD CLASSIFICATION: Not applicable RISK PHRASES: Not applicable					

* EU Classification Components:

H225:	Highly flammable liquid and vapor
H302:	Harmful if swallowed
H312:	Harmful in contact with skin
H315:	Causes skin irritation
H319:	Causes serious eye irritation
H332:	Harmful if inhaled
H335:	May cause respiratory irritation

** Hazardous according to Regulation (EC) No. 1272/2008

Section 4: First Aid Measures

The article is not hazardous under normal conditions of use. Damaged ultracapacitors may release electrolyte containing acetonitrile (AN) and TEABF4. Acetonitrile is moderately toxic by inhalation and/or skin absorption. If necessary, physicians should refer to Section 11 (Toxicological Information) in the event there is a severe inhalation, skin contact or ingestion exposure to the electrolyte solution. Overcharging, reverse charging, incinerating or heating capacitors must be avoided. Under these circumstances, take a copy of this SDS to the physician or health care professional with the exposed individual.

FIRST AID MEASURES IN CASE OF CONTAMINATION WITH THE ELECTROLYTE:

- **SKIN EXPOSURE:** If skin exposure to electrolyte occurs, flush contaminated area liberally with water. Seek medical attention if any adverse effects occur after flushing.
- **EYE EXPOSURE:** If liquid, vapours or fumes from the electrolyte contained in this product contaminate the eyes, rinse eyes under gently running water. Use sufficient force to open eyelids and then "roll" eyes while flushing. Minimum flushing is for 15 minutes. Seek medical attention.

- **INHALATION:** If vapours or fumes from the electrolyte contained in this product are inhaled, remove exposed person to fresh air. If necessary, use artificial respiration to support vital functions and seek medical attention.
- **INGESTION:** In the unlikely event that the electrolyte contained in this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, DO NOT INDUCE VOMITING. Rinse mouth thoroughly with water. Let water be drunken in little sips (dilution effect). Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain immediate medical attention.
- **MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED:** Skin contact with the carbon may cause mild irritation. Electrolyte solution will cause burns to mouth and throat. Ingestion of large quantities can cause tissue ulceration of the gastrointestinal tract. Inhalation of electrolyte solution mist will severely irritate the nose and throat. Electrolyte solution will cause irritation to eyes and skin.
- **INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED**: No specific requirements.

FIRST AID MEASURES IN CASE OF ELECTRIC SHOCK: Victim should not be touched if a connection to the product still exists. Once the victim is no longer in contact with the device and if electric shock from the device has resulted in cessation of breathing, immediately begin cardiopulmonary resuscitation (CPR). If no person that is trained in CPR is available, obtain immediate medical advice on how to perform CPR. If the heart has stopped, a qualified person should begin CPR. Immediate medical attention should be sought while attempts to revive the victim are ongoing. If an automatic external defibrillator (AED) is available, immediately begin treatment with AED.

Section 5: Fire Fighting Measures

SUITABLE FIRE EXTINGUISHING MATERIALS: The following fire extinguishing materials are suitable for fires involving this product:

Water Spray: OK (cooling only and only if products are uncharged)	Dry Chemical: OK	Carbon Dioxide: OK
Foam: OK	Halon: OK	Other ABC Type: OK

UNSUITABLE FIRE EXTINGUISHING MATERIALS: High power water jet.

FIRE AND EXPLOSION HAZARDS: This product is not flammable under normal operational and non-operational conditions; however, if this product is operated improperly, punctured or exposed to high temperatures, as may be encountered in a fire situation, the adsorbed electrolyte may escape and ignite. Due to the small amount of electrolyte solution in each device and the presence of activated carbon, these articles contain little or no freestanding liquid and are not anticipated to pose a significant fire hazard under normal conditions of storage, use and shipment. Sealed devices involved in a fire may rupture explosively if heated for a sufficiently long period of time.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL HAZARDS ARISING FROM THE ELECTROLYTE: If involved in a fire, the materials contained in these articles may thermally decompose and produce toxic gases (e.g. nitrogen oxides, carbon oxides, hydrogen cyanide, hydrogen fluoride and other fluoride and boron compounds).

SPECIAL FIRE-FIGHTING PROCEDURES: Wear SCBA with a chemical protection suit only where personal (close) contact is likely. Fire fighter's clothing conforming to European standard EN469 should be used. Move the articles from fire area if it can be done without risk to personnel. Water spray or fog may be used by trained firefighters to disperse vapours, protect personnel and to cool fire-exposed containers in areas where dangerous electrical voltages are not present. Collect contaminated fire extinguishing water separately. Do not allow entering drains or surface water.

Section 6: Accidental Release Measures

SPILL AND LEAK RESPONSE: Because the hazardous constituents are adsorbed on carbon media and very little free liquid is available for release to the environment, this product does not normally represent a spill hazard. If failures occur or misuse of the product results in a release or spill of the electrolyte solution, releases should be cleaned up by trained personnel using appropriate cleaning tools and techniques. Eliminate sources of ignition and ensure adequate ventilation.

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES: Always wear proper personal protective equipment (PPE) such as impervious gloves and eye protection.

METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP: Keep unnecessary personnel away, neutralize with dilute acetic or hydrochloric acid, then wipe up with absorbent paper towels. Place material into a tightly closed chemical waste container and dispose of as hazardous waste. Contact local regulatory authorities for advice regarding disposal of clean-up materials and cells.

ENVIRONMENTAL PRECAUTIONS: Avoid uncontrolled releases to the environment. Accidental spills of the electrolyte should be kept away from drains, surface and ground water.

Section 7: Handling and Attention in Storage

GENERAL SAFE WORK PRACTICES AND GOOD HYGIENE PRACTICES: Do not eat, drink, smoke, or apply cosmetics while handling this article. Wash hands thoroughly after handling this article or containers for this article. Avoid breathing gases generated by this article. Use in a well-ventilated location. Follow SPECIFIC USE INSTRUCTIONS supplied by the manufacturer.

SAFE HANDLING PRACTICES: Employees must be trained to properly use this article. These articles are capable of accepting, storing, or releasing an electric charge. Although these articles are shipped uncharged and operate singly at low voltages, when charged and shorted, arcing may occur and result in molten metal splattering and arc-flash hazards. Remove hand jewellery before handling these articles. Keep away from heat, sparks, and other sources of ignition. Do not charge in unventilated areas. When stacking the articles upon one another, place insulating and cushioning layers between each unit, to avoid damage and short-circuiting. Do not use organic solvents other than recommended chemical cleaners.

CONDITIONS FOR SAFE STORAGE: Store in a cool, dry, well-ventilated place away from combustible materials and away from material with which it is incompatible (see Section 10, Stability and Reactivity). Do not store at temperatures over 70°C. Do not store together with explosives, oxidizing solids ang liquids, radioactive substances and infectious substances. Have appropriate fire extinguishing and spill response equipment in the storage area. Inspect all incoming packages before storage to ensure that ultracapacitors are properly labelled and not damaged.

Section 8: Exposure Controls / Personal Protection

NORMAL USE: NOT APPLICABLE. Finished commercial product.

FOR OPENED UNITS: As an intact, sealed, manufactured article, exposure to individual components is not possible. If this product leaks, fails, is cut or is otherwise manipulated in such a way that the contents are released, exposure to the internal components is possible. The only internal component that is dispersible is the electrolyte; therefore, the following information applies to the electrolyte solution only.

Chemical Name	CAS #	Applicable Exposure Limits							
		OSHA-PELs		ACGIH-TLVs		ACGIH-RELs			Other
		TWA ppm	STEL ppm	TWA ppm	STEL ppm	TWA ppm	Skin Note	IDLH ppm	
Acetonitrile (AN)	75-05-8	40	60 (15 min.)	20	NE	20	Skin	500	DFG MAKS (skin) (vacated TWA = 20 ppm (skin) 1989 PEAK = 2 ppm max 15 min, average value, 1-hr interval, 4 per shift DFG MAK Pregnancy Risk Classification: C Carcinogen: EPA-CBD, EPA-D, TLV-A4
DLC112	NE	NE	NE	NE	NE	NE	NE	NE	

NE = Not Established

DNEL and PNEC according to EU REACH legislation of acetonitrile (AN):

DNEL	Worker				Consumer			
Route of exposure	Acute effect local	Acute effect systemic	Chronic effect local	Chronic effect systemic	Acute effect local	Acute effect systemic	Chronic effect local	Chronic effect systemic
Oral	Not required					0.6 mg/m³	No data available	
Inhalation	68 mg/m³	68 mg/m³	68 mg/m³	68 mg/m³	22 mg/m³	220 mg/m³	No data available	4.8 mg/m³
Dermal	No data available			32.2 mg/kg bw/d*	No data available			

* bw/d: Body weight per day

Environmental protection target	PNEC
Fresh water	10 mg/l
Fresh water sediments	7.53 mg/kg
Marine water	1 mg/l
Food chain	No hazard identified
Onsite sewage treatment plant	32 mg/l
Soil (agriculture)	2.41 mg/kg
Air	No hazard identified

Relevant data for TEABF4 is not available as this substance has not been registered under REACH and corresponding chemical safety assessment has not been carried out for the time being.

Section 9: Characteristic of Physics and Chemistry

APPEARANCE (COLOR, PHYSICAL FORM, SHAPE): Finished commercial product with various sizes and shapes.

VOLATILE ORGANIC COMPOUND (VOC) CONTENT: Not applicable. Product not regulated for VOC content at state or federal level

Section 10: Stability and Reactivity

STABILITY: Stable under condition of normal temperature.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:

Electrolyte Solution: Strong reducing agents, strong oxidizers, strong acids, diphenyl sulfoxide, trichlorosilane, n-fluoro compounds, nitrating agents.

POSSIBILITY OF HAZARDOUS REACTIONS: None known. Hazardous polymerization will not occur.

COMBUSTION DECOMPOSITION PRODUCTS**:**

Products of thermal decomposition can include toxic gases (e.g. nitrogen oxides, carbon oxides, hydrogen cyanide, hydrogen fluoride and other miscellaneous fluoride and boron compounds).

CONDITIONS TO AVOID: Avoid exposure to or contact with sparks, flames, or other sources of ignition and extreme temperatures. Prevent short-circuiting across terminals, do not puncture, crush or incinerate.

Section 11: Toxicological Information

This product is a finished commercial product. It is classified as an “article” and exempt from CLP regulations, REACH SDS requirements and US federal OSHA Hazard Communication standard.

Carcinogenicity: This finished consumer product is not carcinogenic

Skin corrosion/irritation: Classification criteria are not applicable for the article itself.

Serious eye damage/ irritation: Classification criteria are not applicable for the article itself.

Aspiration hazard: Classification criteria are not applicable for the article itself.

Respiratory or skin sensitisation: Classification criteria are not applicable for the article itself.

Summary of evaluation of the CMR properties: Classification criteria are not applicable for the article itself. Article does not contain component substances classified for CMR properties.

Specific target organ toxicity single exposure: Classification criteria are not applicable for the article itself.

Chronic effects: No chronic health effects reported.

STOT-repeated exposure: Classification criteria are not applicable for the article itself.

As an intact, sealed, manufactured article, exposure to individual components is not possible. If this product leaks, fails, is cut or is otherwise manipulated in such a way that the contents are released, exposure to the internal components is possible. The only

internal component that is dispersible is the electrolyte; therefore, the following information applies to the electrolyte solution only.

CAS-Nr.	Designation				
75-05-8	**Acetonitrile (AN)**				
	Routes of exposure	Dose	Method	Species	Exposure time
	Oral	LD50 617 mg/kg	OECD guideline 401	Mouse	1 admin., 14 d
	Dermal	LD50 >2000 mg/kg	OECD guideline 402	Rabbit	24h
	Inhalation	LC50 3587 ppm	OECD guideline 403	Mouse	4h
NE	**DLC112** (Quantitative data on the toxicity of this product are not available)				

NE = Not Established

Section 12: Ecological Information

TOXICITY: Classification criteria are not applicable for the article itself. This product is not expected to decompose in the environment. The following environmental data are available for components of the electrolyte solution only.

CAS-Nr.	Designation				
75-05-8	**Acetonitrile (AN)**				
	Toxicity	Concentration	Method	Species	Exposure time
	Toxicity to fish	LC50 >100 mg/l	OECD guideline 203	Oryzias latipes	96h
	Toxicity to aquatic invertebrates	EC50 >1000 mg/l	OECD guideline 202	Daphnia magna	48h
	Toxicity to aquatic algae and cyanobacteria	EC50 >1000 mg/l	OECD guideline 201	Pseudokirchneriella subcapitata	72h
NE	**DLC112** (Quantitative data on the ecological effects of this product are not available)				

NE = Not Established

PERSISTENCE AND DEGRADABILITY: Not applicable for articles. Acetonitrile is readily biodegradable - OECD guideline 301C. Biodegradation results after 28 days: BOD - 65%; TOC - 84%.

BIOACCUMULATION POTENTIAL: Not applicable for articles. No indication of bioaccumulation potential based on data available for hazardous components. No biodegradability is to be expected for acetonitrile (log Pow -0.34).

MOBILITY IN SOIL: Not applicable for articles. Acetonitrile not expected to adsorb on soil.

RESULTS OF PBT AND vPvB ASSESSMENT: The product does not contain substances classified as PBT or vPvB.

OTHER ADVERSE EFFECTS: None known. For electrolyte avoid release to the environment, stable in water, hydrolyses slowly.

Section 13: Disposal Considerations

These articles are not exempt from government solid and hazardous waste regulations. As solid, intact articles, they are not specifically listed as, nor do they exhibit any characteristics of a hazardous waste; however, they do contain materials that may become an environmental concern if disposed improperly. The primary material of potential concern is the electrolyte, which contains acetonitrile and tetraethylammonium tetrafluoroborate. These articles should be disposed only in facilities suitable for accepting industrial waste that do not allow ultracapacitor components to be released into the environment, and not into municipal solid waste landfills. Check state and local regulations for any additional requirements, as these may be more restrictive than federal laws and regulations.

EUROPEAN WASTE CODES: 16 02 Waste Electrical and Electronic Equipment; 16 02 13: Discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12

USEPA (RCRA) HAZARDOUS WASTE NUMBER: None.

Section 14: Transport and Logistic Information

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This product is listed in the IATA Dangerous Goods Regulation under the listing for Capacitor, electric double layer with an energy storage capacity greater than 0.3Wh. However, Electric Double-layer Capacitors with an energy storage capacity of 10Wh or less, including when configured in a module, are not subject to other provisions of the Dangerous Goods Regulation and do not need to be shipped as dangerous goods when they are packaged in a manner that protects them from short circuits or fitted with a metal strap connecting the terminals, when they withstand 95 kPa pressure differential, when they are designed with a safety pressure relief valve, when they are marked with the energy storage capacity in Wh and when they can withstand a 1.2m drop test. Cells with a storage capacity greater than 10 Wh must be shipped as dangerous goods, per IATA regulations. Proper IATA Shipping name: UN3499, Capacitor, electric double layer, Class 9, PGIII. (See A186, SP361). Note that all SECH ultracapacitors individual cells and cells configured into modules have an energy storage capacity of 10Wh or less and meet all requirements listed in A186 and SP361.

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION: This product is listed in the IMO Dangerous Goods Regulation (IMDG) under the listing for Capacitor, electric double layer with an energy storage capacity greater than 0.3Wh. However, Electric Double-layer Capacitors with an energy storage capacity of 10Wh or less, including when configured in a module, are not subject to other provisions of the IMDG regulations and do not need to be shipped as dangerous goods when they are packaged in a manner that protects them from short circuits or fitted with a metal strap connecting the terminals. Cells with a storage capacity greater than 10Wh must be shipped as dangerous goods, per IMO regulations. Proper IMO IMDG Shipping name: UN3499, Capacitor, electric double layer, Class 9, PGIII. (See 36-12, SP361). Note that all SECH ultracapacitors individual cells and cells assembled into modules have an energy storage capacity of 10Wh or less and meet all requirements listed in SP361.

SECH ultracapacitors with an energy storage capacity of 0.3Wh or less are not regulated and, therefore, are exempt from DG/HZM shipping.

Section 15: SAFETY, HEALTH AND ENVIRONMENTAL Regulations/Legislation specific for the Substance or Mixture

EU-REGULATIONS:

- Information not relevant to the IE - Directive 2010/75 / EU (VOC): Not relevant
- Information pursuant to VOC Directive irrelevant 2004/42 / EC: Not relevant
- Information about Seveso III Directive 2012/18 / EU: Is not subject to the Seveso III Directive additional
- Directive 2012/19 / EU: Waste electrical and electronic equipment (WEEE)
- Authorisations and/or restrictions on use: Substances contained in this article are not subject to authorisation or restrictions under REACH regulation.

SARA REPORTING REQUIREMENTS:

The components of these products are subject to reporting requirements under Sections 302, 304, 311, 312 and 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), as indicated below:

- SARA Section 302: None of the components of ultracapacitors has a Threshold Planning Quantity listed in the implementing regulations for SARA Section 302 contained in Appendix A to 40 CFR Part 355.
- SARA Section 304: The CERCLA release reporting threshold for acetonitrile is 5,000 pounds.
- SARA Sections 311/312: The default Federal Material Safety Data Sheet submission and inventory requirement fling threshold of 10,000 lbs. (4,540 kg) applies to acetonitrile, per 40 CFR §370.20. For product as manufactured: ACUTE: No; CHRONIC: No; FIRE: No; REACTIVE: No; SUDDEN RELEASE: No. For Electrolyte Solution: ACUTE: Yes; CHRONIC: No; FIRE: Yes; REACTIVE: No; SUDDEN RELEASE: No
- SARA Section 313: Acetonitrile is listed in 40 CFR §372.65. Persons who “otherwise use” acetonitrile in quantities greater than 10,000 pounds per year are required to report releases to the environment on EPA Form R.

CERCLA REPORTABLE QUANTITY (RQ): Acetonitrile = 5,000 lbs. (2,270 kg)

TOXIC SUBSTANCE CONTROL ACT (TSCA) INVENTORY STATUS: All components of these articles are listed on the TSCA inventory.

OTHER REGULATIONS: This product meets the definition of an "article" under the Federal OSHA Hazard Communication Standard and is exempt from MSDS/SDS requirements pursuant to §1910.1200(b)(6)(v). Specifically, the §1910.1200(c) defines an "article" as follows: article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design

during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees. Acetonitrile has requirements under the following U.S. Federal regulations.

CLEAN AIR ACT: Acetonitrile is listed as a Hazardous Air Pollutant (HAP).

CLEAN WATER ACT REQUIREMENTS: Acetonitrile is designated as a toxic pollutant pursuant to Section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations.

CERCLA: Persons in charge of vessels or facilities are required to notify the National Response Centre (NRC) immediately, when there is a release of a designated hazardous substance, in an amount equal to or greater than its reportable quantity. Acetonitrile has a RQ of 5,000 lbs. or 2,270 kg. The toll-free number of the NRC is (800) 424-8802. Notification requirements are set forth in

40 CFR §302.6.

ANSI LABELING (ZI29.1): This is a manufactured article; no label information is required under OSHA 29 CFR 1910.1200 or ANSI Z400.1 to address the chemical hazards.

CHEMICAL SAFETY ASSESSMENT: No Chemical Safety Assessment has been carried out (nor is required) for this article by the supplier. However, CSA has been conducted for some of the components: acetonitrile, carbon and aluminium.

Section 16: Other Information

INFORMATION ON REVISION OF THE SAFETY DATA SHEET: This SDS is issued for the first time on October 13, 2017

LEGEND TO ABBREVIATIONS AND ACRONYMS:

AN – Acetonitrile
BOD – Biochemical oxygen demand
CLP – Classification, Labelling, Packaging
CMR – Carcinogen, Mutagen, or Reproductive Toxicant
CSA – Chemical Safety Assessment
CSR – Chemical Safety Report
DNEL – Derived No Effect Level
EC50 – Effective lethal Concentration to 50% of a test population (Median Lethal Concentration)
LC50 – Lethal Concentration to 50% of a test population (Median Lethal Concentration)
LD50 – Lethal Dose to 50% of a test population (Median Lethal Dose)
NOAEL – No Observed Adverse Effect Level
OECD – Organisation for Economic Cooperation and Development
PBT – Persistent, Bioaccumulative and Toxic substance
PNEC – Predicted No Effect Concentration
Pow – Partition Coefficient n-Octanol/Water
PPE – Personal Protection Equipment
REACH – Registration, Evaluation, Authorisation and Restriction of Chemicals, a European Union regulation
RMM – Risk Mitigation Measures
STOT – Specific Target Organ Toxicity (STOT)
TOC – Total Organic Carbons
RE – Repeated Exposure
(STOT) SE – Single Exposure
SVHC – Substance of very high concern
vPvB – Very Persistent and Very Bioaccumulative
VOC – Volatile Organic Compounds

FURTHER INFORMATION: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. SECH Ltd and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sech

Product Datasheet

35mm ∅ Ultracapacitors

- Rated voltage 3VDC
- 330F and 360F capacitance
- Highest power density based on ultra-low ESR
- High cycle life of 1 million cycles
- Hermetically sealed cell
- Most ruggedized cell based on all laser welded design
- Radial terminals for PCB mounting

ELECTRICAL SPECIFICATIONS		
Type	**C35S-3R0-0330**	**C35S-3R0-0360**
Rated Voltage V_R	3.00 V	3.00 V
Surge Voltage V_S[1]	3.10 V	3.10 V
Rated Capacitance C[2]	330 F	360 F
Capacitance Tolerance[3]	0% / +20%	0% / +20%
ESR[2] (DC, 10 Hz)	<1.2 mΩ	<1.8 mΩ
ESR[2] (AC, 1 kHz)	<0.9 mΩ	<1.4 mΩ
Leakage Current, typical IL[4]	<1 mA	<1 mA
Self-discharge Rate, typical[5]	<20%	<20%
Constant Current (ΔT = 15°C)[6]	33 A	25 A
Max Current I_{Max}[7]	355 A	329 A
Short Current I_S[8]	2.5 kA	1.5 kA
Stored Energy E[9]	0.4 Wh	0.5 Wh
Energy Density E_d[10]	5.9 Wh/kg	6.3 Wh/kg
Usable Power Density P_d[11]	13 kW/kg	7.6 kW/kg
Matched Impedance Power Density P_{dMax}[12], 10 Hz ESR	27 kW/kg	15.8 kW/kg
Matched Impedance Power Density P_{dMax}[12], 1 kHz ESR	35.7 kW/kg	22.3 kW/kg

THERMAL CHARACTERISTICS		
Type	**C35S-3R0-0330**	**C35S-3R0-0360**
Working Temperature	-40 ~ 65°C	-40 ~ 65°C
Storage Temperature[13]	-40 ~ 55°C	-40 ~ 55°C
Thermal Resistance R_{Th}[14]	11.7 K/W	11.7 K/W
Thermal Capacitance C_{Th}[15]	82 J/K	85 J/K

LIFETIME CHARACTERISTICS		
Type	**C35S-3R0-0330**	**C35S-3R0-0360**
DC Life at High Temperature, 3V and 65°C[16]	1500 hours	1500 hours
DC Life at RT[17]	10 years	10 years
Cycle Life[18]	1'000'000 cycles	1'000'000 cycles
Shelf Life[19]	4 years	4 years

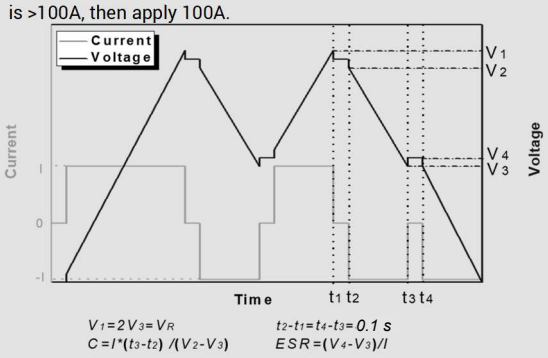
SAFETY & ENVIRONMENTAL SPECIFICATIONS		
Type	**C35S-3R0-0330**	**C35S-3R0-0360**
Safety	RoHS, REACH and UL810	RoHS, REACH and UL810
Vibration	ISO 16750 table 12	ISO 16750 table 12
Shock	IEC 60068-2-27	IEC 60068-2-27

PHYSICAL PARAMETERS

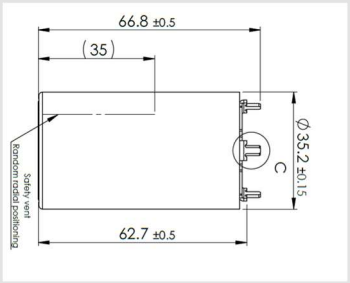
Type		C35S-3R0-0330	C35S-3R0-0360
Mass, typical M		70 g	72 g
Terminals (leads)		Solderable[21]	Solderable[21]
Dimensions[20]	Height	62.7 mm	62.7 mm
	Diameter	35.2 mm	35.2 mm

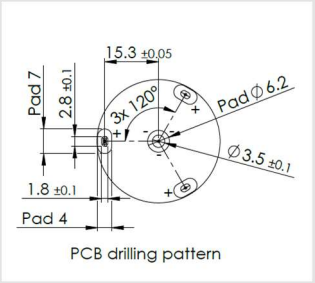
NOTES:

1. Surge voltage V_S: Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.
2. Capacitance C: The test current is 0.1 A/F, if the calculated current is >100A, then apply 100A.



3. Capacitance tolerance: Initially +10%~+30%.
4. Leakage current measurement procedure: 1) Charge the capacitor to the V_R with a constant current (0.1 A/F, if the calculated current is >100A, then apply 100A). 2) Hold the voltage at V_R for 72h. 3) The current to maintain V_R after 72 h is the leakage current.
5. Self-discharge rate measurement procedure: 1) Charge the capacitor to V_R with a constant current (0.1 A/F, if the calculated current >100A, then apply 100A). 2) Hold the voltage at V_R for 8h. 3) Floating for 72h. 4) Measure the voltage after 72 h.
6. Max constant working current: $I_{MCC} = \sqrt{\Delta T/(ESR * R_{Th})}$
7. Max current: $I_{Max} = 0.5C * V_R/(\Delta t + ESR * C)$, discharge from V_R to $V_R/2$ in 1 second.
8. Short current: $I_S = V_R/ESR$
9. Stored energy: $E = 0.5C * V^2/3600$
10. Energy density: $E_d = E/M$
11. Usable power density: $P_d = (0.12V_R^2/ESR)/M$
12. Matched impedance power density: $P_{dMax} = (0.25V_R^2/ESR)/M$
13. Storage temperature: Storage in discharge state
14. Thermal resistance: $R_{Th} = \Delta T/P$, where P = ESR * I^2
15. Thermal capacitance: For the whole capacitor
16. DC life at high temperature: Hold the capacitor charged at specified voltage and temperature. The capacitance shall be >80% of the rated value, the ESR shall be <200% of the rated value.
17. DC life at RT: Hold the capacitor charged at rated voltage at room temperature RT, the capacitance shall be >80% of the rated value, the ESR shall be <200% of the rated value.
18. Cycle life: Charge and discharged the capacitor in the range between V_R and $V_R/2$. 5 seconds waiting period between charge and discharge. The constant test current is 0.1 A/F (if the calculated current >100A, then apply 100A).
19. Shelf life: Discharged and no load applied at RT.
20. Dimensions, potential indication, recommended PCB drilling pattern:

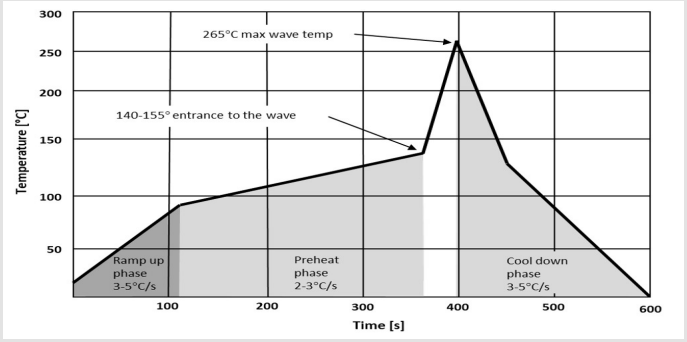




Standard markings:
+ Name of manufacturer, part number, serial number
+ Rated voltage and capacitance, positive terminals, warning marking
+ Stored energy in watt-hours

Mounting recommendations:
+ Mounting without applying undue mechanical stress on the terminals
+ Provide adequate spacing in between cells to secure required insulation strength
+ Provide clearance around the safety vent and do not position anything next to the safety vent that may be damaged in an event of vent rupture

21. Recommended wave soldering profile for printed circuit assembly with use of lead-free alloy:



Total soldering process time from room temperature to peak temperature 265°C and cool down is 10 minutes max. The time to reach the required temperatures depends on the design of the application and on the power of pre-heating section of the soldering machine. All temperatures are measured on the cell leads on top of the PCB. Recommended thickness for PCB = 2.4 to 3.2 mm. Conformal coating is recommended.

Solder:	Lead-free (Sn96.5/Ag 3.0/Cu0.5) liquidus point 217°C
Recommended Flux	Kester 979T
Ramp Up Rate:	3°-5° C/sec. Max
Preheat:	140° to 155° C 2°-3° C/sec on top of board
Temperature entrance into wave:	140° to 155° C on top of board
Ramp to peak temp:	200°C/sec
Peak Temp:	265°C for 1.5 to 5 sec. Max
Cool Down Rate:	3°C-5°C /sec. Max
Conveyor Speed:	40-50 cm/min