Material Safety Data Sheet
Product name: Nickel–Cadmium Battery

Note: Saft Nickel-Cadmium batteries are exempt articles and are not subject to the OSHA Hazard Communication regulation. Saft Nickel-Cadmium batteries do not pose a physical or health risk to the user under normal use conditions. This MSDS is provided as a service to our customers.

1. PRODUCT IDENTIFICATION

Product

Product name
Nickel-Cadmium Aircraft Battery and Cell

Supplier

Saft America Inc.
711 Gil Harbin Industrial Blvd.
Valdosta, GA 31601- USA
Phone: +1 (229)-247-2331
Fax: +1 (229)-245-2890
For Chemical Emergency
Spill, Leak, Fire, Exposure or Accident
Call CHEMTREC - Day or night
Tel: +1 (800) 424 9300

Saft Bordeaux
111/113 boulevard Alfred Daney
33074 BORDEAUX – France
Phone: +33 (0)5 57 10 64 00
Fax: +33 (0)5 57 10 65 70

2. CHEMICAL COMPOSITION

Ingredients	CASH #	EINECS#	Quantity
Cadmium (as Cadmium and Cadmium hydroxide)	7440-43-9 21041-95-2	231-152-8 244-168-5	8% - 16%
Nickel (as Nickel and Nickel dihydroxide)	7440-02-0 12054-48-7	231-111-4 235-008-5	19% - 36%
Electrolyte solution (18-30% Potassium hydroxide)	1310-58-3	215-181-3	13% - 19%
Cobalt (as Cobalt hydroxide)	21041-93-0	244-166-4	≈ 1%
Copper	7440-50-8	231-159-6	9% - 11%
Polyamide 11			11% - 13%
Steel			22% - 34%

3. HEALTH HAZARD IDENTIFICATION

Ingredients				Classification*		
Name	Chemical	CAS #	EINECS#	Symbol	Risk phrase	Safety phrase
Cadmium hydroxide	$Cd(OH)_2$	21041-95-2	244-168-5	Xn N	R20/21/22 R50/53	S2, S60, S61
Nickel dihydroxide	$Ni(OH)_2$	12054-48-7	235-008-5	Carc. Cat3 Xn N	R40 R20/22 R43 R50/53	S2, S22, S36, S60; S61
Potassium hydroxide	K(OH)	1310-58-3	215-181-3	Xn C	R22 R35	$S^{1/2}$, S26, S36/37/39, S45
Cobalt hydroxide	$Co(OH)_2$	21041-93-0	244-166-4	Xn Xi	R20/21/22 R36/R37/R38 R43	S24, S26 S36/37; S39

*Classification according to the Annex I of Directive 67/548/EEC

Effects of Overexposure

Eye Effects	Contact with electrolyte solution inside battery causes very rapid, severe damage. Extremely corrosive to eye tissues. May result in permanent blindness.
Skin Effects	Contact with electrolyte solution inside battery may cause serious burns to skin tissues. Contact with nickel compounds may cause skin sensitization, resulting in chronic eczema or nickel itch.
Ingestion	Ingestion of electrolyte solution causes tissue damage to throat area and gastro/respiratory tract. Ingestion of cadmium and/or nickel compounds causes nausea and intestinal disorders.
Inhalation	Mists generated during activation procedures may cause varying degrees of irritation to the nasal mucous membranes and respiratory tract tissues varying from mild irritation of nasal mucous

	membranes to damage of lung tissues proper. Inhalation of cadmium compounds may cause dry throat, cough, headache, vomiting, chest pain, and/or chills. Excessive overexposure may result in pulmonary edema, breathing difficulty, and prostration.
Carcinogenicity	NIOSH recommends that nickel and cadmium be treated as occupational carcinogens.

4. FIRST AID MEASURES

Battery Electrolyte	
Eye Contact	Flush with plenty of water for at least 20 minutes. Get immediate medical attention.
Skin Contact	Remove contaminated clothing and flush affected areas with plenty of water for at least 20 minutes.
Ingestion	Do not induce vomiting. Dilute by giving large volumes of water or milk. Get immediate medical attention. Do not give anything by mouth to an unconscious person.
Inhalation	Remove to fresh air. Give oxygen or artificial respiration if needed. Get immediate medical attention.
Nickel and Cadmium Compounds	Skin Contact - Wash with cold water and soap for 15 minutes.

5. FIRE AND EXPLOSION HAZARDS

Extinguishing Media: CO_2, sand

	Melting Point	Boiling Point
Cadmium	608°F / 320°C	1410°F / 766°C
Cadmium hydroxide	N/A	2838°F / 1559°C (sublimes) 4653°F / 2567°C
Copper	19891°F / 1083°C	
Nickel	2645°F / 1452°C	4950°F / 2732°C
Nickel dihydroxide	N/A	445°F / 229°C (Decomposes to NiO)
Plastics : Polamyde 11(if present)	370-374°F / 188-190°C	N/A (burns may release toxic NO_2 fumes)

Special Fire Fighting Procedures

Use self-contained breathing apparatus to avoid breathing toxic fumes. Wear protective clothing and equipment to prevent potential body contact with electrolyte solution or mixture of water and electrolyte solution. **Disconnect or cut all cables to and from battery – especially ground connection.**

Unusual Fire and Explosion Hazards

Electrolyte solution is corrosive to all human tissues. It will react violently with many organic chemicals, especially nitrocarbons and chlorocarbons. Electrolyte solution reacts with zinc, aluminum, tin and other active materials releasing flammable hydrogen gas.

6. ACCIDENTAL RELEASE MEASURES

Electrolyte Solution Spills	The electrolyte is a potassium hydroxide solution.
Small (up to 19 liters/5 gallons)	Flush with water and neutralize with dilute citric acid.
Large	Contain material in suitable containers or holding area. DO NOT allow material to enter sewers, streams, or storm conduits. Recover material with vacuum truck and dispose of properly. Reportable Quantity: 453.6 kg / 1000 pounds. 40 CFR-117.13.

7. HANDLING AND STORAGE

These cells and the batteries constructed from them may be highly charged and are capable of high energy discharge. Care should be taken to handle cells properly to avoid shorting or misuse that will result in a rapid, uncontrolled electrical, chemical, or heat energy release.

Do not transport batteries without vent caps in place.

When removing battery from service, visually inspect for leakage prior to handling. If leakage has occurred follow Spill Management Procedures.

Store in sealed packaging and in normal vertical position at normal room temperature and conditions.
Keep away from exposed flames, sparks, and other ignition sources.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure control

Ingredients	CAS #	EINECS#	Exposures Limits
Cadmium (as Cadmium and Cadmium hydroxide)	7440-43-9 21041-95-2	231-152-8 244-168-5	5.0 mcg/m^3 dust – OSHA 0.05 mg/m^3 ACGIH CEILING-Fume
Nickel (as Nickel and Nickel dihydroxide)	7440-02-0 12054-48-7	231-111-4 235-008-5	1 mg/m^3 – OSHA
Electrolyte solution (18-30% Potassium hydroxide)	1310-58-3	215-181-3	2 mg/m^3 ACGIH CEILING-Air
Cobalt (as Cobalt hydroxide)	21041-93-0	244-166-4	0.1 mg/m^3 OSHA
Copper	7440-50-8	231-159-6	1 mg/ m^3 dust - OSHA

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION (continued)

Personnal protection

Perform charging procedures in a well-ventilated area. Battery operating areas must be well ventilated for removal of potentially dangerous and harmful gases generated. Normal reactions inside the battery liberate explosive and flammable hydrogen gas

Respiratory Protection	Use NIOSH approved mist respirator during activation and actual usage to maintain exposure levels below the TWA.
Eye Protection	Use splash goggles or face shield whenever handling a battery
Hand Protection	If exposure to electrolyte solution or dried salts is likely, use any water-insoluble, non-permeable glove, i.e., synthetic rubber. DO NOT use leather or fabric gloves.
Other protective equipment	Rubber apron or rainwear, or equivalent if exposure to electrolyte solution is likely

9. PHYSICAL PROPERTIES

Boiling Point:	Not Applicable	Melting Point:	Not applicable
Vapor Pressure:	2 mm Hg at 68°F / 20°C	Vapor Density:	Not applicable
Specific Gravity:	1.17 - 1.30 (electrolyte)	Evaporation Rate:	Not Determined
Solubility in water:	Electrolyte solution is completely soluble.	Remainder:	is insoluble

10. STABILITY AND REACTIVITY

CAUTION: NEVER ACTIVATE OR TOP OFF WITH ACID

Incompatibilities	Aluminum, zinc, tin and other active metals, acid, chlorinated and aromatic hydrocarbons, nitrocarbons, halocarbons. Tricholorethylene will react with electrolyte solution to form dichloroacetylene which is spontaneously combustible.
Hazardous Decomposition Products	Nickel compounds, cadmium compounds, and potassium hydroxide.

Note that normal reactions inside battery liberate explosive and flammable hydrogen gas. Do not seal battery from atmosphere. Hazardous Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Ingredients	CAS #	EINECS#	LD_{50} (Oral, Rat)
Cadmium hydroxide	21041-95-2	244-168-5	Not available
Nickel dihydroxide	12054-48-7	235-008-5	1600 mg/kg
Potassium hydroxide	1310-58-3	215-181-3	365 mg/kg
Cobalt hydroxide	21041-93-0	244-166-4	Not available

12. ECOLOGICAL INFORMATION

The electrolyte solution (18-30% Potassium Hydroxide) is very toxic to aquatic organisms. It may cause long-term adverse effects in the aquatic environment.

13. DISPO

SAL CONSIDERATIONS

Nickel-Cadmium aircraft batteries are universal wastes under RCRA. They may be returned to Saft Valdosta or local collecting points mentioned in Saft website (www.saftbatteries.com) for recycling.

These batteries, wet and dry cell constructions, are TCLP Toxic for cadmium. If not recycled, they must be disposed of in accordance with all federal, state, and local hazardous waste regulations.

14. REGULATIONS

EPCRA reporting requirements

Section 313 Supplier Notification – This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of Section 313 if the Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372).

CAS #	EINECS#	Chemical Name	Percent by Weight
7440-43-9	231-152-8	Cadmium	8%-16%
7440-48-4	231-158-0	Cobalt	1%
7440-50-8	231-159-6	Copper	9%-11%
7440-02-0	231-111-4	Nickel	19%-36%

A copy of this MSDS may be required to be submitted to your local emergency planning commission, state emergency response commission, and local fire department in accordance with sections of the Emergency Planning and Community right-To-Know Act.

(14. Regulations – continued)

EC classification

Symbols

C	Corrosive
N	Dangerous for the environment
Xn	Harmful
Xi	Irritant

Risk phrases

R20	Harmful by inhalation
R21	Harmful in contact with skin
R22	Harmful if swallowed
R36	Irritating to eyes
R37	Irritating to respiratory system
R38	Irritating to skin
R40	Limited evidence of a carcinogenic effect
R41	Risk of serious damage to the eyes
R43	May cause sensitization by skin contact
R50/53	Very Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases

S1/2	Keep locked up and out of the reach of children
S2	Keep out of the reach of children
S20	When using, do not eat or drink
S22	Do not breathe dust
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S36	Wear suitable protective clothing
S37	Wear suitable gloves
S39	Wear eyes/face protection
S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible.)
S60	Must be disposed of as hazardous waste.
S61	Avoid release to the environment

15. TRANSPORTATION INFORMATION

"Wet Cell" Nickel-Cadmium Batteries:

Wet cell Nickel-Cadmium batteries being forwarded or being returned to Saft for repair should be shipped as Hazardous Material using the following description:

Batteries, Wet, Filled with Alkali, 8, UN2795, PG III.

Spent batteries being sent to Saft Valdosta or local collecting points for recycling should be shipped as Universal Waste using the following description:

Used Batteries, Wet, Filled with Alkali, 8, UN2795, PG III.

"Dry Cell" Nickel-Cadmium Batteries:
Saft sealed Nickel-Cadmium batteries are classified as "dry cell" batteries and are unregulated for purposes of transportation under the regulations of the U.S. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), International Air Transport Association (IATA) and the International Maritime Organization (IMO). These batteries are subject to the shipping requirements of DOT Special Provision 130 which states: "Batteries, dry are not subject to the requirements of this subchapter only when offered for transportation in a manner that prevents the dangerous evolution of heat (for example, by the effective insulation of exposed terminals)."
The only requirements for shipping these batteries by ICAO and IATA is Special Provision A123 which states: "An electrical battery of battery-powered device having the potential of dangerous evolutions of heat that is not prepared so as to prevent a short-circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or in the case of equipment, by disconnection of the battery and protection of exposed terminals) is forbidden from transportation."
The International Maritime Dangerous Goods Code (IMDG) regulates them for ocean transportation under Special Provision 304 which states: "Batteries, dry, containing corrosive electrolyte which will not flow out of the battery if the battery case is cracked are not subject to the provisions of this Code provided the batteries are securely packed and protected against short-circuits."
Examples of dry batteries are: alkaline-manganese, zinc-carbon, nickel-metal hydride and nickel -cadmium batteries.

16. OTHER INFORMATION

HMIS Ratings

Note: Saft Nickel-Cadmium batteries are manufactured articles and do not expose users to the harmful substances they contain. There are no physical or health risks under normal use conditions.

Health	3 (if exposed to internal cell components cadmium and potassium hydroxide)
Flammability	1
Reactivity	1

MSDS Revision Date: 02/20/2012

Disclaimer : This information has been complied for sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the dated 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 material 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 own particular use. We do not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information nor do we offer warranty against patent infringement. Additional information is available by calling the telephone number above designated for this purpose.