

**Saft.** The world leader  
in powering emergency lights (\*)



(\*) You can relax  
with Saft batteries

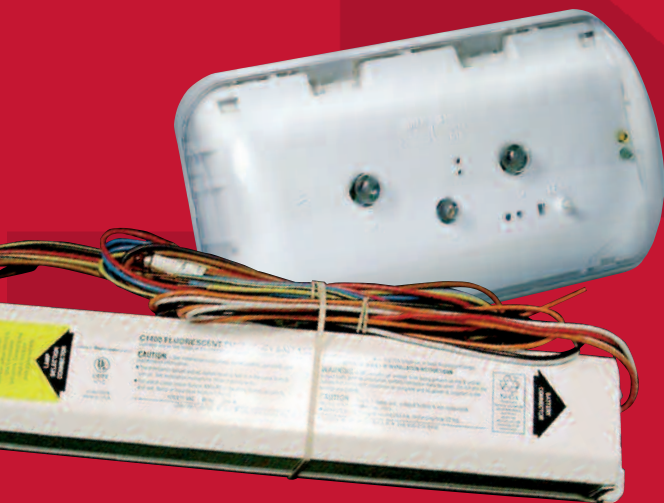




For more than 40 years, Saft has been the leading supplier to the major battery manufacturers of emergency lighting units (ELUs) and re-engineered luminaires throughout Europe (70% of the market), North America (58% of the market) and the Asia-Pacific zone.

Saft designs, produces and markets a complete range of nickel-cadmium rechargeable batteries which are specially designed to fit the specific requirements of emergency lighting units and self-contained emergency luminaires.

These cells typically accept a permanent overcharge (C/20 to C/15) for a minimum of 4 years in a high-temperature environment (up to +55°C).



# Product range

- Saft series up to + 40°C (4-year life duration at + 40°C)

	Saft type 1,2V	IEC capacity at 0,2C rate		Standard charge Current (mA)	Permanent charge Current (mA)	Typical impedance m	Max dimensions		Weight (g)
		Typical (mAh)	Minimum (mAh)				Diameter(mm)	Height (mm)	
Ni-Cd	VT AA	700	600	60	30	28	14.0	50.2	20
	VT Cs	1350	1200	120	60	12	22.2	42.2	45
	VT Cs 1500	1650	1500	150	75	8	22.2	42.2	48
	VT Cs 1600	1750	1600	160	80	7	22.2	42.2	49
	VNT Cs 1600	1670	1600	160	80	11	22.15	42.2	45
	VT C	2500	2200	220	110	14	25.3	49.5	75
	VT 1/2 D	2500	2200	220	110	10	32.3	36.8	80
	VT D	4300	4000	400	200	7	32.3	60.3	132
	VT F	7500	7000	700	350	5	32.4	91.1	210

- Saft series up to + 55°C (4-year life duration at + 55°C)

	Saft type 1,2V	IEC capacity at 0,2C rate		Standard charge Current (mA)	Permanent charge Current (mA)	Typical impedance m	Max dimensions		Weight (g)
		Typical (mAh)	Minimum (mAh)				Diameter(mm)	Height (mm)	
Ni-Cd	VT Cs 1500 U	1650	1500	150	75	<7	22.2	42.2	47
	VT C 2500	2700	2500	250	125	14	25.3	49.5	75
	VT D 70	4500	4000	400	200	6	32.4	60.3	134
	VT D U	4700	4100	400	200	6	32.3	58.4	136
	VT F 70	7700	7000	700	350	5	32.4	89.5	210

- Luminaires are part of the mandatory safety equipment of buildings, imposed by international standards such as safety in case of fire, building and workplace directives, all translated into national laws.
- Self contained Emergency Lighting Luminaires, i.e. Luminaires drawing energy from batteries in the emergency mode, rely presently on batteries as a reliable power source to comply with the safety requirements :
  - They must work at any time, for at least a four-year period.
  - They must work in extreme temperature conditions (from -20°C up to +55°C).
- They must provide lighting for a time period between one to three hours long (enough for people to leave the building and for rescue teams to carry out their work).
- They must comply with the specific requirements of the international standards (61951 and UL 924).

# Major characteristics

## Technology

- Ni-Cd:
  - Sintered positive electrode.
  - Plastic bonded negative electrode.
  - Plastic bonded nickel electrode (PNE).

material polypropylène separator selected for their behaviour at high temperatures.

- High reliability.
- Good storage retention.
- Comprehensive product range (from AA to F size).

- ISO 9001 qualified (with certification regularly reviewed).

SAFT Ni-Cd batteries equip 60% of installed self-contained Luminaires worldwide and have had an excellent record for safety and reliability.

SAFT VT Ni-Cd batteries are benefiting from a long history : more than 40 years of design and process improvement to ensure or surpass compliance with the existing regulations.

**SAFT ELU range : a high performance and reliable product range designed to fulfill your most demanding needs.**

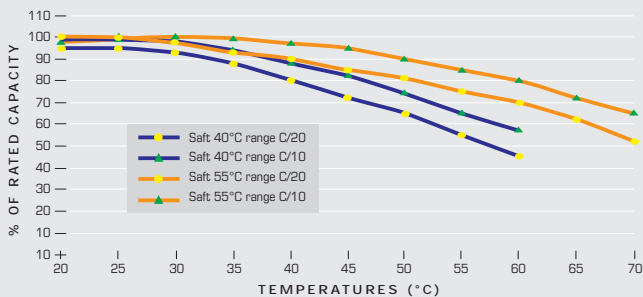
## Performances

- Excellent charge efficiency at high temperatures (up to +55°C), as illustrated by **curve 1**.
- Permanent charge endurance.
- Long life duration as illustrated by permanent charge endurance test as per 61951 (**curve 2**), extended permanent charge endurance for 55°C range (real test in application in **curve 3**), thanks to raw

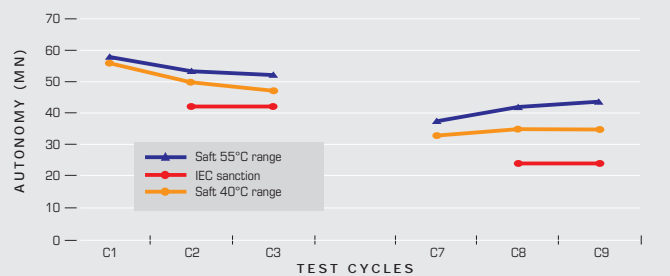
## Norms

- Product safety in compliance with worldwide standards.
- 1- International standards (IEC 61951-1 and 61951-2).
  - 2- Product safety approved by US standards (UL 924).
  - 3- Japanese standards (JISC 8705).
  - 4- PSB audit.

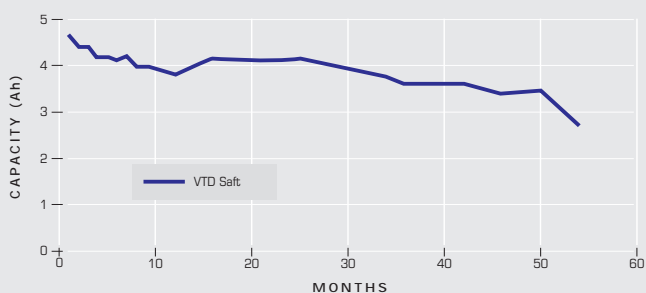
1 - Charge efficiency after 24h charge at C/2 discharge



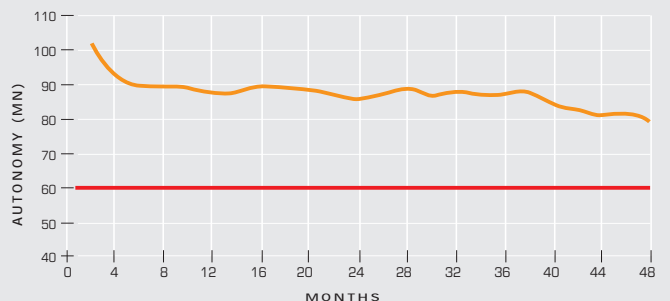
2 - Autonomy before and after ageing test, charge C/20 and discharge C at 40°C, as per IEC 61951



3 - Capacity change at 55°C in permanent charge at 200mA and discharge at 1.A



4 - Permanent overcharge of Cs cells at 80mA at 40°C, 1 discharge/10 weeks at 0,6C



# Recommendations

## Charge recommendations

### 1 Constant current

- Permanent charge: from C/20 to C/15.
- Rapid recharge rate:
  - C/5 to C/8 with timer as end of charge cut-off
  - Not recommended but can be used with cautions :  
From C/5 to C/8 : end of charge  $-dV$  or better  $-dT/dt$
- Higher C/5 : not allowed in high temperature series.

### 2 Pulsed current

- >50Hz : allowed without any risk.
- <50Hz : strongly to be avoided because risk of metal deposit of separator (Cd metal) which leads reduce of life duration.

### 3 Temperature

- Depends on series 40°C to 55°C.

## Discharge recommendations

### 1 Discharge rate

- Maximum allowed 3C in constant current.
- Pulse to 10C during 0.3S.

### 2 Temperature

- Depends on series 40°C to 55°C.

### 3 Storage

- No specific caution for Ni-Cd cell with sintered positive electrode.
- Foam and plastic bonded electrode :

It is important to control the storage conditions in order to maintain 100% of the cell performances, The charge retention in storage, both for sinter and foam and PNE (plastic bonded nickel electrode) technologies, allows to keep the cells partially charged during several months, when stored in open circuit.

Thus, the use of the following guide lines will help avoiding the prolonged storage of discharged cells:

- Store Sintered, foam, Plastic bonded electrode cells as charged as possible. (SAFT VNT cells - are delivered in a state of charge of 55°C minimum), even though sintered cells are less affected by the storage duration.
- Keep storage duration under control: use FIFO methods for storage and deliveries, enhance the storage time while storing at lower temperature.
- Recharge the battery if storage period exceed the recommended value (see cells specification).
- When the battery is connected to the system, avoid leakage currents due to electronics: use systems with low leakage currents, or electronics with a "sleeping mode", being for example awake at first charge. Typical acceptable values for leaking currents are lower than 100µA.
- In case of systems with high leaking current, store the battery separately or disconnected from the system.

*For specific questions please contact the sales support.*

## Pack configurations



# Striving for full customer satisfaction

## Manufacturing improvement program

- **Continuous improvement through the WorldClass program with its step-by-step methodology:**
  - Production staff involved in product design.
  - Full production flow on line.
  - Supplier integration in quality and productivity program.
  - Multi-function task-forces including suppliers and customers.
- **Continuous pursuit of productivity gains:**
  - Optimized and computerized product design.
  - Dynamically balanced manufacturing lines.
- **Industrial flexibility:**
  - Manual and automated production lines adaptable to the quantity and the type of batteries required.
  - Ongoing investment in production lines and control equipment.

## A commitment to customer satisfaction

An integrated logistics platform managed by a multilingual Customer Service team trained in international trade.

A high-performance transportation system ensuring fast and reliable worldwide deliveries.

Efficient order processing thanks to direct customer/production facility contact, enabling top reactivity and customized solutions to all requests.

## Full technical facilities

Engineers and technicians benefit from extensive testing equipment and CAD 3D stations to shorten design lead times.

A prototype workshop offers validation capabilities for new battery designs and manufacturing processes.

# Total quality and respect for the environment

## Saft commitment to the environment

Environmental management lies at the core of Saft's business. For both nickel-cadmium and nickel-metal hydride battery technologies and at every stage of the product life, Saft strives to minimize the impact of its activities and products. From design and production through their many uses and applications, to final collection and recycling, Saft provides clean solutions for a cleaner world.

- Fully permitted operations with regular permit renewal
- On site implementation of IPPC<sup>(\*)</sup> requirements
- Reduction of water and air releases beyond legal requirements
- Maximisation of on site recycling of production waste
- When necessary, if treated outside, waste recycling is given absolute priority over other means of treatment
- Active role in the collection and recycling of used batteries

(\*) IPPC: Integrated Pollution Prevention and Control as prescribed by directive 96/61/EEC

## Collection and recycling of used batteries

In the EU and in North America, Saft takes an active role in setting up industry wide collection and recycling organisations. Such systems operate in many EU countries and in the United States, and Saft is an active member of these organisations. In the countries where such systems do not operate, Saft has set up partnerships with logistical partners and recyclers to provide its customers with an easy solution to recycle their used batteries.

## Continuous quality improvement and a dedication to TOTAL QUALITY

- ISO 9001 certified sites.
- Consistently high quality level.
- Continuous improvement through PDCA methodology.
- Quality assurance contracts with suppliers.
- Fostering personnel involvement at every level for quality excellence and customer service (training initiatives, responsibility awareness and communication).



Quality systems aimed at the highest world standards have been implemented at Saft for several years.

The plants have been ISO 9001 qualified for many years, with certification regularly reviewed.



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