

Battery expertise for rail networks



A network of excellence for railway systems

Railway vehicles now depend upon on-board electrical systems to control or safeguard critical operating functions, and must meet increasingly stringent safety standards. Saft offers a partnership of people and products, experience and responsibility.

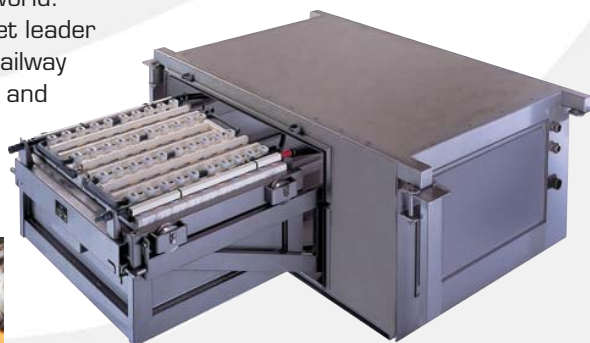


Saft : past, present and into the future

Saft has been involved in world rail industries for over 100 years. Today, purpose-built Saft nickel-cadmium battery systems are specified for diesel starting, emergency and standby power, signalling and track-side applications in over 150 networks and mass transit systems worldwide.

From the hot and remote main lines in Tunisia, Pakistan and Sri Lanka to the hostile temperatures of

northern Canada; from EMU/DMU, Metro systems serving the world's major cities in North and South America, across Europe, into The Middle and Far East and Australia; and in installations for Eurotunnel and the Hong Kong Tung Chung Line, the benefits of Saft Ni-Cd batteries are endorsed by transportation departments around the world. Saft will continue as market leader for future generations of railway manufacturers, operators and end-users.



A member of your team



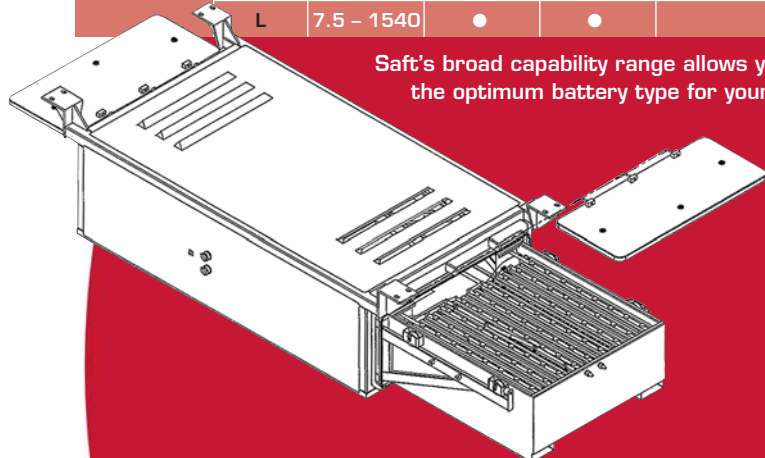
Saft's battery technologies and skilled professionals are meeting expectations for quick, clean, efficient and reliable rail transport in all locations and environments.

We will seamlessly integrate into your project at all stages of engineering design, sizing, testing and implementation, and work with you to achieve a tailor-made battery system. We will match your quality standards, control supply chains and respect your development schedules. Saft will engineer the best all round solution as though it was a single component.

Saft manufacture batteries with strict attention to quality and meet ISO 9001 and ISO 14000 criteria.

Ni-Cd battery type		Capacity range Ah	Battery application			
			Emergency power supply	Low voltage system back-up	Engine starting	Signalling
Sintered/pbe	SRX	22 - 375		●	●	
	SRM	25 - 440	●	●		
Sintered/pbe compact	MATRICES	70 - 260	●	●		
Pocket plate	H	8.3 - 920		●	●	
	M	9 - 1390	●	●		●
	L	7.5 - 1540	●	●		●

Saft's broad capability range allows you to select the optimum battery type for your application



Comprehensive expertise part of your railway team



Saft offers a range of nickel-cadmium products which provide completely reliable performance over 15+ years' life.

With minimal maintenance and greater controllability for the most demanding operating conditions, Saft batteries are designed for:

- engine starting duties which require high currents for short periods to locomotives and DMU's
- critical back-up, short period/high power duties, required by high speed trains for braking and tilting systems and in emergencies for up to 90 minutes following main supply interruption

- passenger coach lighting, air-conditioning, heating and door control functions for up to 5 hours
- essential trackside standby high or low current services for signalling, level crossing and point operation, security surveillance and telecommunications equipment

Our turnkey solution is based on thorough and professional planning, accurate life cycle costing with reliable quality and service



Low life cycle cost

The Saft sintered/pbe railway batteries are designed specifically for mobile railway operating conditions.

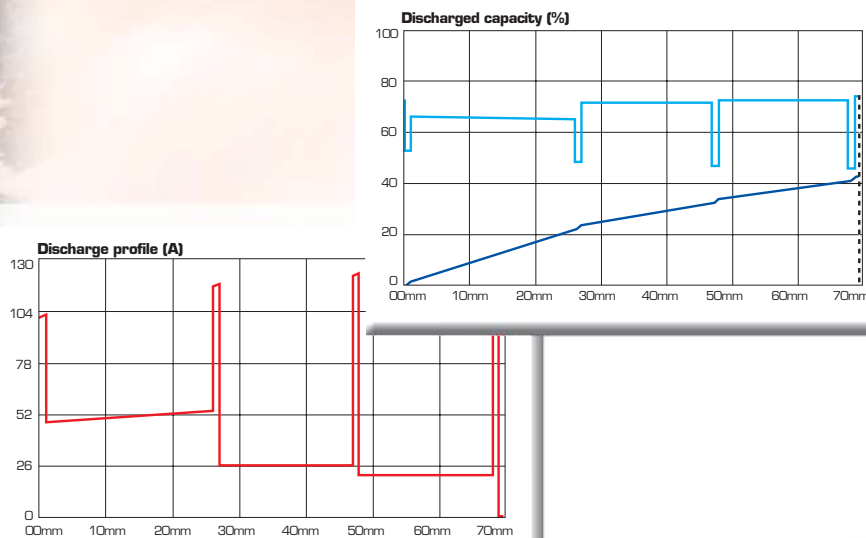
Sizing Software

Battery type	82 x SRM 105Ah Plastic
Operating temperature	-10°C
Ageing coefficient	0,90
State of charge coefficient	0,90
Voltage drop in line	2 V
Discharged capacity	45 Ah
Depth of discharge	43%
Capacity margin	3%
Discharged Energy	4206 Wh
Equipment minimum voltage	78 V
Voltage margin	1,2 V

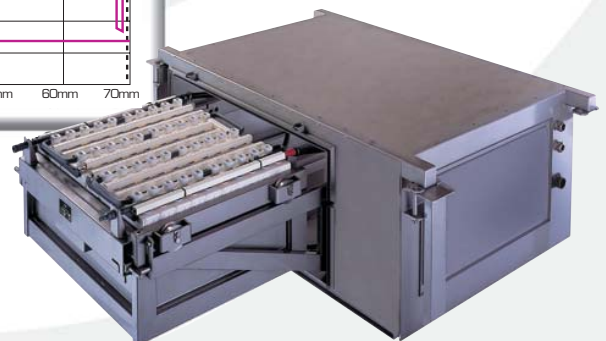
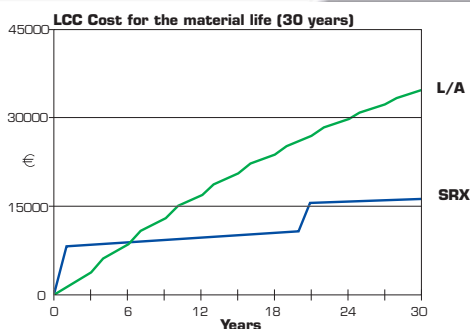
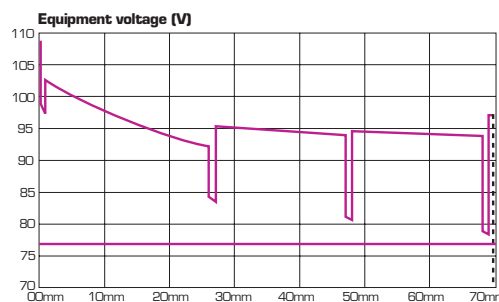
- Compact and lightweight
- Tolerant of heavy vibration, wider fluctuations in operating temperature, and physical and electrical abuses that can destroy conventional batteries.
- Outstanding charge-discharge characteristics. Ni-Cd cells can be completely discharged and rapidly recharged without affecting performance more frequently, than other battery types. In typical railway conditions, sintered/pbe batteries suffer no loss of capacity after many years in service.
- Negative plates, produced by bonding active material onto perforated steel strips, and sintered nickel positive electrodes are separated by microporous separators. These allow volumes of electrolyte to freely circulate. No components engage in electrochemical reactions, so these batteries are immune from sudden death.

Low running cost, long lasting reliability

By analysing likely operating temperature extremes, charging regime and performance requirements, Saft will provide an optimum battery specification and will be able to show significant on-going savings in life cycle cost (LCC).



Example of sizing generated by in-house developed software, taking into account specific requirements of each customer.

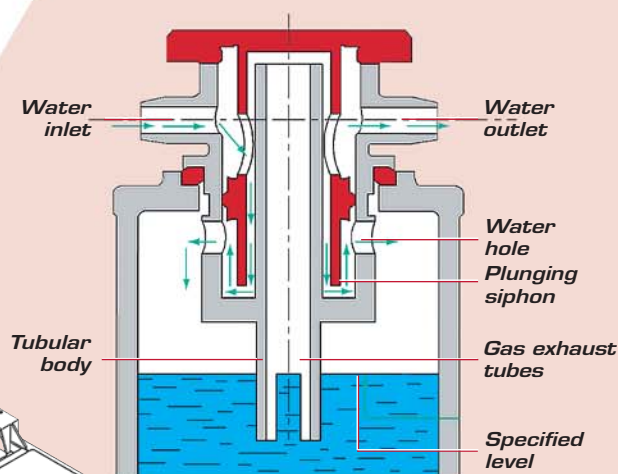


Integrated tray design

Typical 24 V–110 V systems will include electrical, mechanical and control functions, comprising rafts, access mechanisms, water filling systems, voltage and temperature controls, and will undergo qualitative mechanical, environmental and electrical approvals. All have been specifically developed for the rail and mass transit sectors. Saft will plan tray manufacture to suit battery size and individual application requirements, including:

- Construction materials
- Locking systems
- Mechanical and electrical interfaces
- Cell restraints
- Physical characteristics
- Calculated to GMRT 2100 - EN 12663

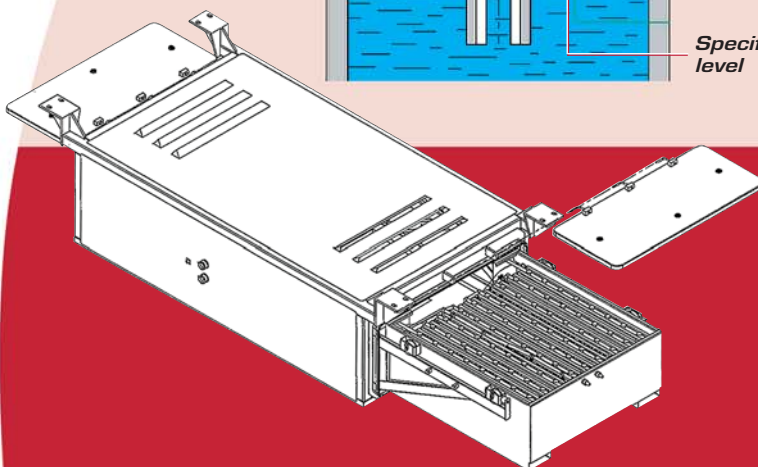
- Vibration and shock tested to IEC 61373
- Extensive range of battery housings to suit most requirements – from flame-retardant plastic containers for particularly critical underground systems to wooden or stainless steel crates.



Low maintenance

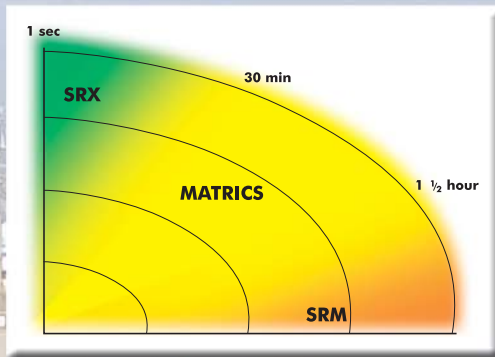
A unique feature of sintered/pbe technology is its low water consumption. Topping-up can be carried out quickly, more easily, reliably and accurately with Saft's centralised water filling system:

- all cells fill in sequence from one central tank
- special vents have no moving parts giving totally reliable performance
- quick, accurate, cost-saving system



Soft ranges for railways

The selection of cell range relates to discharge time and application requirements



SRX - For starting-up and for slowing down

- Provides short duration high peak discharges.
- For diesel engine starting, metro and high speed train braking and tilting system duties.
- Excellent charge-recharge characteristics at constant voltage (from -20°C (-4°F) to $+45^{\circ}\text{C}$ ($+113^{\circ}\text{F}$) SRX retains 90% of rated capacity).
- Provides back-up for essential on-board systems while trains are immobile.
- Strong, chemical and impact resistant stainless steel or plastic containers specifically designed for railway rolling stock applications.

MRX - MAss Transit & Rail Integrated Compact System

Newly developed to deliver extended discharges on metro, EMU, electric locomotive, high speed train and LRV systems for many on-board applications.

MATRICES is tough, lightweight and compact. Its standard flame retardant block battery construction and built-in water filling system make it safer to run with a significantly reduced life cycle cost.

The battery has excellent charging characteristics with minimal water consumption and high energy concentration, allowing significant reductions in volume and weight.

SRM - For smooth running and emergencies

Designed to supply long discharges for on-board computing systems, door opening functions, air conditioning and emergency lighting.

SRM is lightweight and compact, ideal for mass transit sub-surface and deep tunnel routes where minimal bulk with maximum performance is vital.

Pocket plate ranges

Block batteries, steel and plastic pocket plate single cell ranges are ideal for direct replacement in current applications.

Soft's entire range of Ni-Cd batteries meets all major international mechanical and electrical standards, including IEC 60623/UIC 854 and IEC/EN 60077.





Saft is committed to the highest standards of environmental stewardship.

Implementing this commitment to minimise the impact of its products and operations on the environment means that Saft gives priority to recycled over unrecycled raw materials, reduces its plant releases into the environment year after year, minimizes water usage, and ensures that its customers have recycling solutions for their batteries at the end of their lives.

Regarding industrial Ni-Cd batteries, Saft has had partnerships for many years with collection companies in most EU countries as well as in North America. This collection network receives and dispatches our customers' batteries at the end of their lives to fully approved recycling facilities, in compliance with the Laws governing transboundary waste shipments. Saft offers these services free of charge to its customers.

Please find a list of our collection points on our web site.

In other countries, Saft assists its customers in finding environmentally sound recycling solutions. Please contact your sales representative for further information.

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