saft

# SPL+ Ni-Cd battery

## Sustainable trackside power when it matters most

TotalEnergies

# SPL+

## Sustainable trackside power that's always there

### Reliability, continuity and safety

Signaling and communication are complex and critical parts of a railroad's operating system. Reliability is paramount to guarantee the safe movements of trains and to provide effective control of trains and traffic at grade crossings.
This means ensuring a highly reliable power supply for trackside signals, flashers, switches, remote monitoring and control, communications and other equipment.
Stationary batteries, housed in trackside bungalows and cabinets, play a vital role in ensuring continuity of power supply to these critical signaling and communication operations.

Including Positive Train Control and Communications Based Train Control systems. Batteries are also used to meet peak electricity demand and to provide backup power to all systems in case of an emergency.

SPL+ Ni-Cd (nickel-cadmium) batteries are optimized for the specific requirements of railroad trackside power. They are extremely reliable, require minimal maintenance, and cost less over their lifetime than comparable batteries.

### Your trusted partner for sustainable rail battery applications

Saft has over 100 years experience in delivering well-proven.

Ni-Cd battery solutions optimized to ensure the total security and availability of multiple applications.

Ni-Cd battery solutions optimized to ensure the total security and availability of multiple applications. Saft products and components are designed and manufactured to the very highest quality standards. SPL is operating in ten of thousands of locations across North America, from Alaska to the Panama Canal. Saft's comprehensive global service provides expert support throughout every stage of your battery's life from initial concept through volume supply, installation and training to endof-life recycling.

GOLD 2022 ecovadis Sustainability Rating

**In 2022, the sustainability performance of Saft was evaluated by Ecovadis, a leading Environment and Social Responsibility rating agency. This evaluation focuses on the following matters: environment, labor and human rights, ethics as well as sustainable procurement.**

**Saft is ranked within the top 1% of companies involved in the manufacture of batteries and accumulators.**



saft

# Reliability wherever you need it

### Built for today's trackside equipment

Today's trackside systems are increasingly all electronic: cabinets full of relays have been largely replaced by microprocessors and electronic circuitry along with relays, to support and operate the entire signal system.

Battery backup systems ensure continuity of power supply to these systems in the event of failure of the normal mains power supply. In railroad applications, this is vital to maintain the safe operation of trains, for good traffic control at crossings and to ensure the integrity of information about safety and control system management.

These trackside battery systems must be able to operate across a wide range of temperatures. They must offer a good, predictable lifetime, even at high temperatures, good low temperature performance and minimal maintenance requirements, without risk of sudden failures.

The stationary batteries must be capable of receiving their charge from the mains supply (continuous or intermittent) or from small solar panels or wind generators.

### SPL+ Ni-Cd batteries help ensure complete system reliability and security by offering several advantages:

- Lifetime in excess of 20 years
- Infrequent and straightforward maintenance needs
- Longer lifetime at higher operating temperature than lead acid batteries, together with superior low-temperature performance
- Little or no need for replacement, due to long lifetime and reliability
- Performance optimized for the duty cycle (cycling ability is well within the requirements of trackside applications)
- Low Total Cost of Ownership, thanks to high reliability and low operating costs.

Over the lifetime of our trackside systems, it's clear that nickel-cadmium batteries offer far superior performance and optimized operational costs than equivalent lead acid types.

# Performance where it matters

## Field-proven, robust nickel-cadmium pocket plate construction provides extremely reliable solutions for demanding railroad applications

SPL+ Ni-Cd batteries offer reliability even in the most demanding conditions:

- 20-plus year lifetime.
- Excellent electrical performance.
- High resistance to electrical and mechanical abuse.

## SPL+ batteries offer ultra-low operating maintenance needs

Trackside batteries can be hundreds of miles from the nearest maintenance depot, and the cost of frequent inspection and maintenance visits over the battery's life can easily outweigh the purchase price. SPL+ Ni-Cd batteries reduce maintenance needs dramatically compared with lead acid designs:

- No "sudden-death", thermal runaway and cell dry-out as seen with VRLA batteries.
- Thousands of charge-discharge cycles while retaining excellent electrical performance, dependant on Depth Of Discharge (DOD).

## SPL+ batteries are able to perform in harsh conditions and remote areas

The temperature in an outdoor battery cabinet can be up to +10°C (+18°F) or higher than the outside air.

While high temperatures reduce the life of all batteries, SPL+ batteries cope better than the alternatives.

SPL+ batteries operate in ambient temperatures ranging from −30°C (−22°F) to +40°C (+104°F), and are able to withstand extremes of − 40°C (−40°F) to +55°C (+131°F).

SPL+ batteries are able to operate with renewable energy sources.

- The high level of gas recombination is beyond the requirements of IEC 62259 (recombination level higher than 90 percent) and reduces water consumption and gas emissions.
- One topping up interval during the entire battery life at +20°C (+68°F) or +40°C (+104°F).
- Fast and simple charging within a narrow window for minimal downtime and maximum availability.

## Ni-Cd battery benefits:

### ▶ Sustainable

- Saft manufacturing process and recycling capability ensure lowest $CO_2$ footprint.
- Saft Ni-Cd wide operating temperature range makes AC and heating redundant, hence saving energy.

### ▶ Reliable

- Long operational life of over 20 years, at least 3 times longer than lead-acid batteries.
- No risk of sudden death failure.

### ▶ Economical

- Lowest total cost of ownership.

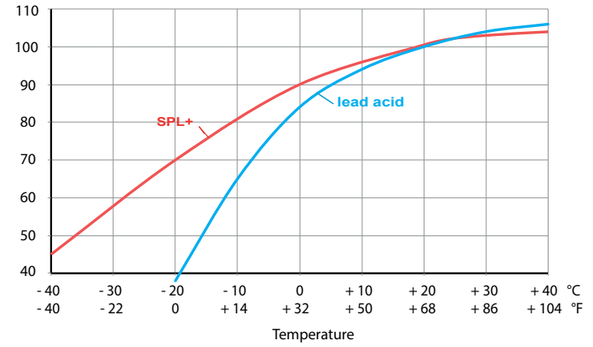
## SPL+ batteries simplify handling and installation

Saft SPL+ batteries make transportation, installation and operation fast and easy:

- Batteries are only delivered filled with electrolyte and in electrically charged condition.
- Batteries may be stored for up to two years in normal conditions, and in some circumstances also at higher temperatures.
- Cell containers are polypropylene with visible electrolyte levels and are equipped with flame arresting flip top vents.
- Design eliminates need for special handling equipment.

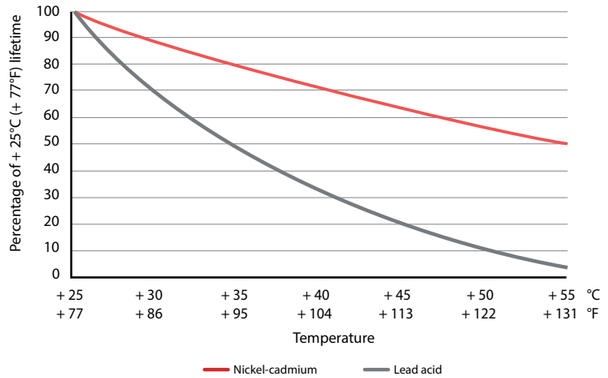
**SPL+ batteries outperform lead acid batteries at low temperatures**

Percentage (%) of $C_5$ rated capacity



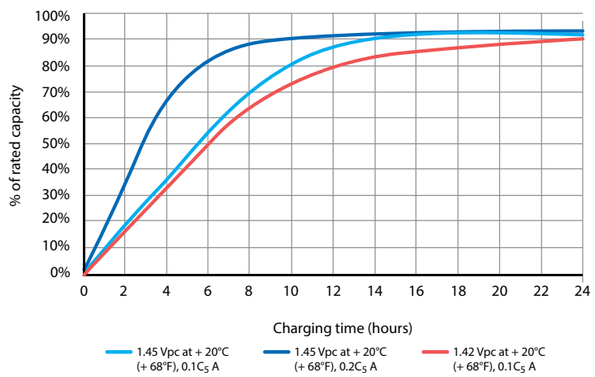

**Ni-Cd batteries have superior high temperature performance compared with lead acid batteries**

Effect of temperature on lifetime




**Available capacity after constant voltage charge**

Current 0.1 C5 A or 0.2 C5 A



SPL+ Ni-Cd battery

## SPL+ batteries are designed in full compliance with the highest quality, safety and environmental standards

### Electrical characteristics:

- **Certified IEC 62259** - Secondary cells and batteries containing alkaline or other non-acid electrolytes – Nickel-cadmium prismatic secondary single cells with partial gas recombination. SPL+ exceeds gas recombination requirements.
- **Certified IEC 60623** - Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells.

### Quality

- **ISO 9001** und **ISO 14001**
- **Saft Excellence System**

### Safety

- **Complies with EN 50272-2/ IEC 62485-2 -** Safety requirements for secondary batteries and battery installations
- Stationary batteries – The protective covers for terminals and connectors, the insulated cables are compliant with IP2 level protection against electrical shocks according to safety standards.

### Environment & Recycling:

- **Fully recyclable**
- **RoHS** – Although batteries and accumulators are not within the scope of the RoHS directive, Saft has taken voluntary measures to make sure that the substances forbidden by RoHS are not present in the battery, with the exception of the electro-chemical core.
- **REACH** - The Saft Group has adopted internal procedures to ensure conformity with the European REACH (Registration, Evaluation, Authorisation and Restriction of Chemical Substances) Regulation.Substances) Regulations.

- Saft operates the only plant in the world that produces nickel-cadmium batteries incorporating metals that have been reclaimed on site from spent batteries, reducing their eco-footprint. The recycling of Ni-Cd batteries is a complex process that involves separating the nickel, cobalt and cadmium from the electrodes, a process perfected by Saft's plant in Oskarshamn, Sweden. This plant in Sweden is the only one in the world which combines the recycling of used batteries and the manufacturing of new ones, hence facilitating the incorporation of recycled materials into new products.

# Proven performance and reliability

## Dimensions

| Cell type | Capacity C, Ah | Height | | Width | | Length | | Approx. weight | | Internal resistance | Terminal |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | in | mm | in | mm | in | kg | lb | mOhm | bolt par pole |
| SPL+80 | 80 | 349 | 13,74 | 192 | 7,56 | 68 | 2,68 | 6,8 | 15,0 | 1,94 | M10 |
| SPL+100 | 100 | 349 | 13,74 | 192 | 7,56 | 68 | 2,68 | 6,8 | 15,0 | 1,55 | M10 |
| SPL+130 | 130 | 349 | 13,74 | 192 | 7,56 | 68 | 2,68 | 7,5 | 16,5 | 1,19 | M10 |
| SPL+165 | 165 | 349 | 13,74 | 192 | 7,56 | 93 | 3,66 | 9,8 | 21,6 | 0,94 | M10 |
| SPL+200 | 200 | 349 | 13,74 | 192 | 7,56 | 93 | 3,66 | 10,4 | 22,9 | 0,78 | M10 |
| SPL+250 | 250 | 405 | 15,94 | 192 | 7,56 | 101 | 3,98 | 12,4 | 27,3 | 0,66 | M10 |
| SPL+290 | 290 | 405 | 15,94 | 192 | 7,56 | 130 | 5,12 | 16,0 | 35,3 | 0,57 | 2xM10 |
| SPL+340 | 340 | 405 | 15,94 | 192 | 7,56 | 130 | 5,12 | 16,7 | 36,8 | 0,49 | 2xM10 |
| SPL+380 | 380 | 400 | 15,75 | 195 | 7,68 | 146 | 5,75 | 18,4 | 40,6 | 0,43 | 2xM10 |
| SPL+420 | 420 | 400 | 15,75 | 195 | 7,68 | 159 | 6,26 | 19,8 | 43,7 | 0,39 | 2xM10 |
| SPL+470 | 470 | 400 | 15,75 | 195 | 7,68 | 171 | 6,73 | 21,8 | 48,1 | 0,35 | 2xM10 |
| SPL+510 | 510 | 400 | 15,75 | 195 | 7,68 | 183 | 7,20 | 23,5 | 51,8 | 0,32 | 2xM10 |

**Height including IP2 terminal cover - ** Rigid connector included*

## Charge voltages

| | |
|---|---|
| Two level charge: | High level: 1.45 ± 0.01 V/cell - Float level: 1.42 ± 0.01 V/cell |
| Single level charge: | 1.42 ± 0.01 V/cell |



# Performance data - All trackside applications

## Performance after prolonged float charge of fully charged cells

Available Amperes at + 20°C ± 5°C (+ 68°F± 9°F) — Final voltage: 1.00 V/cell

| Cell type | C, Ah | Hours | | | | | | | Minutes | | | | | | Seconds | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 8 | 5 | 3 | 2 | 1,5 | 1 | 30 | 20 | 15 | 10 | 5 | 1 | 30 | 5 | 1 |
| SPL+80 | 80 | 8,88 | 11,0 | 16,7 | 26,9 | 36,6 | 44,7 | 54,5 | 62,2 | 69,3 | 68,1 | 74,7 | 80,1 | 90,8 | 96,4 | 110 | 124 |
| SPL+100 | 100 | 11,1 | 13,7 | 20,8 | 33,7 | 45,8 | 55,9 | 68,1 | 77,7 | 86,6 | 85,1 | 93,4 | 100 | 114 | 120 | 137 | 155 |
| SPL+130 | 130 | 14,4 | 17,9 | 27,1 | 43,8 | 59,6 | 72,6 | 88,6 | 101 | 113 | 111 | 121 | 130 | 148 | 157 | 178 | 201 |
| SPL+165 | 165 | 18,3 | 22,7 | 34,4 | 55,5 | 75,6 | 92,2 | 112 | 128 | 143 | 140 | 154 | 165 | 187 | 199 | 227 | 255 |
| SPL+200 | 200 | 22,2 | 27,5 | 41,7 | 67,3 | 91,6 | 112 | 136 | 155 | 173 | 170 | 187 | 200 | 227 | 241 | 275 | 309 |
| SPL+250 | 250 | 27,7 | 34,4 | 52,1 | 84,2 | 115 | 140 | 170 | 194 | 216 | 213 | 233 | 250 | 284 | 301 | 343 | 386 |
| SPL+290 | 290 | 32,2 | 39,9 | 60,4 | 97,6 | 133 | 162 | 198 | 225 | 251 | 247 | 271 | 290 | 329 | 349 | 398 | 448 |
| SPL+340 | 340 | 37,7 | 46,7 | 70,8 | 114 | 156 | 190 | 232 | 264 | 294 | 289 | 318 | 340 | 386 | 410 | 467 | 525 |
| SPL+380 | 380 | 42,2 | 52,2 | 79,1 | 128 | 174 | 212 | 259 | 295 | 329 | 323 | 355 | 380 | 431 | 458 | 522 | 587 |
| SPL+420 | 420 | 46,6 | 57,7 | 87,5 | 141 | 192 | 235 | 286 | 327 | 364 | 358 | 392 | 420 | 477 | 506 | 577 | 649 |
| SPL+470 | 470 | 52,1 | 64,6 | 97,9 | 158 | 215 | 263 | 320 | 365 | 407 | 400 | 439 | 470 | 534 | 566 | 645 | 726 |
| SPL+510 | 510 | 56,6 | 70,1 | 106 | 172 | 234 | 285 | 348 | 396 | 442 | 434 | 476 | 510 | 579 | 615 | 700 | 788 |

Available Amperes at + 20°C ± 5°C (+ 68°F± 9°F) — Final voltage: 1.05 V/cell

| Cell type | C, Ah | Hours | | | | | | | Minutes | | | | | | Seconds | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 8 | 5 | 3 | 2 | 1,5 | 1 | 30 | 20 | 15 | 10 | 5 | 1 | 30 | 5 | 1 |
| SPL+80 | 80 | 8,43 | 10,4 | 16,5 | 24,5 | 32,1 | 38,0 | 43,8 | 51,3 | 56,4 | 57,5 | 59,6 | 65,7 | 77,9 | 81,9 | 95,6 | 106 |
| SPL+100 | 100 | 10,5 | 13,0 | 20,6 | 30,6 | 40,1 | 47,5 | 54,8 | 64,1 | 70,5 | 71,9 | 74,4 | 82,1 | 97,4 | 102 | 119 | 132 |
| SPL+130 | 130 | 13,7 | 16,9 | 26,8 | 39,7 | 52,1 | 61,8 | 71,2 | 83,3 | 91,6 | 93,5 | 96,8 | 107 | 127 | 133 | 155 | 172 |
| SPL+165 | 165 | 17,4 | 21,5 | 34,0 | 50,4 | 66,2 | 78,5 | 90,4 | 106 | 116 | 119 | 123 | 135 | 161 | 169 | 197 | 218 |
| SPL+200 | 200 | 21,1 | 26,0 | 41,2 | 61,1 | 80,2 | 95,1 | 110 | 128 | 141 | 144 | 149 | 164 | 195 | 205 | 239 | 264 |
| SPL+250 | 250 | 26,3 | 32,5 | 51,4 | 76,4 | 100 | 119 | 137 | 160 | 176 | 180 | 186 | 205 | 243 | 256 | 299 | 330 |
| SPL+290 | 290 | 30,5 | 37,7 | 59,7 | 88,6 | 116 | 138 | 159 | 186 | 204 | 209 | 216 | 238 | 282 | 297 | 346 | 383 |
| SPL+340 | 340 | 35,8 | 44,3 | 70,0 | 104 | 136 | 162 | 186 | 218 | 240 | 245 | 253 | 279 | 331 | 348 | 406 | 449 |
| SPL+380 | 380 | 40,0 | 49,5 | 78,2 | 116 | 152 | 181 | 208 | 243 | 268 | 273 | 283 | 312 | 370 | 389 | 454 | 502 |
| SPL+420 | 420 | 44,2 | 54,7 | 86,4 | 128 | 168 | 200 | 230 | 269 | 296 | 302 | 313 | 345 | 409 | 430 | 502 | 555 |
| SPL+470 | 470 | 59,5 | 61,2 | 96,7 | 144 | 189 | 223 | 258 | 301 | 331 | 338 | 350 | 386 | 458 | 481 | 561 | 621 |
| SPL+510 | 510 | 53,7 | 66,4 | 105 | 156 | 205 | 242 | 279 | 327 | 359 | 367 | 380 | 419 | 497 | 522 | 609 | 674 |

Available Amperes at + 20°C ± 5°C (+ 68°F± 9°F) — Final voltage: 1.10 V/cell

| Cell type | C, Ah | Hours | | | | | | | Minutes | | | | | | Seconds | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 8 | 5 | 3 | 2 | 1,5 | 1 | 30 | 20 | 15 | 10 | 5 | 1 | 30 | 5 | 1 |
| SPL+80 | 80 | 7,95 | 9,86 | 14,4 | 21,3 | 28,4 | 31,6 | 35,9 | 41,3 | 43,4 | 46,1 | 47,1 | 52,3 | 61,9 | 66,3 | 72,0 | 80,6 |
| SPL+100 | 100 | 9,94 | 12,3 | 18,0 | 26,6 | 35,6 | 39,5 | 44,9 | 51,6 | 54,2 | 57,6 | 58,9 | 65,4 | 77,4 | 82,9 | 90,0 | 101 |
| SPL+130 | 130 | 12,9 | 16,0 | 23,4 | 34,6 | 46,2 | 51,4 | 58,4 | 67,1 | 70,5 | 74,8 | 76,6 | 85,0 | 101 | 108 | 117 | 131 |
| SPL+165 | 165 | 16,4 | 20,3 | 29,7 | 44,0 | 58,7 | 65,2 | 74,1 | 85,2 | 89,5 | 95,0 | 97,2 | 108 | 128 | 137 | 149 | 166 |
| SPL+200 | 200 | 19,9 | 24,6 | 36,0 | 53,3 | 71,1 | 79,0 | 89,8 | 103 | 108 | 115 | 118 | 131 | 155 | 166 | 180 | 202 |
| SPL+250 | 250 | 24,9 | 30,8 | 45,0 | 66,6 | 88,9 | 98,8 | 112 | 129 | 136 | 144 | 147 | 164 | 193 | 207 | 225 | 252 |
| SPL+290 | 290 | 28,8 | 35,7 | 52,2 | 77,2 | 103 | 115 | 130 | 150 | 157 | 167 | 171 | 190 | 224 | 240 | 261 | 292 |
| SPL+340 | 340 | 33,8 | 41,9 | 61,2 | 90,6 | 121 | 134 | 153 | 176 | 184 | 196 | 200 | 222 | 263 | 282 | 306 | 343 |
| SPL+380 | 380 | 37,8 | 46,8 | 68,4 | 101 | 135 | 150 | 171 | 196 | 206 | 219 | 224 | 249 | 294 | 315 | 342 | 383 |
| SPL+420 | 420 | 41,8 | 51,7 | 75,7 | 112 | 149 | 166 | 189 | 217 | 228 | 242 | 247 | 275 | 325 | 348 | 378 | 423 |
| SPL+470 | 470 | 46,7 | 57,9 | 84,7 | 125 | 167 | 186 | 211 | 243 | 255 | 271 | 277 | 307 | 364 | 390 | 423 | 474 |
| SPL+510 | 510 | 50,7 | 62,8 | 91,9 | 136 | 181 | 201 | 229 | 263 | 276 | 294 | 300 | 334 | 395 | 423 | 459 | 514 |

Available Amperes at + 20°C ± 5°C (+ 68°F± 9°F) — Final voltage: 1.14 V/cell

| Cell type | C, Ah | Hours | | | | | | | Minutes | | | | | | Seconds | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 8 | 5 | 3 | 2 | 1,5 | 1 | 30 | 20 | 15 | 10 | 5 | 1 | 30 | 5 | 1 |
| SPL+80 | 80 | 7,38 | 9,23 | 12,4 | 18,3 | 22,9 | 23,6 | 26,3 | 28,2 | 31,0 | 32,5 | 33,8 | 38,9 | 46,9 | 50,7 | 58,6 | 66,2 |
| SPL+100 | 100 | 9,22 | 11,5 | 15,5 | 22,9 | 28,7 | 29,6 | 32,9 | 35,3 | 38,8 | 40,6 | 42,2 | 48,6 | 58,6 | 63,3 | 73,3 | 82,7 |
| SPL+130 | 130 | 12,0 | 15,0 | 20,1 | 29,8 | 37,3 | 38,4 | 42,8 | 45,8 | 50,5 | 52,7 | 54,9 | 63,2 | 76,1 | 82,3 | 95,3 | 108 |
| SPL+165 | 165 | 15,2 | 19,0 | 25,6 | 37,8 | 47,3 | 48,8 | 54,3 | 58,2 | 64,0 | 66,9 | 69,7 | 80,2 | 96,6 | 104,5 | 121 | 136 |
| SPL+200 | 200 | 18,4 | 23,1 | 31,0 | 45,8 | 57,4 | 59,1 | 65,8 | 70,5 | 77,6 | 81,1 | 84,4 | 97,2 | 117 | 126,7 | 147 | 165 |
| SPL+250 | 250 | 23,0 | 28,9 | 38,7 | 57,2 | 71,7 | 73,9 | 82,2 | 88,1 | 97,0 | 101 | 106 | 121 | 146 | 158,3 | 183 | 207 |
| SPL+290 | 290 | 26,7 | 33,7 | 44,9 | 66,4 | 83,2 | 85,7 | 95,4 | 102 | 113 | 118 | 122 | 141 | 170 | 184 | 213 | 240 |
| SPL+340 | 340 | 31,3 | 39,2 | 52,7 | 77,8 | 97,5 | 100 | 112 | 120 | 132 | 138 | 144 | 165 | 199 | 215 | 249 | 281 |
| SPL+380 | 380 | 35,0 | 43,9 | 58,9 | 87,0 | 109 | 112 | 125 | 134 | 147 | 154 | 160 | 185 | 223 | 241 | 279 | 314 |
| SPL+420 | 420 | 38,7 | 48,5 | 65,1 | 96,2 | 120 | 124 | 138 | 148 | 163 | 170 | 177 | 204 | 246 | 266 | 308 | 347 |
| SPL+470 | 470 | 43,3 | 54,2 | 72,8 | 108 | 135 | 139 | 155 | 166 | 182 | 191 | 198 | 228 | 275 | 298 | 345 | 389 |
| SPL+510 | 510 | 47,0 | 58,9 | 79,0 | 117 | 146 | 151 | 168 | 180 | 198 | 207 | 215 | 248 | 299 | 323 | 374 | 422 |

# We energize the world.

# On land, at sea, in the air and in space.

## Saft has launched a sustainability initiative, Program Net Zero, consisting of 5 pillars:

1. Reducing the environmental footprint of our activities and that of our battery solutions.

2. Assisting Saft's customers in lowering their environmental footprint.

3. Using natural resources sustainably and implementing circular economy principles throughout our operations.

4. Prioritizing suppliers with strong environmental, social, and human rights records.

5. Working to always ensure compliance with environmental regulations and best practices in all locations.

Batteries facilitate the shift towards clean energy, but there is much work to do to achieve Net Zero. Therefore, Saft is committed to reducing its impact while respecting social and human rights all along the value chain.

SAFT

26, quai Charles Pasqua
92300 Levallois-Perret - France
T. : +33 (0)1 58 63 16 00
F. : +33 (0)1 58 63 16 18

**Saft is a company of TotalEnergies**
S.A.S. with a capital of 26 724 876 €
R.C.S. Nanterre 481 480 465
VAT FR 51 481 480 465
www.saftbatteries.com

Document N°22155-0122-2
Edition: February 2023
Data in this document is subject to change without notice and becomes contractual only after written confirmation.
Photo credits: Saft, Adobe stock,
Conception: Cap Interactif agency - 1044
© Saft

TotalEnergies