5.2.4. Recommended charging method

For ambient temperature between 0°C and +35°C.

❑ **The charging method described below is generally applicable for STM MR-MRE batteries installed in electric vehicles. However, individual charging methods might be required for specific customer needs, depending on the application, climatic conditions, etc. For exceptional cases, consult Saft.**

The recommended charging method for Saft STM MR-MRE batteries is two-level constant current charge IOIa, as shown in the diagram below.

■ **Principle**

The battery is charged at constant current. Its voltage increases. As soon as the predetermined charging voltage has been reached, the charge current is reduced in order to limit useless heat dissipation during overcharge while assuring the necessary overcharge. The change-point threshold, is indicated in the diagram by a small circle.

First level: constant current at 0.2 C_5A up to predetermined threshold voltage.

Second level: constant current reduced to 0.05 C_5A without voltage limitation.

The charge coefficient is 1.15.

The maximum charging time of a fully discharged battery is approximately 8 hours.

■ **Temperature compensation**

It is essential that the battery reach the threshold voltage before it is fully charged. As the voltage characteristics of Ni-Cd batteries vary with their temperature (higher voltage when cold and lower voltage when hot), it is imperative to correct the voltage threshold according to the battery temperature.

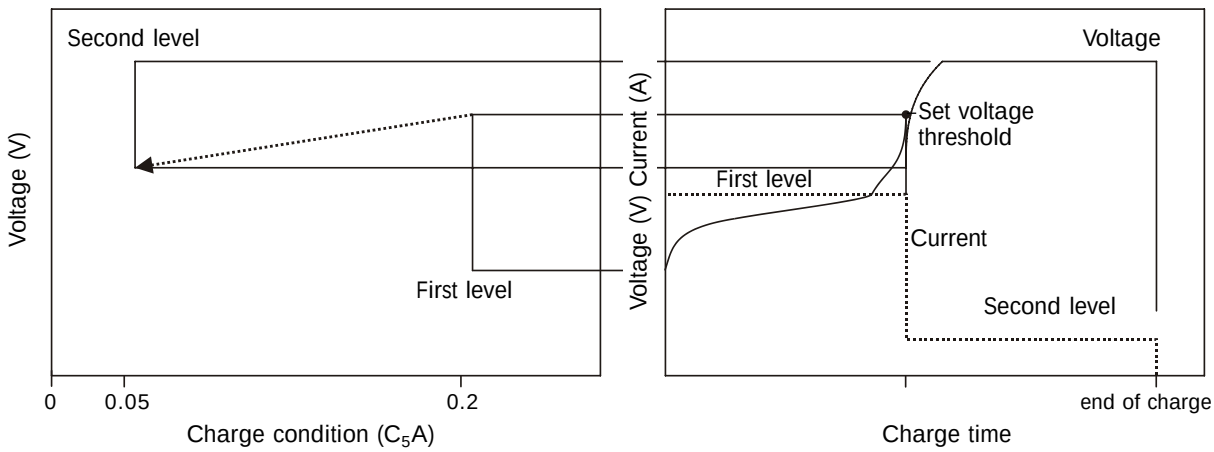
The relation between threshold voltage and temperature can be viewed as linear.

The voltage threshold for STM batteries is indicated at a temperature of +10°C and is adjusted according to the battery temperature with a negative coefficient in millivolts per °C.

- **Voltage threshold**
  The voltage threshold that ends the first level is set at 1.63 V/cell, i.e. 8.15 V per monoblock.
- **Temperature coefficient**:
  For T>10°C
  –0.003 V/°C/cell,
  i.e. –0.015 V/°C/monoblock.

  For T<10°C
  –0.006 V/°C/cell,
  i.e. –0.03 V/°C/monoblock.

  Cut-off can be manual, controlled by a time switch, or electronically.



	STM 5-100 MR and MRE	STM 5-140 MR
First level		
Constant current	20 A	28 A
0.2 C_5A		
Voltage threshold	8.15 V/monoblock	8.15 V/monoblock
Time t1	until the voltage threshold is reached	
Second level		
Constant current	5 A	7 A
0.05 C_5A		
Voltage threshold	open	open
Temperature coefficient	–0.015 V/°C/monoblock T>10°C –0.03 V/°C/monoblock T<10°C	
Overcharge coefficient	1.15	

Recommended charge method for STM monoblocks

Examples of charge voltage at different temperatures:

■ Charge of an STM monoblock at +35°C:
Voltage threshold at +10°C .....8.15 V
Charge temperature .....+35°C
Temperature difference starting at +10°C .....+25°C
Correcting factor of the:
Voltage threshold +25°C x (–0.015) V/°C =..... –0.375 V
Voltage threshold for charge at +35°C 8.15 V –0.375 V = .. 7.78 V

■ Charge of a STM monoblock at 0°C:
Voltage threshold at +10°C .....8.15 V
Charge temperature .....0°C
Temperature difference starting at +10°C .....–10°C
Correcting factor of the:
Voltage threshold –10°C x (–0.03)V/°C = ... +0.3 V
Voltage threshold for charge at 0°C8.15 V +0.3 V =..... 8.45 V

A special document concerning the charging methods recommended by Saft is available on request from the application service.