

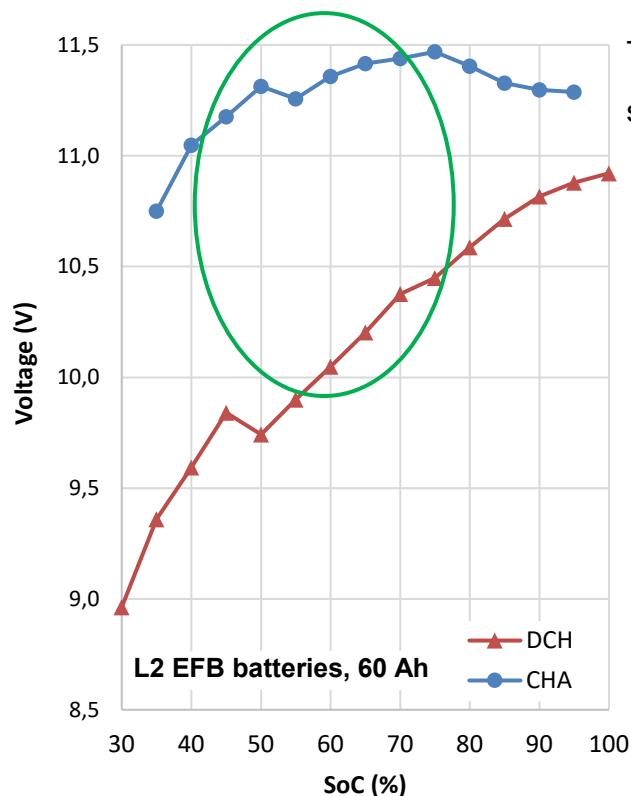
CR13:Enhanced SoF in auxiliary batteries: Voltage plateau evaluation

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May 20th 2026

CR13: Enhanced SoF in auxiliary batteries: Voltage plateau evaluation. Exide

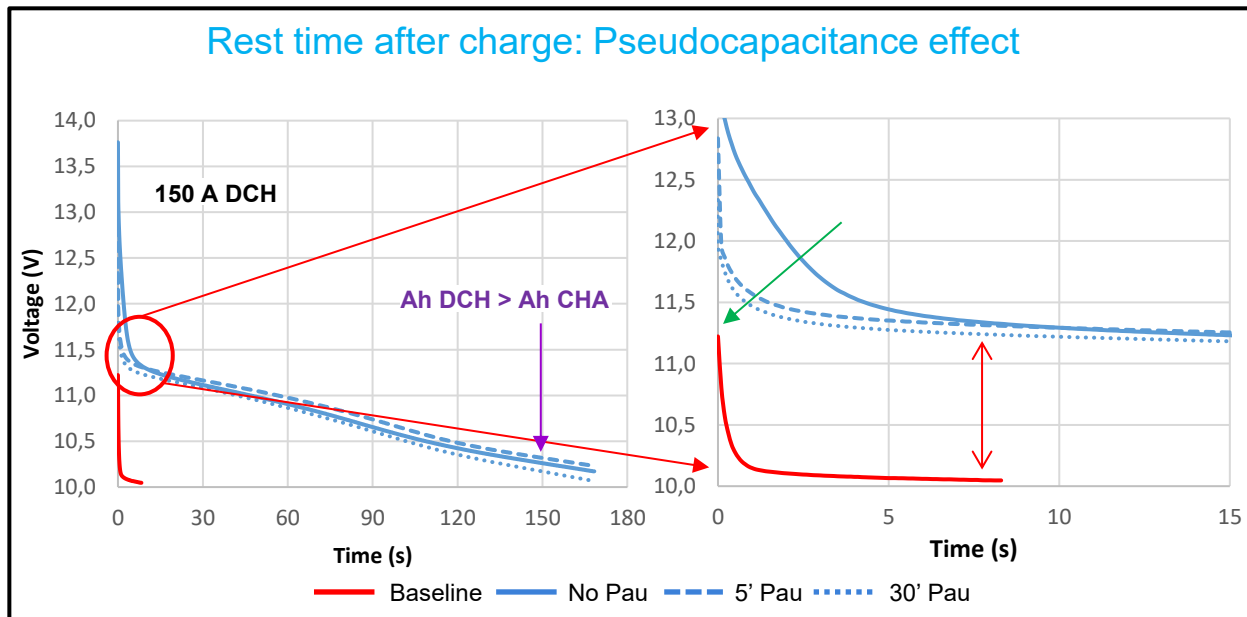
Control frame -18°C



The test starts with a fully charged battery that is soaked to target temperature (-18 °C)

The batteries are discharged at I20 in 5% SoC intervals that includes at the end of every step a pulse of 8s at 150 A, every point in the graph is the voltage value at 8s

Rest time after charge: Pseudocapacitance effect

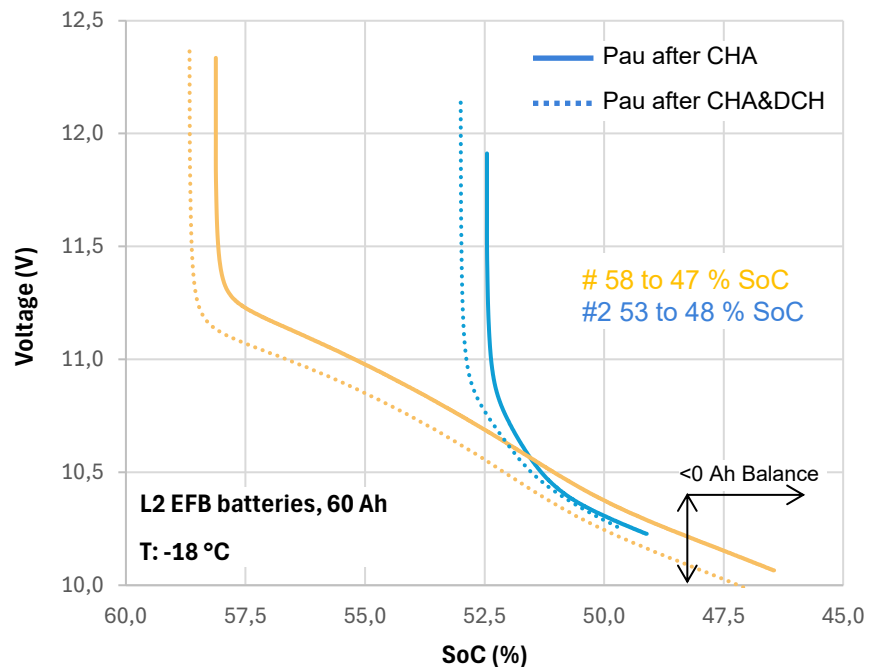


Pseudocapacitance vanish in few minutes, but voltage plateau uplift remains!

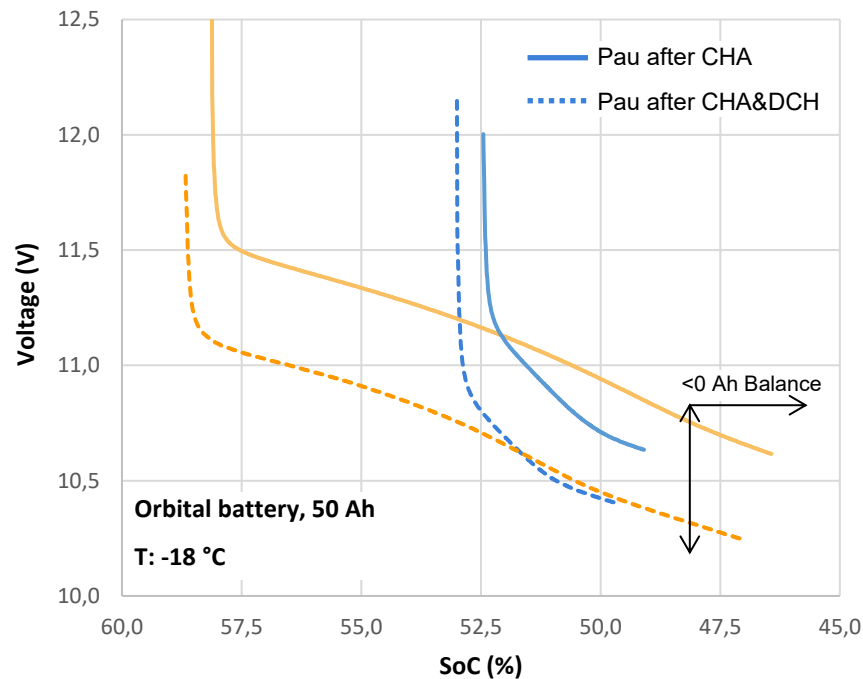
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EFB vs AGM

EFB



AGM orbital

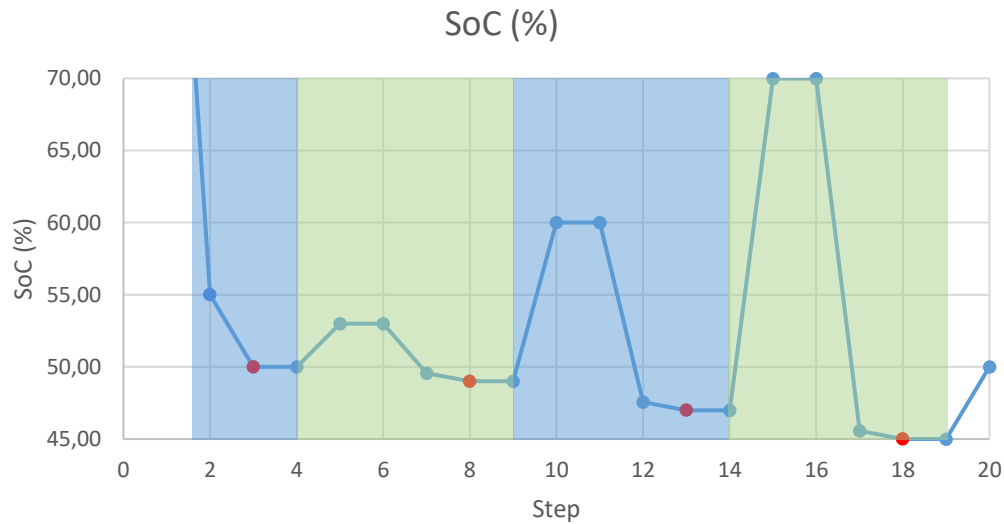


Cool down after discharge (with a pause) reduces the charge effectiveness affecting the later performance during the discharges

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Step	Conditions			SoC (%)
1	Start			100,00
2	DCH	3 A		55,00
3	DCH	150 A	72 s	50,00
4	PAU	2 h		50,00
5	CHA	15 V / 60 A	1,8 Ah	53,00
6	PAU	30 min		53,00
7	DCH	3 (60) A		49,56
8	DCH	150 A	8 s	49,00
9	PAU	2 h		49,00
10	CHA	15 V / 60 A	6,6 Ah	60,00
11	PAU	30 min		60,00
12	DCH	3 (60) A		47,56
13	DCH	150 A	8 s	47,00
14	PAU	2 h		47,00
15	CHA	15 V / 60 A	13,8 Ah	70,00
16	PAU	30 min		70,00
17	DCH	3 (60) A		45,56
18	DCH	150 A	8 s	45,00
19	PAU	2 h		45,00
20	CHA	15 V / 60 A	3 Ah	50,00
21	STO			

- Deeper discharges each step
- Lower final SoC
- Different discharge history (3/60 A) but same amount of charge in every block



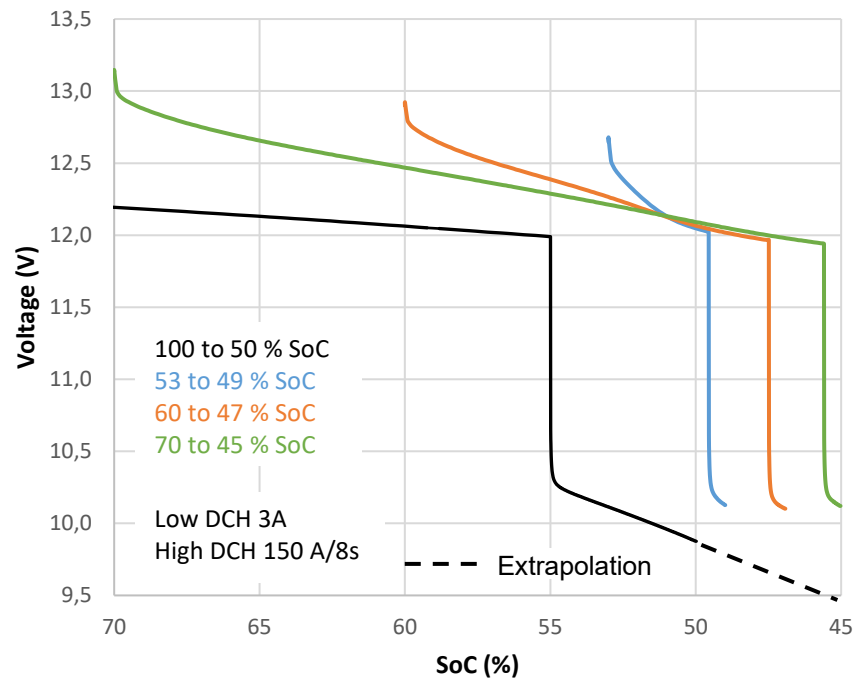
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L2 EFB batteries, 60 Ah T: -18 °C Ah DCH > Ah CHA

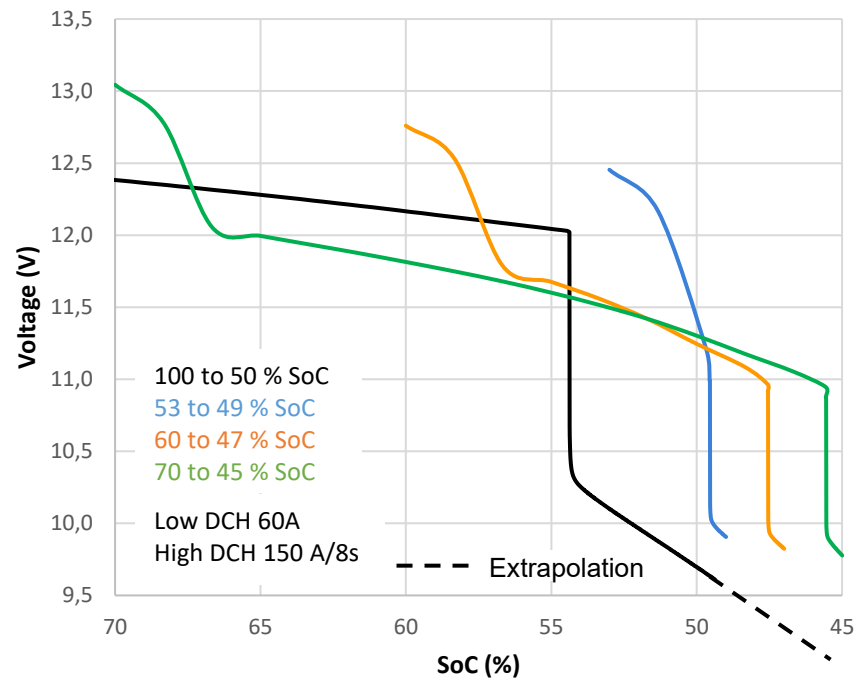
Same amount of charge is drained from the battery at different rates

EFB

I20 & 150 A DCH



20*I20 & 150 A DCH



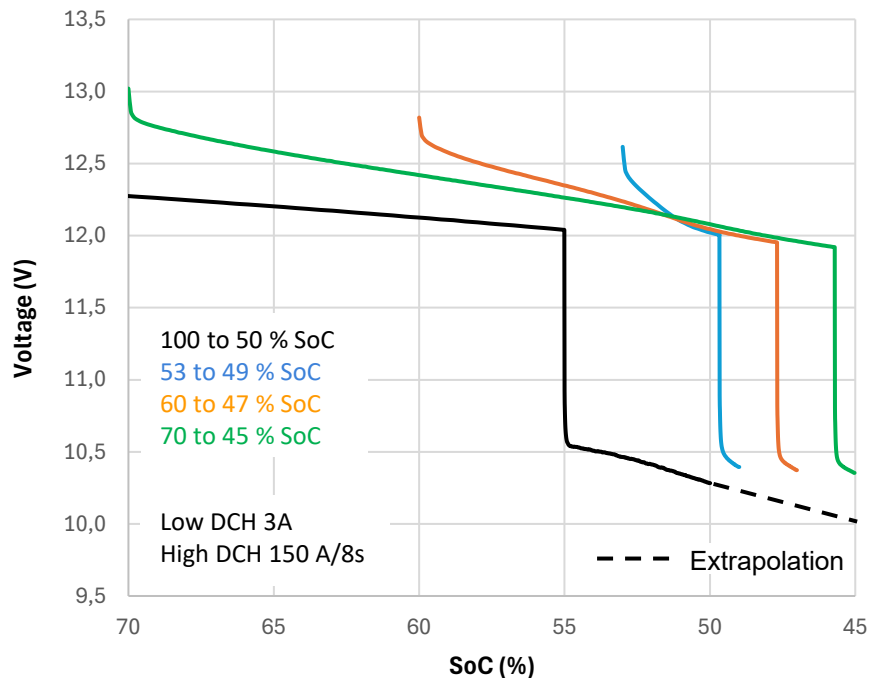
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Orbital (Spiral design) AGM batteries, 50 Ah T: -18 °C Ah DCH > Ah CHA

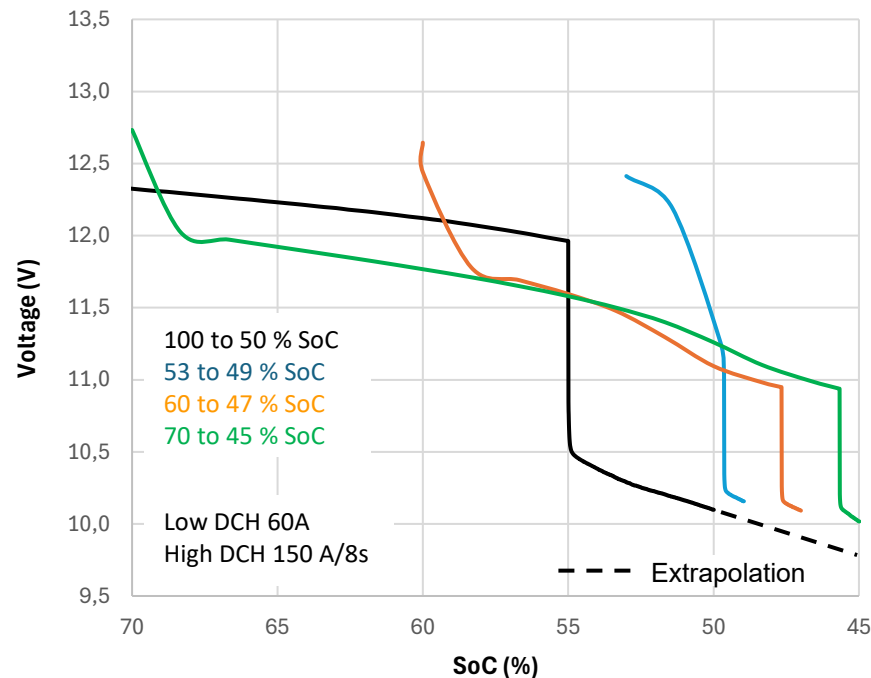
Same amount of charge is drained from the battery at different rates

AGM

I20 & 150 A DCH



20*I20 & 150 A DCH



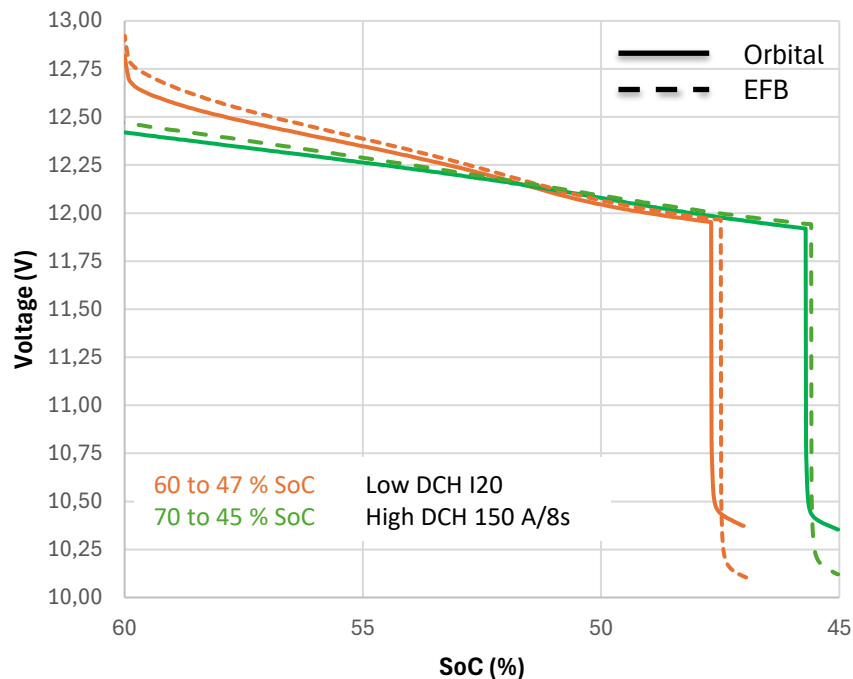
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L2 EFB batteries, 60 Ah // Orbital (Spiral design) AGM batteries, 50 Ah

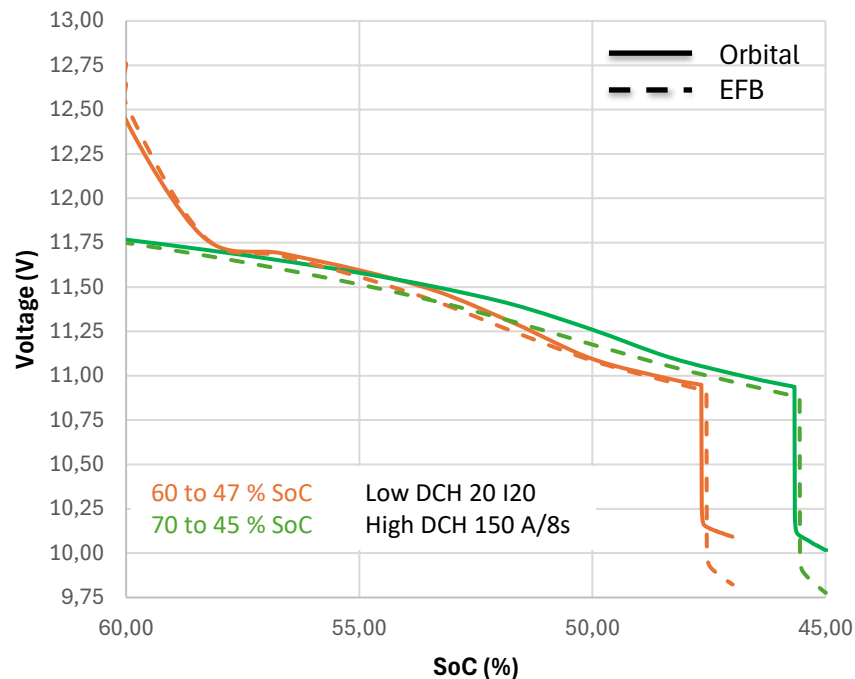
T: -18 °C Ah DCH > Ah CHA Same amount of charge is drained from the battery at different rates

EFB vs AGM

I20 & 150 A DCH



20*I20 & 150 A DCH



Conclusions

- Pseudocapacitance effect disappears after a few minutes
- The plateau uplift is available for discharge for longer time
- The plateau uplift is maintained even when drained Ah are higher than the previous recharged
- End voltage is always higher when a previous recharge has been done even at lower SoC