Panasonic
ideas for life

EV battery introduction

High power & Long cycle life type VRLA battery

EV battery : VRLA battery for Electric Vehicle application

Panasonic Storage Battery Co., Ltd.

Concept to develop EV battery

●Low Maintenance

- VRLA Battery (AGM type)

●High Power

- at the end of discharge
- in the wide temperature

●Rapid Charge

- Rapid charge capability

●Long Cycle Life

- Keep power characteristics until end of life
- High quality and reliability in battery pack

●Recycling

- Same material as SLI battery（Automotive battery)

Specifications of EV battery

- ◆ For pure EV applications two models
- ◆ For HV application one model

		For Pure EV		For HV
		EC-FV1260	EC-FV1238	EC-HV1255
Out line				
Nominal Voltage		12V	12V	12V
Nominal Capacity		60Ah	38Ah	55Ah
Dimension	Height	175mm	175mm	175mm
	Length	388mm	261mm	388mm
	Width	116mm	116mm	116mm
Mass		21kg	14kg	22kg
Terminal	Position	Upper side center	Upper side center	Upper side center
	Type	Stud Bolt Bolt:M8mm P1.25mm H13mm	Stud Bolt Bolt:M8mm P1.25mm H13mm	Stud Bolt Bolt:M8mm P1.25mm H13mm
Capasity (25deg.C)	1/3CA	53Ah	35Ah	57Ah
	3CA	34Ah	23Ah	43Ah

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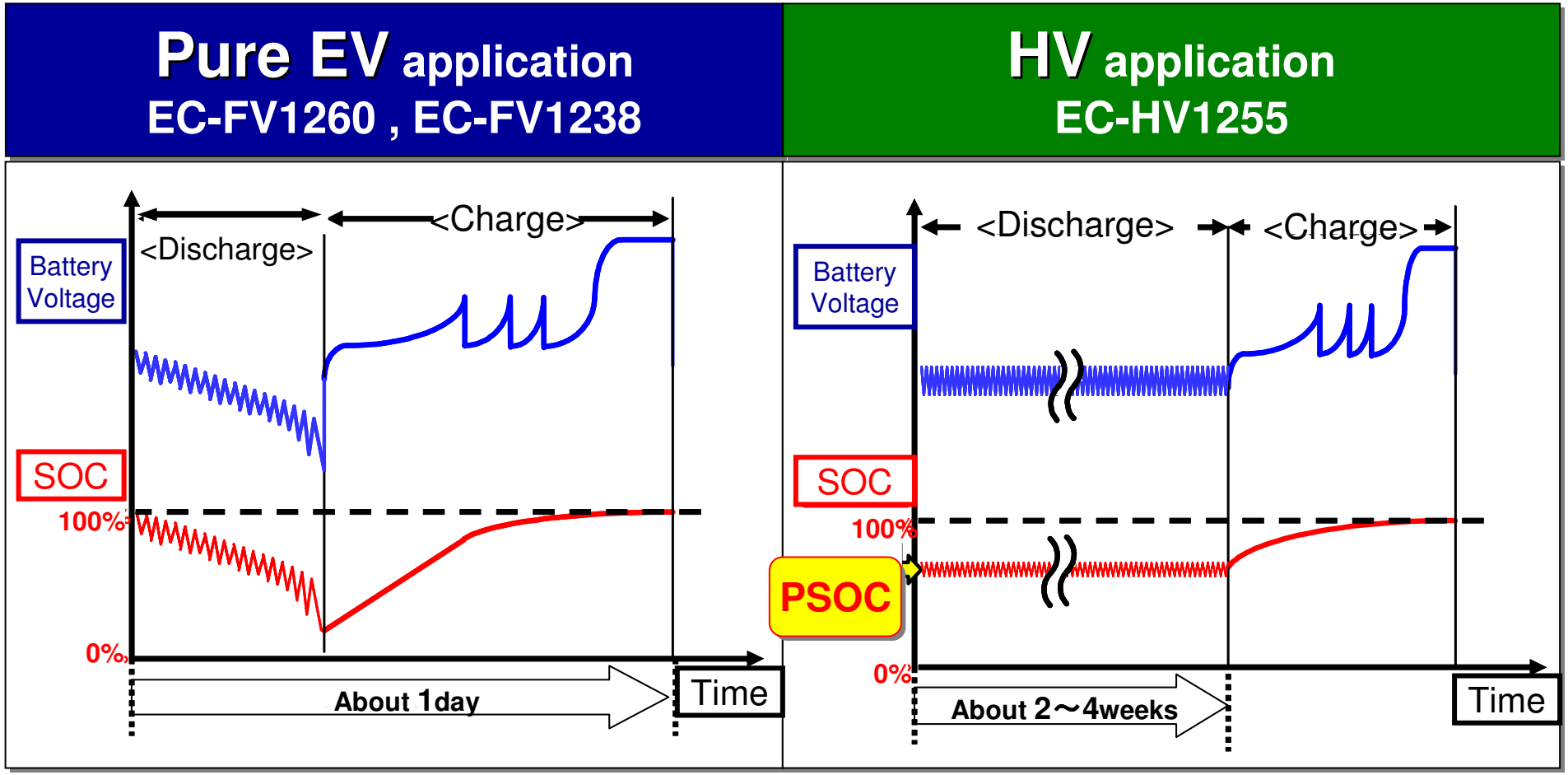
Application image of EV battery



SOC :State of Charge
PSOC :Partial Stet of Charge

Technologies for EV Battery

●Electrodes

- ・Special grid alloy and grid design
- ・Thin electrode design
- ・Special additives and contents

●2ply Separators

- ・Glass fiber and Synthetic fiber

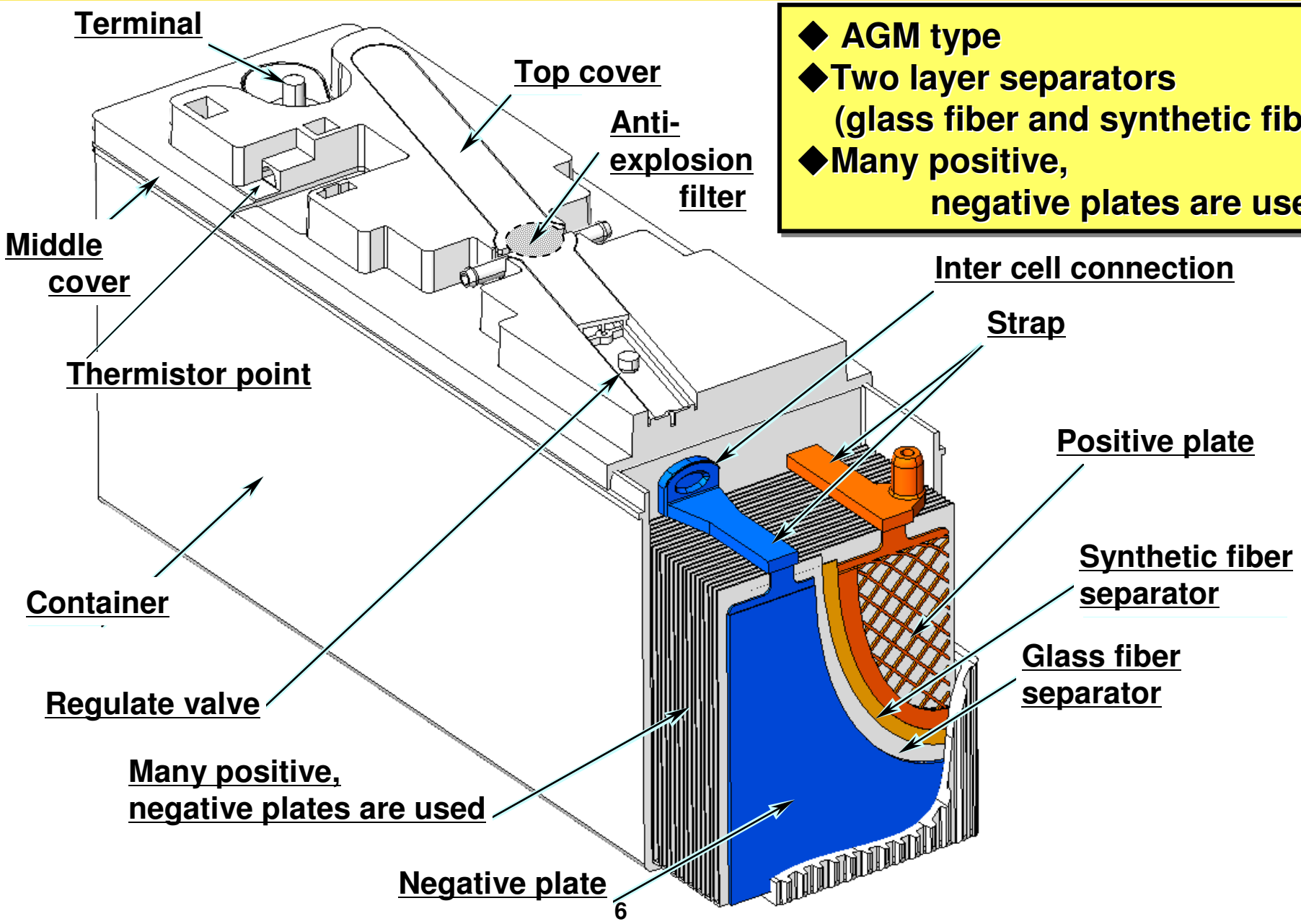
●Production Method

- ・ISO 9001 certified
- ・More Quality Check Points

●Battery Management

- ・Excellent charge method

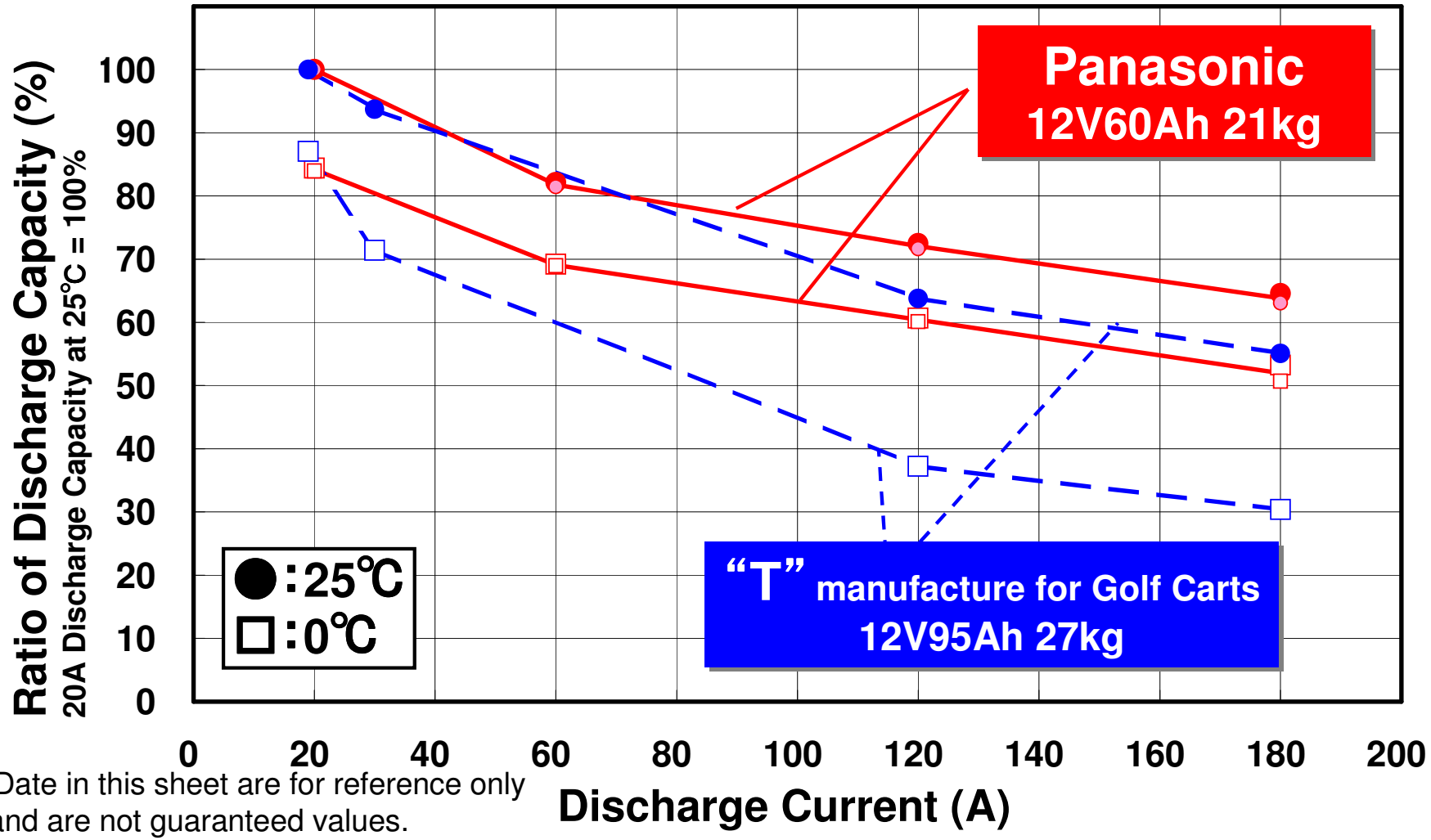
Structure of EV battery / EC-FV1260



- ◆ AGM type
- ◆Two layer separators (glass fiber and synthetic fiber)
- ◆Many positive, negative plates are used

Discharge Capacity of EV Battery #1 vs. Vent type Lead Acid battery for Golf Carts

◆**Excellent Discharge Performance at low temperature, at High rate Discharge**



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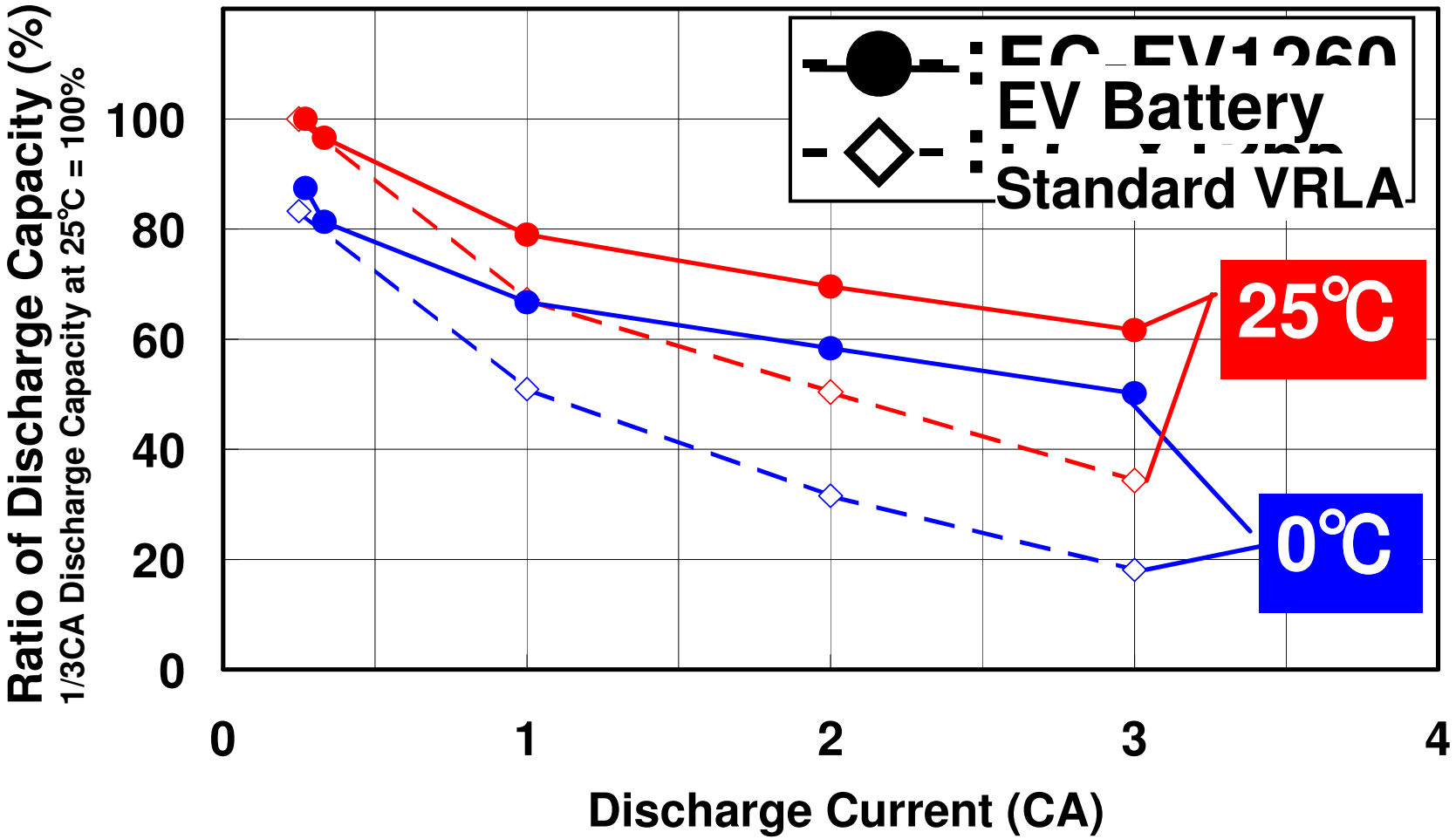
Discharge Capacity of EV Battery #1 vs. VRLA battery by Shenyang

◆Excellent Discharge Performance
at low temperature, at High rate Discharge



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Recommendation Charge method of EV battery

◆5 Step-CCC (constant current charge) method

Charge profile (12V60Ah)

1st～4th step

Charge current I_1= 0.2 CA (12A)
I_2= 0.1 CA (6A)
I_3= 0.05 CA (3A)
I_4= 0.025 CA (1.5A)

Switching voltage

V=14.4 V+0.03 V(25-T)

T：Battery temperature(℃)

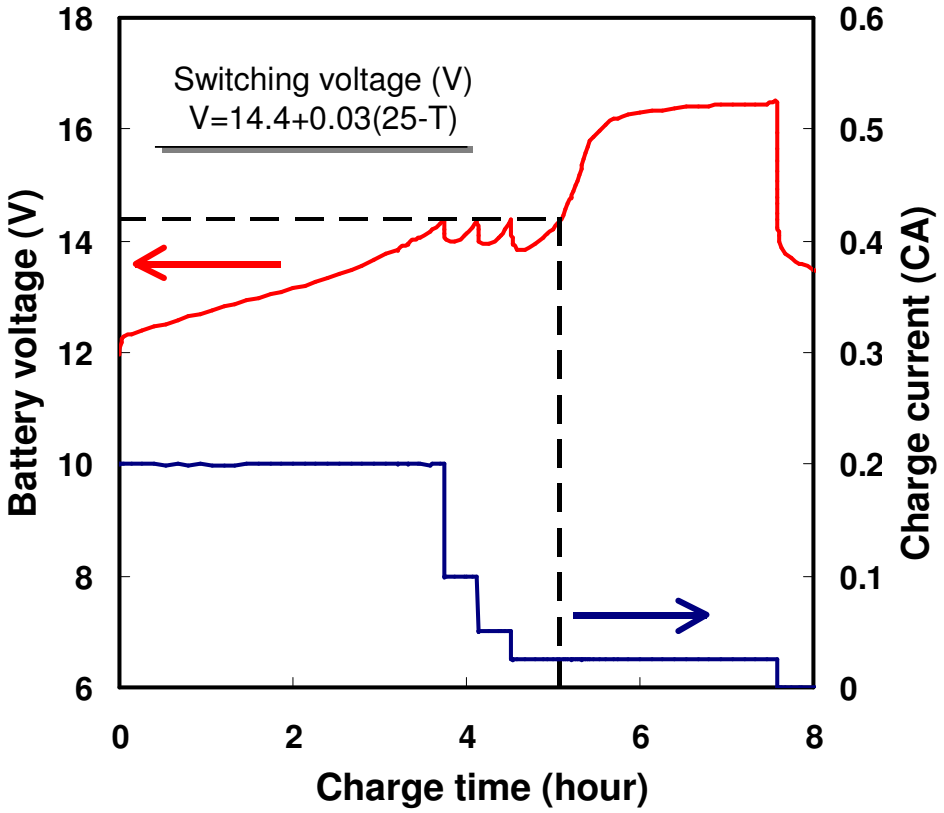
5th：step

Charge current I_5= 0.025 CA (=I_4)

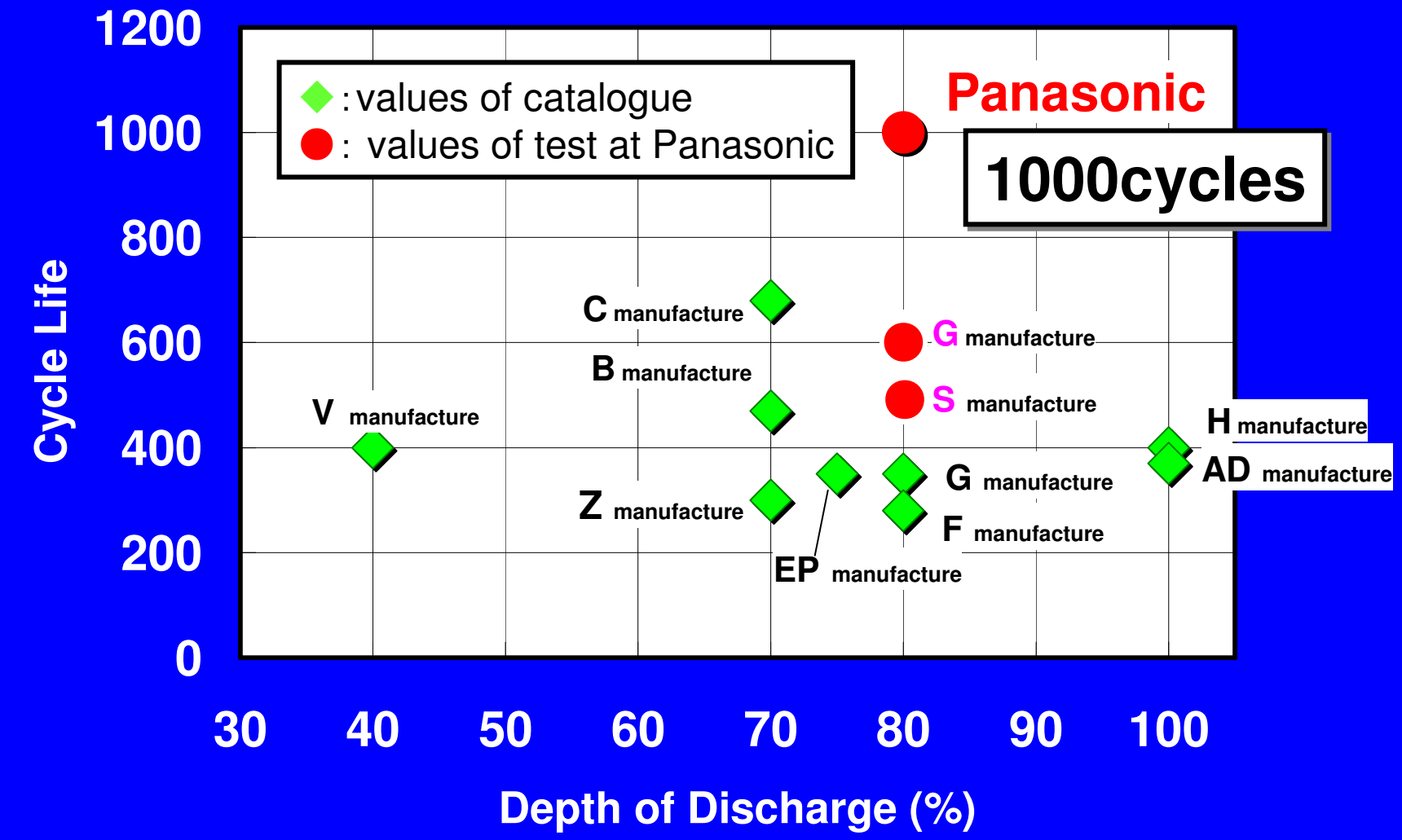
Charge time

t_5 is decided by the charge time and the temperature of 1st step

An example of charge profile from 80% DOD



Cycle Life Performance #1 vs. competitor



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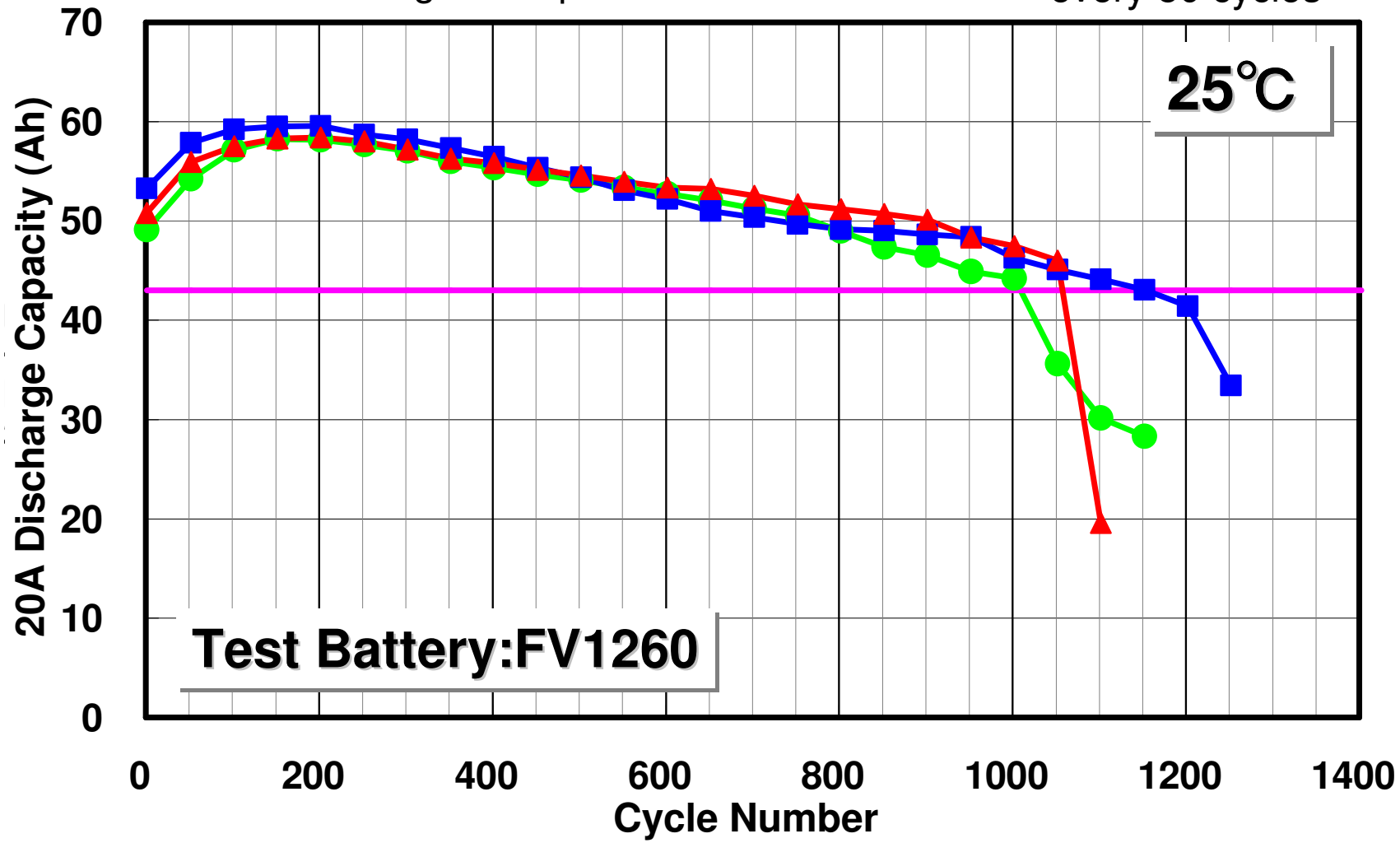
Cycle Life Performance #2
1/3CA Discharge DOD 80%

【Cycle test condition】Temp.:25℃
Discharge:20A 48Ah
Charge:5Step -CCC

【Capacity check】Temp:25℃
Discharge:20A 9.9Vcut
every 50 cycles



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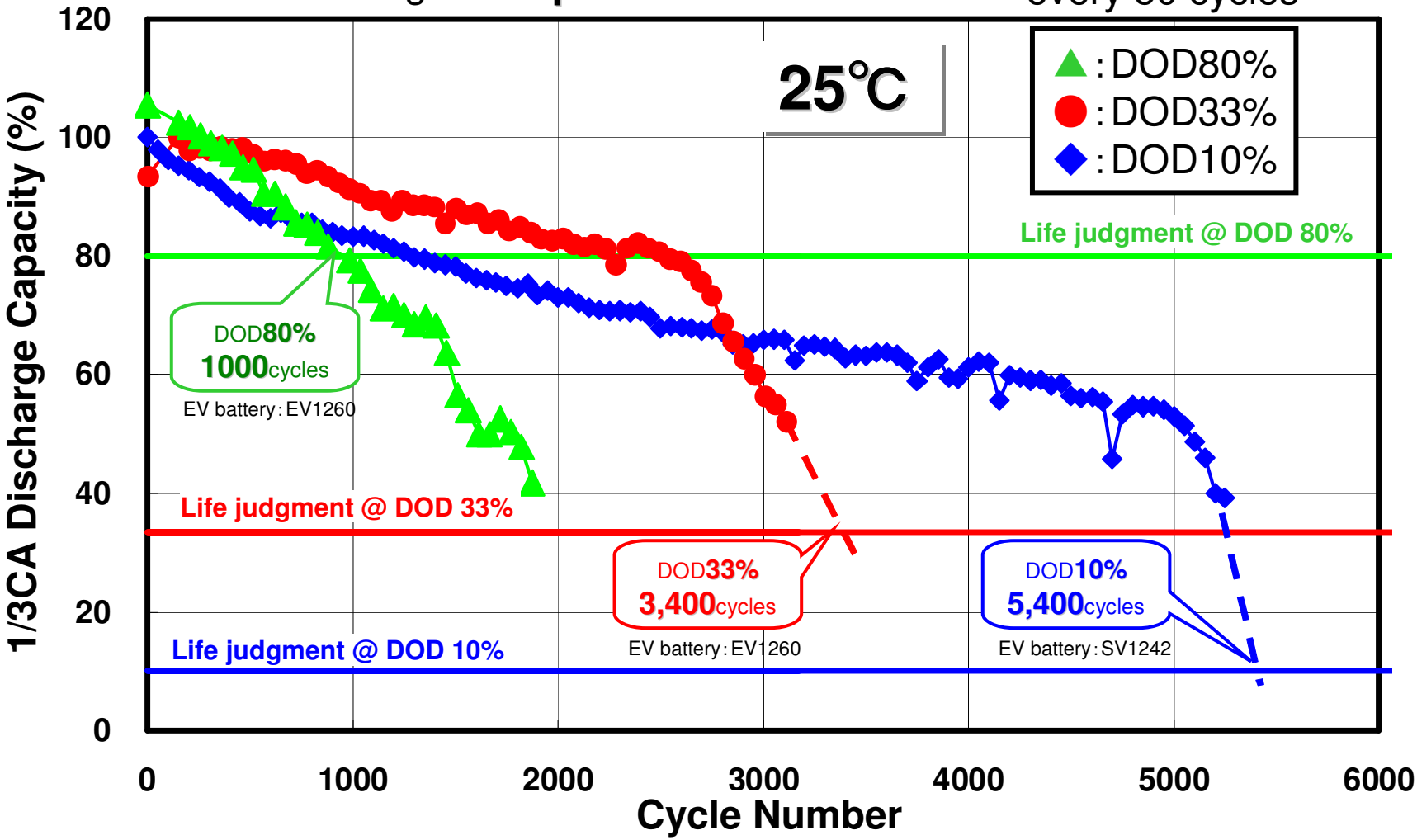
Cycle Life Performance #3
1/3CA Discharge DOD 80% & 33% & 10%

【Cycle test condition】Temp.：25℃
Discharge：1/3CA
Charge：**5Step –CCC**

【Capacity check】Temp：25℃
Discharge：1/3CA 9.9Vcut
every 50 cycles



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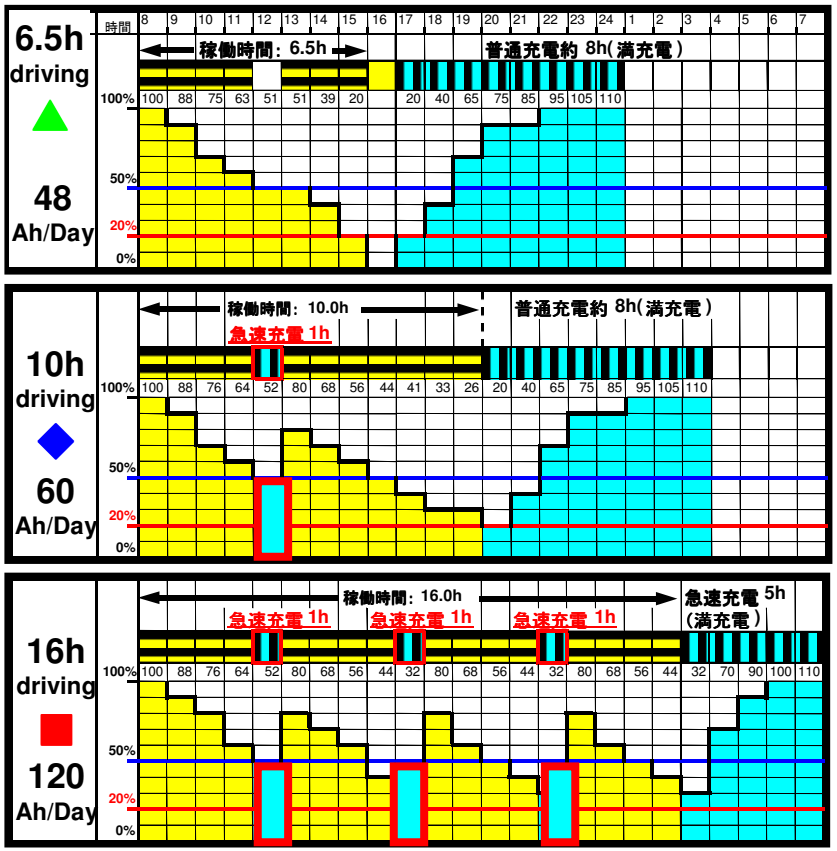
Cycle Life Performance #4 for Rapid Charge application

◆Rapid Charge applications Pattern

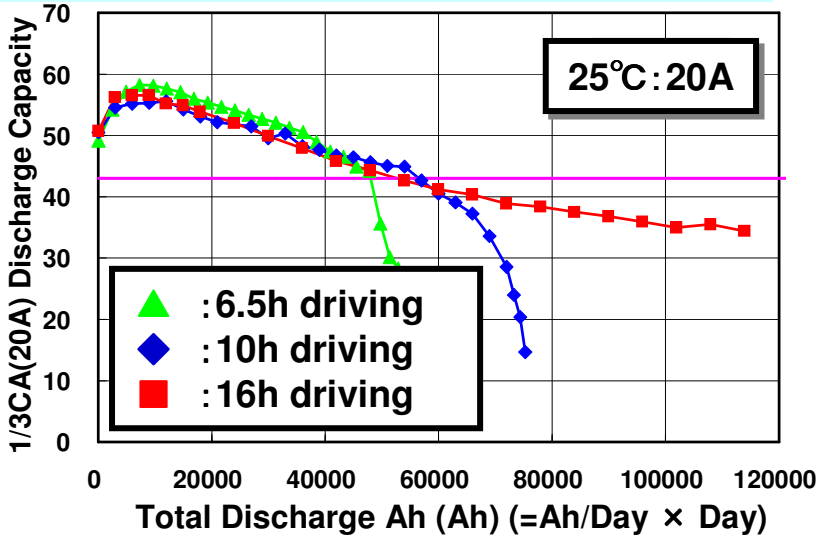
: Discharege:1/3CA(20A)

: Charge:5step-CCC

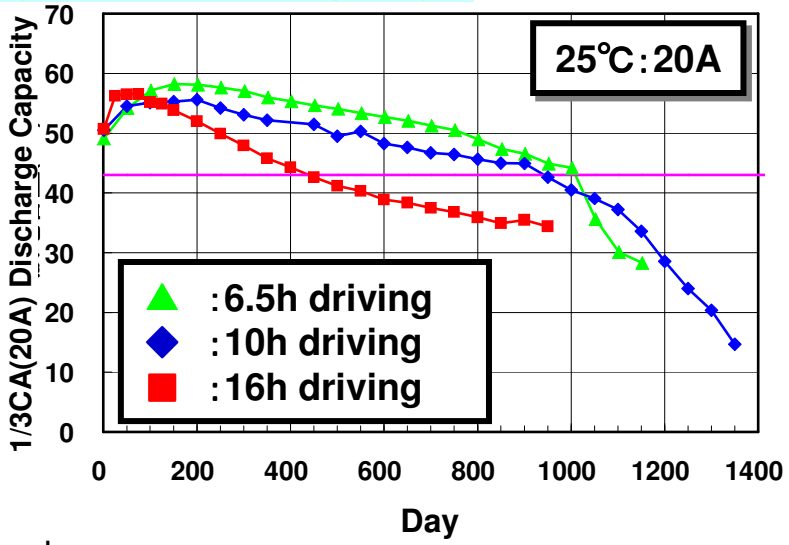
: Rapid Charge:0.6CA



＜Total Discharge Ah－1/3CA(20A) Capacity＞



＜Day－1/3CA(20A) Capacity＞



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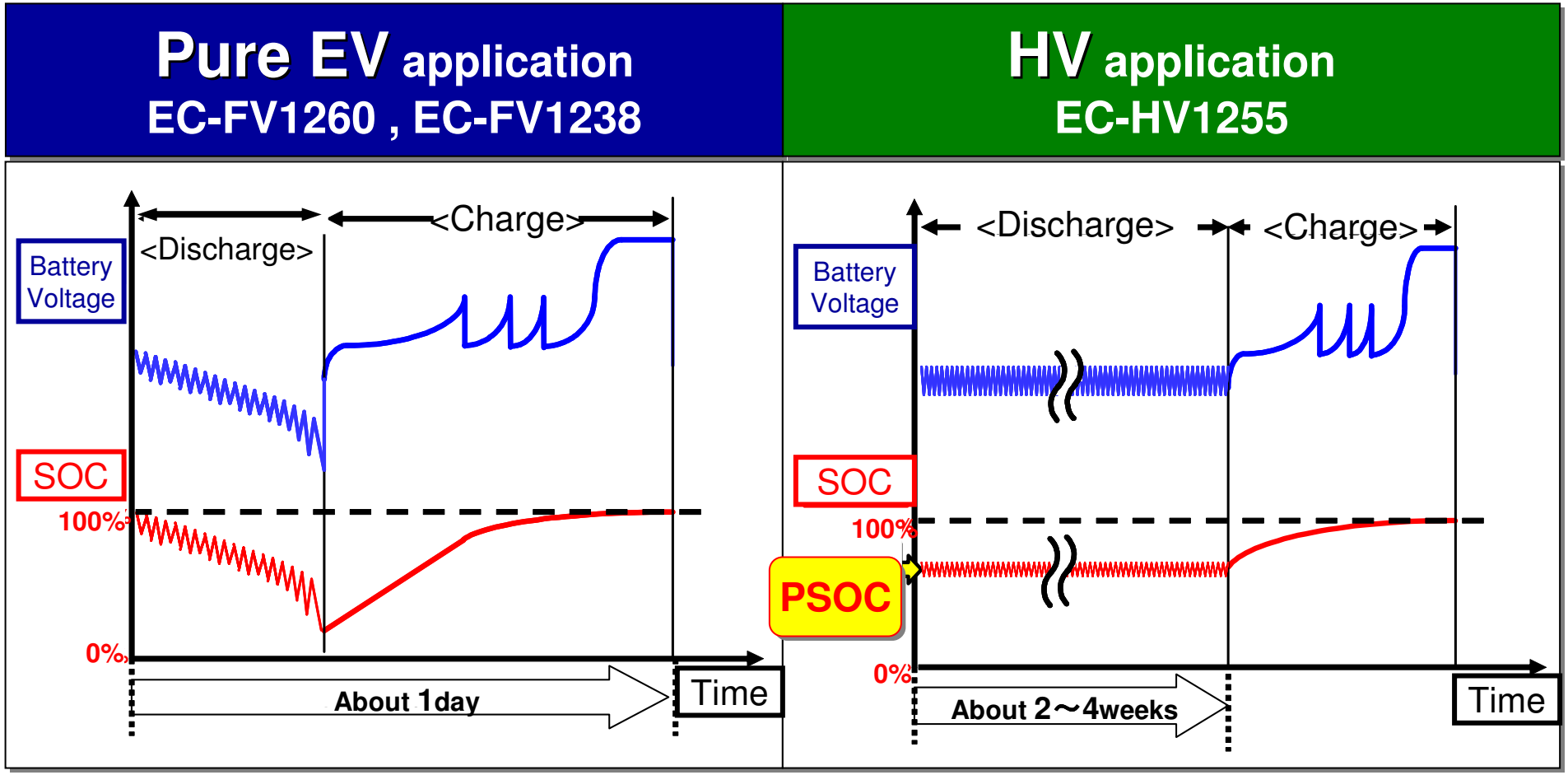
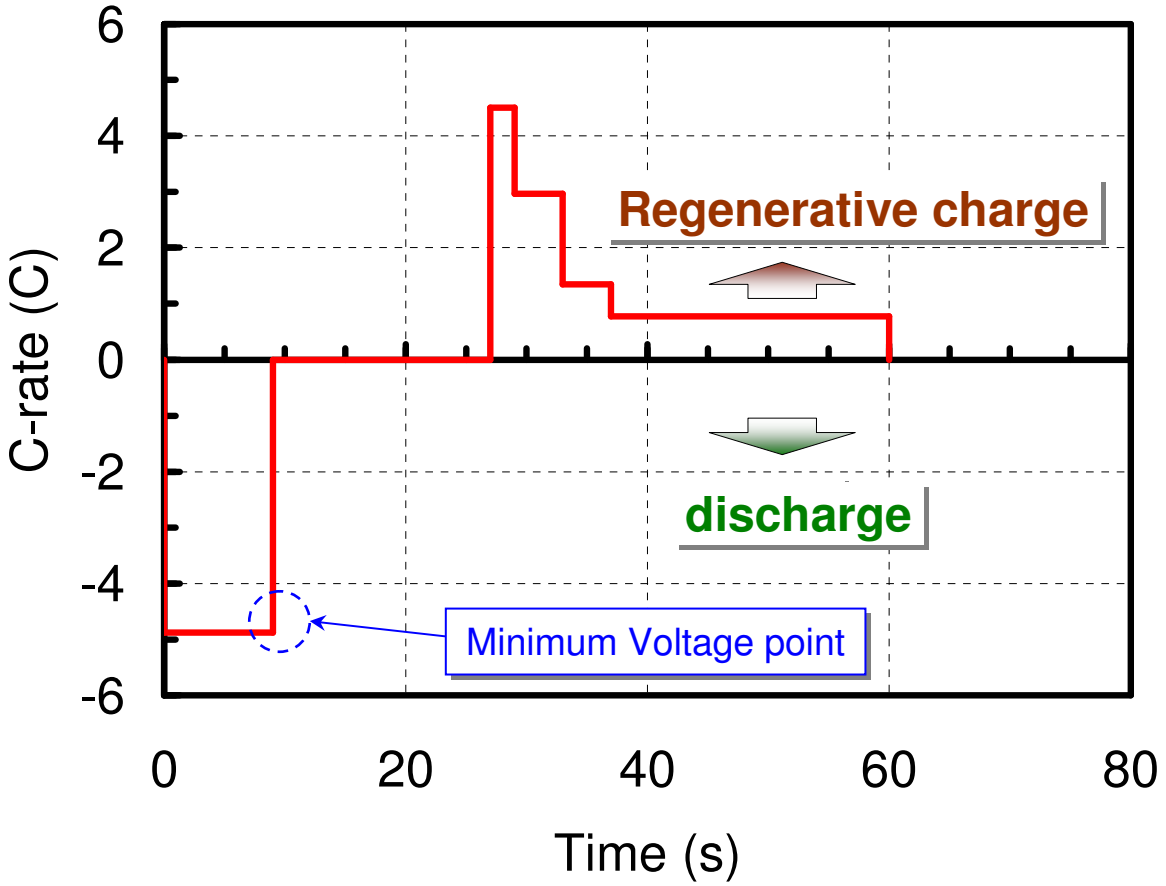


SOC :State of Charge
PSOC :Partial Stet of Charge

PSOC (Partial State of Charge) cycle Life test condition

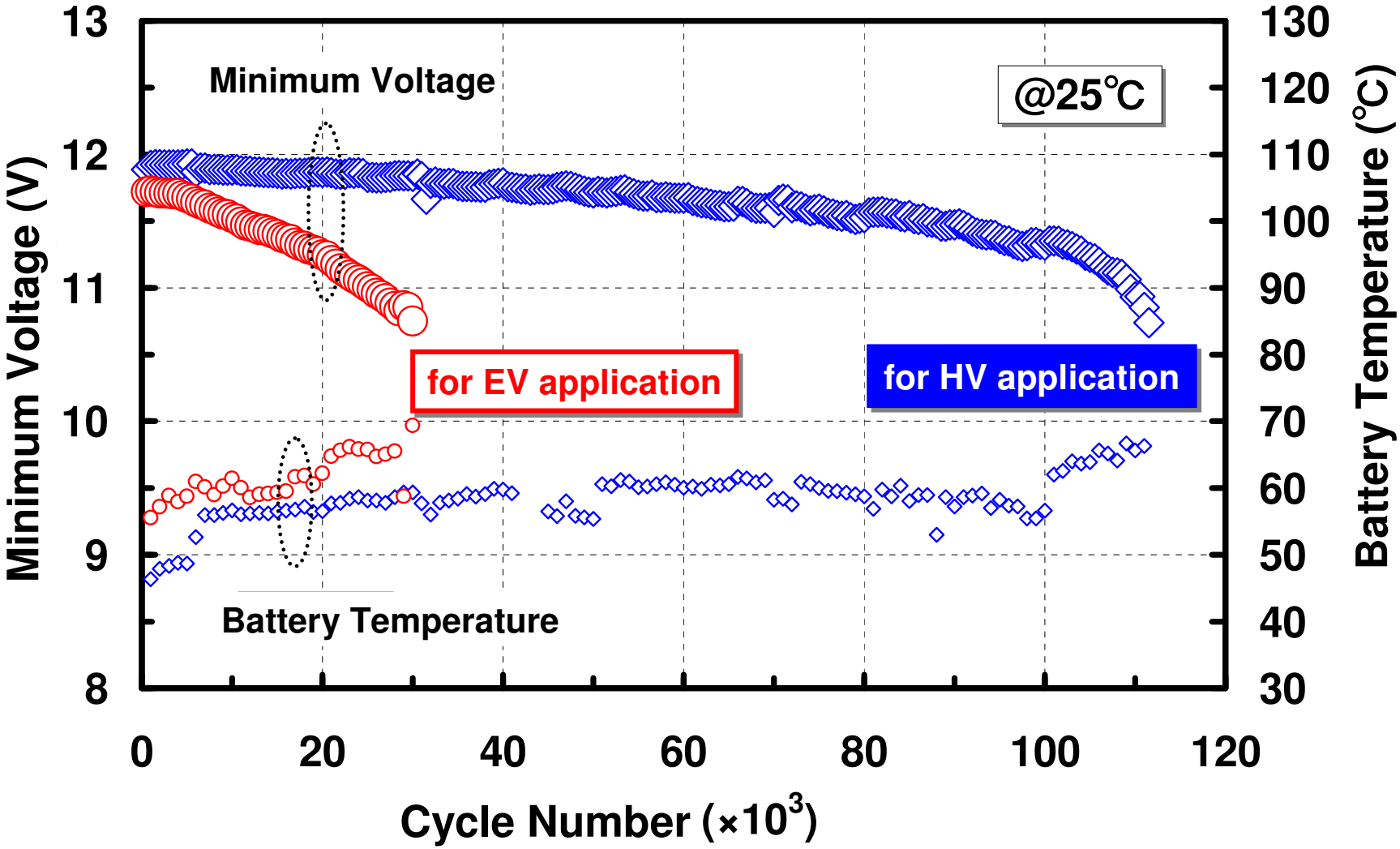
Test condition

- SOC center : 70%
- Ambient Temp. : 25℃
- Measure items :
  - ①Minimum Voltage
  - ②Battery Temp.



【Source】 PNGV Battery Test Manual *(1998/5, U.S. Department of Energy)*

PSOC (Partial State of Charge) cycle Life Performance



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