



Charging Performance of EVs

EV Fast & Smart Charging cluster (F&SC)

3rd meeting, 21st February 2025

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Topics

- ❑ Overview of the JRC technical facilities for vehicle testing e-mobility
- ❑ Description of equipment and testing methodology
- ❑ Charging profiles
- ❑ Points of discussion



Overview of the JRC technical facilities for vehicle testing e-mobility (VeLA laboratories)



Vehicle Emission Laboratory (VeLA)

The VeLA laboratories permit to evaluate experimentally the electric vehicles functionality, their energy efficiency, range, electromagnetic compatibility as well as their interoperability with the smart grid

Overview of the JRC technical facilities for vehicle testing e-mobility (VeLA laboratories)

□ **VeLA 8: The Electric and Hybrid Vehicles Testing Facility**



□ **VeLA9: E-Mobility Electromagnetic Testing Facility**



The European Interoperability Centre for Electric Vehicles and Smart Grids

Description of equipment and testing methodology (1)

- ❑ Modular data acquisition system, high acquisition speeds of up to 1 MS/s per channel. Possibility to connect signals 1000 V

CAN and OBDII interface

- ❑ DC CCS2 breakout box to acquire DC voltage (up to 1000 V) and DC current (up to 400 A)

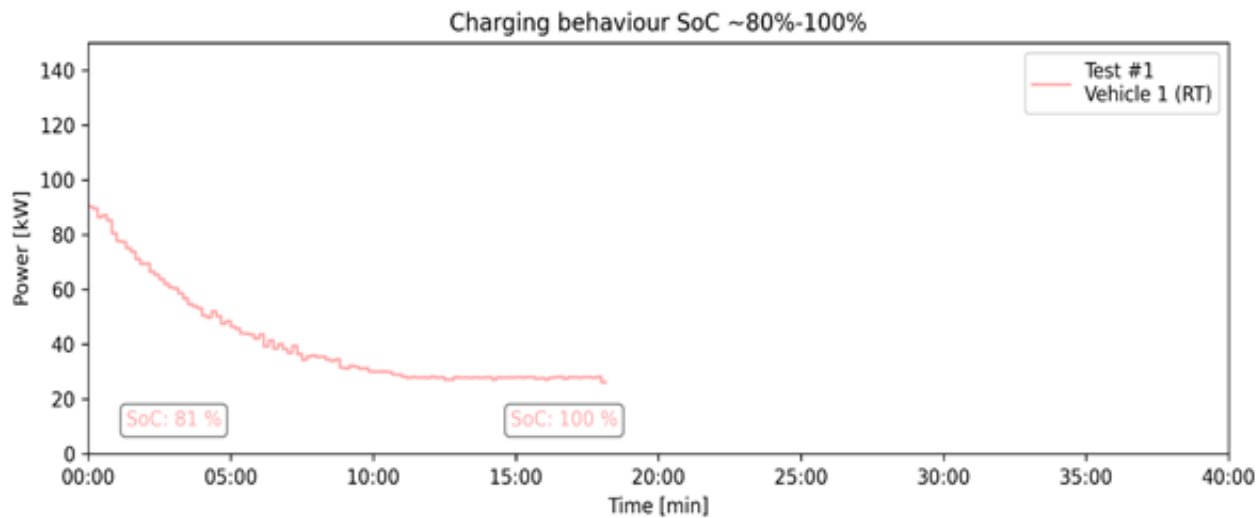
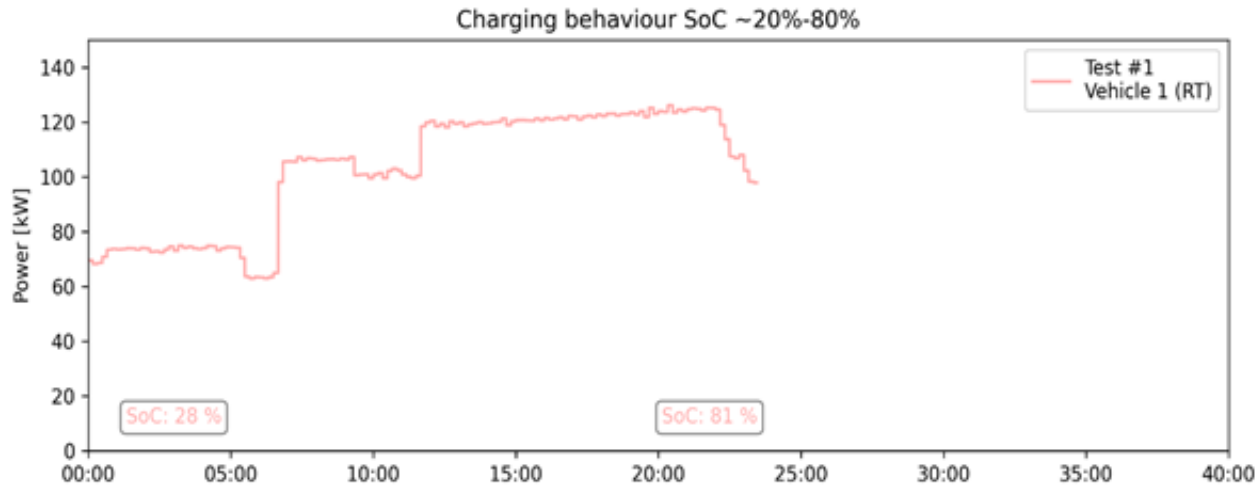
- ❑ Data collected through software acquisition



Description of equipment and testing methodology (2)

- ❑ Only one single DC charger (160 kW maximum power delivered to the vehicle) was used during the entire test campaign
- ❑ 7 BEVs were tested under the same environmental testing condition (room temperature around 20°C)
- ❑ 8 test campaigns, one test was performed in VeLA 8 laboratory at +40 °C
- ❑ Data collected from testing campaigns aimed to measuring the energy efficiency (EE) of the HPC. Support to DG MOVE to identify recommended value to be inserted in Regulations

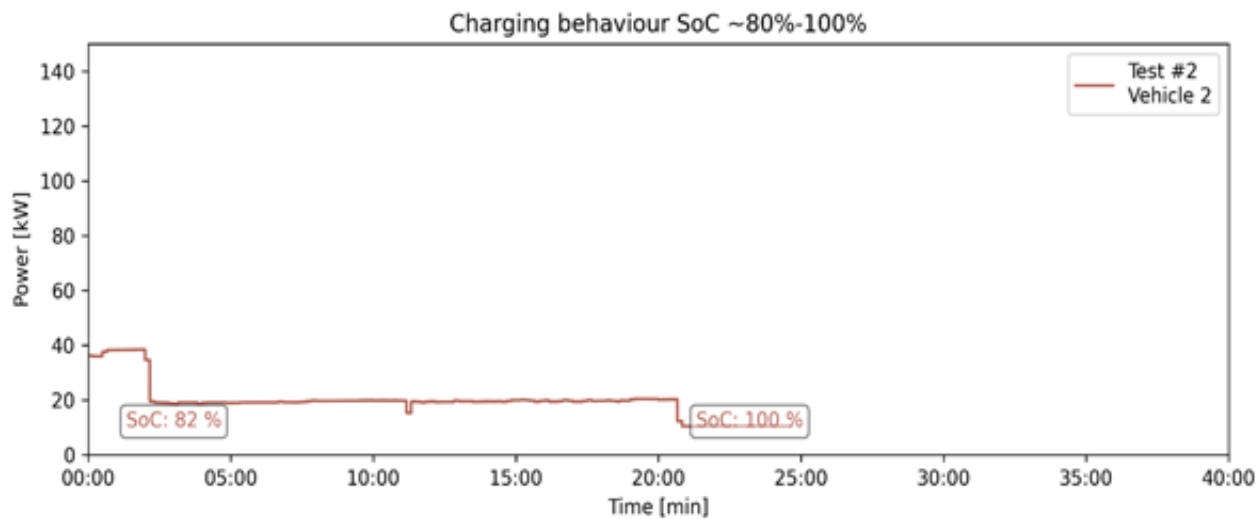
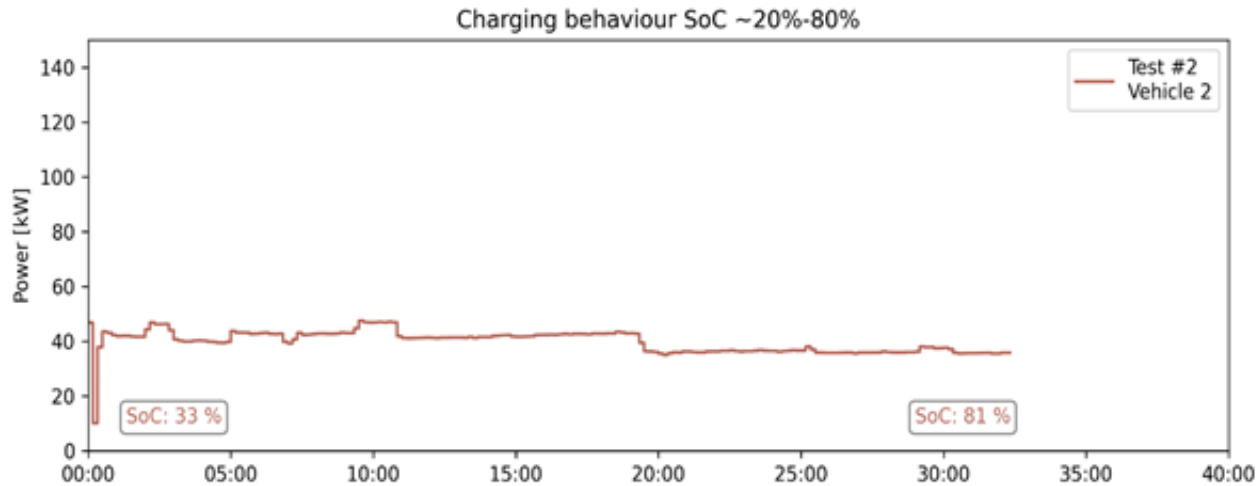
Charging profile # 1



Vehicle #1	
Charge Power (max)	263 kW DC
Charge Power (10-80%)	205 kW DC

source: ev-database.org

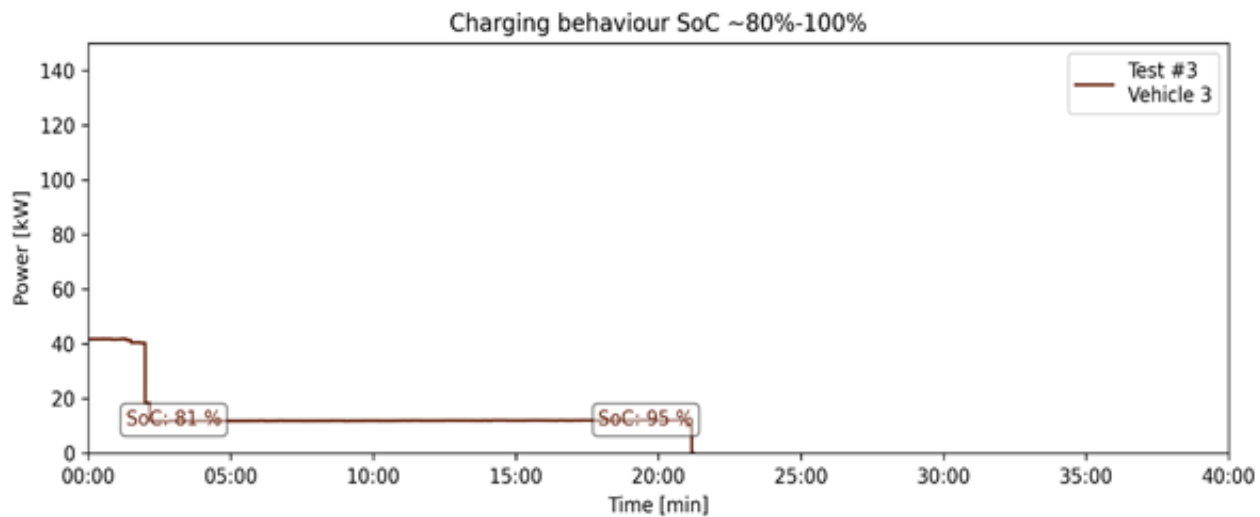
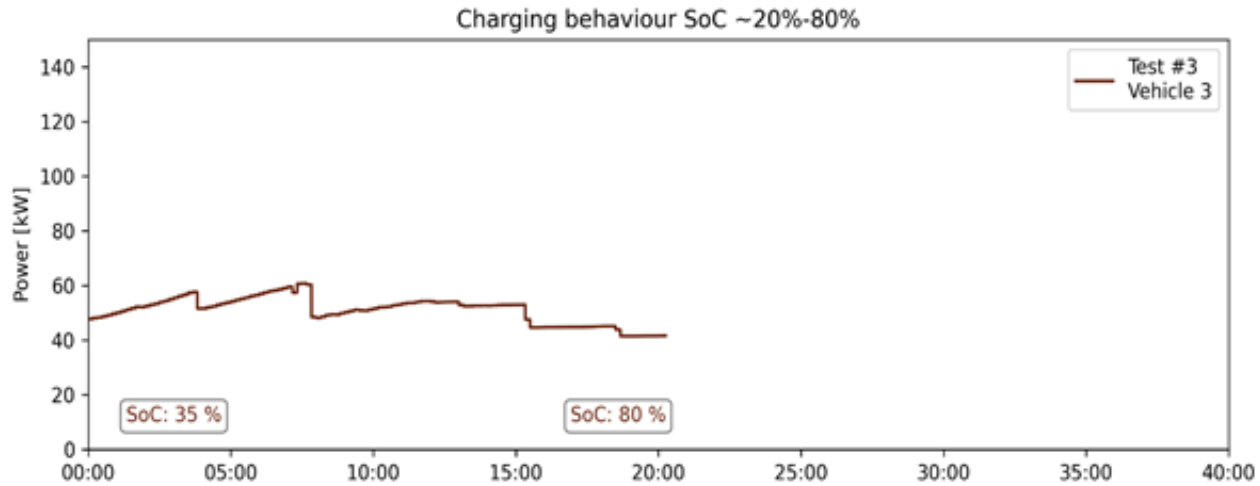
Charging profile # 2



Vehicle #2	
Charge Power (max)	101 kW DC
Charge Power (10-80%)	78 kW DC

source: ev-database.org

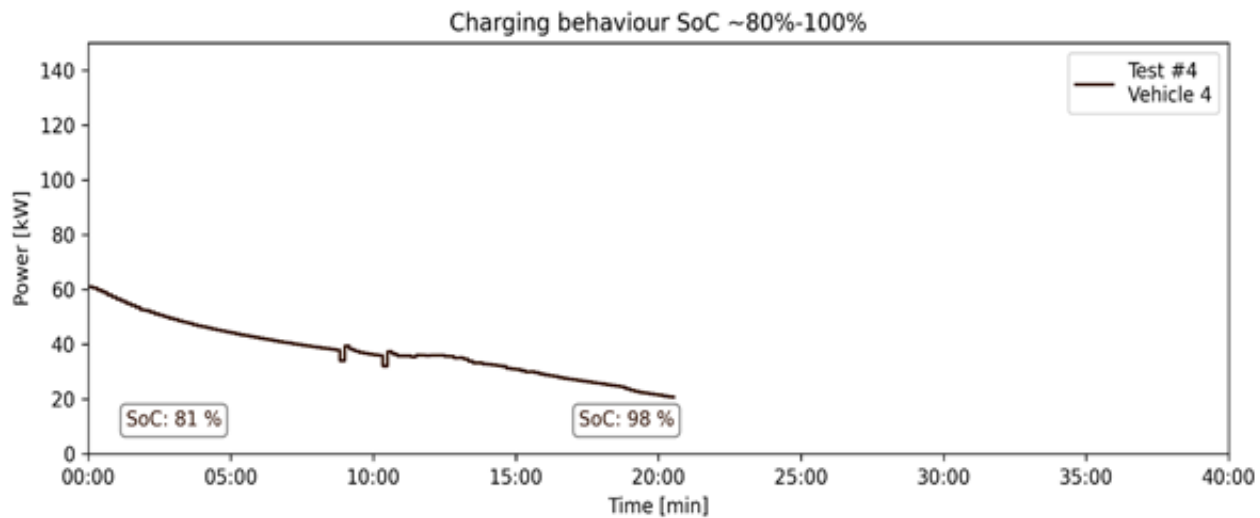
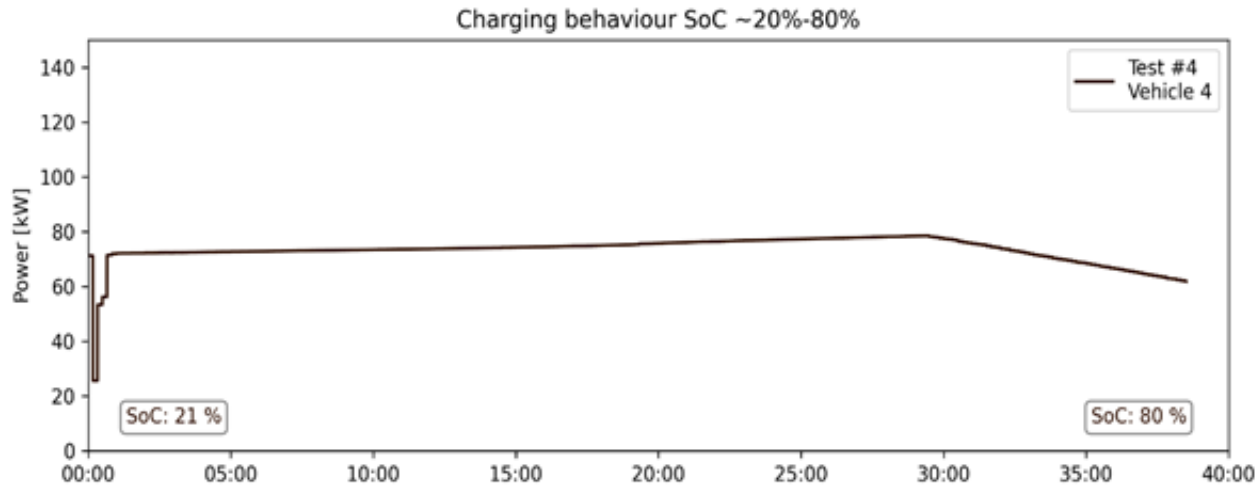
Charging profile # 3



Vehicle #3	
Charge Power (max)	50 kW DC
Charge Power (10-80%)	40 kW DC

source: ev-database.org

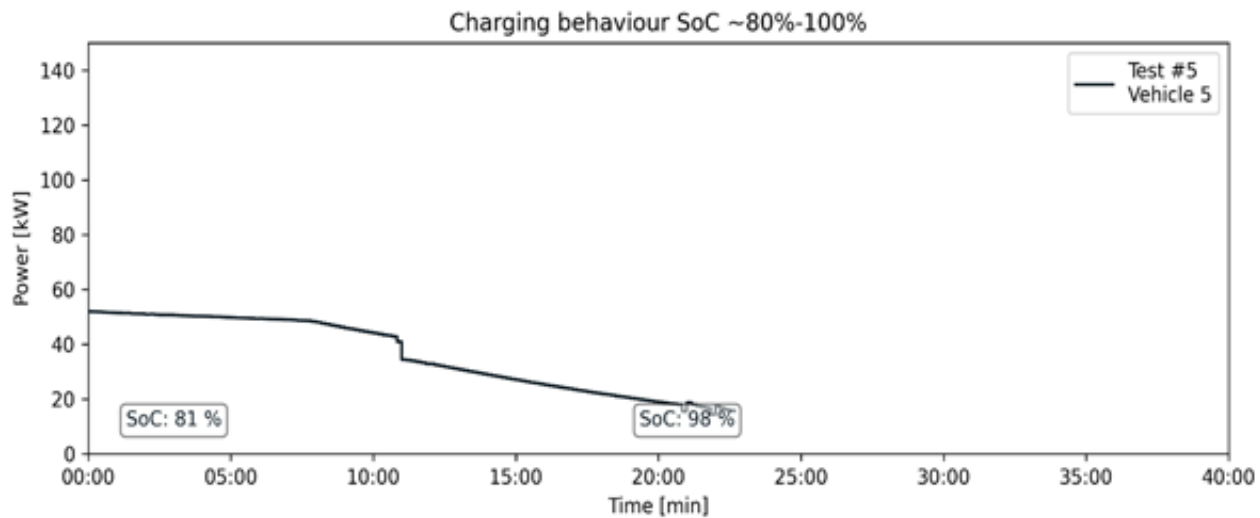
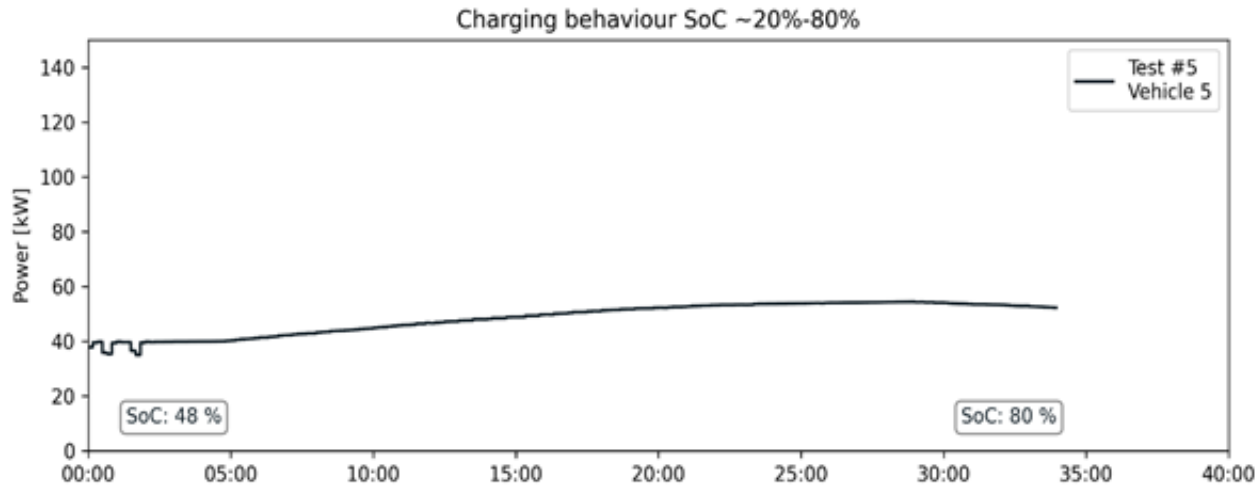
Charging profile # 4



Vehicle #4	
Charge Power (max)	250 kW DC
Charge Power (10-80%)	124 kW DC

source: ev-database.org

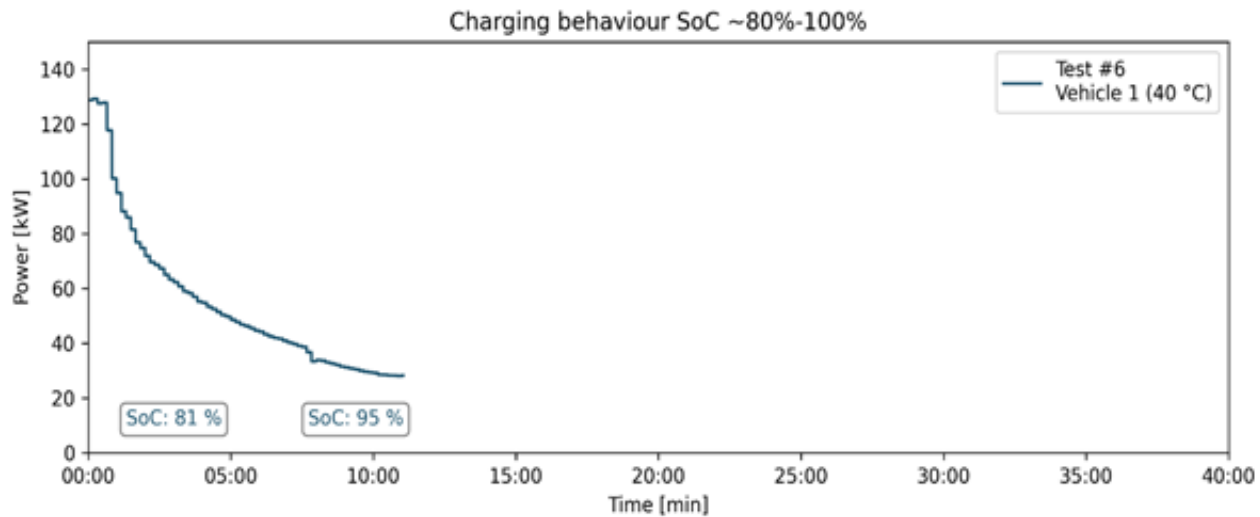
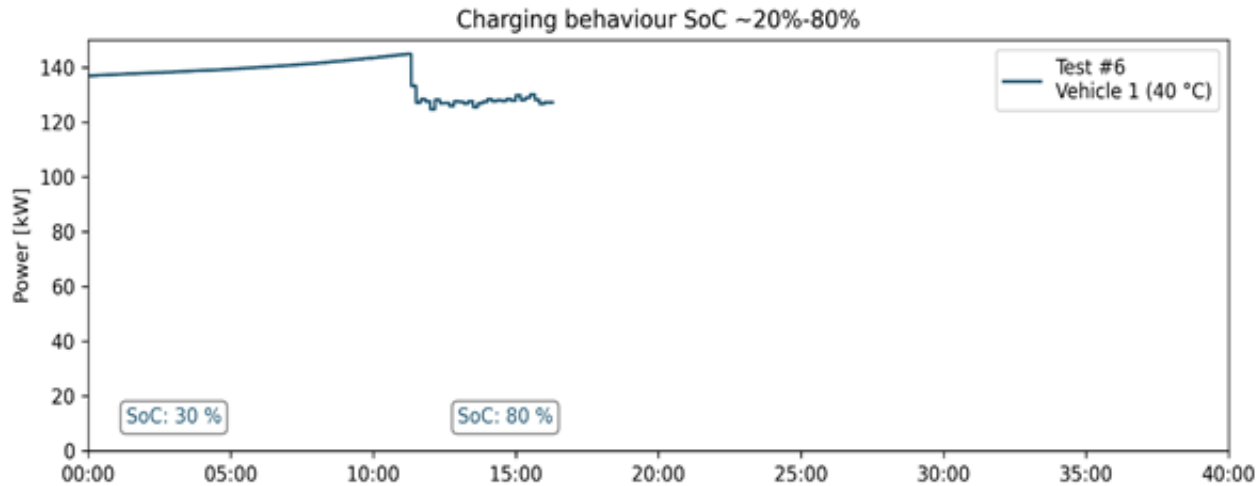
Charging profile # 5



Vehicle #5	
Charge Power (max)	250 kW DC
Charge Power (10-80%)	124 kW DC

source: ev-database.org

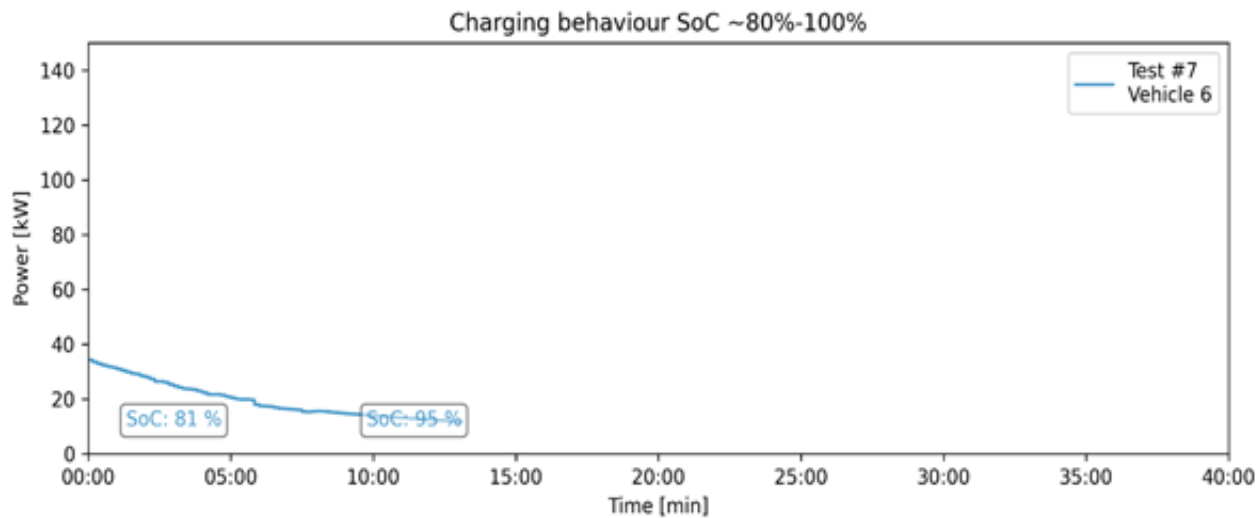
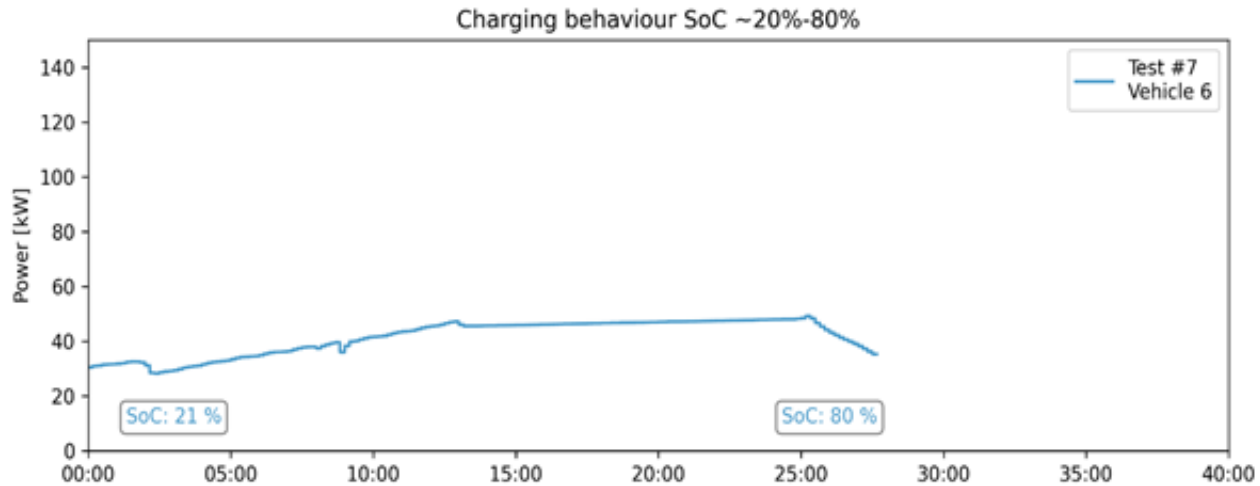
Charging profile # 6



Vehicle #1	
Charge Power (max)	263 kW DC
Charge Power (10-80%)	205 kW DC

source: ev-database.org

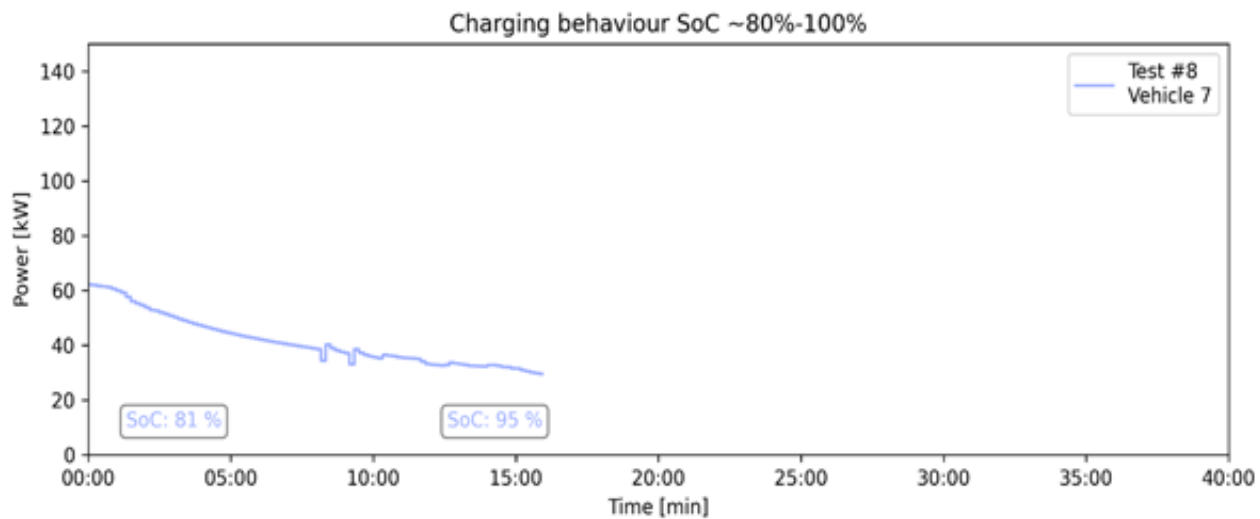
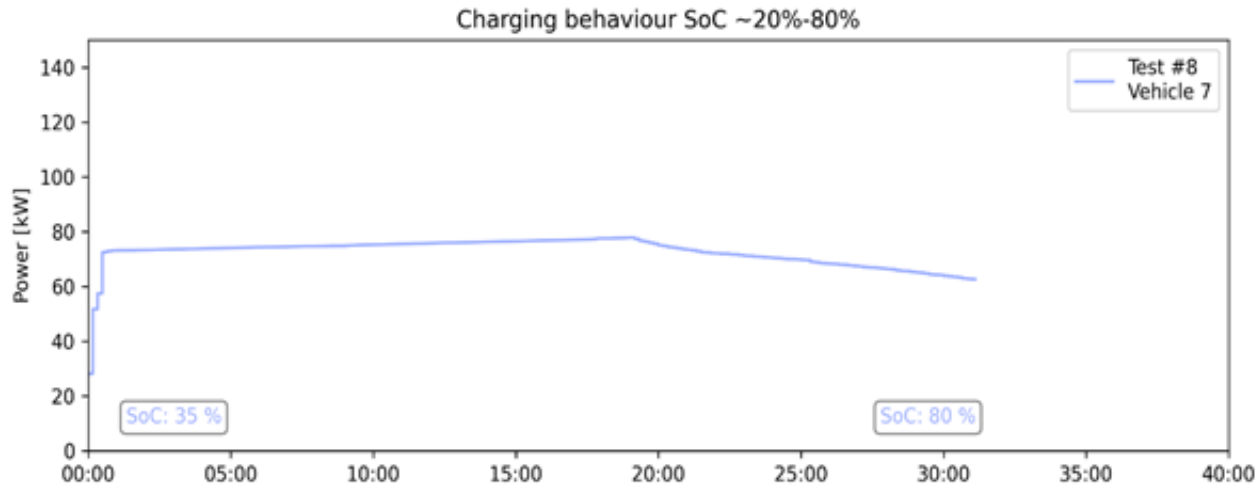
Charging profile # 7



Vehicle #6	
Charge Power (max)	49 kW DC
Charge Power (10-80%)	44 kW DC

source: ev-database.org

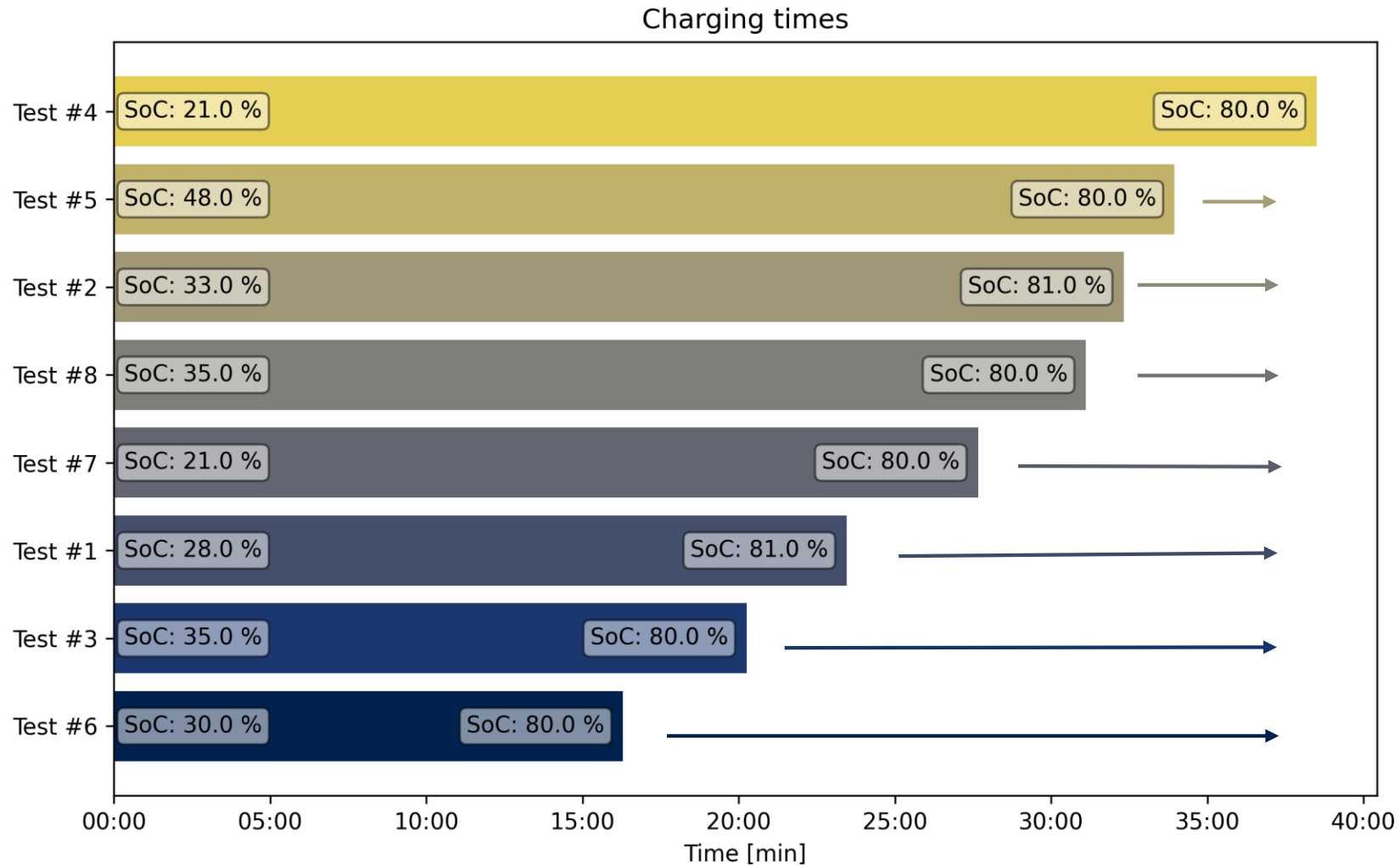
Charging profile # 8



Vehicle #7	
Charge Power (max)	170 kW DC
Charge Power (10-80%)	108 kW DC

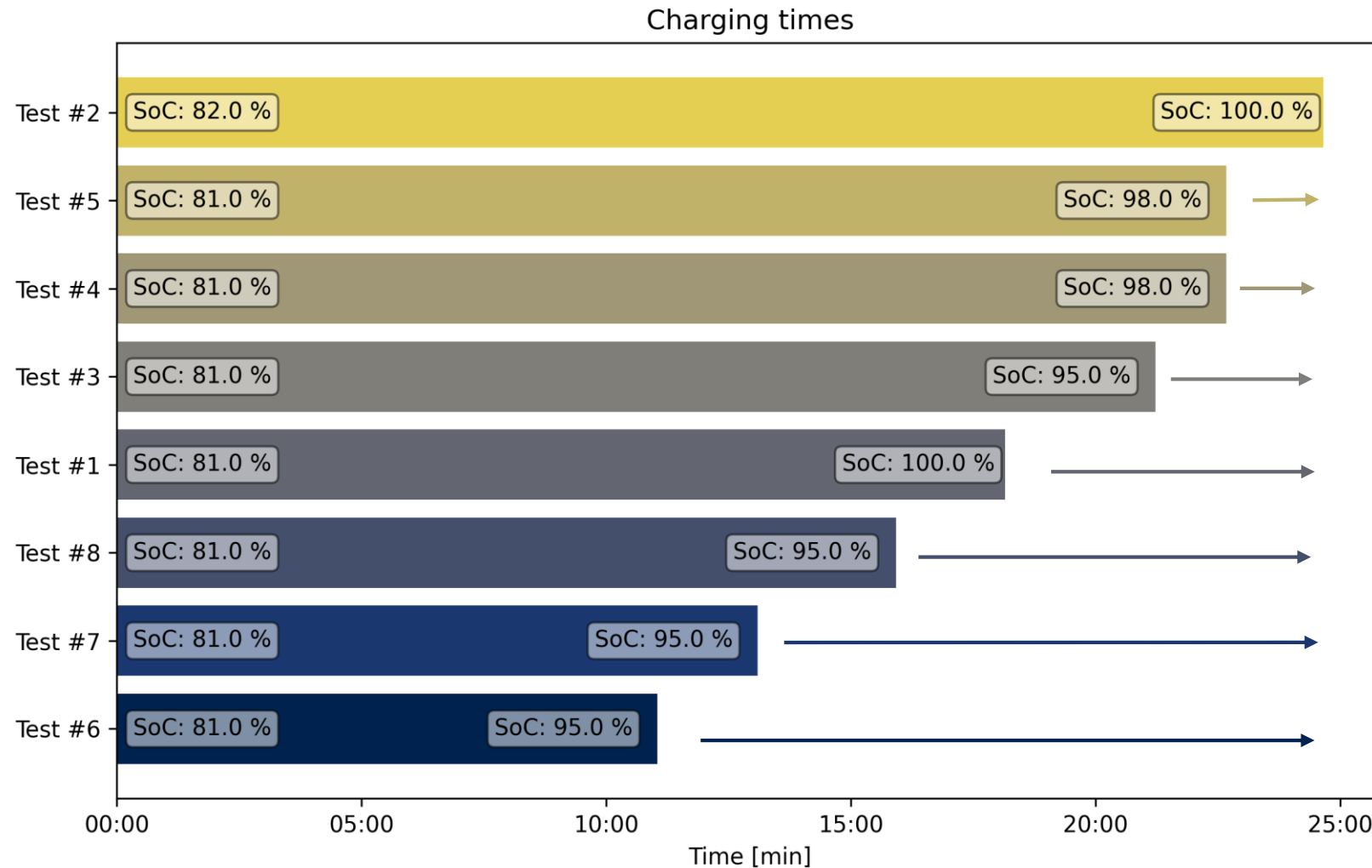
source: ev-database.org

Charging profile – summary (1)



Vehicle	max. Power [kW]
Vehicle 4	78.49
Vehicle 5	54.38
Vehicle 2	47.48
Vehicle 7	77.85
Vehicle 6	49.19
Vehicle 1 (RT)	126.14
Vehicle 3	60.73
Vehicle 1 (40 °C)	144.87

Charging profile – summary (2)



Vehicle	max. Power [kW]
Vehicle 2	38.37
Vehicle 5	51.93
Vehicle 4	60.97
Vehicle 3	41.78
Vehicle 1 (RT)	90.25
Vehicle 7	62.14
Vehicle 6	34.25
Vehicle 1 (40 °C)	129.22

Points of discussion

- ❑ SoC of vehicles should be registered together with the electric parameters by the acquisition system
- ❑ The environmental conditions in the testing area (temperature, humidity) must be identical during the different campaigns
- ❑ The battery conditions of the vehicles should be the same. If necessary a preconditioning period must be applied before starting with the charging process

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