Charging Interface Initiative e.V.

DC CCS Power Classes

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Introduction

CharIN is dedicated to develop and establish the Combined Charging System (CCS) as the standard for charging Battery Electric Vehicles (BEVs) of all kinds.

Today, a clear definition for supported voltage, current and power classes is missing for DC CCS charging stations and vehicles.

Vehicles in field are using	330-420 V, 1-125 A and 50 kW max.
Charging Stations in field are supporting	200-500 V, 1-125 A and 50 kW max.

To assure interoperability between legacy vehicles and HPC charging stations, clear definitions are necessary. (E.g. 400 V vehicles requiring 1 A current at HPC DC CCS charging stations)

„CCS 1.0 Specification“ distinguishes between CCS 1.0 (DIN 70121) and CCS 2.0 (ISO 15118) and gives a limit of 80 kW for DIN 70121. (Must be updated)

The following slides introduce power classes with voltage and current limits to assure interoperability between electric vehicles and charging stations and allow conformance testing.

Overview

Minimum requirements for power classes. For details see graphics on following pages.

Power Class	Voltage range		Min Current*	Current Range	Power Range	Communication
DC5	200 V	500 V	1 A @500 V	≥10 A@500 V	≥5 kW	DIN 70121
DC10	200 V	500 V	1 A @500 V	≥20 A@500 V	≥10 kW	DIN 70121
DC20	200 V	500 V	1 A @500V	≥40 A @500 V	≥20 kW	DIN 70121
FC50	200 V	500 V	1 A @500 V	≥100 A @500 V	≥50 kW	DIN 70121
HPC150	200 V	920 V	5 A @500 V 5 A @920 V	≥300 A @500 V ≥163 A @920 V	≥150 kW	DIN 70121 & ISO15118
HPC250	200 V	920 V	5 A @500 V 5 A @920 V	≥500 A @500 V ≥271 A @920 V	≥250 kW	DIN 70121 & ISO15118
HPC350	200 V	920 V	5 A @500 V 5 A @920 V	≥500 A@500 V ≥380 A@920 V	≥350 kW	DIN 70121 & ISO15118

DC = Direct Current, FC = Fast Charging, HPC = High Power Charging

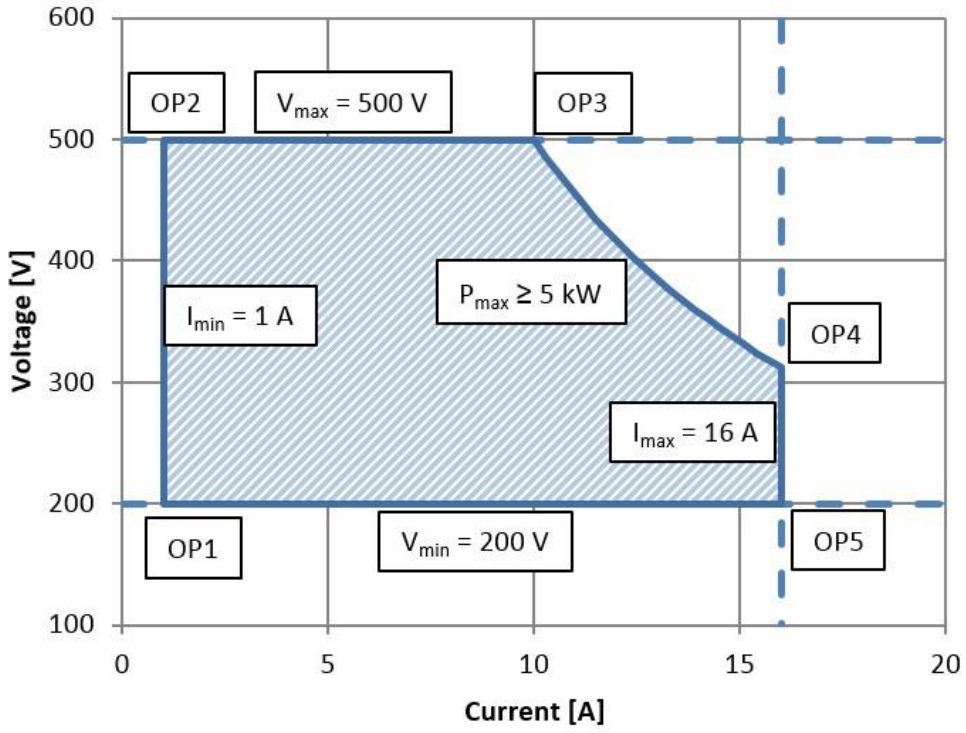
* 0 A min. current is a special case and should always be possible

A DC CCS Charging Station can provide a wider range of values for voltage, current and power but it must provide at least the values given above to achieve a certain power class rating. Details see following pages.

DC5 power class - voltage and current range

- A DC5 charging station shall support a voltage range between 200 V and 500 V.
  (Min. voltage can be lower and max. voltage can be higher but 200 - 500 V is required to achieve DC5 classification).
- A DC5 charging station shall support a max. current of 10 A at 500 V at least.
- In voltage range 200 - 500 V the DC5 charging station shall be able to provide a minimum current of 1 A. 0 A as a special case must be possible anyway.
- A DC5 charging station shall support any valid combination of voltage and current within the operating ranges specified above both in controlled current charging (CCC) and controlled voltage charging (CVC) mode.
- A DC5 charging station shall support DIN SPEC 70121 (it can also support ISO15118).

The dashed blue area must be supported by the EVSE to achieve DC5 class:



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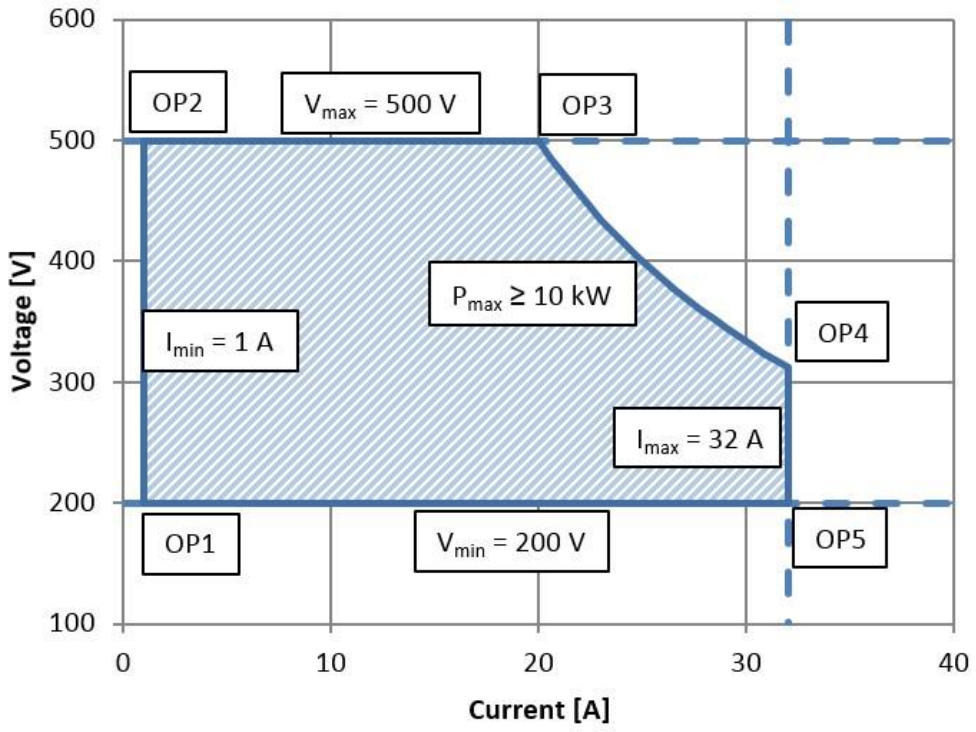
DC10 power class - voltage and current range

- A DC10 charging station shall support a voltage range between 200 V and 500 V.
  (Min. voltage can be lower and max. voltage can be higher but 200 - 500 V is required to achieve DC10 classification).
- A DC10 charging station shall support a max. current of 20 A at 500 V at least.
- In voltage range 200 - 500 V the DC10 charging station shall be able to provide a minimum current of 1 A. 0 A as a special case must be possible anyway.
- A DC10 charging station shall support any valid combination of voltage and current within the operating ranges specified above both in controlled current charging (CCC) and controlled voltage charging (CVC) mode.
- A DC10 charging station shall support DIN SPEC 70121 (it can also support ISO15118).

The dashed blue area must be supported by the EVSE to achieve DC10 class:



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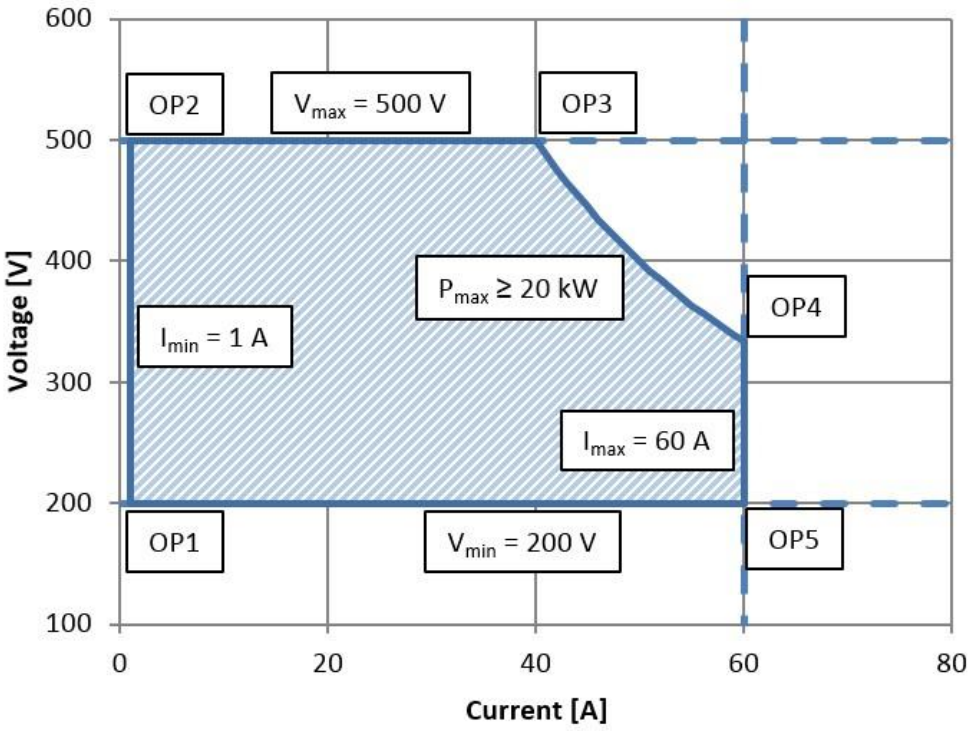
DC20 power class - voltage and current range

- A DC20 charging station shall support a voltage range between 200 V and 500 V.
  (Min. voltage can be lower and max. voltage can be higher but 200 - 500 V is required to achieve DC20 classification).
- A DC20 charging station shall support a max. current of 40 A at 500 V at least.
- In voltage range 200 - 500 V the DC20 charging station shall be able to provide a minimum current of 1 A. 0 A as a special case must be possible anyway.
- A DC20 charging station shall support any valid combination of voltage and current within the operating ranges specified above both in controlled current charging (CCC) and controlled voltage charging (CVC) mode.
- A DC20 charging station shall support DIN SPEC 70121 (it can also support ISO15118).

The dashed blue area must be supported by the EVSE to achieve DC20 class:



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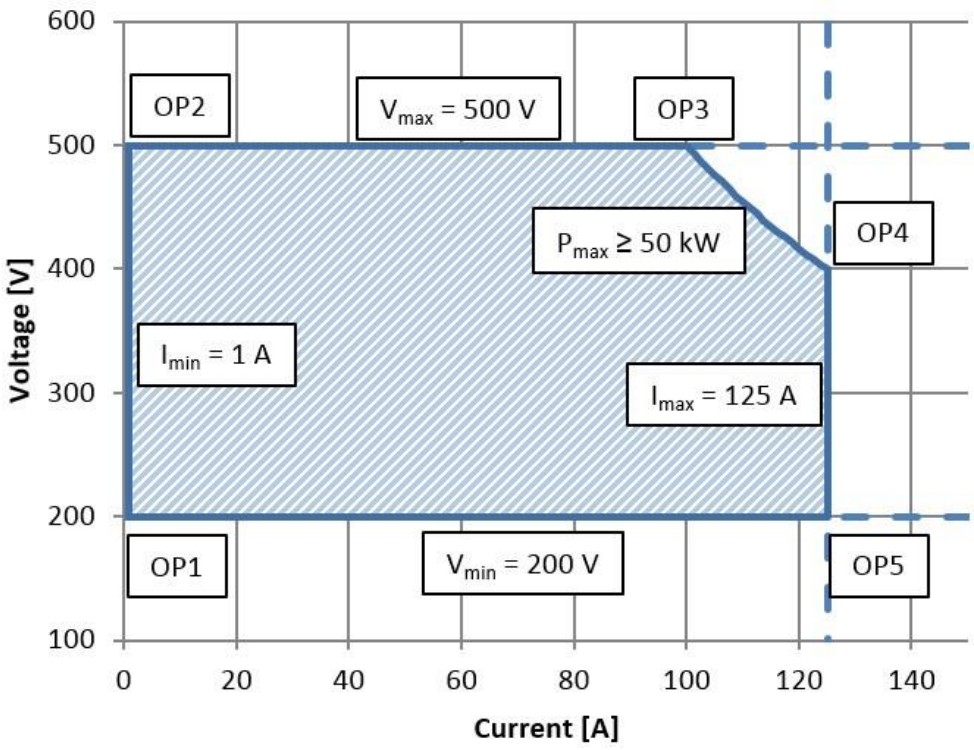
FC50 power class - voltage and current range

- A FC50 charging station shall support a voltage range between 200 V and 500 V.
  (Min. voltage can be lower and max. voltage can be higher but 200 - 500 V is required to achieve FC50 classification).
- A FC50 charging station shall support a max. current of 100 A at 500 V at least.
- In voltage range 200 - 500 V the FC50 charging station shall be able to provide a minimum current of 1 A. 0 A as a special case must be possible anyway.
- A FC50 charging station shall support any valid combination of voltage and current within the operating ranges specified above both in controlled current charging (CCC) and controlled voltage charging (CVC) mode.
- A FC50 charging station shall support DIN SPEC 70121 (it can also support ISO15118).

The dashed blue area must be supported by the EVSE to achieve FC50 class:



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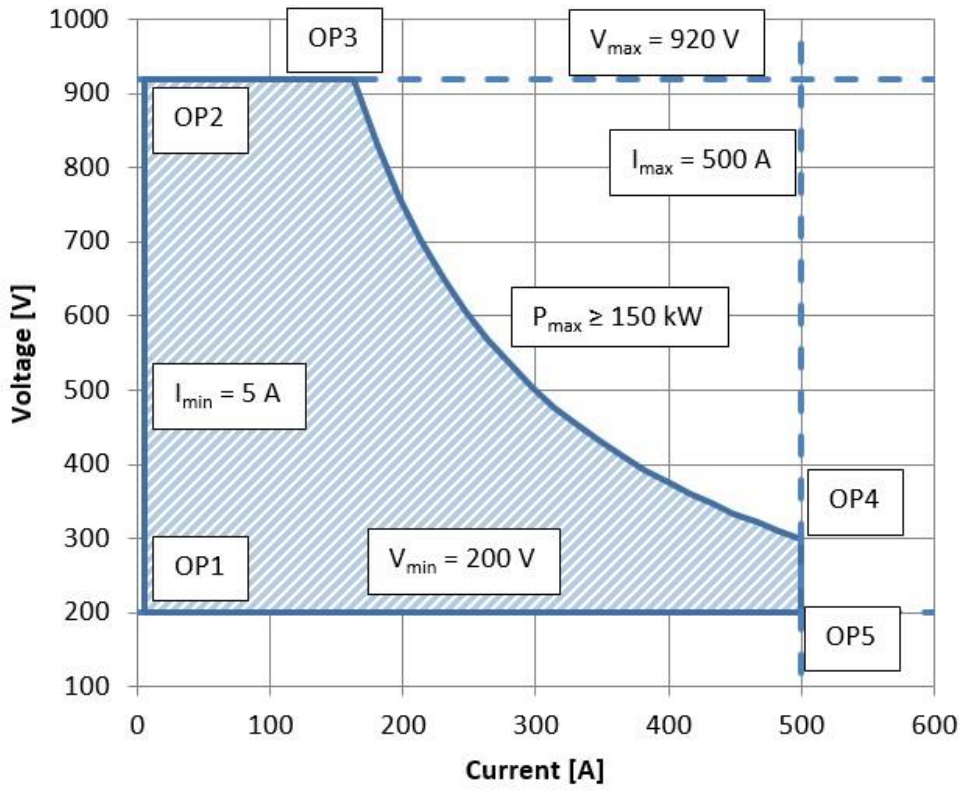
HPC150 power class - voltage and current range

- A HPC150 charging station shall support a voltage range between 200 V and 920 V.
  (Min. voltage can be lower and max. voltage can be higher but 200 - 920 V is required to achieve HPC150 classification).
- A HPC150 charging station shall support a max. current of 300 A at 500 V at least.
- A HPC150 charging station shall support a max. current of 163 A at 920 V at least.
- In voltage range 200 - 920 V the HPC150 charging station shall be able to provide a minimum current of 5 A. 0 A as a special case must be possible anyway.
- A HPC150 charging station shall support any valid combination of voltage and current within the operating ranges specified above both in controlled current charging (CCC) and controlled voltage charging (CVC) mode.
- A HPC150 charging station shall support DIN SPEC 70121 and ISO15118.

The dashed blue area must be supported by the EVSE to achieve HPC150 class:



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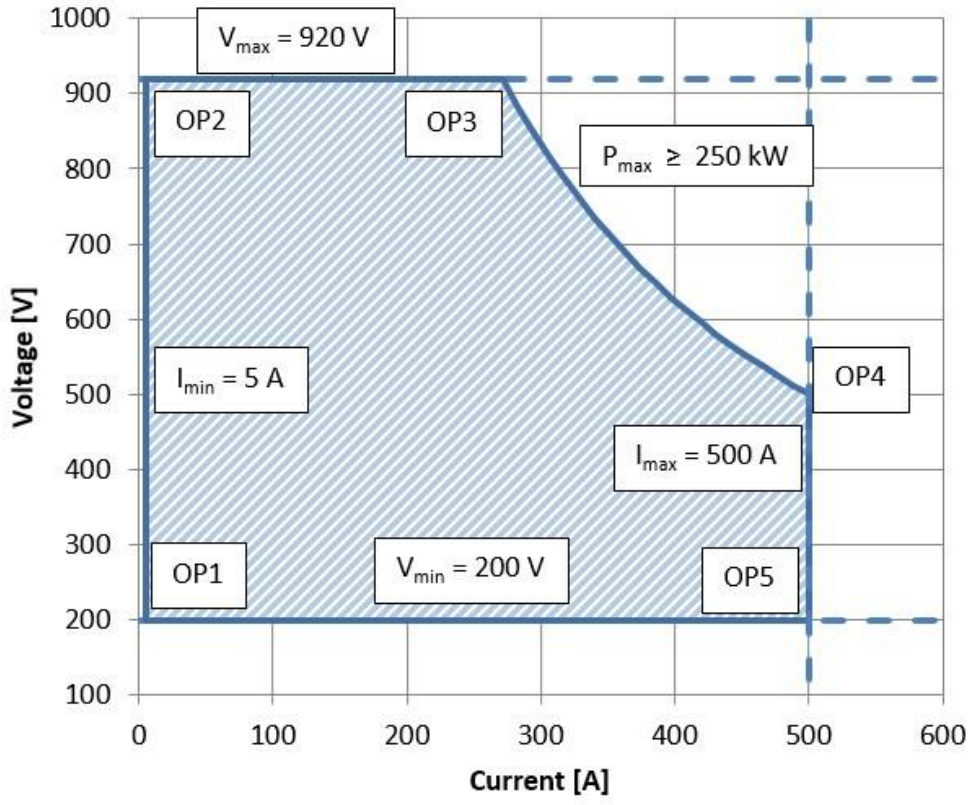
HPC250 power class - voltage and current range

- A HPC250 charging station shall support a voltage range between 200 V and 920 V.
  (Min. voltage can be lower and max. voltage can be higher but 200 - 920 V is required to achieve HPC250 classification).
- A HPC250 charging station shall support a max. current of 500 A at 500 V at least.
- A HPC250 charging station shall support a max. current of 271 A at 920 V at least.
- In voltage range 200 - 920 V the HPC250 charging station shall be able to provide a minimum current of 5 A. 0 A as a special case must be possible anyway.
- A HPC250 charging station shall support any valid combination of voltage and current within the operating ranges specified above both in controlled current charging (CCC) and controlled voltage charging (CVC) mode.
- A HPC250 charging station shall support DIN SPEC 70121 and ISO15118.

The dashed blue area must be supported by the EVSE to achieve HPC250 class:



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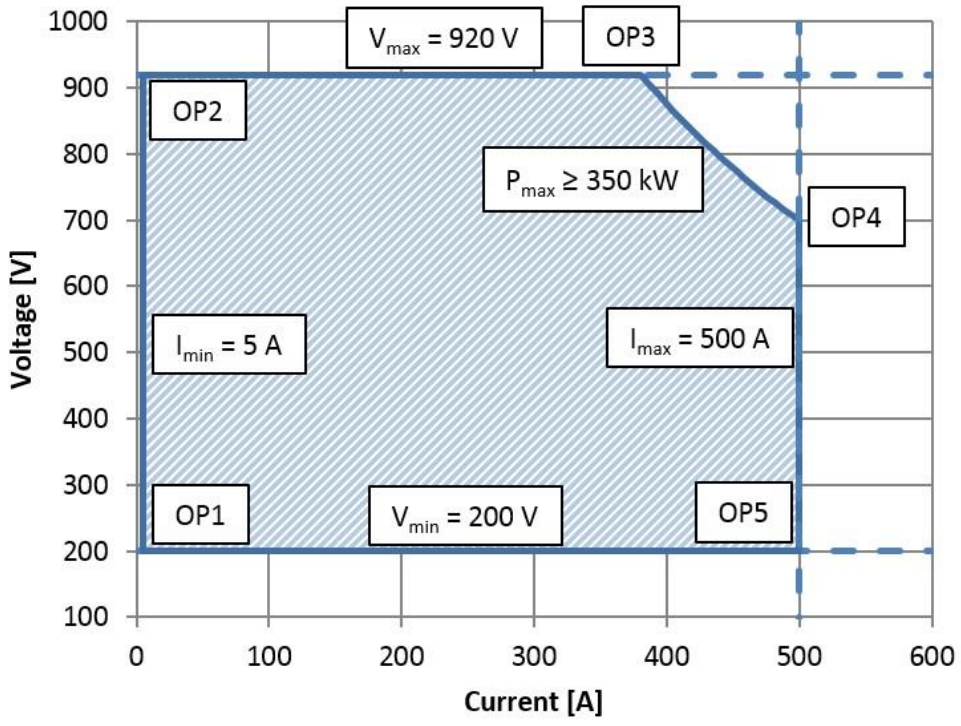
HPC350 power class - voltage and current range

- A HPC350 charging station shall support a voltage range between 200 V and 920 V.
  (Min. voltage can be lower and max. voltage can be higher but 200 - 920 V is required to achieve HPC350 classification).
- A HPC350 charging station shall support a max. current of 500 A at 500 V at least.
- A HPC350 charging station shall support a max. current of 380 A at 920 V at least.
- In voltage range 200 - 920 V the HPC350 charging station shall be able to provide a minimum current of 5 A. 0 A as a special case must be possible anyway.
- A HPC350 charging station shall support any valid combination of voltage and current within the operating ranges specified above both in controlled current charging (CCC) and controlled voltage charging (CVC) mode.
- A HPC350 charging station shall support DIN SPEC 70121 and ISO15118.

The dashed blue area must be supported by the EVSE to achieve HPC350 class:



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