



# DC CCS Power Classes

27.06.2018 v6, Final

# DC CCS Power Classes for Conformance Tests

## Document Timeline

Version	Editor	Date	Changes
V1	M. Schwaiger	20.09.2017	Initial Draft
V2	M. Schwaiger	30.10.2017	Update after commenting
V3	M. Schwaiger	24.11.2017	Update after commenting: 450V changed to 500V Constant Voltage Control mode added ISO15118 removed from FC50 class Max. values in Graphics removed Wording improved
V4	M. Schwaiger	29.01.2018	Update after commenting: Limit DC20 to 60A Limit FC50 to 120A Rephrasing of requirements Editorial changes
V5	M. Schwaiger	01.03.2018	Update after commenting: Limit DC5 to 16A Limit DC10 to 32A Limit FC50 changed from 120A to 125A Split HPC150 class into 500V and 920V HPC150-920 with 2 Modes Editorial changes
V6	M. Schwaiger	27.06.2018	Final update after SC decision on HPC150 class: HPC150-500 and HPC150Mode2 deleted HPC 150-920Mode1 renamed to HPC150 Page 3 Timeline deleted

# DC CCS Power Classes for Conformance Tests

## Introduction

Today a clear definition for supported voltage, current and power classes is missing for DC CCS Charging Stations and Vehicles.

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

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

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

The following slides introduces Power Classes with voltage and current limits to assure interoperability between Electric Vehicles and Charging Stations and allow Conformance Testing ...

# DC CCS Power Classes for Conformance Tests

## 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	200V	500V	1A @500V	$\geq 10\text{A}@500\text{V}$	$\geq 5\text{kW}$	DIN 70121
DC10	200V	500V	1A @500V	$\geq 20\text{A}@500\text{V}$	$\geq 10\text{kW}$	DIN 70121
DC20	200V	500V	1A @500V	$\geq 40\text{A}@500\text{V}$	$\geq 20\text{kW}$	DIN 70121
FC50	200V	500V	1A @500V	$\geq 100\text{A}@500\text{V}$	$\geq 50\text{kW}$	DIN 70121
HPC150	200V	920V	5A @500V 5A @920V	$\geq 300\text{A}@500\text{V}$ $\geq 163\text{A}@920\text{V}$	$\geq 150\text{kW}$	DIN 70121 & ISO15118
HPC250	200V	920V	5A @500V 5A @920V	$\geq 500\text{A}@500\text{V}$ $\geq 271\text{A}@920\text{V}$	$\geq 250\text{kW}$	DIN 70121 & ISO15118
HPC350	200V	920V	5A @500V 5A @920V	$\geq 500\text{A}@500\text{V}$ $\geq 380\text{A}@920\text{V}$	$\geq 350\text{kW}$	DIN 70121 & ISO15118

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

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.

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

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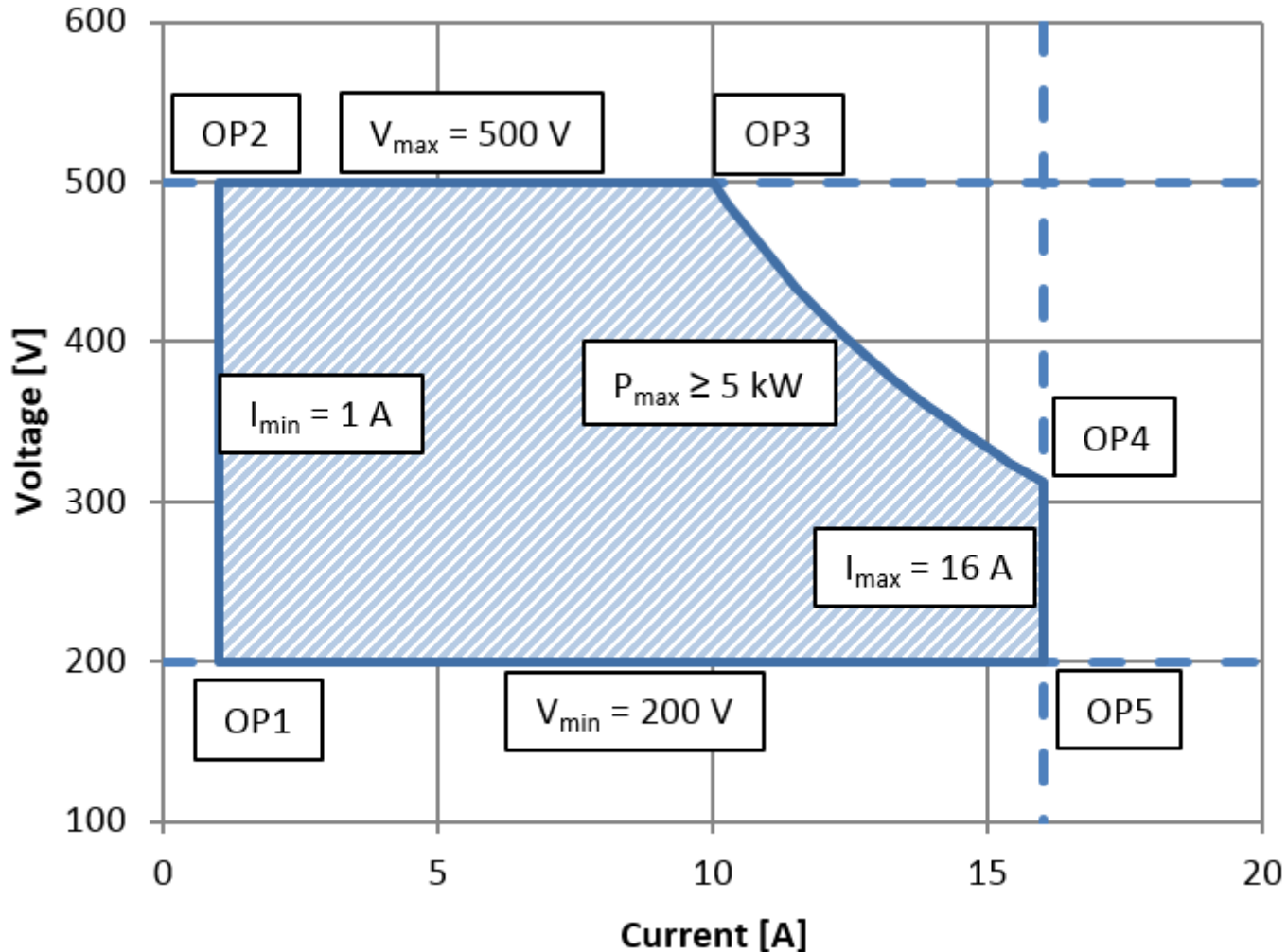
Slide 4



# DC CCS Power Classes for Conformance Tests

## DC5 Power Class - Voltage and Current Range

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



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

# DC CCS Power Classes for Conformance Tests

## DC5

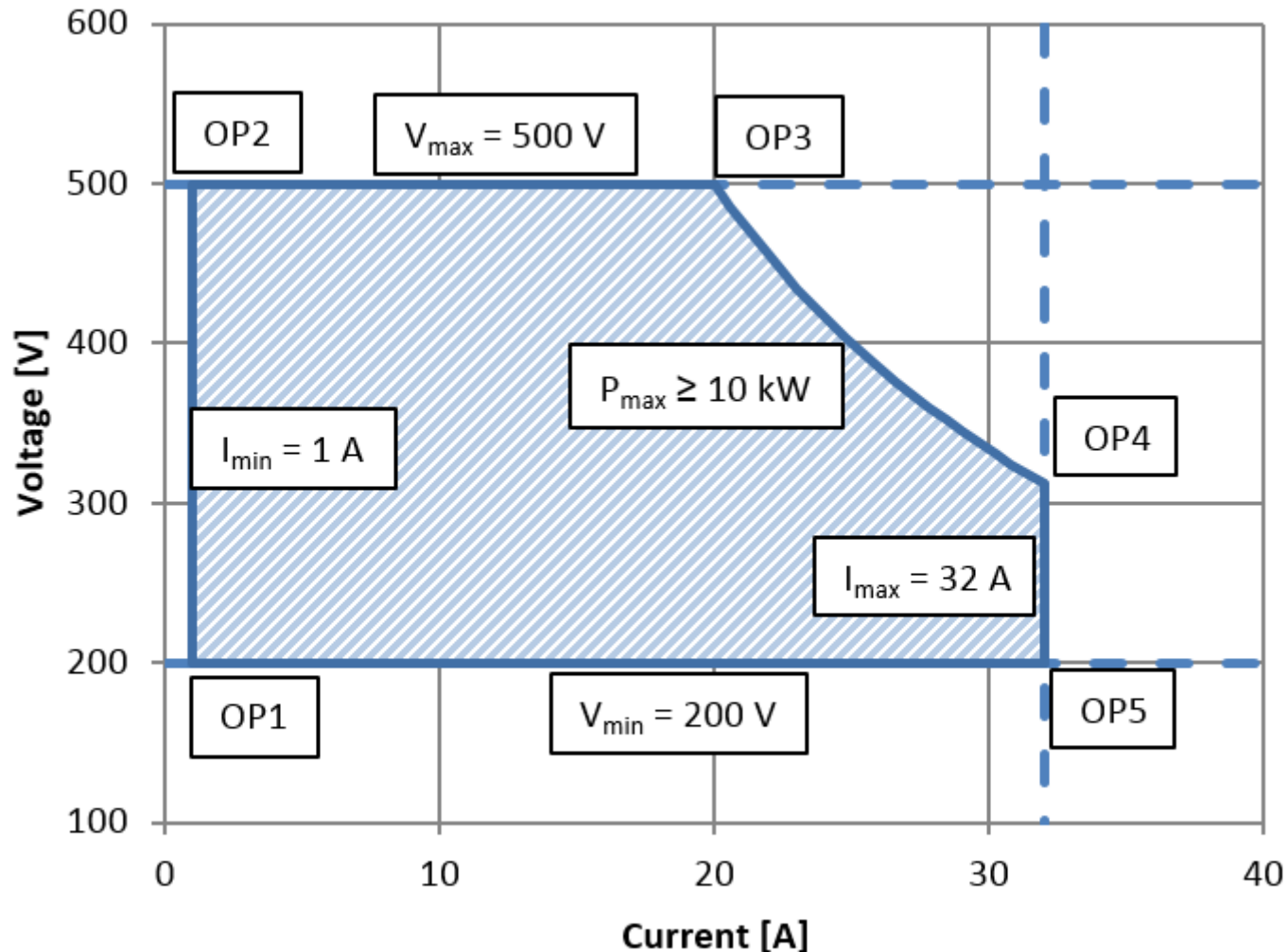
### DC5 Power Class Requirements

- DC5 charging station shall support a voltage range between 200V and 500V (Min. voltage can be lower and max. voltage can be higher but 200-500V is required to achieve DC5 classification).
- DC5 charging station shall support a max. current of 10A at 500V at least
- In voltage range 200-500V the DC5 charging station shall be able to provide a minimum current of 1A. 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)

# DC CCS Power Classes for Conformance Tests

## DC10 Power Class - Voltage and Current Range

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



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

# DC CCS Power Classes for Conformance Tests

## DC10

### DC10 Power Class Requirements

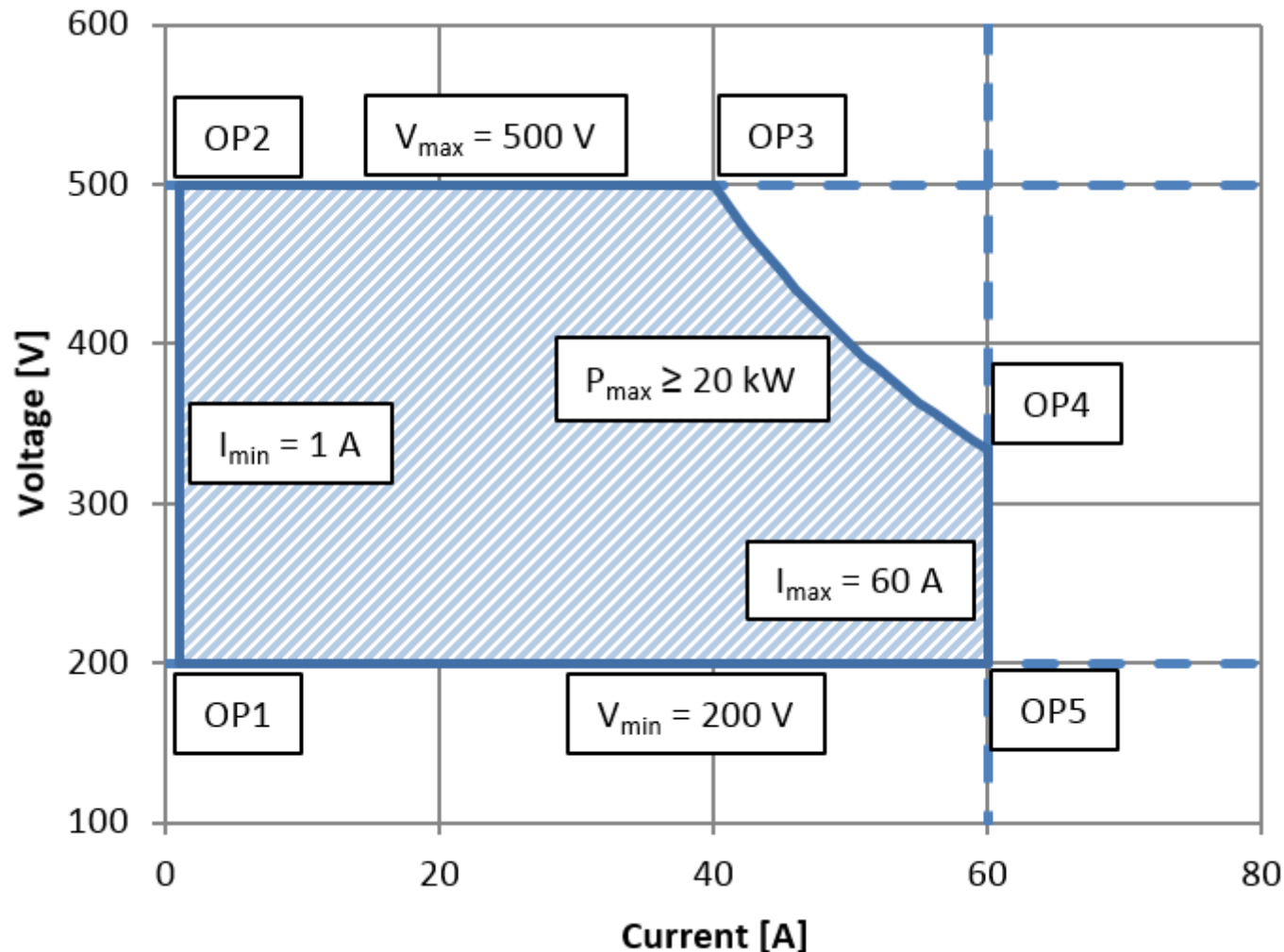
- DC10 charging station shall support a voltage range between 200V and 500V (Min. voltage can be lower and max. voltage can be higher but 200-500V is required to achieve DC10 classification).
- DC10 charging station shall support a max. current of 20A at 500V at least
- In voltage range 200-500V the DC10 charging station shall be able to provide a minimum current of 1A. 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)



# DC CCS Power Classes for Conformance Tests

## DC20 Power Class - Voltage and Current Range

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



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

# DC CCS Power Classes for Conformance Tests

## DC20

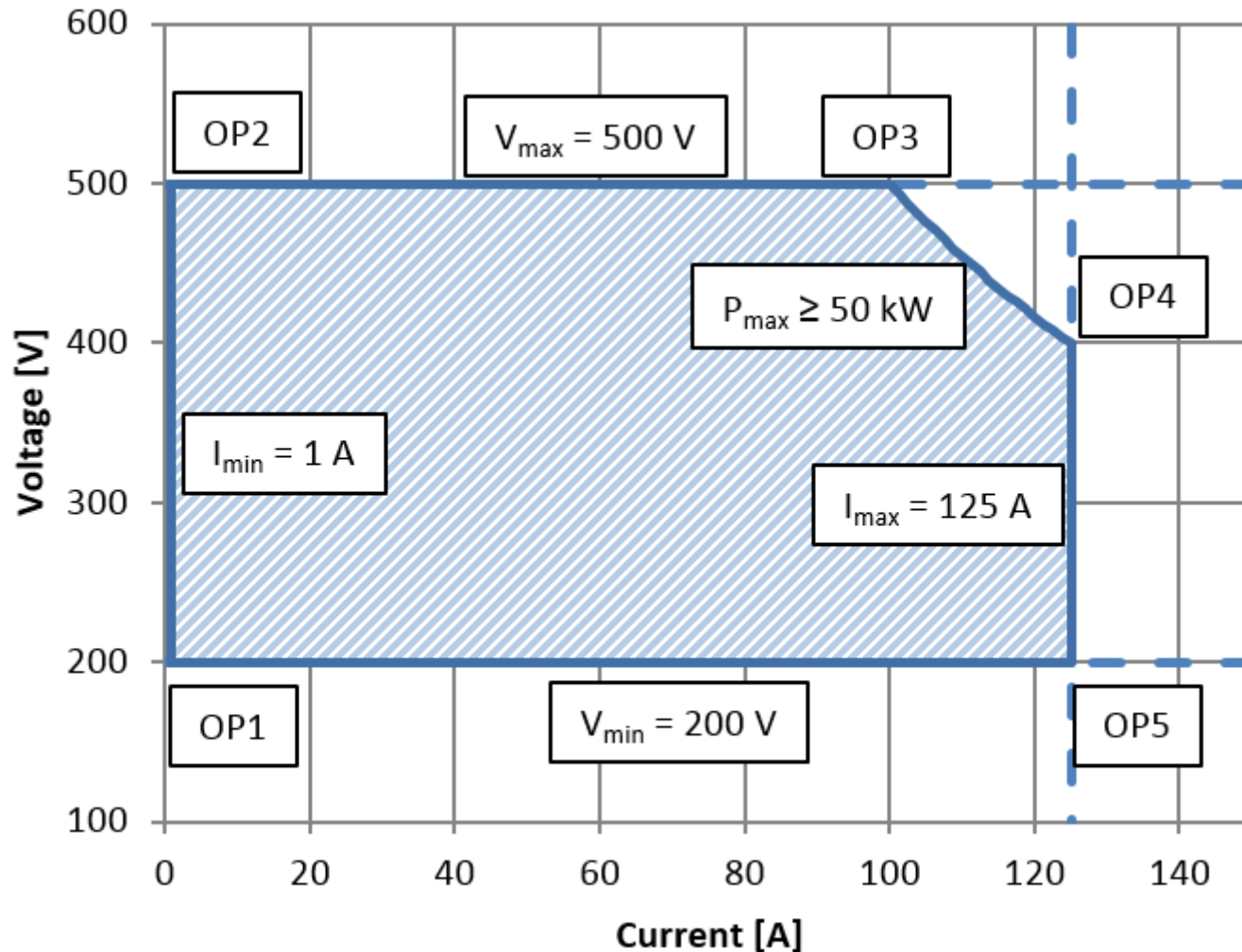
### DC20 Power Class Requirements

- DC20 charging station shall support a voltage range between 200V and 500V (Min. voltage can be lower and max. voltage can be higher but 200-500V is required to achieve DC20 classification).
- DC20 charging station shall support a max. current of 40A at 500V at least
- In voltage range 200-500V the DC20 charging station shall be able to provide a minimum current of 1A. 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)

# DC CCS Power Classes for Conformance Tests

## FC50 Power Class - Voltage and Current Range

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



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

# DC CCS Power Classes for Conformance Tests

FC50

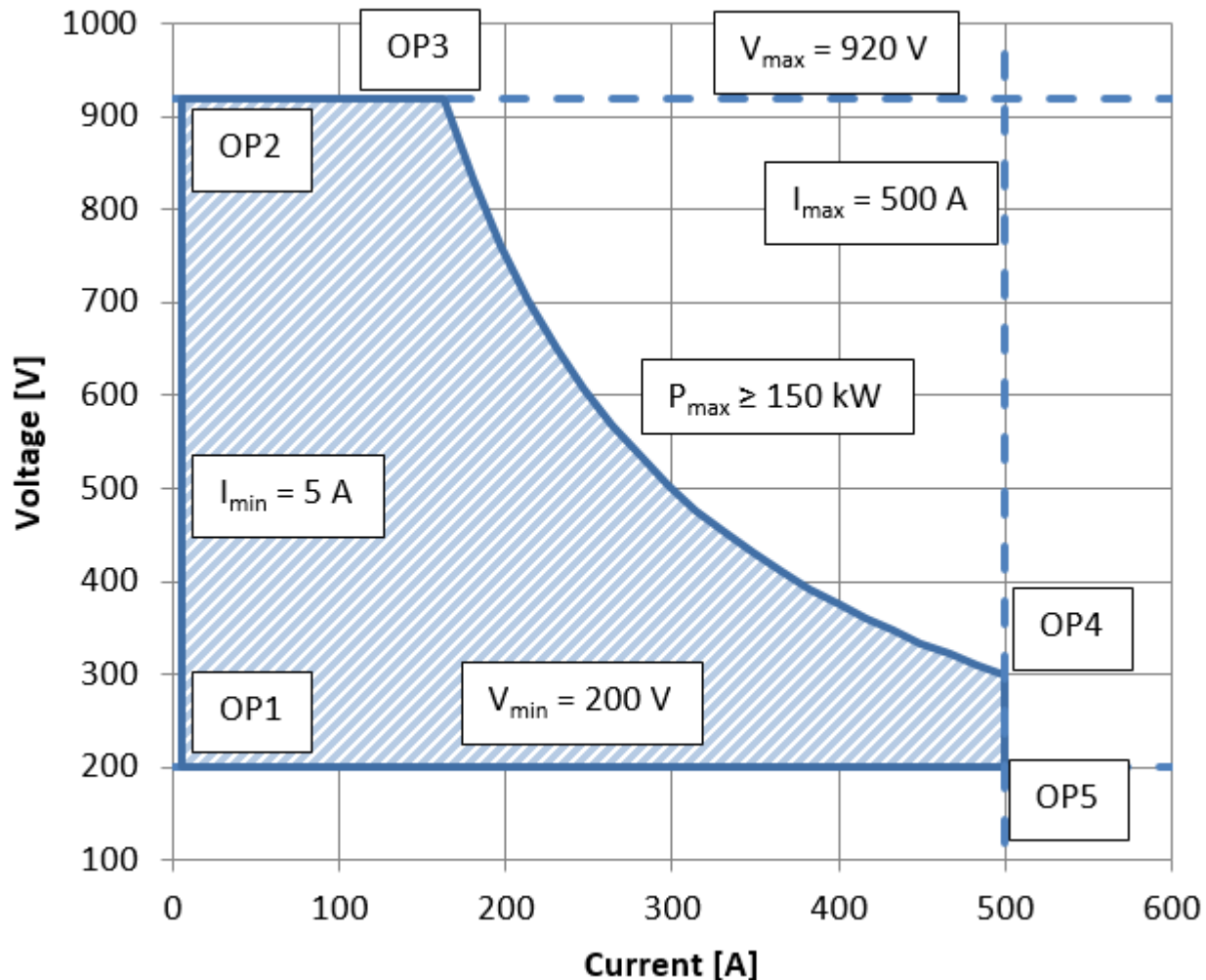
## FC50 Power Class Requirements

- FC50 charging station shall support a voltage range between 200V and 500V (Min. voltage can be lower and max. voltage can be higher but 200-500V is required to achieve FC50 classification).
- FC50 charging station shall support a max. current of 100A at 500V at least
- In voltage range 200-500V the FC50 charging station shall be able to provide a minimum current of 1A. 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)

# DC CCS Power Classes for Conformance Tests

## HPC150 Power Class - Voltage and Current Range

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



The 500A limit is dependent from the IEC standards update  
0A min. current is a special case and should always be possible

# DC CCS Power Classes for Conformance Tests

HPC150

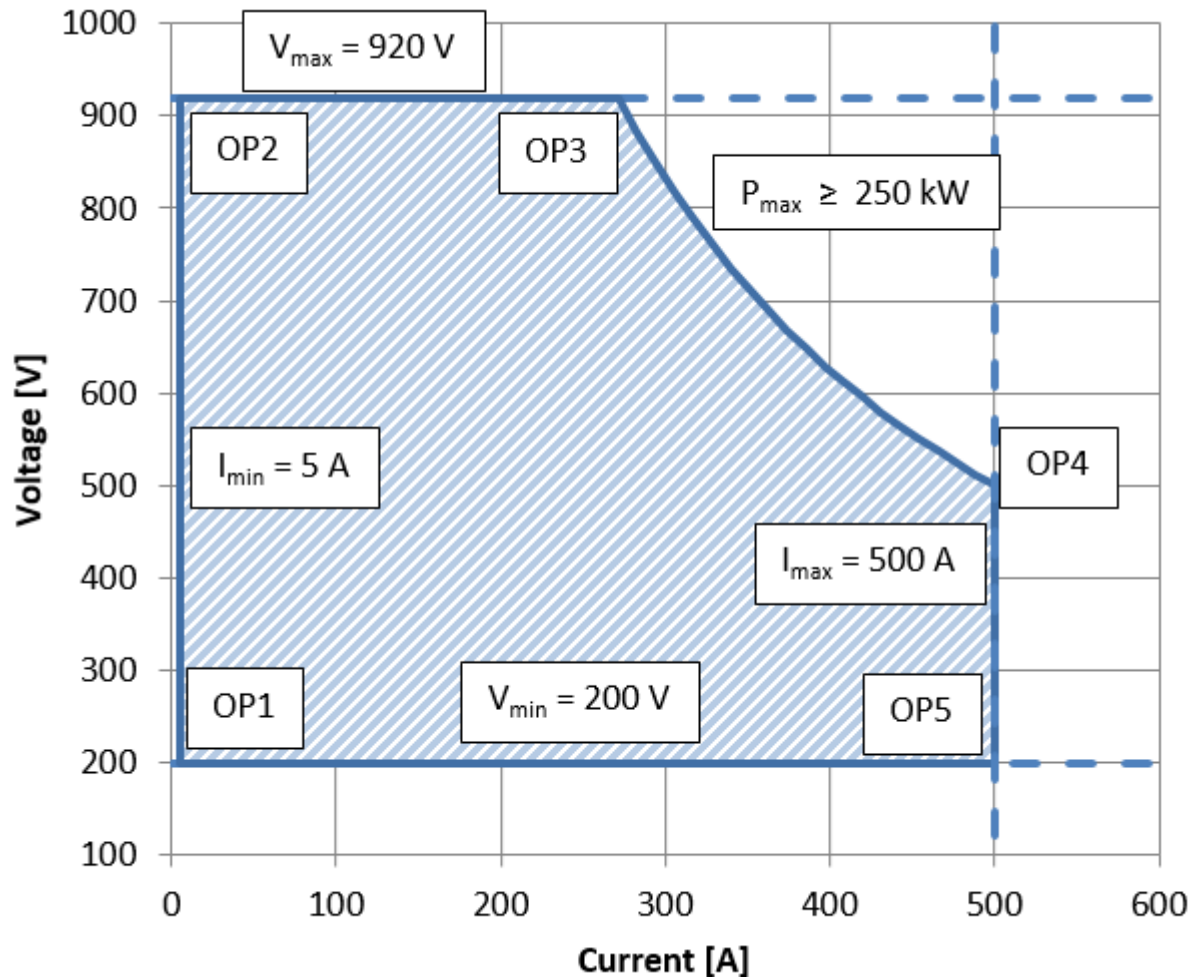
## HPC150 Power Class Requirements

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

# DC CCS Power Classes for Conformance Tests

## HPC250 Power Class - Voltage and Current Range

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



The 500A limit is dependent from the IEC standards update  
0A min. current is a special case and should always be possible

# DC CCS Power Classes for Conformance Tests

HPC250

## HPC250 Power Class Requirements

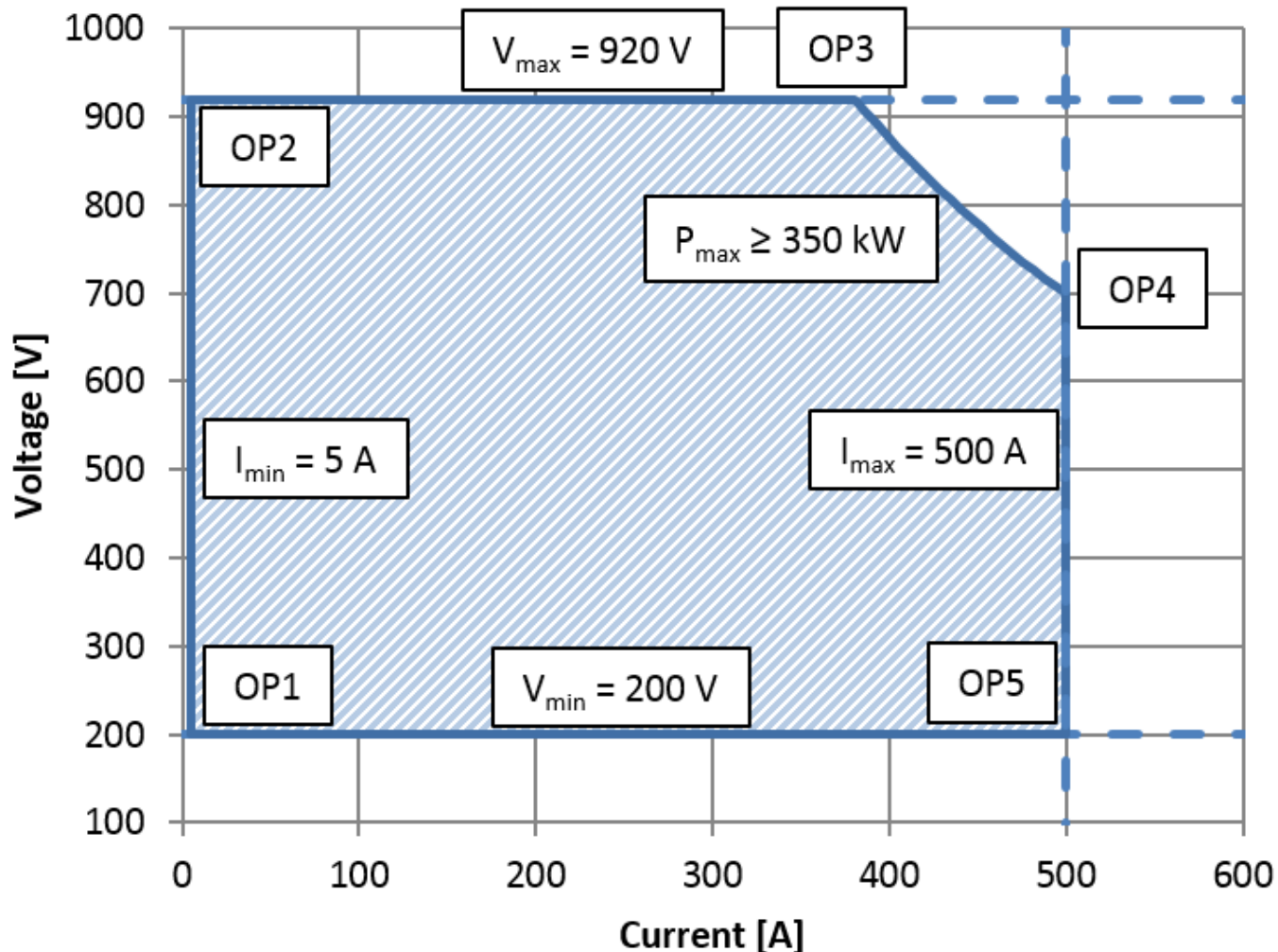
- HPC250 charging station shall support a voltage range between 200V and 920V (Min. voltage can be lower and max. voltage can be higher but 200-920V is required to achieve HPC250 classification).
- HPC250 charging station shall support a max. current of 500A at 500V at least
- HPC250 charging station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



# DC CCS Power Classes for Conformance Tests

## HPC350 Power Class - Voltage and Current Range

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



The 500A limit is dependent from the IEC standards update  
0A min. current is a special case and should always be possible

# DC CCS Power Classes for Conformance Tests

HPC350

## HPC350 Power Class Requirements

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

# Thank You

