

# DAIMLER

## CharIN High Power Commercial Vehicle Charging Standardization Task Force update

Rustam Kocher  
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# Who is CharIN?



The Charging Interface Initiative e. V. - abbreviated to CharIN e. V. - is a registered association founded by Audi, BMW, Daimler, Menneke, Opel, Phoenix Contact, Porsche, TÜV SÜD and Volkswagen. Based in Berlin, it is open to all interested parties. The purpose of the CharIN association is the worldwide promotion and support of the Combined Charging System. In this connection the limits drawn by antitrust laws are to be observed by all members. The three primary aims are:

1. To develop and establish the Combined Charging System (CCS) as the standard for charging battery-powered electric vehicles of all kinds
2. To draw up requirements for the evolution of charging-related standards and develop a certification system for use by manufacturers implementing the CCS in their products
3. To promote the CCS standard worldwide

# Background - Many customers require the option to fast charge when needed

**A CharIN task force was formed with the following purpose statement:**

“Define a new **commercial vehicle high power charging standard** to maximize customer flexibility.” It was named the High Power Commercial Vehicle Charging Task Force (HPCVC for short).










CharIN Appointed  
Task Force Lead



Rustam Kocher - EMG



There are many DC charging standards currently available... but the Power is too low. Target must be **1 to 3 MW**

	CharIN					Proposed	
	GB/T	New GB/T	CHAdeMO	CCS1	CCS2	Tesla	HPCVC
							
Max Power	950V x 250A = <b>237.5 kW</b>	1500V x 600A = <b>900 kW</b>	1000V x 400A = <b>400 kW</b>	1000V x 500A = <b>500 kW</b>	1000V x 500A = <b>500 kW</b>	410V x 610A = <b>250 kW</b>	1500V x 2000A = <b>3 MW??</b>
Range add /minute charge	1.5 miles	5.8 miles	2.6 miles	3.2 miles	3.2 miles	1.6 miles	19.2 miles
Communication Protocol	CAN (SAE J1939)	CAN (SAE J1939)	CAN (ISO 11898)	PLC (ISO 15118)	PLC (ISO 15118)	CAN (SAE J2411)	CAN or Ethernet (ISO 15118)
Location Used	China, India	China	Global	US	EU, South Korea, Australia	Global	US?, EU?
Related Standards	IEC 61851	IEC 61851	IEC 61851 IEEE 2030.1	IEC 61851 SAE J1772	IEC 61851	none	none
Notes	none	Liquid Cooled under development	Liquid Cooled under development	Liquid Cooled	Liquid Cooled	Liquid Cooled	Liquid Cooled
		in development					

### What already exists?

There are many DC charging standards.  
See table.

### Why do we need another?

Target charge times of 20 minutes  
(currently possible with today's batteries)  
on commercial EVs require power levels  
of **~ 1-3 MW**

### Why not AC?

AC charging requires that the inverter be  
carried on the vehicle, which is a limiting  
factor in weight and charging speed.



# Background – Major customers see the need and are actively participating in the HPCVC Task Force

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*“As a leading services provider to commercial fleets, we feel standardization around electric vehicle charging and charging stations will help accelerate the use of electric vehicles within the transportation industry. The interoperability of vehicle charging stations over the road is essential for commercial fleet uptime, efficiency, maintenance, and general ease of use for the industry.”*

—Brian Hard, President and CEO of Penske Truck Leasing

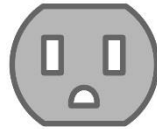
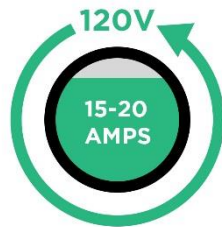


# Background - Diverse views are represented by the many members of the HPCVC Task Force



# Charging Levels

## Level 1

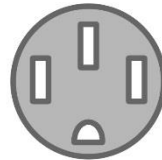
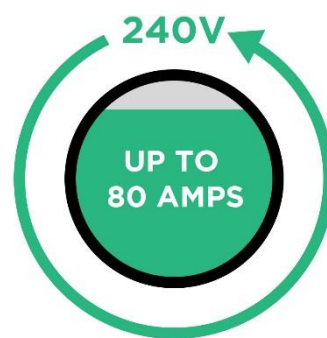


Level 1 chargers use standard 120V electrical outlets. 120V circuits are also used by most home electronics.

**7-8 miles of i3 range per hour charging**

1.4 kW power delivery

## Level 2

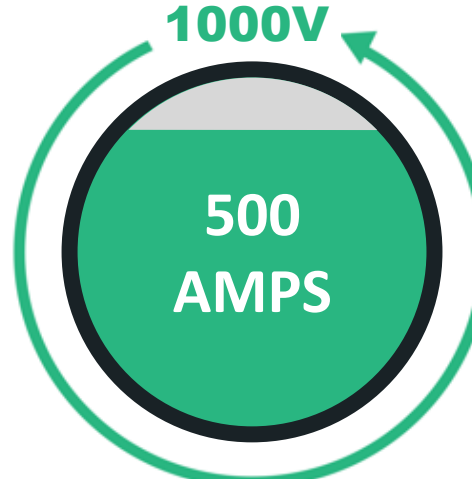


Level 2 chargers use 240V electrical circuits. 240V circuit are also used by electric dryers & electric stovetops.

**10 - 26 miles of i3 range per hour charging**

3.7 - 7.7 kW power delivery

## CCS DC charging

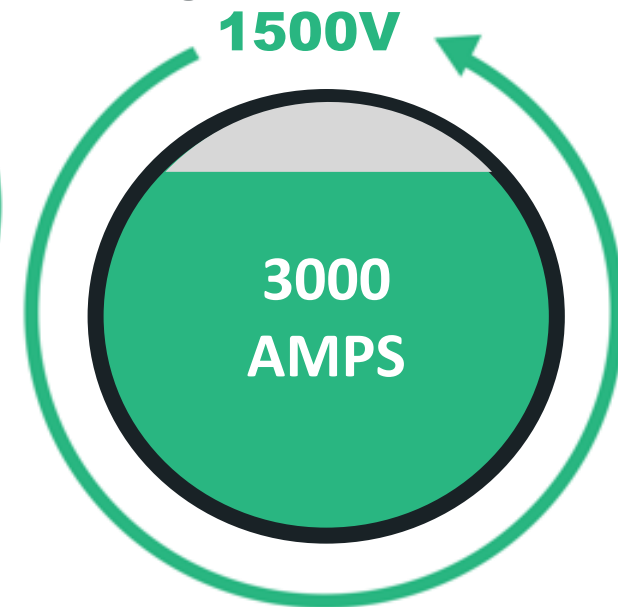


CCS can deliver up to around 200Amps with traditional copper cables, while higher currents are delivered via cooled cables.

**Up to 80% of 100kWh battery in less than 20 minutes**

Up to 350kW power delivery, Some units up to 500kW

## Commercial Vehicle High Power (proposed)



The High Power Commercial Vehicle charging standard would allow users to recharge their large, commercial vehicles (Classes 6, 7 & 8) in 20-30 minutes.

**Up to 80% of Class 8 truck, carrying 500kWh, in 20 minutes**

Up to **4.5 MW** power delivery

# HPCVC Process, Requirements, and Selection

## Process

- A requirements-gathering process including all HOCVC stakeholders. An in-person meeting was held to gain group agreement on the requirements.
- The requirements were approved by the CharIN Board of Management on Nov 28, 2018.
- Proposals were solicited in Q1, 2019, resulting in 5 strong entries.
- An in-person voting meeting was held on May 16<sup>th</sup>, 2019 at the CharIN conference. Ranked choice voting was used. A winner was chosen but has not yet been announced.

## Requirements

- single conductive plug
- max 1500 DCV
- max 3000 DCA
- PLC + ISO/IEC15118
- touch-safe (UL2251)
- on-handle software-interpreted override switch
- adheres to OSHA and ADA requirements
- FCC Class A EMI
- located on the driver side of the vehicle, hip-height
- capable of being automated
- UL (NRTL) certified
- cyber-secure
- V2X (bi-directional)



# Submission selection



HPCVC called for contributions to solve the requirements as set forth.

There were five submissions, from Tesla, Electrify America, ABB, paXos, and Staubli.

They were reviewed and graded based on how well they solved the requirements and on their technological readiness.

The Task Force reviewed the submissions first online, and again after presentations at the in-person voting event on **May 16**.

Ranked choice voting was used to select a winning submission. That winner has not yet been announced due to some further discussions taking place.

# HPCVC Roadmap

## HPCVC Task Force proposal submission and review roadmap

