

# **CAPACITORS FOR ELECTRIC VEHICLE BATTERY CHARGER APPLICATIONS**



# An Introduction to EV Chargers for Autos and Light Trucks

## There are three basic types of Electric Vehicle Charging Stations:

- **Level 1**, Residential Charging: 120-Vac - Charging Speed (range): 3 to 5 miles per charging hour\*
- **Level 2**, Residential, Public Charging: 208-Vac to 240-Vac - Charging Speed: 12 to 80 miles per charging hour\*
- **Level 3**, Commercial, Public Charging: 400-Vdc to 900-Vdc (DC Fast Charge & Supercharging) - Charging Speed: 3 to 20 miles per charging minute.



*\* When powered from the grid.*

# High Performance Capacitors are Essential for EV Chargers

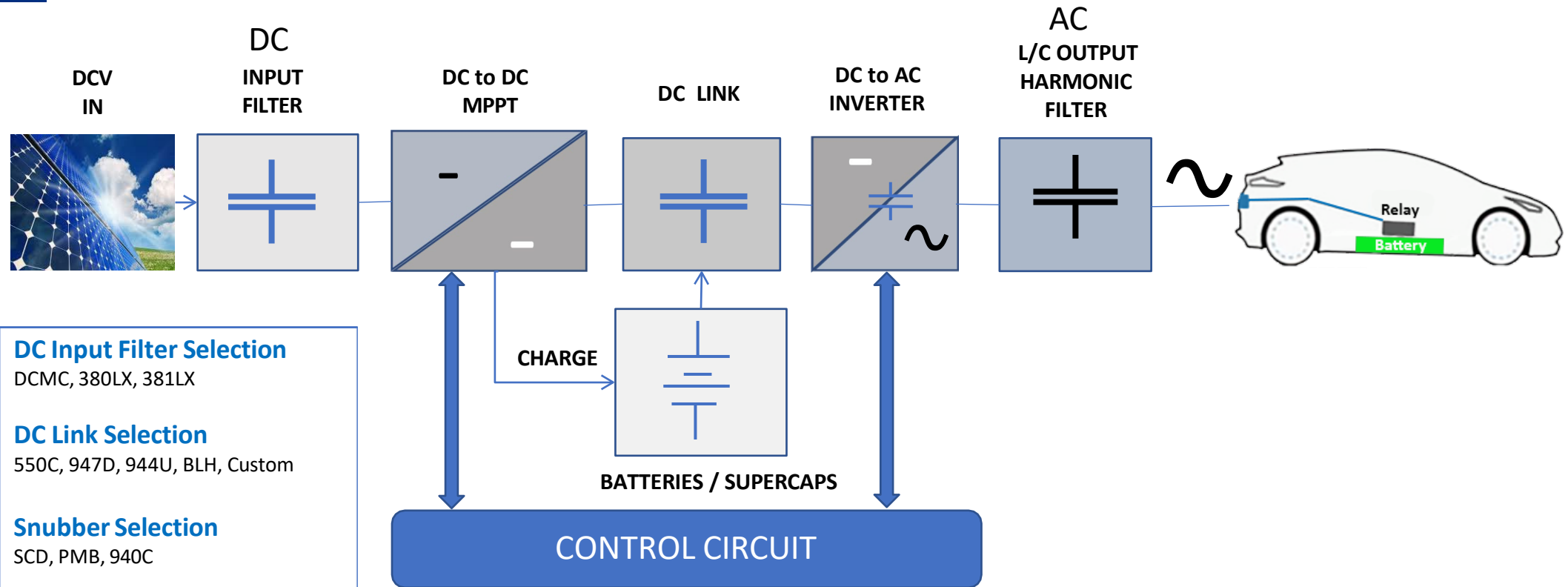
**Capacitors are critical components used in inverters and converters for all types of Electric Vehicle Charging Stations:**

- Grid-powered Level 1 and Level 2 chargers do not require AC to DC conversion; however, solar-powered Level 1 and 2 chargers use an inverter and require a variety of capacitors, including:
  - DC Input Filter Capacitors
  - DC Link Capacitors
  - AC Output Filter Capacitors
- Level 3: DC fast chargers use AC to DC conversion requiring power capacitors:
  - AC input filter capacitors
  - DC link capacitors
  - DC output filter capacitors





# Solar-Powered Inverter EV Charging System (Levels 1 and 2)



## DC Input Filter Selection

DCMC, 380LX, 381LX

## DC Link Selection

550C, 947D, 944U, BLH, Custom

## Snubber Selection

SCD, PMB, 940C

## AC Harmonic Filter Selection

ALH, PC, PFCH

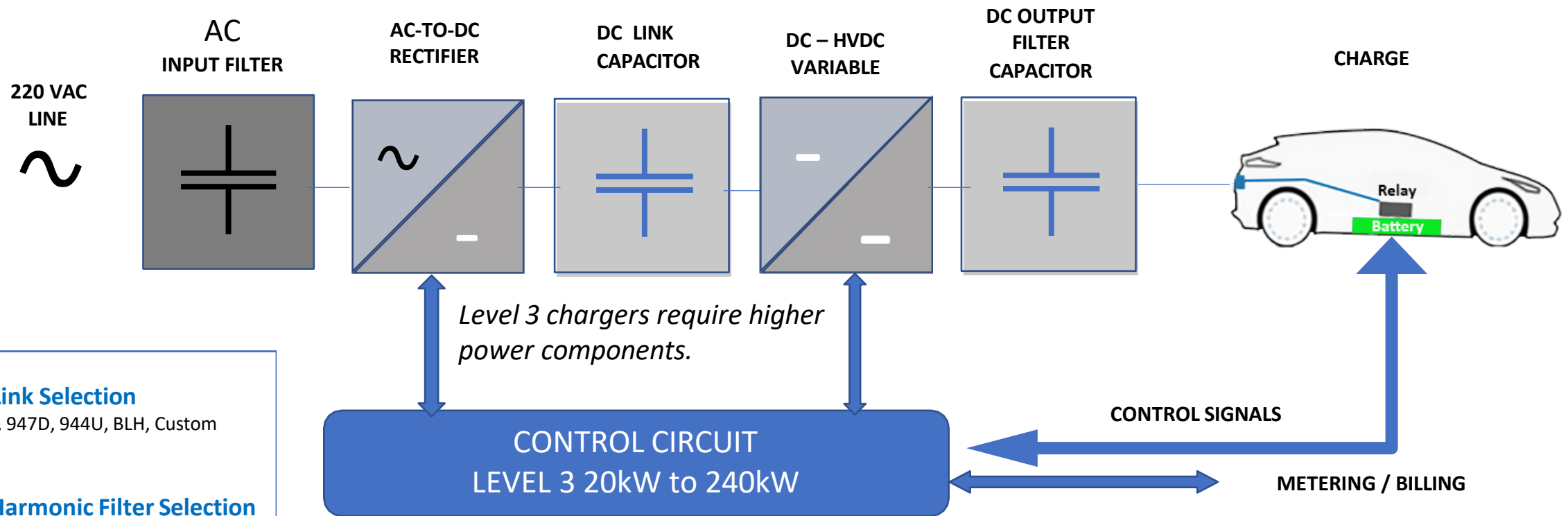
## Supercapacitor Selection

DGH, DSF

*Supercapacitors are used in combination with batteries for energy storage from solar inverters.*



# Grid-Powered EV Charging System (Level 3)



## DC Link Selection

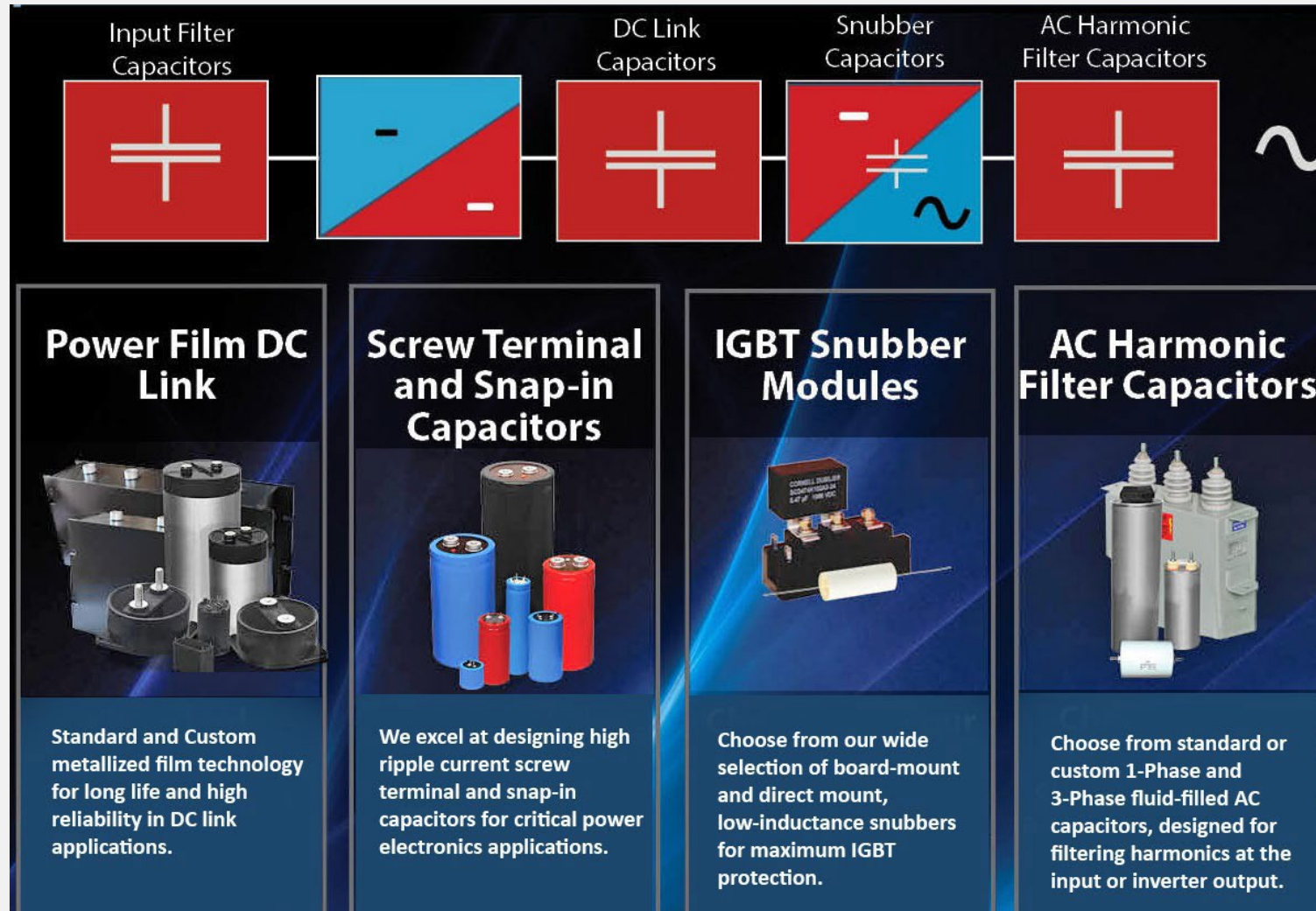
550C, 947D, 944U, BLH, Custom

## AC Harmonic Filter Selection

ALH, PC, PFCH



# CDE Capacitors at a Glance for Inverters and Converters



CDE is recognized as a global leader in the design and manufacture of capacitors for all stages of power conversion for standard and custom solutions.

<https://www.cde.com/solutions/inverters>

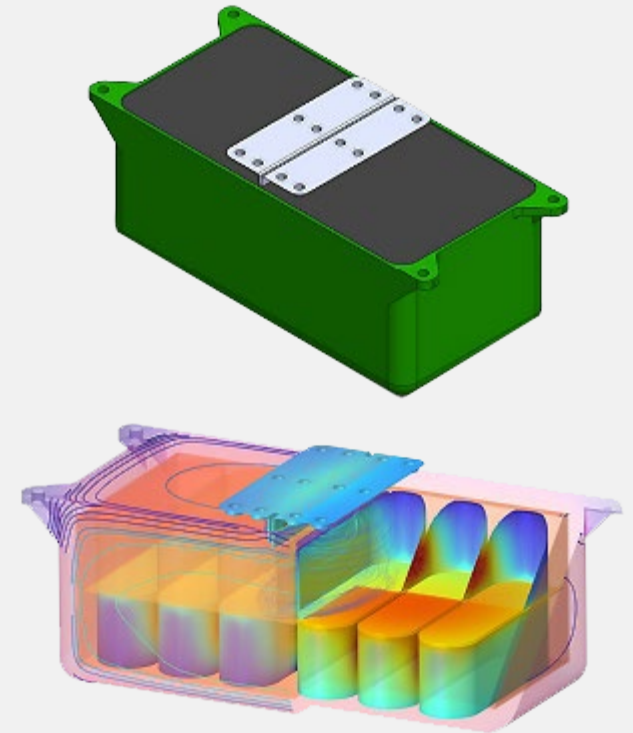
# Custom DC Link Capacitors for Level 3 EV Charging Stations

**CDE has the capability to produce custom DC link capacitors, optimized for power inverter/converter EV charging systems.**

- Module designs, engineered to meet mechanical and electrical requirements of the application, including high energy and high-current density
- High capacitance values available
- Low inductance: <5 nH achievable
- Very high ripple current: 100's of amperes (rms)
- Self-healing and low-loss dielectric system
- Metal or insulated plastic cases available
- Advanced capacitor performance modeling based on customer's application

## Specifications

Capacitance Range:	Designed for specific application
Voltage Range:	450 Vdc to 3800 Vdc
Operating Temperature:	-40 °C to +135 °C
Life Expectancy:	200,000 hours typical



# Useful Links and Contacts

## **Cornell Dubilier Website Homepage**

<https://www.cde.com/>

## **CDE Inverter Solutions**

<https://www.cde.com/solutions/inverters>

## **CDE Custom DC Link Product Brief**

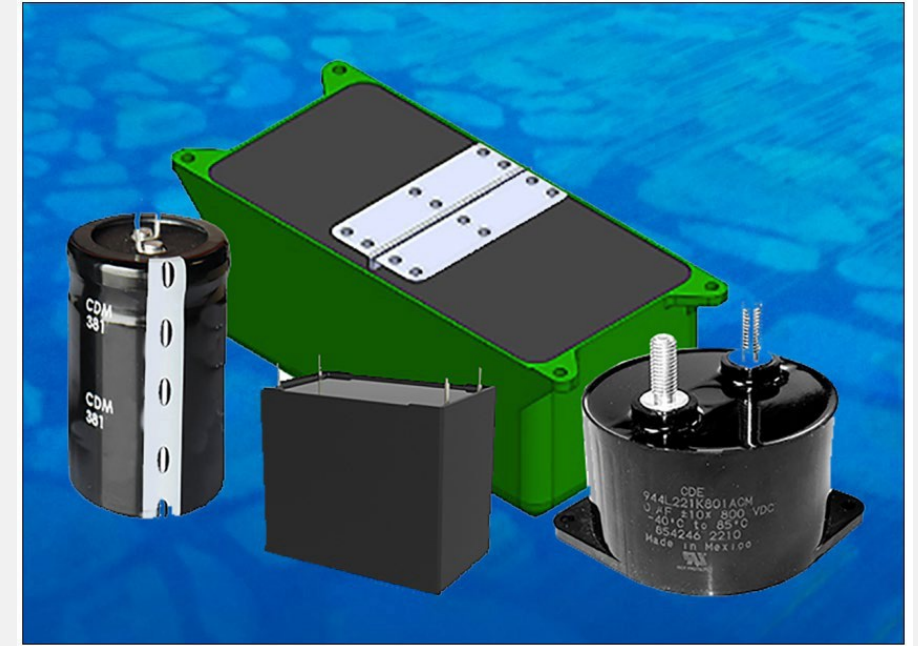
<https://www.cde.com/resources/downloads/Briefs/Custom-DC-Link-Brief.pdf>

## **CDE Custom DC Link Solutions**

<https://www.cde.com/custom-solutions/dc-link-dc-filtering>

## **CDE Sales Rep Contacts**

<https://www.cde.com/sales-rep-search>



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