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)

Supercapacitors are used in combination with batteries for energy storage from solar inverters.
Grid-Powered EV Charging System (Level 3)

400-480 VAC LINE

Level 3 chargers require higher power components.

CONTROL CIRCUIT
LEVEL 3 20kW to 240kW

AC INPUT FILTER
AC-TO-DC RECTIFIER
DC LINK CAPACITOR
DC – HVDC VARIABLE
DC OUTPUT FILTER CAPACITOR

400-480 VAC LINE

RELAY

AC Harmonic Filter Selection
ALH, PC, PFCH

DC Link Selection
550C, 947D, 944U, 944L, BLH, Custom

METERING / BILLING

CONTROL SIGNALS
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

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Input Filter Capacitors

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DC Link Capacitors

+ -

Snubber Capacitors

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AC Harmonic Filter Capacitors

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Power Film DC Link

Standard and Custom metallized film technology for long life and high reliability in DC link applications.

Screw Terminal and Snap-in Capacitors

We excel at designing high ripple current screw terminal and snap-in capacitors for critical power electronics applications.

IGBT Snubber Modules

Choose from our wide selection of board-mount and direct mount, low-inductance snubbers for maximum IGBT protection.

AC Harmonic Filter Capacitors

Choose from standard or custom 1-Phase and 3-Phase fluid-filled AC capacitors, designed for filtering harmonics at the input or inverter output.
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

CDE Custom DC Link Solutions

CDE Sales Rep Contacts
https://www.cde.com/sales-rep-search

Phone: 508-996-8564
Email: cdena@cde.com