

SECTION 26 33 43
ELECTRIC VEHICLE SUPPLY EQUIPMENT – LEVEL 3 360kW DC FAST CHARGER

PART 1 - GENERAL

1.1 SCOPE

- A. The requirements of the contract, Division 26, applies to work in this section for a 360kW DC fast charger electric vehicle solution, as specified and as shown on the contract drawings which shall be furnished and installed by the contractor.

1.2 RELATED DOCUMENTS

- A. Related sections include the following:
 - 1. [Section 26 28 16—Substations]
 - 2. [Section 26 13 13—Medium Voltage Switchgear]
 - 3. [Section 26 23 00—Low Voltage Switchgear]
 - 4. [Section 26 24 13—Switchboards]

1.3 SUBMITTALS

- A. For review:
 - 1. The following information shall be submitted to the engineer:
 - a. Product datasheets
 - b. Installation manuals
- B. For construction:
 - 1. The following information shall be submitted for record purposes:
 - a. Final as-built overview drawings
 - b. Wiring diagrams
 - c. General layout floor plans
- C. Installation information including equipment anchorage provisions. The manufacturer shall provide final as-built drawings that record the general location of the supplied equipment and installation layout as well as operation and maintenance manuals.

1.4 RELATED STANDARDS

- A. The Level 3 DC fast charger electric vehicle supply equipment shall be designed, manufactured, and tested in accordance with the latest version of the following standards (unless otherwise noted):
 - 1. CCS Type 1 electric vehicle conductive charge coupler
 - 2. OCPP 1.6J
 - 3. Met Lab Certified
 - 4. NEMA Type 3R
 - 5. FCC Part 15.105 Class B
 - 6. Security: SSH with EC keys and unique password
 - 7. National Electric Code, ANSI/NFPA 70
 - 8. Charging standards:
 - a. SAE J1772: Electric vehicle conductive charge coupler
 - b. SAE J3105: Electric Vehicle Power Transfer System Using Conductive Automated Connection Devices Recommended Practice
 - 9. Charging standard: EN61851-23
 - 10. Communications: CCS using DIN 70121 or ISO 15118
 - 11. Safety: UL 2202, UL 2231, CSA 22.2 No. 107-1-16 and No.346:22
 - 12. Charging level: Level 3 (DCFC)
 - 13. Charging connector: CCS type 1 and Pantograph
 - 14. Open Charge Point Protocol (OCPP) v1.6J
- B. Products shall be listed or approved by Met Labs or Underwriters Laboratories, Inc.

1.5 QUALITY ASSURANCE

- A. The manufacturer shall have been manufacturing 360kW DC fast chargers or similar transportation electrification equipment for a minimum of five years. The manufacture shall also have been in manufacturing for a minimum of ten (10) years.
- B. The DC fast charger supplier shall manufacture “make ready” electrical infrastructure equipment to power and protect the charging equipment, providing an integrated EVSE solution.
- C. The manufacturer shall have ISO 9001:2015 certification, complying with its quality management standards.

1.6 DELIVERY, STORAGE AND HANDLING

- A. The DC fast charger provider shall build the Level 3 360kW power chargers in the United States to conform to Buy America Act requirements.
- B. The DC fast charger manufacturer shall stock the units and power components in the United States to facilitate fast and easy deliveries to the job site.
- C. If the DC fast charger is being stored prior to installation, the unit shall be stored to maintain the equipment in a clean and dry condition as required by the manufacturer’s instructions; in accordance with manufacturer’s instructions, one (1) copy of these instructions shall be included with the equipment at the time of shipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The 360 kW DC fast charger electric vehicle supply equipment shall be provided by Siemens eMobility or a pre-approved equal. Approved manufacturers are as follows:
 - 1. SIEMENS eMobility—360kW DC fast charger product line
 - 2. Heliox eMobility- 360kW DC fast charger product line
- B. Manufacturers listed above shall meet these specifications in their entirety. Products in compliance with the specification and manufactured by others not named shall be considered only if pre-approved by the engineer ten (10) days prior to bid date.
- C. The 180kW charger shall be built/assembled in the United States to meet Buy America compliant regulations.

2.2 PERFORMANCE REQUIREMENTS

- A. 360kW power with 480V AC range, 3 phase
- B. Input power needed: 3 phase, Delta, 480V AC supply (+6/-13%), 3 wires, 247A Frequency: 57Hz to 63Hz
- C. Total Harmonic Distortion: $V < 2\%$, $I < 5\%$
- D. Peak Power Efficiency: $>95\%$
- E. Power Factor: >0.98 about 50% load
- F. Short Circuit Current Rating: 35kA
- G. Input current: 247A (480V)
- H. Output current: 500A maximum
- I. Output voltage: 150V- 1000V
- J. Noise level: Maximum 60 dB operational
- K. Temperature: $-13\text{ }^{\circ}\text{F}$ to $113\text{ }^{\circ}\text{F}$ ($-25\text{ }^{\circ}\text{C}$ to $45\text{ }^{\circ}\text{C}$)

- L. Humidity
 - a. 95% relative humidity, non-condensing
- M. Corrosion Resistance: DIN 55633-1 standard for paints and varnishes used as product guideline for corrosion protection of steel structures. HP EVSE enclosure shall be galvanized steel with powder coating.
- N. Dispenser:
 - a. The unit shall allow up to three (3) EV vehicle dispensers supporting three (3) vehicles.
- O. Charging will be dynamic and parallel for the up to three (3) dispensers each with a charging port by varying the charging stations power by means of a built-in control system or through remote software.
- P. A separate power control cabinet unit shall be used to provide power to up to three (3) dispensers in a system.
- Q. Multiple HP-EV dispensers:
 - a. System shall allow up to three (3) remote EV vehicle dispensers.
 - b. Power control/power module unit shall have the ability to limit the power that can be delivered to the dispensers by means of a built-in control system or through remote software.
 - c. The system shall be capable of dynamically charging up to three (3) vehicles from a single power cabinet.
 - d. The system design shall support mounting of each remote dispenser up to 100 meters radially from the main power cabinet, or max 250 meters from the main power cabinet and last remote dispenser if they are daisy chained with a max of 100 meters between each of the remote dispensers.

2.3 CONSTRUCTION

- A. Power/control cabinet physical specifications
 - a. Provide a national recognized 360kW, free-standing DC fast charger; quantities and locations as shown on the drawings.
 - b. An integrated DC power and control cabinet design shall be provided. No two-piece designs that increase the installation and wiring costs shall be permitted.
 - c. The DC fast charger shall come standard, up to three (3) dispensers, each with a cable/port.
 - d. Enclosure shall be rated for outdoor, NEMA 3R, to withstand severe weather requirements.
 - e. Enclosure shall have provisions for the locking of the unit.
 - f. The integrated fast charger cabinet size shall be:
 - a. 64" (W) x 99" (H) x 32" (D) / 1626mm (W) x 2,515mm (H) x 813mm (D)
 - g. Cabinet installed weight: 2,646 pounds (1200 kg)
 - h. An emergency shutoff button shall be integrated into the front of the DC fast charger dispenser and cabinet.
 - i. The power cabinet shall have at least two levels of protection for current:
 - a. Hardware: Through a main circuit breaker or independent system that will monitor data to drive currents to zero if an overcurrent is detected. In addition, the power modules shall have an over current protection.
 - b. Software: Integrated programmable logic control (PLC) to continuously monitor the output current
 - j. The dispenser shall have embedded fast acting fuses.
 - k. Unit shall include built-in replaceable power modules.

- l. A rectifier bridge shall be incorporated into the cabinet to convert AC to DC current.
 - a. External and internal Identification label shall be provided with key current/voltage and model number information.
 - b. Surge arrester overvoltage protection shall be included in the power module.
 - c. A fully automated PLC system shall be incorporated to control the power and functionality of the system.
 - m. A cooling fan shall be provided to ensure proper air quality.
 - n. Support for integrated hardwired Ethernet communications.
 - o. Support for integrated wireless communication through 3/4G
 - p. Power shall be provided either through a bottom or side conduit open to ensure ease of installation.
 - q. Integrated lifting straps shall be provided into the charger for ease of mounting.
- B. Remote Dispenser Charging Unit Physical Specifications
- a. Remote dispenser shall be available in three designs:
 - a. Wall mount
 - b. Pedestal mount
 - c. Ceiling mount
 - b. Remote dispenser charging cable shall have a CCS Type 1 connector with the following characteristics:
 - a. DC 2 x 2/0 AWG
 - b. PE 1 x 1 AWG
 - c. CP and CS 2 x 18 AWG
 - d. Temperature sensor 2 x 18 AWG
 - c. Charging cable length shall be up to 23 ft with CCS1 plug
 - d. Cable management system shall be provided with the remote dispenser.
 - e. Standard CCS communications module will be used for powerline communications between the charger and vehicle.
 - f. Dispenser will incorporate DC output fuses to protect the charging station and vehicle from overcurrent.
 - g. Integrated Ethernet communications port for connection to the main power/control cabinet.
 - h. Communications between remote dispenser and power/control cabinet:
 - a. Copper Ethernet CAT6 up to 100m
 - b. Can communication distances for up to 250m
- C. Remote Control Box Charging Unit Physical Specifications
- a. Remote dispenser shall be available in three designs:
 - a. 250 Amp Vertical (Landscape)
 - b. 600 Amp Vertical (Landscape)
 - c. 600 Amp Horizontal (Portrait)
 - b. Remote Control Box Charging Unit shall have be compatible with the following Pantographs
 - a. Shunk Depot inverted pantograph 250A UL Buy America / SLS 301.102 E06.2217.02
 - b. Shunk Fast inverted pantograph 600A UL Buy America / SLS 201.106 SB-035533
 - c. Shunk Slow inverted pantograph w/capacitor 600A UL Buy America / SLS 201.102 SB-028815
 - c. Standard SAE J3105 will be used for powerline communications between the charger and vehicle.
 - d. Charger RFID system to be supplied, in order to eliminate cross-communication issues in depot environments
 - e. The overhead dispensers should be able to charge dynamically and in parallel

- f. Pantographs should be capable of cabin temperature pre-conditioning, based on pre-defined schedule
- g. Charger vendor shall provide all components necessary to connect up to three (3) pantographs per power cabinet, if required
- h. Pantograph communications box shall be equipped with LEDs for charging status indication
- i. Vendor to provide a complete solution including all necessary peripherals, which enables a seamlessly functioning system, including but not limited to: WiFi Antenna, RFID Antenna, LED Indicator light, Control panel for pantograph system.
- j. Dispenser will incorporate DC output fuses to protect the charging station and vehicle from overcurrent.
- k. Integrated Ethernet communications port for connection to the main power/control cabinet.
- l. Communications between remote dispenser and power/control cabinet:
 - a. Copper Ethernet CAT6 up to 100m
 - b. Can communication distances for up to 250m

2.4 INTERFACE PANEL

Integrated interface panel shall be provided to facilitate end user ease-of-use. This interface will supply at least these icons and readings:

- A. Stop button
- B. E-Stop button
- C. Charging indicator that glows when the charging session is in progress.

2.5 PAYMENT INTERFACE

N/A

2.6 COMMUNICATIONS

- A. The DC fast charger shall have a built-in gigabit Ethernet communications port.
 - a. Copper Ethernet, CAT6 or better with RJ45 connector
- B. An integrated 3G/4G cellular communications model shall be provided with a SIM card.
- C. Communications shall be fully compatible with OCPP v1.6j (JSON) open protocol for backend systems.
- D. Standard data communicated via OCPP will include:
 - a. Session ID
 - b. Vendor ID
 - c. EVSE ID
 - d. Port ID
 - e. Number of ports on the EVSE
 - f. Charge start date and time
 - g. Charge end date and time
 - h. Charge duration—time power being provided to EV
 - i. Session (connection) start date and time—when the port is connected to the EV
 - j. Session (connection) end date and time—when the port is disconnected to the EV
 - k. Session connection time
 - l. Charge kWh usage per session
 - m. Charge maximum demand kW per session
 - n. Vehicle make (optional)
 - o. Vehicle model (optional)
 - p. User ID—anonymous user ID (optional)

- E. No access of live parts shall be required to update the communication elements of the charging station.

2.7 DATA COLLECTING AND MONITORING

- A. The manufacturer shall offer a cloud-based solution to provide the customer with hosted data and monitoring from a web-based device.
- B. Remote maintenance shall be provided by a web server (IP) connection.
- C. Visibility to all aspects of the charger will be provided for troubleshooting, maintenance, updating charging software, and support.
- D. Remote 24x7 maintenance support shall be offered by the manufacturer.

2.8 MOUNTING

- A. Enclosure shall come with mounting plate and detailed descriptions for installing the cabinet.
- B. Complete wiring diagrams shall be provided to show wire type, size and terminations points.
- C. Locations for entry/exit of wiring shall be shown.
- D. Manufacturer shall provide minimum space clearances for the cabinet to ensure accurate operations. Installer will need to reference local codes to ensure material is installed per regulations.
- E. Mounting shall be on a concrete foundation with supporting conduit hole, as recommended by the manufacturer.
- F. Power shall be provided either through a bottom or side conduit open to ensure ease of installation.
- G. Integrated lifting straps shall be provided into the charger for ease of mounting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All installation work shall be performed by a qualified person who is familiar with the installation, construction, operation of the equipment, and the hazards involved.
- B. Install per the manufacturer's recommendations and contract documents.
- C. Install units in a plumb, level, and rigid fashion without distortion.
- D. Installation of the 180kW fast charger shall follow the procedure in the published literature.
- E. The contractor shall install all equipment per the manufacturer's recommendations and contract drawings.
- F. All necessary hardware to secure the assembly in place shall be provided by the contractor.

3.2 ADJUSTMENTS AND CLEANING

- A. Remove debris from the EVSE and wipe dust and dirt from all components.
- B. Repaint marred and scratched surfaces with touchup paint to match original finish.

3.3 TESTING

- A. Check tightness of all accessible mechanical and electrical connections to ensure they are torqued to the minimum acceptable manufacturer's recommendations.
- B. Check all installed charging systems for proper grounding, fastening, and alignment.

- C. Each EVSE shall undergo factory testing of all operational and protective features prior to shipment. No onsite testing shall be required.

3.4 WARRANTY

- A. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for two (2) years from the date of shipment.
- B. Changes or modifications to this product not authorized by the manufacturer shall void the warranty. The contractor shall contact the manufacturer to avoid non-compliant modifications.

3.5 OPERATIONS AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets and instruction bulletins for the complete assembly.

3.6 SERVICE

- A. DC fast charger supplier shall offer a managed service offering if required by the end user.
- B. 24x7 Level 1 technical support line via a 1-800 number shall be provided at no cost.
- C. Onsite startup assistance by the supplier shall be offered as part of the package.

END OF SECTION