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Permit to Practice No. 1001261

Vancouver Coastal Health Electrical Performance Specification For DC Fast Chargers and Level 2 EV Chargers

November 10, 2022
Internal Project Number 22- 041

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Performance Specification Executive Summary

O'M Engineering has analyzed and reviewed at various DC Fast Charging (DCFC) and Level 2 EV Charging systems available in the market and has completed a performance specifications in accordance with the requirements set out by Vancouver Coastal Health. A suitable questionnaire had been drawn up to gain an understand of the VCH's requirements for the DCFC. The survey results gathered from the client give a roadmap of what Vancouver Coastal Health is in the market for and helped formulate the performance specifications.

DC fast charging is governed by the North American SAEJ 1772 Combo standard and the Japanese JEVS G105-1993 standard. DCFC stations generally support both standards. All carmakers adhere to one of these standards except for the company Tesla, which has developed a higher performance charging station but can offers a CHAdeMO adapter as an option. Level 2 chargers utilize the J1772 charger or other proprietary charging connectors (ie Tesla).

Typically, customers in business areas are subject to different energy rates for energy associated with EV charging. As the EV chargers will increase the maximum power demand and because rates are subject to change by the power distributor the ideal strategy is to supply the charging stations from a dedicated connection (separate meter and billing) to avoid optimization charges associated with maximum power demand while complying with BC Hydro's Conditions of Electricity Service. Another way to avoid optimization charges when supplying a group of charging stations is to select a model that has a built in energy management system for controlling power demand and charger output.

Below are the questionnaire results for the DCFC and the results of which have been considered in the formulation of these specifications:

Item	Question	Answer
1	KW rating is required for the DCFC?	50-200 kW
2	Is power sharing amongst DCFC acceptable?	Yes
3	Number of charging heads per DCFC?	2
4	Type of charging head(s)?	CCS2 and CHAdeMO
5	Cable length for each charging head?	10-20 ft
6	Preferred communications protocol for chargers?	Wi-Fi and Cellular
7	DCFC activation preference?	Mobile App/ RFID/ Credit Card
8	Open charge point protocol (OCPP) compliant chargers required?	Yes
9	Do DCFCs need billing and credit card processing capabilities?	Yes
10	Remote monitoring for troubleshooting, charger faults and customer support required?	Yes

1.0. DC Fast Charger Electrical Specifications

The Performance Specifications for the DC Fast chargers which the Vancouver Coastal Health require will be highlighted in the sections below. The sections which will be discussed below are as follows:

- Power Specific - AC Input and DC Output
- User Interface and Control
- Communications
- Mechanical specifics

1.1. AC Input and DC Output

The Power Specification will include both the AC Input power and the DC Output power specifications needed for the client. The client would like multiple DC Fast Chargers on the Vancouver Coast Health's premises with the following electrical characteristics:

AC Voltage:	480V AC
Phase	3 + neutral (4 wire + bond)
Input Frequency:	60 Hz
Input voltage Tolerance:	+10% to -15% of nominal
Power Input:	50kW – 200kW
Power factor:	96% or better
Efficiency (at max output power):	92% or better
Harmonics	<5% iTHD (comply with IEEE 519)
DC output voltage:	50V to 500V
DC voltage accuracy:	+/- 2%
Energy Management:	Yes, built into unit

DCFC may be separate units for each output rating or, preferably, a scalable system with standard sized power modules. The unit shall have electrical isolation between input and output internal wiring and circuitry.

The unit shall have built in energy management systems to share power between the two charging connectors on each unit, or with other stand-alone DCFC. The DCFC shall be capable of providing simultaneously charging for two electric vehicles and be able to dynamically manage the power distribution.

1.2. User Interface and Control

The User Interface and Control involves the inclusion of the display and function buttons.

Screen size:	7-inch, or equivalent
Touch Screen:	Yes, preferred
Emergency Stop Button:	Yes

The DCFC should have at least a 7-inch display which is easily accessible and clear for all customers. There shall also be function buttons such as operational buttons and an emergency stop which should be clearly labelled.

1.3. Communications

Communications involves the External and Internal connections in the DC fast chargers. The external connection needed are stipulated below while the Internal connection must have a CAN bus as standard.

External Ethernet Communications Protocols:	hardwired ethernet and Wi-Fi,
External cellular Communications Protocols:	3G, 4G or LTE
Other Communications Protocols:	BACnet IP
OCPP compliant:	Yes. Version 1.6 and upgradable to 2.0 and beyond.
Card reader:	Yes, built in utilizing NFC/RFID technology.
In Vehicle Authentication:	Yes
Payment processing:	Shall support Visa, MasterCard, paypal (via app) and option of integrated magnetic strip and chip based payment options
Payment Regulatory Standard:	PCI Compliancy
Charger Activation	Via touchscreen, Android/IOS devices or proximity cards (HID)
Push Notifications	Must have the ability to send push notifications to mobile phones

The DCFC shall be capable of networked or standalone operations.

Software shall be capable of user authentication, metering, billing, running diagnosis and remote management. Software and firmware updates shall be done “over the air” and not impede use of charger while updating.

Customers shall be able to access DCFC via mobile app or RFID System and shall be able to provide user with real time updates and notifications.

1.4. Mechanical Specifics:

The Mechanical Specifications are also important as they can include the general construction of the DCFC, charging connectors, cable length, cabinet dimensions and even the cooling method of the fast chargers. The two most common EV chargers include the CHAdeMO and the CCS1.

DCFC Casing:	NEMA Type 3R
Casing Material	Aluminum
Vandal Resistant:	Yes
Operating Temperature:	-30°C – 50°C
Humidity Tolerance:	Up to 95% (non-condensing)
Impact Rating	IK-10
Charging connections per DCFC:	2
Charging Connectors:	CCS1 and CHAdeMO (one of each)
Cable length:	6.1m (20') minimum
Cable management	Yes retracting type
Noise Level	53db or less
Fixing type	Pedestal style

It is preferred the DCFC also have a customizable partner panel for branding and company logo.

2.0. Level 2 Charger Electrical Specifications

The Performance Specifications for Level 2 chargers which the Vancouver Coastal Health require will be highlighted in the sections below. The sections which will be discussed below are as follows:

- Power Specific - AC Input
- User Interface and Control
- Communications
- Mechanical specifics

2.1. AC Input

The Power Specification will include the AC Input power specifications needed for the client. The client would like multiple Level 2 Chargers on the Vancouver Coast Health's premises with the following electrical characteristics:

AC Voltage:	208V AC
Phase	1 (2 wire + bond)
Input Frequency:	60 Hz
Input voltage Tolerance:	+5% to -5% of nominal
Power Input:	up to 7.2kW
Energy Management:	Yes, built into unit (minimum 4:1 load sharing)

The unit shall have built in energy management systems to share power between the charging connectors on each unit, or with other stand-alone level 2 chargers. The chargers shall be capable of dynamically manage the power distribution.

2.2. User Interface and Control

The User Interface and Control involves the inclusion of the display and function buttons.

Touch Screen:	LCD display preferred, but not required
Display:	LCD display preferred, but not required

The chargers shall have status LED indicator lights as a minimum if no LCD display is provided. Readouts shall be easily accessible and clear for all customers.

2.3. Communications

Communications involves the External and Internal connections for the chargers. The external connection needed for the specific chargers must have an Ethernet, Wi-Fi and cellular connection as standard.

External Ethernet Communications Protocols:	hardwired ethernet and Wi-Fi,
External cellular Communications Protocols:	3G, 4G or LTE
Other Communications Protocols:	BACnet IP (for data gathering)
OCPP compliant:	Yes. Version 1.6 and upgradable to 2.0 and beyond.
Card reader:	Yes, built in utilizing NFC/RFID technology.
In Vehicle Authentication:	Yes
Payment processing:	Shall support Visa, MasterCard, paypal (via app) and option of integrated magnetic strip and chip based payment options
Payment Regulatory Standard:	PCI Compliancy
Charger Activation	Via charger, Android/IOS devices or proximity cards (HID)
Push Notifications	Must have the ability to send push notifications to mobile phones

The charger shall be capable of networked or standalone operations.

Software shall be capable of user authentication, metering, billing, running diagnosis and remote management. Software and firmware updates shall be done “over the air” and not impede use of charger while updating.

Customers shall be able to access charger via mobile app or RFID System and shall be able to provide user with real time updates and notifications.

2.4. Mechanical Specifics:

The Mechanical Specifications are also important as they can include the general construction of the charger, charging connectors, cable length, etc.

Casing:	NEMA Type 3R
Casing Material:	Aluminum
Vandal Resistant:	Yes
Operating Temperature:	-30°C – 50°C
Humidity Tolerance:	Up to 95% (non-condensing)
Impact Rating	IK-10
Charging connections per charger:	single or double
Charging Connectors:	SAE J1772
Cable length:	6.1m (20') minimum
Cable management	Yes retracting type
Noise Level	53db or less
Fixing type	Pedestal or wall mounted

It is preferred the charger also have a customizable partner panel for branding and company logo.

3.0. Warranty Requirements

Proponent shall provide a 5 year extended manufacturer warranty and services maintenance plan from day of substantial completion of project, issued by Project Consultant for both Level 2 and DCFC. Include extended warranty and service maintenance cost for total number of EV charger per site. **This cost is to be considered as part of base price per site.** Provide unit price per charger for extended warranty and service maintenance plan for future reference.

Proponent shall clearly note any exclusions if applicable with regards to warranty/maintenance.

Vendor/Contractor shall respond within 24 hours of problem reported and make all efforts to fix the issue within 72 hours after problem is reported.

For the service maintenance plan, include two maintenance site visits per year (spring and autumn) for each site. Each maintenance site visit shall consist of review and analysis of installed EV chargers and associated EV charging infrastructure. Test sheet shall be submitted to VCH designate upon completion of each site maintenance visit. Test sheet to include diagnostic test of applicable EV charger and EV infrastructure.”

4.0. Regulations:

The chargers shall comply with the following certifications and/or regulations:

CSA 22.2 No 281.12 – Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements

CSA 22.2 No 107.1-16 – Power Conversation Equipment

cUL 2202 – Standard for Electric Vehicle (EV) Charging System Equipment

FCC Part 15 – Radio Frequency Devices

EN 61851 – Electric Vehicle Conductive Charging System Part 1: General Requirements

UL 2231-1 – Personal Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements

UL 2231-2 – Personal Protective Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use In Charging Systems.

UL 2494 – Standard for Electric Vehicle Supply Equipment

5.0. Proponent Qualifications

The successful proponent shall supply and install the Level 2 and DCFCs. The proponent shall provide information relating to or demonstrate the following in their proposal:

1. Provide overview of company qualifications, experience and relevant projects where DCFC were locally supplied and installed.
2. Provide resume and qualifications of key personnel along with time with firm.
3. Provide details of the ability and capacity to provide local support for servicing, repairs, etc.
 - Service centre or technicians shall be located in the Greater Metro Vancouver Area
 - Indicate typical dispatch and repair times.
 - Typical fee structure for servicing plan.
4. Have the ability to program in house or via external forces a customized dashboard to display energy consumption, GHG saving, etc. Dashboard may be displayed locally or via the internet on desktop or mobile devices
5. Provide general pricing for Level 2 and DCFC of various sizes. Proponents will not be held to these prices and VCH will solicit quotes on individual project basis.