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USACE / NAVFAC / AFCEC **UFGS-34 60 13 (August 2024)**

Preparing Activity: NAVFAC **Superseding**
UFGS-11 11 37 (November 2018)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2024
****

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DIVISION 34 - TRANSPORTATION

SECTION 34 60 13

ELECTRIC VEHICLE CHARGING FACILITY (EVCF)

08/24

-- End of Section Table of Contents --

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****

SECTION 34 60 13

ELECTRIC VEHICLE CHARGING FACILITY (EVCF)
08/24

****
NOTE: This guide specification covers the requirements for charging facilities to support electric vehicles.

Coordinate with the Activity and provide specific requirements "to match existing systems" when necessary. If specifying proprietary products, insure that appropriate "Justification and Authorization (J & A)" documentation has been obtained by project manager and "proprietary language requirements" have been added to Division 1 as well as adding the following lines above the section number and title at the top of the first page of this section of the specifications:

****
This specification section contains proprietary products.
****

If there are any components (such as chargers, control systems, meters, housing, or current transformers) that will be Government Furnished Contractor Installed (GFCI), or Government Furnished Government Installed (GFGI), edit Division 1 and this specification section appropriately.

Service Tailoring Option
This specification also includes tailoring options for the Service (Air Force, Army, Navy) the specification is used for. Only ONE of the three tailoring options related to the Service should be used. You have currently included the following option(s):

ARMY
NAVY
AIR FORCE

If more than one item appears between the dashes above, you have included more than one Service's tailoring option and need to DESELECT all but one of them. If there is no text between the dashes above, you have not included any Service's tailoring options. Select ONE of the Service's tailoring options for inclusion.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
****

PART 1 GENERAL

1.1 REFERENCES

****
NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C260/C260M (2010a; R 2016) Standard Specification for

	Air-Entraining Admixtures for Concrete
ASTM D709	(2017) Standard Specification for Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 142	(2007; Errata 2014) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book
IEEE C2	(2023) National Electrical Safety Code

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 15118	(2022) Road vehicles - Vehicle-to-Grid Communication Interface
ISO 15118-2	(2014; Reconfirmed 2020) Vehicle-to-Grid Communication Interface - Part 2: Network and Application
ISO 15118-3	(2015; Reconfirmed 2020) Vehicle-to-Grid Communication Interface - Part 3: Physical and Data Link Layer Requirements
ISO 15118-20	(2022) Vehicle-to-Grid Communication Interface - Part 20: 2nd Generation Network Layer and Application Layer Requirements

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)

NECA NEIS 1	(2015) Standard for Good Workmanship in Electrical Construction

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2023) National Electrical Code

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J1772	SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler
SAE J3068	(2022) SAE Electric Vehicle Power Transfer System Using a Three-Phase Capable Coupler

UNDERWRITERS LABORATORIES (UL)

UL 62	(2018) UL Standard for Safety Flexible Cords and Cables
UL 486A-486B	(2018; Reprint Jul 2023) UL Standard for Safety Wire Connectors
UL 2202	(2022) UL Standard for Safety Electric Vehicle (EV) Charging System Equipment

UL 2231-1	(2012; Reprint Sept 2021; ANSI Approved 2021) Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements
UL 2231-2	(2012; Reprint Dec 2020; ANSI Approved 2020) Standard for Personnel Protection Systems for Electrical Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
UL 2251	(2017; Reprint Dec 2022; ANSI Approved 2022) Standard for Plugs, Receptacles and Couplers for Electric Vehicles
UL 2263	(2022) Electric Vehicle Cable
UL 2594	(2022) Electric Vehicle Supply Equipment

1.2 DEFINITIONS

1.2.1 Electric Vehicle Charging Facility

The DoD uses the term "Electric Vehicle Charging Facility" (EVCF) in place of the broader industry term "Electric Vehicle Supply Equipment" (EVSE) to differentiate between DoD equipment (EVSE) and DoD real property (EVCF). EVCF encompasses the conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, personnel protection system, and all other fittings, devices, power outlets, panel, or apparatus installed specifically for the purpose of transferring energy from the premises wiring to the electric vehicles (EVs). EVs include battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). There are three charging levels of EVCF:

a. Level 1 - Refers to a freestanding or wall mounted charging device with an input voltage ranging between 110-230 VAC, 1-phase, replenishing an electric vehicle (EV) battery at a rate of 4 to 6 miles of range per hour of charging time. Charging at Level 1 typically takes between 5-6 hours for a PHEV and 40-50 hours for a BEV depending on the size of the vehicle's battery.

b. Level 2 - Refers to a freestanding or wall mounted charging device capable of being networked, with an electrical output ranging between 2kW - 19.2kW, with an input voltage ranging between 208-240 VAC, 1-phase, and replenishing a EV battery at a rate from 18 - 28 miles per hour of charging time. Charging an EV at Level 2 typically takes between 1-2 hours for a PHEV and 2-10 hours for a BEV, depending on the size of the vehicle's battery.

c. Direct Current Fast Charger (DCFC) - Refers to a freestanding or wall mounted charging device capable of being networked that is designed to charge vehicles more quickly than Level 2, with an electrical output ranging between 25kW - 350kW, and an input voltage ranging between 208-600 VAC, 3-phase. DCFCs are designed to charge EV batteries up to 80 percent in 20 - 40 minutes and 100 percent in 60 - 90 minutes at an average rate of 50 - 100 miles of range per 15 minutes of charging time. DCFC is synonymous with Level 3.

1.2.2 Cable Management System

An apparatus designed to control and organize lengths of cable or cord.

1.2.3 Charger Power Converter

The device used to convert energy from the power grid to a high-frequency output for wireless power transfer.

1.2.4 Electric Vehicle Connector (Conductive Charge Coupler)

A device that, when electrically coupled (conductive or inductive) to an electric vehicle inlet, establishes an electrical connection to the electric vehicle for the purpose of power transfer and information exchange.

1.2.5 Electrical Vehicle Power Export Equipment (EVPE)

The equipment, including the outlet on the vehicle, that is used to provide electrical power at voltages greater than or equal to 30 Vac or 60 Vdc to loads external to the vehicle, using the vehicle as the source of supply.

1.2.6 Fixed In Place

Mounting means of equipment using fasteners that require a tool for removal.

1.2.7 Networked Management System

A networked management system that controls the amount of power dispensed by chargers to EVs to meet user’s charging needs while simultaneously responding to external power demand [and][or] pricing signals to provide load management, resilience, or other benefits to the electrical grid.

1.2.8 Output Cable To The Electric Vehicle

An assembly consisting of a length of flexible EV cable and an electric vehicle connector (supplying power to the electric vehicle).

1.2.9 Personnel Protection System (As Applied To EVSE)

A system of personnel protection devices and constructional features that when used together provide protection against electric shock of personnel.

1.2.10 Power-Supply Cord

An assembly consisting of an attachment plug and length of flexible cord connected to utilization equipment.

1.2.11 Listed

Equipment, materials, or services included in a list published by NRTL or an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.3 RELATED REQUIREMENTS

****

NOTE: Include Section 26 08 00 APPARATUS INSPECTION AND TESTING on all projects involving specialized power distribution equipment. Coordinate EVCF equipment with Government's cybersecurity requirements and interpretations.

****

Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION, Section 32 17 23 PAVEMENT MARKINGS, Section 25 05 11 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS, and Section 26 08 00 APPARATUS INSPECTION AND TESTING applies to this section with the additions and modifications specified herein.

1.4 SEISMIC REQUIREMENTS

****

NOTE: For use on Air Force and Army projects only. When directed to meet seismic requirements, edit Sections 13 48 73 SEISMIC CONTROL FOR MECHANICAL EQUIPMENT and 26 05 48 SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT to suit the project and include in the contract documents. Edit the following paragraph and include it in the project specification. When a Government designer is the Engineer of Record, provide seismic requirements on the drawings.

****

Provide seismic details[conforming to[Section 13 48 73 SEISMIC CONTROL FOR MECHANICAL EQUIPMENT][and to] Section 26 05 48 SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT][as indicated].

1.5 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the

District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy and Air Force projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

In addition, submit in accordance with paragraph COORDINATED SUBMITTAL REVIEWS herein.

****

NOTE: Bracketed submittal items correspond to bracketed paragraphs within the text. Use these submittal items when the bracketed paragraph is used.

****

SD-02 Shop Drawings

Installation Drawings; G, [_____]

[Wireless Survey; G, [_____]

] SD-03 Product Data

Output Cable to the Electric Vehicle; G, [_____]

Plug Connectors; G, [_____]

[Level 1 Plug-in EVCF; G, [_____]

][Level 2 Plug-in EVCF; G, [_____]

][DC Fast Charger EVCF; G, [_____]

] Charge Management System (CMS); G, [_____]

SD-07 Certificates

Certified Installers; G, [_____]

SD-08 Manufacturer's Instructions

Output Cable to the Electric Vehicle; G, [_____]

Plug Connectors; G, [_____]

[Level 1 Plug-in EVCF; G, [_____]

][Level 2 Plug-in EVCF; G, [_____]

][DC Fast Charger EVCF; G, [_____]

] Charge Management System (CMS); G, [_____]

SD-09 Manufacturer's Field Reports

Testing of Electric Vehicle Charging Facility; G, [_____]

SD-10 Operation and Maintenance Data

Electric Vehicle Charging Facility, Data Package 3

SD-11 Closeout Submittals

Warranty; G, [_____]

****
NOTE: Delete Record Documentation for Navy projects. Normally as-built documentation is a requirement of Division 01.
****

Record Documentation

[1.6 OPERATION AND MAINTENANCE MANUALS

Provide a list of manufacturer recommended maintenance items required for EVCF Operation.

1.6.1 Operation and Maintenance Manuals

****
NOTE: Provide number of copies based on Base needs.
****

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Submit [two][_____] manuals and electronic file at least 2 weeks prior to field training.

[1.6.2 Spare Parts

****
NOTE: Do not include for Navy projects.
****

Provide one spare cord and connector assembly for every [three][_____] stations installed.

]]1.7 QUALITY ASSURANCE

1.7.1 Installation Drawings

Drawings must include, but not be limited to the following:

a. Shop drawing must include installation details of EVCF equipment

indicating location as proposed in design drawings, layout and arrangement of EVCF, dimensions, weights, clearances, support and mounting details, communications, conduits, meters, security systems, and all other accessories associated with the installation of the EVCF. Single-line diagrams must identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each equipment item for power, communications, and control wiring.[Include verification of wireless communications service via Wireless Survey at each location of EVCF.]

b. Shop drawings may include legible copies of manufacturer's product literature, with selected items and specifications highlighted thereon.

[1.7.2 Wireless Survey

Complete a wireless survey to verify if the wireless provider's signals meet or exceed the minimum manufacturer's recommended values.

]1.7.3 Certified Installers

Installers must be certified by EVSE manufacturer or the Electric Vehicle Infrastructure Training Program (EVITP).

Submit documentation certifying that pertinent personnel are qualified for EVSE installation. The documentation must include installation experience on a minimum of two projects of comparable size and scope of work.

1.7.4 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated. NECA NEIS 1 must be considered the minimum standard for workmanship.

1.7.5 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer and the component parts of the item must be the products of the same manufacturer. Additionally:

a. Products must have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been available on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.

b. Products which are an upgraded model of equipment meeting the requirements above, are acceptable.

c. Products having less than a 2-year field service record are acceptable

if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, is furnished.

1.7.5.1 Material and Equipment Manufacturing Date

Provide products manufactured within 2 years prior to date of delivery to site. As a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70 for all materials, equipment, and devices.

1.8 WARRANTY

****
NOTE: Include first bracketed option for CONUS, second bracketed option for OCONUS, or fill in the third bracket for special circumstances.

NOTE: Delete first paragraph on Navy Projects.
****

Provide equipment items supported by service organizations that are convenient to the equipment installation in order to render satisfactory service to the equipment within [24][48][_____] hours of notification during the warranty period of the contract.

Provide warranty for Materials and Workmanship of EVCF: Two [2][_____] years.

1.9 OPERATING CONDITIONS

****
NOTE: Select 50 degrees C 122 degrees F ambient temperature rating unless in areas subject to extreme temperatures (e.g., Middle East or desert environments). Use 0-95 percent relative humidity unless extreme condensation, such as in a jungle climate.
****

The equipment must be rated for continuous operation from no load to rated full load under the following conditions:

a. Ambient temperatures ranging from minus 30 to[50][55][60][65][_____] degrees C 22 to[122][131][140][149][_____] degrees F.

b. Relative humidity from [0 to 95][_____] percent noncondensing.

c. Ambient pressure from sea level to [1830][_____] meters [6000][_____] feet.

****
NOTE: Where the equipment operating conditions fall outside of the environmental conditions above, incorporate a method below to ensure the equipment can operate as intended.
****

[d. Provide a[sun shade,][environmentally controlled enclosure,][_____]

to ensure the installed products meet the manufacturer's operating conditions.

]PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Provide products and materials not considered to be ELECTRIC VEHICLE CHARGING FACILITY and related accessories for power requirements as specified in[Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM,][and][Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION][and][Section 32 17 23 PAVEMENT MARKINGS]. Equipment covered by the scope of this section must be listed.

2.2 ELECTRIC VEHICLE CHARGING FACILITY

2.2.1 Conductive Plug-in System Description

****
NOTE: Number and type of charging stations selection must be based on User's requirements after interviewing User to determine number and frequency of EVs to be charged. Each charger may have multiple ports to provide charge to multiple vehicles at once.
****

Electric Vehicle Charging Facility capable of charging [one] [multiple] vehicles at[Level 1][Level 2][Direct Current (DC) Fast Charger]. Equipment must have surge protection rated at [6000][_____] kV and [3000][_____]A.

[2.2.1.1 Level 1 EVCF

****
NOTE: Power levels for Electric Vehicle Charging Facility should be based on User's Projected Electric Vehicle usage. Verify power requirements for available chargers. Chargers range from 1.2-1.9 kW at 120VAC, 1-phase. Refer to NEC Article 625, 210 and 240 for sizing of conductors and overcurrent protection.
****

2.2.1.1.1 Level 1 Plug-in EVCF

UL 2251, UL 2231-1, UL 2231-2, UL 2594. Level 1, Input/Output VAC: [120][230][_____].[Input [_____] amps, output [_____] amps, [_____] kW.] Mounting: [wall-mounted][pedestal mounted][post mounted][overhead].

][2.2.1.2 Level 2 EVCF

****
NOTE: Power levels for Electric Vehicle Charging Facility should be based on User's Projected Electric Vehicle usage. Verify power requirements for available chargers. Chargers range from 2.0-19.2 kW at 208/240VAC, 1-phase. Refer to NEC

Article 625, 210 and 240 for sizing of conductors and overcurrent protection.

****

2.2.1.2.1 Level 2 Plug-in EVCF

UL 2251, UL 2231-1, UL 2231-2, UL 2594. Level 2, Input/Output[208, 1-phase][208, 3-phase][230, 1-phase][400, 3-phase][480, 3-Phase] [_____].[Input [_____] amps, output [_____] amps, [_____] kW.] Mounting: [wall-mounted][pedestal mounted][post mounted][overhead].

][2.2.1.3 DC Fast Charger EVCF

****

NOTE: Power levels for Electric Vehicle Charging Facility should be based on User's Projected EV usage. Verify power requirements for available chargers. Chargers range from 25-350 kW at 480/600VAC, 3-phase. Refer to NEC Article 625, 210 and 240 for sizing of conductors and overcurrent protection.

****

2.2.1.3.1 DC Fast Charger EVCF

UL 2202, UL 2251, UL 2231-1, UL 2231-2. Input/Output VAC: [208, 3-phase][480, 3-phase][400, 3-phase][600, 3-phase] [_____].[Input [_____] amps, output [_____] amps, [_____] kW.] Mounting: [wall-mounted][pedestal mounted][overhead].

]2.2.1.4 Output Cable to the Electric Vehicle

[UL 62][or][and][UL 2263]. Cable must meet or exceed voltage and current ratings of charger.

****

NOTE: Provide length of cable for installation. Maximum cable length is 7.6 meters 25 feet unless equipped with a cable management system that is part of the listed EVCF (See NFPA 70, Article 625). Provide retractable cable management for each installation as standard practice.

****

a. [4.25 meters 14 feet][_____], minimum, UL rated [liquid cooled][_____] type charging cable with[integral retractable] cable management system.

2.2.1.5 Plug Connectors

UL 2251. Plug connector must meet or exceed voltage and current ratings or charger.

****

NOTE: Provide type of connector for installation. Coordinate the type of connector with geographical location, type of vehicle port, and charging output. North America accepts J1772, NACs, and J3068 for AC charging and CCS1, NACS, or Chademo for

DC charging. EU accepts Mennekes, NACS for AC charging and CCS2, NACS for DC charging. Japan accepts J1772 for AC charging and Chademo, CCS1 for DC charging.

****

a. CONUS - Connector Type: [SAE J1772,][CCS1,][NACS,][SAE J3068,][or][and][Chademo].

b. OCONUS - Connector Type: [SAE J1772,][CCS1,][CCS2,][Chademo,][or][and][Mennekes].

2.2.1.6 Connector Holster Dock

Provide connector holster dock to store charger plugs when not in use. Holster construction consist of high strength injection molded plastic with temperature ratings of minus 30 deg C to 50 deg C 22 deg F to 122 deg F. Provide holster to match EV plug.

2.3 EQUIPMENT ENCLOSURE

****

NOTE: For all outdoor applications at project locations with Environmental Severity Classification (ESC) factors of C4 and C5 and all indoor applications in a harsh environment, select NEMA 4X option below. In other outdoor locations, select NEMA 3R option. See UFC 1-200-01 for determination of ESC for project location. Designer to coordinate NEMA designation on drawings.

****

Provide corrosion resistant construction for outdoor use and continuous exposure to a marine environment and high humidity locations. Equipment enclosure must be NEMA Type[3R][3R Type 304 stainless steel][4X Type 304 stainless steel][4X fiberglass][4X plastic] [____][as indicated].

2.4 CHARGE MANAGEMENT SYSTEM (CMS)

****

NOTE: NFPA 70 requires dedicated circuits for EVCF. However, an exception may be permitted to feed multiple EVSE from a single circuit when energy management systems in compliance with Section 750.30 of NFPA 70 is applied. Charge management systems provide operational and load management controls for network connected and non-network connected electric vehicle charging facilities locally from a programmable hardware controller or remotely via cloud based software.

Local control of electric vehicle charging stations is implemented by an external programmable hardware EVSE controller that is typically connected to specified number of chargers as well to a facility electric meter to primarily provide energy load management without a network connection. Where the external charge management system is not network

connected, use non-network connected management system option. Where an external EVSE controller that may have options to connect to a network based system, use network-connected charge management system option.

Electric vehicle charging facilities controlled remotely require a network connected charge management system. The cloud based charge management software uses a charging network to communicate over the internet with the charging stations and connected electric vehicles. Network connected CMS offer more advanced operation controls, energy load management, and scalability. Where cloud base charging management software is designed, use network-connected charge management system option.

****

****

NOTE: Where EVCF is designed in publicly accessible spaces for GOV and POV usage, a network connected charge management system must be selected.

****

****

NOTE: For non-network connected charge management system, provide EVCF behind a secure fence-line or some other means to limit access to only GOV vehicles. The chargers are plug-and-play, with no payment or access control features built-in.

****

[2.4.1 Non-Network Connected Charge Management System

[Provide a non-networked connected Charge Management System that will provide power to [_____] quantity of charging ports.][The system must not gather, store, report, or produce any data during the charger session.]

****

NOTE: When multiple charging ports are fed from a single circuit, an energy load management solution must be selected.

Static load management will equally distribute the available charging capacity between all charging ports. This is recommended in situations where vehicles have long dwell times as there will be a significant reduction in available power when there is high utilization of charging ports.

Programmable load management may provide a power ceiling limit during certain hours of the day, set charging schedule and limit the duration of charging sessions. This is recommended in areas of long term parking or when using interchangeable fleet vehicles.

****

[2.4.1.1 Energy Load Management

[a. Static Load Management

][b. Programmable Load Management

][c. [_____]

]]][2.4.2 Network Connected Charge Management System

****
NOTE: Include a version of Section 25 05 11 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS edited specifically for electric vehicle charging facility control system where a network connected control management system is specified.
****

Provide a network connected charge management system that operates the electric vehicle charging system as described in the EVCF Control Strategies in the project plans. Submit Sequence of Operation for the Charge Management System describing the operation of the proposed charging of vehicles with any auxiliary devices as required for a complete and operable system. Sequence of Operation must provide the strategies identified in the EVCF Control Strategies. Provide a complete charge management system suitable for[access control][,][payment transaction and processing][,][energy load management][,][remote monitoring and reporting on station status][,][data collection, storing, and reporting of station usage][,][and][or][remote maintenance] through a[cloud-base management software][,][programmable controller] and other systems as indicated.

[Contractor must verify that the Charge Management System installed on any site is compatible with the base-wide Charge Management System with respect to the types of EVSE selected and the method used to program and operate the EVSE. Provide or coordinate with any software and programming tools necessary to set up the EVSE described by this specification. New software tools different from the programming methods currently used by base personnel will require an Authority to Operate (ATO) by Command Information Office at the Enterprise level.

][Contractor must verify that the Charge Management System installed on any site is compatible with the facility-wide or base-wide EVSE control.

][2.4.2.1 Charge Management System Vendor Requirements

****
NOTE: Select a bracketed option below if it is intended that the new Charge Management System be compatible with the existing system components.
****

****
NOTE: Keep this bracketed subpart ONLY for projects where the installation has obtained a J&A to downselect a particular vendor.

When keeping this subpart text:

1) Fill in the Charge Management System manufacturer and product line information. For example: "EVCF Co, Best System version 5".

2) Include the configuration setting requirements so the equipment can be programmed in accordance with the existing Risk Management framework Authority to Operate. Obtain the equipment configuration settings from Public Works, the system owner, or local CIO office. Include these requirements as an attachment to this specification, as part of the contract drawings, or in some other manner and select the appropriate bracketed text indicating where the settings are provided.

****

The Charge Management System provided under this Section must be [_____]. Configure the equipment as indicated in[attached configuration setting requirements][the configuration settings drawings] [_____].

2.4.2.1.1 Proprietary Systems

For proprietary systems part of a J&A are exempted from open protocol requirements and a proprietary network and hardware communicating via proprietary protocol are permitted.[For these systems, a gateway or interface to connect the proprietary system to the open protocol network must be provided.]

]2.4.2.2 Network Connected Charge Management Communication Protocols

****

NOTE: Open Charge Point Protocol (OCPP) is used as the standard open-source communication protocol that governs the communication between chargers and the charging network that remotely manage the chargers. OCPP version 1.6J is being replaced with 2.0.1 which is expected to be implemented within industry by March 2024. Open Charge Point Interface (OCPI) is the open-source communication protocol that governs the communication among multiple charging networks, other communication networks, and software applications to provide information and services for users. ISO 15118 compliance is the standard vehicle to grid communication interface. Chargers should conform to ISO 15118-3 and provide hardware capable of implementing both ISO 15118-2 and ISO 15118-20.

ISO 15118-20 was released in 2022 and is the 2nd generation network layer and application requirement, which introduces higher security protocols than ISO 15118-2. Confirmation should be made for number of manufacturers who are meeting this standard prior to incorporating it. The ISO 15118-20 is not backwards compatible with ISO 15118-2. The advantage of ISO 15118-20 is stronger security protocols, including the digital certificates that are used to verify and authorize the sender, and external identification means (EIM) which includes secure payment methods (authorize EV

charging session at a station).
****

****
NOTE: The EV-To-Charger Communication protocol is satisfied when the appropriate connector type is selected.
****

a. Charger-to-Charger Network Communication: Open Charge Point Protocol (OCPP) version [1.6J][2.0.1] or higher.

[b. Charger Network-to-Charger Network Communication: Open Charge Point Interface (OCPI) version 2.2 or higher.

][c. ISO 15118 compliant, specifically ISO 15118-2, ISO 15118-3,[ISO 15118-20][and the ability to upgrade to ISO 15118-20] for[Level 2][and][DCFC].

]2.4.2.3 Charge Management System Network Connectivity

[a. WAN communication: [Cellular LTE: [3G][4G][5G][or][_____]] [Ethernet]

][b. LAN Communication: [Wi-Fi: [2.4 GHZ][and][or][5 GHZ]] [Ethernet]

][c. Provide back-up[cellular][or][Wi-Fi] network

]2.4.2.4 Charge Management System Software

****
NOTE: Select one of the next two paragraphs below for either local network-connected charge management or cloud-based management software.

Network connected charge management systems may be highly customizable with advanced options. Fleet managers can remotely control all charging stations and charging operations from a single dashboard in real-time. Charge management software can collect, store, and generate analytic-driven reports regarding charger performance, charging patterns, charging transaction, energy consumption, etc. Remote monitoring and maintenance of chargers help in early detection of any issues and offer resolutions that minimize charger downtime. Cloud-based charge management systems offer sophisticated energy load management that may dynamically distribute power based on the available capacity at the branch circuit, panel, or building service level and the demand request of each EV.

Cloud-based CMS software is the most robust option and may require tying into a base-wide EVCF charge management system.
****

****
NOTE: Where non-networked charging stations are

used but the charge management system is network-connected, select local network-connected charge management option. The external controller may operate independently and without communication with EVCF. However, this will limit the options and customization of the controls of the management system. Where network-connected chargers are used with a network-connected CMS or tying into a base-wide EVCF charge management system, select Cloud-based Charge Management Software.

****

[2.4.2.4.1 Cloud-based Charge Management Software

****

NOTE: Select all functions that may apply to the controls of the CMS as described in paragraph NETWORK CONNECTED CHARGE MANAGEMENT SYSTEM. If feature is not listed, input the feature. Where EVCF is design for public use, payment transaction and access control must be selected.

****

[a. Remote management of charging operations

][b. Transactional billing, payment, and processing

][c. [Dynamic]Energy load management

][d. Access Control Management

][e. Remote monitoring and maintenance

][f. Analytic-driven data collection, storing, and reporting operations

][g. [_____]

]][2.4.2.4.2 Local Network Connected Charge Management Software

****

NOTE: Select all functions that may apply to the controls of the CMS as described in paragraph NETWORK CONNECTED CHARGE MANAGEMENT SYSTEM. If feature is not listed, input the feature. Where EVCF is design for public use, payment transaction and access control must be selected.

****

[a. Transactional billing, payment, and processing

][b. [Programmable]Energy load management

][c. Access Control Management

][d. Analytic-driven data collection, storing, and reporting operations

][e. [_____]

]]][2.5 ACCESSORIES

****

NOTE: Provide accessories listed below as determined by user requirements and to provide a complete charge management system as described in paragraph NON-NETWORK CONNECTED CHARGE MANAGEMENT SYSTEM or NETWORK CONNECTED CHARGE MANAGEMENT SYSTEM.

****

[a. Indicator lights to display charging status

][b. Daylight readable LCD/LED screen with auto brightness control, UV protection, and fingerprint resistant.

][c. Back-lit touch button interface keypad with audio feedback. LCD must display ready to charge, charging, charge complete, pause-waiting to charge, and fault.

][d. Capable of remote control and authorization including mobile phone application or toll free phone number.

][e. Access control via[magnetic strip,][RFID,][Near Field Communication (NFC) enabled reader,][contactless credit card reader,][and][barcode cards].

][f. Payment Card Industry (PCI) Compliant.

][g. Activation of EVCF upon identification utilizing[magnetic strip,][RFID,][and][or][barcode cards]

][h. Provide minimum four keycards/ barcodes/ RFID keys for each charger to activate the charger and its data network.

][i. Time-of-day pricing capability

][j. Nuisance tripping avoidance and auto-re-closure features

][k. Cold Load Pickup (Randomized auto restart following power outage).

][l. Real-time energy management controls.

][m. Fifteen minute energy management interval recording.

][n. EVCF must include automatic web-based tracking / metering and control connection via a cell phone service provider compatible with Electric Vehicle Management system. The web-based application must generate per vehicle kWh usage and charging times based on user input intervals. EVCF Electronic Data Interface must capture and be capable of push and pull file transfer of the parameters listed below. Web-based control capability must enable remote charger station administration and access control by the Government. Data must be User ID and Password protected.

(1) Kilowatt (kWh) data report must be compatible with Microsoft Excel.

(2) Must have option to limit usage to designated users with bar code/key card type system (locked or open access).

(3) Manufacturer control of EVCF is not allowed without prior written Government approval.

]][2.6 CAST-IN-PLACE CONCRETE

****
NOTE: Coordinate the requirement for concrete pads with user requirements.
****

****
NOTE: Use the first bracketed paragraph when project includes a concrete section in Division 3; otherwise, the second bracketed paragraph may be used. Coordinate requirements with Section 03 30 00 CAST-IN-PLACE CONCRETE.
****

[Concrete associated with electrical work for other than encasement of underground ducts must be 30 MPa 4000 psi minimum 28-day compressive strength unless specified otherwise. Concrete associated with electrical work for encasement of underground ducts must be 21 MPa 3,000 psi minimum 28-day compressive strength unless specified otherwise. All concrete must conform to the requirements of Section 03 30 00 CAST-IN-PLACE CONCRETE.

] **********
NOTE: If concrete requirements are detailed and no cast-in-place concrete section is to be included in the project specification, refer to Section 03 30 00 CAST-IN-PLACE CONCRETE, and select such portions as needed to provide complete requirements in addition to the requirements below.
****

[Must be composed of fine aggregate, coarse aggregate, portland cement, and water so proportioned and mixed as to produce a plastic, workable mixture. Fine aggregate must be of hard, dense, durable, clean, and uncoated sand. The coarse aggregate must be reasonably well graded from 4.75 mm to 25 mm 3/16 inch to 1 inch. The fine and coarse aggregates must be free from injurious amounts of dirt, vegetable matter, soft fragments, or other deleterious substances. Water must be fresh, clean, and free from salts, alkali, organic matter, and other impurities. Concrete associated with electrical work for other than encasement of underground ducts must be 30 MPa 4000 psi minimum 28-day compressive strength unless specified otherwise. Concrete associated with electrical work for encasement of underground ducts must be 21 MPa 3,000 psi minimum 28-day compressive strength unless specified otherwise. Slump must not exceed 100 mm 4 inches. Retempering of concrete will not be permitted. Exposed, unformed concrete surfaces must be given a smooth, wood float finish. Concrete must be cured for a period of not less than 7 days, and concrete made with high early strength portland cement must be repaired by patching honeycombed or otherwise defective areas with cement mortar as directed by the Contracting Officer. Air entrain concrete exposed to weather using an air-entraining admixture conforming to ASTM C260/C260M. Air content must be between 4 and 6 percent.

]]2.7 MANUFACTURER'S NAMEPLATES

Each item of equipment must have a nameplate bearing, as a minimum, the

manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

[2.8 FIELD FABRICATED NAMEPLATES

****
NOTE: Use the following paragraph where nameplates are fabricated to identify specific equipment designated on the drawings. Example would be chargers on emergency standby power.
****

Provide field fabricated nameplates in accordance with the following:

a. ASTM D709.

b. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings.

c. Each nameplate inscription: identify the function and, when applicable, the position.

d. Nameplates: melamine plastic, 3 mm 0.125 inch thick, white with [black][_____] center core.

[e. Provide red laminated plastic label with white center core where indicated.

] f. Surface: matte finish. Corners: square. Accurately align lettering and engrave into the core.

g. Minimum size of nameplates: 25 by 65 mm 1 by 2.5 inches.

h. Lettering size and style: a minimum of 6.35 mm 0.25 inch high normal block style.

]2.9 PAVEMENT MARKINGS

****
NOTE: Verify base requirement and coordinate pavement markings. Coordinate with Section 32 17 23 PAVEMENT MARKINGS.
****

Provide pavement markings for the vehicle charging parking spots to indicate the restrictions for electrical vehicle parking.

2.10 ELECTRIC VEHICLE CHARGING FACILITY (EVCF) SIGNAGE

****
NOTE: Coordinate signage requirements with base requirements and Manual on Uniform Traffic Control Devices (MUTCD). MUTCD Regulatory signs related to electric vehicle charging include the R7 series: 111, 111a, 112, 112a, 112b, 113, 113b, 114, 114a, and 114b.
****

Provide signage Electric Vehicle Charging Facility per the Manual on Uniform Traffic Control Devices (MUTCD) and Base standards.

2.11 WHEEL STOPS AND BOLLARDS

****
NOTE: Provide wheel stops or bollard where existing curbing isn't present for protection of EVCF.
****

Provide wheel stops or bollards in Electrical Vehicle parking spaces to provide protection for Electric Vehicle Charging Facility.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations must conform to[IEEE C2,] NFPA 70, and to the requirements specified herein.

a. Provide chargers per manufacturer instructions and recommendations. EVCF must be programmed and configured by a certified installer.

[3.2 GROUNDING

****
NOTE: Use this paragraph when a new electrical service is being created for the EVCF system.
****

NFPA 70, ANSI/IEEE 142[and IEEE C2], except provide grounding systems with a resistance to solid earth ground not exceeding 5 ohms. Complete ground testing at proposed EVCF location with the solid earth.

3.2.1 Grounding Electrodes

Provide driven ground rods as specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION. Connect ground conductors to the upper end of ground rods by exothermic weld or compression connector. Provide compression connectors at equipment end of ground conductors.

]3.3 WIRING AND CONDUIT

a. Install wiring and conduit as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM[and Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION].

b. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

[3.4 FIELD APPLIED PAINTING

Where field applied painting of enclosures is required to correct damage to the manufacturer's factory applied coatings, provide manufacturer's recommended coatings and apply in accordance with manufacturer's instructions.

]3.5 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

[3.6 FOUNDATION FOR EQUIPMENT AND ASSEMBLIES

****
NOTE: Mounting slab connections may have to be given in detail depending on the requirements for the seismic zone in which the equipment is located. Include construction requirements for concrete slab only if slab is not detailed in drawings.
****

3.6.1 Exterior Location

Mount pedestal units on concrete slab, unless otherwise indicated. The slab must be at least 200 mm 8 inches thick, reinforced with a 152 by 152 - MW19 by MW19 6 by 6 - W2.9 by W2.9 mesh placed uniformly 100 mm 4 inches from the top of the slab. Slab must be placed on a 150 mm 6 inch thick, well-compacted gravel base. Top of concrete slab must be flush where installed in pavement and walkways, and a minimum of approximately 100 mm 4 inches above the finished grade where installed in turf or other unpaved surfaces. Edges above grade must have 15 mm 1/2 inch chamfer. The slab must be of adequate size to project at least 200 mm 8 inches beyond the equipment. Provide conduit turnups and cable entrance space required by the equipment to be mounted. Seal voids around conduit openings in slab with water- and oil-resistant caulking or sealant. Seals must be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, or other foreign matter. Cut off and bush conduits 75 mm 3 inches above slab surface.

]3.7 OPERATION AND MAINTENANCE

3.7.1 Operation and Maintenance Training

Conduct a training course for the members of the operating staff as designated by the Contracting Officer. Make the training period consist of a total of [2],[_____] hours for Level 1 or Level 2 and [4],[_____] hours for DC Fast Charge of normal working time and start it after all work specified herein is functionally completed and the Performance Tests have been approved. Conduct field instruction that covers all of the items contained in the Operation and Maintenance Manuals as well as demonstrations of routine maintenance operations. Submit the proposed On-site Training Materials and schedule concurrently with the Operation and Maintenance Manuals and at least 30 days prior to conducting the training course.

3.8 RECORD DOCUMENTATION

****
NOTE: For use on Air Force and Army projects only.
****

Provide drawings indicating construction provided for this project. Provide electronic files and hard copies on 279 mm by 432 mm 11 inch by 17 inch paper.

3.9 FIELD QUALITY CONTROL

3.9.1 Testing of Electric Vehicle Charging Facility

Provide testing of Electric Vehicle Charging Facility with test equipment per current standards and manufacturers recommendations. Provide data submittal indicating time of charge and kW level used.

[3.9.2 Testing of Electric Vehicle Control Network

Provide testing of the Electric Vehicle Charging Facility proving EVSE is communicating with the Control system per manufacturer's recommendation. Provide data submittal indicating successful access and programming.

]3.9.3 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests. Submit reports, including acceptance criteria.

3.9.3.1 EVCF

a. Visual and mechanical inspection.

(1) Compare equipment nameplate data with specifications and approved shop drawings.

(2) Inspect physical and mechanical condition. Check for damage.

(3) Inspect anchorage, alignment, and grounding.

(4) Perform specific inspections and mechanical tests as recommended by manufacturer.

b. Electrical Tests

(1) Perform resistance measurements through all bolted connections with low-resistance ohmmeter.

(2) Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of 1,000 volts DC for 600 volt rated wiring and 500 volts DC for 300 volt rated wiring per NETA ATS to provide direct reading of resistance. All existing wiring to be reused must also be tested.

(3) Perform insulation-resistance test on control wiring; do not perform this test on wiring connected to solid-state components.

(4) Perform control wiring performance test.

(5) Verify voltage levels.

(6) Check ground fault circuit interrupt.

(7) Check pilot signal detection and verification.

(8) Verify current limit for programmable load sharing and load capping.

(9) Verify operation of alarms.

(10) Verify EVCF Electronic Data Interface.

(11) If the EVCF system is connected to a distribution transformer:

(a) Test the outgoing transformer voltage

(b) Test the available capacity on the transformer

(12) Measure duty cycle to see max current available for charging all EVCFs.

Values of test must be within limits of manufacturer's recommendations.

-- End of Section --