

Electric Vehicle Supply Equipment – Technical Requirements

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1. Introduction

1.1 Purpose and scope

The intent of this document is to outline the technical requirements for Electric Vehicle Supply Equipment (EVSE) connected to Horizon Power networks.

The requirements in this document are subject to change as Electric Vehicle uptake matures and there is a better understanding of advancement of EVSE technology, consumer behaviour and impact on the grid.

This document applies to new connections of EVSE inclusive of alterations and modifications to existing EVSE. This document is applicable to single-phase, three-phase and multi-phase connection arrangements. For key criteria of single-phase, three-phase and multi-phase connections, refer to the Western Australian Electrical Requirements (WAER) and Western Australian Service and Installation Requirements (WASIR). The WASIR provides user requirements for connections of loads and covers requirements for the maximum size of the EVSEs depending on the service connection arrangements, main switch circuit breaker requirements and maximum load from EVSEs.

The EVSE Technical Requirements are intended to provide:

1. Minimum technical requirements for EVSE.
2. General information for electrical contractors and EVSE manufacturers.

1.2 Electric Vehicle Supply Equipment Types

Horizon Power defines the following EVSE types based on the kW capacity of the EVSE. Table 1.1 details the associated maximum capacity and applicable standards for each type.

EVSE Type	Maximum Capacity	Technology Type	Applicable Standards
Level 1	Up to 2.4kW (for example, connected via a standard 10A single phase GPO)	Charging Only	Normal load connection and regulatory requirements apply (WAER and WASIR) however the Technical Requirements in this document do not apply for Level 1 EVSE.
		Exporting – VTG or VTB	In addition to the above, the Embedded Generation Technical Requirements also apply for VTG or VTB EVSE (refer Section 4.9).
Level 2	>2.4kW to 23kW (for example, connected via a dedicated circuit, up to 32A single or three phase)	Charging Only	The requirements of this document apply for Level 2 EVSE.
		Exporting – VTG or VTB	In addition to the above, the Embedded Generation Technical Requirements also apply for VTG or VTB EVSE (refer Section 4.9).
Level 3	>23kW	Charging Only	The requirements of this document apply for Level 3 EVSE.
		Exporting – VTG or VTB	In addition to the above, the Embedded Generation Technical Requirements also apply for VTG or VTB EVSE (refer Section 4.9).

Table 1.1: EVSE Types

1.3 General Obligations of Users

The following outlines the general obligations of Users in relation to EVSE equipment:

- Users must comply with the EVSE Technical Requirements in this document.
- Users connecting Level 2 EVSE equipment, must register in advance the connection of EVSE equipment with Horizon Power.
- Users connecting Level 3 EVSE equipment, Level 2 EVSE equipment connected to a Standalone Power Supply (SPS), or any VTB/VTG systems, must apply in advance to Horizon Power to connect EVSE equipment.
- Prior to connection to the network, EVSE registrations and applications must be submitted via Horizon Powers online contractor EV Connect application form, see section 5.1.
- Users connecting VTB/VTG systems must also meet the requirements for connection of embedded generation as outlined in the Basic EG Technical Requirements or LV EG Technical Requirements depending on the EVSE size.

2. Definitions and Abbreviations

2.1 Definitions

Table 2.1 provides a list of definitions relevant to this document and apply in addition to defined terms listed in the relevant Australian Standards (including AS/NZS 3000 and AS/NZS 4777), WAER and Electricity (Licensing) Regulations 1991.

Term	Definition
Distributed Energy Resources (DER)	Distributed Energy Resources are smaller-scale devices that can either use, generate or store electricity, and form a part of the local distribution system, serving homes and businesses. DER can include renewable embedded generation such as rooftop solar photovoltaic (PV) systems, energy storage, electric vehicles (EVs), and technology to manage demand at a premise.
DER Management System (DERMS)	Horizon Power’s control system for managing distributed energy resources.
Electric Vehicle Supply Equipment (EVSE)	Equipment providing dedicated functions (including control) to supply electric energy from a fixed electrical installation or supply network to an EV for the purpose of charging. This is applicable to anything exceeding 2.3 kW AC (trickle charging) and includes wall mounted or cable style equipment. Note: EVSE is part of ‘Storage Works’ as defined in the Electricity Industry Act 2004.
EVSE Energy Management	EVSE Energy Management (not a mandatory requirement) is the remote monitoring, control, and coordination of the EVSE by Horizon Power to support stability of the power system.
may	The word ‘may’ indicates an action or practice that is permitted without affecting other requirements.
shall	The word ‘shall’ indicates a mandatory requirement. Notes to tables and figures with ‘shall’ requirements are mandatory part of this document.
Standalone Power System (SPS)	Stand-alone Power Systems are off-grid systems that operate independently from the main network. Each SPS consists of a renewable energy supply such as

	solar panels, battery energy storage system and a backup generator, making them completely self-sufficient power units.
Standard connection service	As defined in the Western Australian Service and Installation Requirements (WASIR).
User	Means a person, including a generator or a consumer, who is party to a contract for services with a service provider, and under section 13.4(e) of the Access Code includes another business as a party to a deemed access contract. In the context of this document this includes a person connecting or intending to connect EVSE.
Vehicle-to-Building (VTB)	An electric vehicle that storage system that is capable of exporting energy into the Consumer’s premises but not the Electricity System, resulting in a minimal-export configuration (also referred to as Vehicle-to-Building or VTB).
Vehicle-to-Grid (VTG)	An electric vehicle that storage system that is capable of exporting energy into the Electricity System, resulting in either a full or partial export configuration (also referred to as Vehicle-to-Grid or VTG).

Table 2.1: Definitions

2.2 Abbreviations

The following table provides a list of abbreviations and acronyms used throughout this document. Defined terms are identified in this document by capitals.

Term	Definition
API	Application Programming Interface
DER	Distribute Energy Resources
DERMS	DER Management System
EG	Embedded Generation
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
GPO	General Purpose Outlet
LV	Low Voltage
OCPP	Open Charge Point Protocol
SPS	Standalone Power Supply
VTB	Vehicle-to-Building
VTG	Vehicle-to-Grid
WAER	Western Australian Electrical Requirements
WASIR	Western Australian Service and Installation Requirements

Table 2.2: Abbreviations

3. Relevant Rules, Regulations, Standards and Codes

3.1 Standards and Codes

This section lists the Australian and International standards (Table 3.1) and industry codes that shall apply for EVSE system connections to the Horizon Power distribution network. The current versions of these documents apply, unless otherwise indicated.

Reference	Title
AS/NZS 3000	Electrical Installations (Wiring Rules)
AS/IEC 62196	Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles
IEC 61851.1	Electric vehicle conductive charging system – Part 1: General requirements
AS/NZS 4777.1	Grid connection of energy systems via inverters, Part 1: Installation Requirements
AS/NZS 4777.2	Grid connection of energy systems via inverters, Part 2: Inverter Requirements

Table 3.1: Reference Australian and International Standards

Reference	Title
HPC-9DJ-01-0001-2012	Horizon Power Technical Rules
HPC-9DJ-13-0001-2019	Basic Embedded Generation Technical Requirements
HPC-9DJ-13-0002-2019	Low Voltage Embedded Generation Technical Requirements

Table 3.2: Horizon Power documents and relevant Codes

3.2 Legislation and Regulation

This section provides a list of all the relevant legislation and regulations that shall apply for EVSE system connections to the distribution network (refer Table 3.3).

Legislation
WA Electricity Act 1945
WA Electricity Licensing Regulation 1991
WA Electrical Requirements (WAER)
Electricity industry Act 2004
WA Electricity Industry (Code of Conduct) Regulations 2005
WA Electricity Industry (Metering) Code 2012
WA Service and Installation Requirements (WASIR)
Energy Operators (Power) Act 1979

Table 3.3: Legislation and Regulations relevant to EVSE

4. Technical Requirements

4.1 General

All EVSE that are connected behind a Standard Connection Service shall comply to all functional requirements of this document. Where an EVSE is also capable of operating as an Inverter Energy System (VTG or VTB), it needs to conform with the requirements of AS/NZS 4777.2 and the Horizon Power Basic or LV EG Connection Technical Requirements, whichever is applicable depending on the size of the installation.

The connection service at the time of the EVSE installation shall comply with WA Electrical Requirements (**WAER**) and the WA Service and Installation Requirements (**WASIR**). Network connection and isolation requirements for EVSE shall be as per the WASIR, and AS/NZS 3000, noting that:

- The minimum sized consumer mains cable for domestic premises must be in accordance with the WAER clause 9.2.
- Section 10.11.6 of the WASIR provides specific information pertaining to EVSE.
- Electrical contractors must ensure multiphase sites meet the balanced electrical connection requirements of the WASIR (refer to Section 10.7).
- Clause 10.11.5.3 of the WASIR (maximum capacity of single phase appliances) does not apply to EVSE.

4.2 Connection Capacity Assessment

Electrical contractors must assess the expected load demand of the consumer's electrical installation, with the connection of the proposed EVSE, against the capacity of the installation in accordance with Section 10.5 of the WASIR. The installation of an EVSE shall not cause an electrical installation to be overloaded with any combination of load and EVSE utilisation. If the addition of the EVSE may cause the electrical installation to be overloaded, an additional Supply Upgrade application must be completed.

4.3 Electric Vehicle Supply Equipment

The following general requirements apply to EVSE:

- a. The EVSE shall be compatible with the characteristics of Horizon Power's supply as defined in Section 2 of the Horizon Power Technical Rules.
- b. EVSE shall be installed in compliance with the WAER, WASIR, and AS/NZS 3000.
- c. EVSE shall be compliant with AS/IEC 62196 and IEC 61851.1
- d. All Level 3 EVSE equipment shall comply with the ramp rate requirements of Section 4.7.

The following general recommendations apply to EVSE (Not Mandatory):

- a. Horizon Power recommends that Level 2 and Level 3 EVSE equipment is compatible with EVSE Energy Management in accordance with Section 4.4, however this is not mandatory.
- b. Horizon Power recommends that Users be aware that additional technical requirements may apply to EVSE installations receiving grant funding (for example approved charger lists). For more information refer to the relevant grant provider.

4.4 EVSE Energy Management (Not Mandatory)

EVSE Energy Management (Not Mandatory) may be desirable in the future to assist Horizon Power with the management and planning of the power system. EVSE energy management may also form part of future products and solutions offered to customers as part of connecting and using EVSE. Horizon Power will consult with customers prior to introduction of any future EVSE Energy Management requirements.

Horizon Power suggests that Level 2 and Level 3 EVSE equipment has EVSE Energy Management capability¹ via either one of the following:

- Open Charge Point Protocol (OCPP); or
- An API for direct communication between the EVSE and Horizon Power's DERMS which is approved by Horizon Power; or
- An authorised agent or third party to manage communication between the EVSE and Horizon Power's DERMS which is approved by Horizon Power.

4.5 Communication Systems

To be updated in future version.

4.6 Cyber Security

To be updated in future version.

4.7 Ramp Rate Control for Level 3 EVSE

Due to the nature of Horizon Power's systems all Level 3 EVSE shall have ramp rate control (except for Level 3 EVSE installed in towns in the Pilbara Grid – being Dampier, Karratha, Cape Lambert, Roebourne, Point Sampson, and Port Hedland).

Ramp rate control requires that the charger output is limited, such that when charging commences, the output is gradually increased linearly over 30 seconds, to prevent step loads being placed on the power system. At any point during the charging session the ramp up rate (in kW/sec) must be limited to the maximum output (in kW) divided by 30 seconds. Ramp down rate control is not required.

The ramp rate control is to be performed locally, and the ramp rate time of 30 seconds is to be configurable, as advised by Horizon Power from time to time. The ramp rate must be achieved with a local device and must function during times of network (internet) outages.

4.8 Charging Time Schedule for EVSE (Not Mandatory)

It is recommended for the EVSE to have the capability to operate according to a time-based schedule (Not Mandatory). This enables the user to have the ability to align this schedule with future Horizon Power product and solutions, such as a time-of-use pricing.

¹ Note that provision of an active internet connection and/or installation of a secure gateway device may be required to activate energy management at a future date (not currently mandatory).

4.9 Vehicle to building/grid operation (VTB/VTG)

EVSE that are capable of discharging energy are considered Embedded Generators (EG) and need to meet additional requirements specified under the Horizon Power Basic EG or LV EG Connection Technical Requirements, depending on the size of the installation, available at:

www.horizonpower.com.au/contractors-installers/connect-solar-battery-ev.

An EVSE shall be considered an EG System, where:

- a. it is capable of exporting energy into the User's premises but not the Distribution System, resulting in a Minimal-export configuration (also referred to as Vehicle-to-Building or VTB);
- b. it is capable of exporting energy into the Distribution System, resulting in either a full- or Partial- export configuration (also referred to as Vehicle-to-Grid or VTG); or
- c. the EVSE being installed has the capability to export electricity into either the User's premises or the Distribution System.

These EVSE shall comply with the Basic EG or LV EG Connection Technical Requirements (whichever is applicable depending on the size of the installation) and AS/NZS 4777.2. For the purposes of assessment against the Basic EG or LV EG Connection Technical Requirements, the EVSE shall be treated as an Energy Storage System (ESS).

VTG or VTB systems shall have OCPP protocol V2.0 or later.

4.10 Commissioning

To be updated in future version.

4.11 Ongoing Compliance

The User shall ensure the ongoing compliance of the EVSE to the requirements of this document.

This shall include cooperation with Horizon Power on rectification of any non-compliance. Depending on the nature of the non-compliance up to 60 days may be given to rectify the issue.

In cases where a non-compliance remains unresolved, or a non-compliance is identified which poses a safety or system reliability risk, a Fault Note will be placed on the installation and the EV charger will be disconnected from Horizon Power's Electricity System. The EV charger will not be reconnected to Horizon Power's Electricity System until Horizon Power is satisfied that the non-compliance has been resolved.

5. Information Requirements

5.1 General Information Requirements

All EVSE applications must be submitted to Horizon Power via the EV Connect online form available at www.horizonpower.com.au/contractors-installers/connect-solar-battery-ev and shall provide the required information requested on Horizon Power's website at the time of application.

5.2 Additional Information Requirements for Level 3 Chargers

Level 3 chargers shall also submit a single line drawing of the proposed system, showing the connection to the main switchboard.