Disclaimer

All information contained within this guide has come from current Worksafe Guidelines and New Zealand Standards. It should in no way replace these documents and is intended to be a guide only. For full information on Electric Vehicle Charging installations you should refer to AS/NZS 3000:2018 and Worksafe Electric Vehicle Charging Safety Guidelines Edition 2.0.

All information contained within this document is current at time of creation. New Zealand standards are subject to changes and amendments. Check the latest version of these for these for the newest information on all installations.

At the time of publishing none of the standards referenced are cited into the Electrical Safety Regulations and are considered best practice.

Acknowledgments

Made with Support from Peter Morfee from Worksafe New Zealand and Martin Scottorn from Schneider Electric New Zealand.

Roadshow Sponsors
## Definitions

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptor electric vehicle adaptor</td>
<td>An accessory incorporating both a plug portion and a socket-outlet portion for the purpose of converting a vehicle connection or EVSE socket-outlet.</td>
</tr>
<tr>
<td>Adaptor socket-outlet adaptor</td>
<td>An accessory incorporating both a plug portion and one or more socket-outlet portions for the purpose of converting an installation socket-outlet.</td>
</tr>
<tr>
<td>Charging station</td>
<td>A charging station is a location in which EVSE is permanently installed for the purpose of charging an electric vehicle.</td>
</tr>
<tr>
<td>Domestic or similar installation</td>
<td>The electrical installation at premises that are occupied, or intended to be occupied, by a person as a residence on a temporary or permanent basis.</td>
</tr>
<tr>
<td>Electric vehicle supply equipment (EVSE)</td>
<td>The conductors including the phase, neutral and protective earth conductors, the electric vehicle couplers, attachment plugs and all other accessories devices, power outlets, safety function equipment, or apparatus installed specifically for the purpose of delivering energy to an electric vehicle and allowing communication between them if required. EVSE includes charging stations, IC-CPDs, supply leads, electric vehicle adaptors and socket-outlets that are specifically intended to supply electricity to an electric vehicle. EVSE includes discrete components, including contactors current controllers etc., being individually supplied for DIN-rail or other such installation at a switchboard or other place.</td>
</tr>
<tr>
<td>In-Cable Control and Protection Device (IC-CPD)</td>
<td>Assembly of linked parts or components including cables, plug and vehicle connector for supplying electric vehicles in mode 2 charging, which performs control and safety functions.</td>
</tr>
<tr>
<td>Residual Direct Current Detecting Device (RDC-DD)</td>
<td>A Residual Direct Current Detecting Device to be used for charging of Electric vehicles. RDC-DDs are intended to remove or initiate removal of the supply to electric vehicles in cases where a smooth residual direct current equal to or above 6 mA is detected (Bs IEc 62955). The value of 6 mA for smooth residual direct current was chosen to prevent impairing the correct operation of an upstream RCD Type A.</td>
</tr>
</tbody>
</table>
### Installation Types

<table>
<thead>
<tr>
<th>Mode 1</th>
<th>Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A method of charging by the connection of an electric vehicle to a standard AC socket-outlet through a cable and plug, and not having any supplementary pilot or auxiliary contacts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode 2</th>
<th>Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A method of charging by the connection of an electric vehicle to a standard AC socket-outlet through an AC EVSE with a control pilot function and system for personal protection against electric shock.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode 3</th>
<th>Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A method of charging by connection of an electric vehicle to an AC supply through permanently connected EVSE with a control pilot function that extends from the EVSE to the electric vehicle.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode 4</th>
<th>Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A method of charging by the connection of an electric vehicle to an AC supply through permanently connected EVSE providing DC supply to the electric vehicle and which has a control pilot function that extends from the EVSE to the electric vehicle.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Charging</th>
<th>Charging an electric vehicle using EVSE that is intended for use by the public.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note:</td>
<td>1. Public charging includes the use of a fob or similar device to control or enable charging using the EVSE.</td>
</tr>
<tr>
<td></td>
<td>2. Public charging includes (but is not limited to):</td>
</tr>
<tr>
<td></td>
<td>• roadside charging, and</td>
</tr>
<tr>
<td></td>
<td>• charging in public places or commercial facilities open to the public.</td>
</tr>
<tr>
<td></td>
<td>3. Public charging excludes:</td>
</tr>
<tr>
<td></td>
<td>• charging in locations that are not accessible to the public;</td>
</tr>
<tr>
<td></td>
<td>• charging from socket-outlets that are not installed with the specific intention of being used for electric vehicle charging, e.g. socket-outlets used to provide power to caravans and motorhomes in caravan parks; and</td>
</tr>
<tr>
<td></td>
<td>• charging provided by accommodation facilities, for exclusive use by their guests.</td>
</tr>
</tbody>
</table>
Competency

Users of this guide should not:

a. Design or install a charging station or EVSE unless they are competent to do so.

b. Install, test, certify, inspect or connect a charging station or EVSE unless they are competent to do so, licensed to perform PEW and have the correct equipment.

c. Carry out a periodic assessment of a charging station or EVSE unless they are competent to do so and have the correct equipment.

RCD’s

RCDs should be Type B and comply with IEC 62423, have a residual operating current of not greater than 30 mA and operate to interrupt all live conductors, including the neutral.

An RCD located at the origin of the final sub-circuit is deemed to meet the requirements for RCD protection contained in section 2.6 of AS/NZS 3000.

All RCDs used for the protection of supplies for electric vehicles should be permanently marked to identify their function and the location of the charging station or socket-outlet they protect.

All RCDs should:

a. Incorporate the ability to continue to provide protection in the event of above 6 mA of DC fault current, including leakage current; or

b. Isolate the supply in the event or more than 6 mA of DC fault, including leakage, current.
**Mode 1**

To be used in DOMESTIC or Similar ONLY.

Mode 1 is not a common type of charging, what most people consider to be Mode 1 is actually Mode 2.

Mode 1 charging is not forbidden in NZ but you cannot install a socket outlet for this specifically. Mode 1 charging may be used on an existing socket outlet that has Type A RCD protection.

The reasons for this are the following;

a. Mode 1 is regarded as not sufficiently safe as there is no In-Cable control and Protection Device (IC-CPD)

b. A fault with a Mode 1 charger could result in the entire body of the car becoming live

c. When plugged in to the socket outlet on the wall the lead is always live as there is no feedback from the vehicle.

**Mode 2 (Also known as Back-up or Emergency Charger)**

A Mode 2 charger is a lead that can be plugged into a socket outlet and has an In-Cable control and Protection Device (IC-CPD). If you are installing a Mode 2 charger that brings the property close to the rated current of the street protection device (pole fuse etc.) or is greater than 20A, consider replacing the Main Switch with a Main Switch MCB, this will offer additional protection and if mains overcurrent occurs the likelihood is that the home owner can reset this device over calling out the local power authority to replace the street protection device.

**Installation Guidelines**

1. Minimum current carrying capacity of 20A, maximum current carrying capacity of 32A. Each socket-outlet should have an earthing contact connected to the protective earth conductor

2. Electric Vehicle Supply Equipment located in domestic or similar premises should be supplied from a dedicated final sub-circuit

3. Protected with the use of a 30mA Type B RCD

4. The socket outlet for the EV should be located as close as practicable to the EV’s charging location

5. Each socket outlet installed for Mode 2 charging in domestic or similar installations should comply with one of the following:

   a. AS/NZS 3112 and have a rated current not exceeding 20A;
   b. IEC 60309 and have a rated current not exceeding 16A;
   c. AS/NZS 3123 and have a rated current not exceeding 20A per phase;
   d. BS 1363-2 and have a rated current not exceeding 13A

6. Have the correct documentation to prove compliance in New Zealand
All In-Cable Control and Protection Devices should:

I. Incorporate an RCD function to provide protection against electric shock;

2. Incorporate or provide a system that continuously monitors earth continuity and automatically disconnects the supply in the event that the earthing connection becomes ineffective;

3. Provide protection against the overload of the charging supply fittings;

4. Provide protection against the overload of the incoming supply fittings;

5. Be designed to operate at standard low voltage and a nominal frequency of 50 Hz and marked accordingly.

6. All functions of an IC-CPD should fail to safety.

6. Any person supplying IC-CPD should have, and must make available to WorkSafe on request a Supplier Declaration of Conformity, and either:
   a. In respect of IC-CPD complying with IEC standards, the relevant test reports and certification or approvals; or
   b. In the case of IC-CPD complying with UL standards, the relevant verification of UL certification.

Any person supplying IC-CPD should have and should make available a Supplier Declaration of Conformity on request by a purchaser or potential purchaser.

**Mode 3**

Mode 3 charging will be the most common in the domestic market. This is the wall pack with a socket outlet or permanent lead to connect to the EV. If you are installing a Mode 3 charger that brings the property close to the rated current of the street protection device (pole fuse etc.) consider replacing the Main Switch with a Main Switch MCB, this will offer additional protection and if mains overcurrent occurs the likelihood is that the home owner can reset this device over calling out the local power authority to replace the street protection device.

**Installation Guidelines**

1. The minimum current carrying capacity for a single phase Mode 3 Charging in a domestic installation is 32A, multi-phase units can be a minimum of 20A. The circuit shall contain an isolating switch with a minimum 32A current rating complying with AS/NZS 3000 2.3.2.2.1, adjacent to the charger

2. Electric Vehicle Supply Equipment located in domestic or similar premises should be supplied from a dedicated final sub-circuit

3. Protected with the use of a 30mA Type B RCD

4. The socket outlet for the EV should be located as close as practicable to the EV's charging location

5. The output socket or cable of the a.c. supply connection facility shall be installed at a minimum height of 800mm from the floor or ground

6. Have the correct documentation to prove compliance in New Zealand.
**New Electric Vehicle Technology**

As new technology comes to the market these guidelines may no longer be able to provide sufficient information on the installation process that should be followed. Where charging rates above 20 amps are required, or the use of an RDC-DD is being used as an alternative to a type B RCD, the supplier should provide detailed installation instructions, and these should be strictly followed, and they should be referenced and included with the CoC.

Because all EVSE is a medium risk declared article, the SDoC should always be obtained and attached to the CoC as well.

When a socket outlet is being installed for an IC-CPD that is using a plug that is not a normal three pin flat pin (AS./NZS 3112) plug, the SDoC for the IC-CPD should also be obtained and attached.

A quick check that the SDoC is relevant, and that the voltage and frequency markings on the device are correct, should also be performed.

**SDoC Information**

An EVSE is a medium risk declared article that requires the completion of an SDoC.

*Note: This booklet refers to standards that, at the date of publication, are not listed in schedule 4 of the ESR. Therefore any SDoC which relies on one or more of the standards referred to in these guidelines but is not listed in schedule 4 of the ESR should refer to AS/NZS 3820 as the principal standard for establishing compliance and refer to test reports to the standards recognised by this guide for the particular EVSE.*

A person supplying any EVSE should have, and should make available to WorkSafe on request a Supplier Declaration of Conformity, and either:

- a. In respect of an EVSE complying with IEC standards, the relevant test reports and certification or approvals; or
- b. In the case of an EVSE complying with UL standards, the relevant verification of UL certification.

Any person supplying a charging station should have, and should make available to any purchaser, potential purchaser, designer, installer on request a Supplier Declaration of Conformity for that charging station.
The standards that apply to EVSE are:

<table>
<thead>
<tr>
<th>Standard Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 61439-7</td>
<td>IEC 61439-7:2018 Low-voltage switchgear and controlgear assemblies - Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicle charging stations Edition 1.0 or IEC TS 61439-7:2014 Low-voltage switchgear and controlgear assemblies - Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicles charging stations Edition 1.0</td>
</tr>
<tr>
<td>IEC 61851-23</td>
<td>IEC 61851-23:2014 Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station Edition 1.0</td>
</tr>
<tr>
<td>IEC 62196-1</td>
<td>IEC 62196-1 Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements Edition 3.0</td>
</tr>
<tr>
<td>IEC 62752</td>
<td>IEC 62752:2016+AMD1:2018 In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD) Edition 1.1</td>
</tr>
<tr>
<td>IEC 62955</td>
<td>IEC 62955:2018 Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles Edition 1.0</td>
</tr>
<tr>
<td>UL 2202</td>
<td>UL 2202 Standard for Electric Vehicle (EV) Charging System Equipment Edition: 2</td>
</tr>
<tr>
<td>UL 2251</td>
<td>UL 2251 Standard for Plugs, Receptacles, and Couplers for Electric Vehicles Edition: 4</td>
</tr>
</tbody>
</table>
Here is an example of a valid SDoC

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## Supplier Declaration of Conformity

### Supplier Details

**SDoC Identification Number**

201902-01-EV

**Name** (of NZ manufacturer, importer or agent)

Schneider Electric (NZ) Ltd

**Address**

38 Business Parade South, Highbrook, East Tamaki, Auckland 2013, NEW ZEALAND

**Telephone**  **Fax**  **New Zealand Company Number**

+64 9 8290490  +64 9 8290491  1117460

### Medium Risk Article – Details

(Product name, type, rating, brand, model, batch numbers, and serial numbers, as applicable):

<table>
<thead>
<tr>
<th>RANGE</th>
<th>DESCRIPTION</th>
<th>RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVlink</td>
<td>Electric Vehicle Charging solutions</td>
<td>Please see Annex 1 for the list of products</td>
</tr>
</tbody>
</table>

### Documents used as the basis for compliance:

**Standards Compliance:**

- **AS/NZS 3820:2009**  Essential safety requirements for electrical equipment
- **IEC/EN 61851-1:2010 Ed. 2**  Electric vehicle conductive charging system - Part 1: General requirements
- **IEC/EN 61851-22:2001 Ed. 2**  Electric vehicle conductive charging system - Part 22: AC electric vehicle charging station
- **IEC/EN 62196-2:2011 Ed. 1**  Plugs, socket-outlets, vehicle couplers and vehicle inlets – Conductive charging of electric vehicles

**Test Reports & supporting documentation:**

- CB Test Certificates from LCIE Bureau Veritas
- Certification:
  - FR88907; Issue date 2015-09-01
  - FR690768; Issue date 2016-11-23
  - FR673658; Issue date 2016-11-17
  - FR677026AT; Issue date 2016-10-26
<table>
<thead>
<tr>
<th>For models with RFID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency: 13.56 MHz</td>
</tr>
<tr>
<td>RF power rating: 32.7 dBuV/m (Peak) @ 3 meters</td>
</tr>
<tr>
<td>EN 302 291-1:2005 V1.1.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD): Close Range Inductive Data Communication equipment operating at 13.56 MHz</td>
</tr>
<tr>
<td>EN 300 330-1:2010 V1.7.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz</td>
</tr>
<tr>
<td>Test Reports &amp; supporting documentation: EU Declaration of Conformity</td>
</tr>
<tr>
<td>Certification: Nr: NV/83273_00</td>
</tr>
</tbody>
</table>

**Additional information**

The equipment listed in Annex 1 complies with Worksafe New Zealand “Electric Vehicle Charging Safety Guidelines” when installed in accordance with our manufacturers instructions, New Zealand Electrical (Safety) Regulations 2010 (SR 2010/30) and AS/NZS 3000:2007 including A1 and A2 by a competent person.

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### Declaration

We Schneider Electric (NZ) Limited declare under our sole responsibility that the product is in conformity with the relevant clauses of the listed standard(s) or other normative document(s).

For further information please contact Customer Care:
New Zealand: 0800 652 999

**Signature of Authorised Person**

[Signature]

**Printed Name**

Adrian Duque

**Position in Organisation**

Offer Manager
Auckland, New Zealand

**Date of Declaration**

5th of March 2019

**Issuer Identification**

[Schneider Electric Logo]
End User Information

Pros and Cons (For Domestic installations)

<table>
<thead>
<tr>
<th>Mode 1</th>
<th>Mode 2</th>
<th>Mode 3</th>
<th>Mode 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Nil to $</td>
<td>$$</td>
<td>$$$</td>
</tr>
<tr>
<td>Safety</td>
<td>★</td>
<td>★★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>Charge Speed</td>
<td>★</td>
<td>★★</td>
<td>★★★</td>
</tr>
<tr>
<td>Overall</td>
<td>★</td>
<td>★★</td>
<td>★★★★</td>
</tr>
</tbody>
</table>

Unsafe Practices and Conditions

The following are considered unsafe for the supply of electricity to an electric vehicle, or the use of EVSE:

a. use of any electric vehicle adaptor that is not specifically supplied by the vehicle manufacturer or by the EVSE manufacturer;

b. use of a socket-outlet adaptor;

c. cascading of two or more supply leads;

d. use of an extension lead;

e. use of portable socket-outlets including EPOD and PSOA;

f. use of a single socket-outlet for the supply of more than one vehicle at a time;

g. use of EVSE that is not labelled by the manufacturer as being compatible with a 230 V, 50 Hz supply;

h. use of a charging station for public charging without the tag refer to section 2.7 of the Worksafe Electric Vehicle Charging Safety Guidelines Edition 2.0 for further information; and

i. supply of electricity to anything other than an electric vehicle from an IC-CPD or a charging station.

Any charging station or EVSE that is found to be unsafe at any time or which is involved in an electric shock event should be taken out of service immediately and not used or returned to service until the charging station or EVSE is verified as safe.

All EVSE circuits for Mode 2 or 3 charging in a domestic installation should contain RCD protection. The only current recommended RCD is a Type B. It will contain the following images on the RCD:
Process for a Setup

a. Discuss with your electrician what charging type suits your requirements

b. Have the capacity of your supply checked to see what you can install without having major upgrades. This might include having a load management system installed to limit the use to low energy draw times in your home

c. Supply your electrician with the details of your electric vehicle so they can make sure the charger comes with the correct plug

d. Get a quote for any installation.

Consider the use of a smart charger that can vary the supply current to the vehicle to suit your home’s load availability.
Installation Checklist

**Mode 2 (Domestic or similar ONLY)**

- [ ] Check the capacity of the supply to the property. If close to capacity, or exceeds 20A, consider the use of a Main Switch MCB
- [ ] The circuit is to be a single run back to the board with NO other connections
- [ ] Type B, 30mA RCD to be fitted to the circuit
- [ ] Minimum current carrying capacity of 20A, maximum current carrying capacity of 32A
- [ ] Maximum of 20A AS/NZS 3112 / 16A IEC 60309 / 20A per phase AS/NZS 3123 / 16A BS 1363-2 socket outlet
- [ ] SDoC Available for Mode 2 Charging Lead
- [ ] Advise end user of the unsafe practices listed in this guide (page 10)
- [ ] Socket is as close to the vehicle as practicably possible

**Mode 3**

- [ ] Check the capacity of the supply to the property. If close to capacity, consider the use of a Main Switch MCB
- [ ] The circuit is to be a single run back to the board with NO other connections
- [ ] Type B, 30mA RCD to be fitted to the circuit
- [ ] Isolator located near to the unit and labeled
- [ ] SDoC Available for Mode 3 Charger
- [ ] The output socket or cable of the a.c. supply connection facility shall be installed at a minimum height of 800mm from the floor or ground.
- [ ] Advise end user of the unsafe practices listed in this guide (page 10)
- [ ] Socket is as close to the vehicle as practicably possible