Electric vehicle

CHARGING SAFETY GUIDELINES

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2ND EDITION

New Zealand Government

WORKSAFE
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Energy Safety

CONTENTS

appendices

1.0 Safety fundamentals

IN THIS SECTION:

1.1 Application

This second edition of the Electric Vehicle Charging Safety Guidelines applies to electric vehicle supply equipment (EVSE) and may be used immediately. However, work that commenced under the first edition of the guidelines may be completed under that edition, provided that work is certified within three months of the date of this edition.

These guidelines are not intended to apply to:

a. charging stations with greater than 150 kW output

b. EVSE with a maximum AC input of 4 A

c. wireless electric vehicle charging

d. the supply of electricity (including charging) to electric vehicles

   i. while the electric vehicle is undergoing maintenance or repair

   ii. for experimental, testing, demonstration, teaching, or research purposes, or

e. the charging of electric vehicles where the supply to the vehicle is at extra low voltage.

It is intended that these guidelines will be reviewed commencing no later than 12 months from the date of publication.

Note: Refer to the appendices for the Terms and Definitions used throughout this guide.

1.2 Introduction

These guidelines provide guidance for the safe design, specification, supply, installation and operation of EVSE for electric vehicles consistent with New Zealand's electricity supply systems and infrastructure. They are intended to assist suppliers, installers and users of EVSE to meet fundamental safety requirements consistent with the Electricity (Safety) Regulations 2010 (ESR). These guidelines are intended to be read in conjunction with the ESR and do not remove any obligation to comply with those regulations or any other legislation.

Persons conducting a business or undertaking (PCBU) and other persons having duties under the Health and Safety at Work Act 2015 may find these guidelines relevant and useful. However, these guidelines are not a legal substitute for compliance with workplace health and safety legislation.

These guidelines provide for Mode 1 charging as an interim measure to support charging of legacy vehicles.

The use of a TT configured supply system,[1] as an alternative to the MEN supply system is not included in this edition of the guidelines due to the current lack of recognised guidance on the use of TT systems in New Zealand.

Likewise, the use of residual direct current detecting devices (RDC-DD) complying with IEC 62955 is not included in this edition.

The alternative use of TT configured supply systems, wireless charging and RDC-DD will be considered for the next edition of these guidelines.

[1] A TT configured supply system is an alternative to the MEN supply system in which there is no link between the earthing system and the incoming supply neutral. It includes an RCD, usually rated between 100 mA and 300 mA, to provide disconnection in the event of an earth fault.

1.3 General requirements

The following general requirements apply to the supply of electricity for charging an electric vehicle in accordance with these guidelines.

No person may supply electricity for charging an electric vehicle other than through EVSE.

No person may supply or allow the supply of electricity or operation of EVSE for charging an electric vehicle in an unsafe manner.

Mode 1 charging

In New Zealand:

a. It is not permitted to install a socket-outlet with the intention to provide Mode 1 charging for an electric vehicle.
b. It is not permitted to install, use or allow the use of Mode 1 charging in locations that are not domestic or similar.
c. Mode 1 charging of an electric vehicle at a domestic or similar installation may only be undertaken where the supply is protected by a Type A RCD.

Mode 2 charging

In New Zealand, it is not permitted to use or allow the use of a Mode 2 supply for public charging for an electric vehicle.

The maximum current for Mode 2 charging is 32 A.

Each socket-outlet should have an earthing contact connected to the protective earth conductor[2] (PE).

Mode 3 charging

In New Zealand, it is permitted to install and use Mode 3 EVSE.

Mode 4 charging

In New Zealand, it is permitted to install and use Mode 4 EVSE.

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 referenced in section 2.7 of these guidelines, and
i. supply of electricity to anything other than an electric vehicle from an IC-CPD or a charging station.

[2] Also referred to as the earth continuity conductor.

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.

1.4 General requirements for electric vehicle charging stations

In addition to meeting the requirements of the ESR, all charging stations should be designed, installed, tested, certified, inspected and connected in accordance with the following requirements.

All charging stations should:

a. if located in domestic or similar premises, be supplied from a dedicated final sub-circuit

b. if located in non-domestic premises, be supplied from a final sub-circuit protected by an RCD providing personal protection[3]

c. include an earth continuity monitoring system that interrupts the supply in the event that the earthing connection to the vehicle becomes ineffective (this monitoring system should provide a fail-safe earth continuity monitoring system)

d. provide protection against the overload of the charging supply fittings

e. provide protection against the overload of the incoming supply fittings

f. be supplied from a TNC-S (MEN) system of supply that includes an earth electrode and MEN connection, and

g. be installed so that any socket-outlet of a Mode 3 or Mode 4 supply is at least 800 mm above the finished ground or floor level.

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, Mode 2 and Mode 3 EVSE may not be connected to an AC supply that is not at standard low voltage and a nominal frequency of 50 Hz.

All functions of a charging station should fail to safety.

1.5 Competence

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.

[3] The requirement for RCD protection on the final sub-circuit does not apply to non-domestic DC EV charging stations which use the protective measure of electrical separation; provided that the installation complies with the requirements of ISO 17409 for the safety of the charging process and a documented risk assessment has been carried out for the specific installation.

1.6 Periodic assessment

This section applies to electric vehicle charging stations and EVSE that provide public charging.

Every public charging station should be subject to a periodic assessment commencing on or before the first anniversary of connection of that charging station to any supply of electricity.

Subsequent periodic assessments should take place at intervals of no more than 12 months.

A charging station or EVSE should immediately be taken out of service if the periodic assessment has not been carried out:

a. within 12 months from the date of first installation, or

b. within 12 months from the date of the last inspection for that charging station.

A charging station taken out of service in accordance with a or b above, should not be placed in service until relevant repair or maintenance is undertaken and its safety has been confirmed by completion of a new periodic assessment.

Charging station operator

Every charging station operator should:

a. Establish and implement a periodic assessment programme for regularly assessing all EVSE under their control including associated conductors and fittings.

b. Keep records of:

   i. the details of every periodic assessment

   ii. the details of any issues found during the assessment, and

   iii. any actions taken in relation to those issues.

c. Retain a copy of these records, whether in hard copy or electronically, for at least seven years.

d. On request by WorkSafe, provide a copy of the records.

Person who carries out a periodic assessment

Any person who carries out a periodic assessment of a charging station, associated conductors and fittings should:

a. Be a person authorised under the Electricity Act to perform assessments required by this guide.

   Note: This would generally be a licensed electrical inspector.

b. Keep records of each assessment they carry out including:

   i. the details of each assessment

   ii. the details of any issues found during each assessment, and

   iii. any actions required to be taken in relation to those issues.

c. Supply those records to the charging station operator.

d. Record that assessment on the Electricity and Gas High Risk Database.

1.7 General requirements for In-Cord Control and Protection Devices

All In-Cord Control and Protection Devices should:

a. incorporate an RCD function to provide protection against electric shock

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

c. provide protection against the overload of the charging supply fittings

d. provide protection against the overload of the incoming supply fittings, and

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

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

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.

2.0 Selection and installation of electric vehicle supply equipment

IN THIS SECTION:

2.1 Application

This part of the Electric Vehicle Charging Safety Guidelines applies to EVSE and provides guidance for installers of EVSE. It is to be read in conjunction with the Electricity (Safety) Regulations 2010 (ESR).

This part gives specific additional guidance for EVSE located at one or more of the following locations:

a. domestic and similar premises

b. locations providing public charging locations, and

c. other locations.

Note: Refer to the appendices for the Terms and Definitions used throughout this guide.

2.2 Introduction

Part 2 of this guide is intended to assist suppliers, installers and users to meet the fundamental safety requirements of the ESR and does not remove any obligation to comply with those Regulations, or any other legislation.

This part of the guidelines provides specific guidance for the AC power supply arrangements for electric vehicle charging systems. It is supplementary to the requirements of AS/NZS 3000:2007.

2.3 General requirements

Systems of supply

EVSE should not be supplied from other than a TN-C-S (MEN) supply.

Division of installation

EVSE located in domestic or similar premises should be supplied from a dedicated final sub-circuit.

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.

Protection against electric shock

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.

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.

Note: An isolating transformer should not be used as the sole means of protection against electric shock for the supply of electric vehicle charging.

2.4 Selection and erection of electrical equipment

Charging stations – compliance with standards

All AC charging stations should be Mode 3 and:

a. conform with IEC 61851-1:2017

b. until 1 December 2020 conform with IEC 61851-1:2010 and IEC 61851-22. or

c. be certified by UL in compliance with UL 2251 for operation when supplied at 230 V/400 V 50 Hz AC with 230 V to earth.

All DC charging stations should be Mode 4 and:

a. conform with IEC 61851-1 and IEC 61851-23, or

b. be certified by UL in compliance with UL 2202 for operation when supplied at 230 V/400 V 50 Hz AC with 230 V to earth.

An EV charging station should not be connected to a supply of electricity using a plug and socket.

No person may supply or install a charging station unless it is rated and labelled by the manufacturer to take electricity supply with a voltage of 230 V, 400 V or 230/400 V, and a frequency of 50 Hz.

Nothing in these guidelines prevents the use or installation of a single charging station that provides one or more combinations of AC charging and DC charging, so as long as the AC and DC charging supplies are installed and operate in conformance with the relevant sections of the guidelines.

Operational conditions and external influences

PRESENCE OF WATER

Where EVSE or its electric vehicle socket-outlet is installed or used outdoors, or in a damp location, all equipment should have a degree of protection of at least IPX4 in accordance with IEC 60529.

IMPACT

Equipment installed for public charging, including in car parking sites, should be protected against reasonably foreseeable mechanical damage.

Protection of the equipment may be afforded by one or more of the following:

a. position or location in order to avoid damage by any reasonably foreseeable impact in accordance with IEC 61439-7

b. provision of local or general mechanical protection, or

c. use of EVSE that complies with a minimum degree of protection against external mechanical impact of IK07 in accordance with IEC 62262.

METHOD OF ISOLATION

All final sub-circuits supplying a charging station should include a lockable isolator that operates in all live conductors including the neutral.

Protective conductors

Control signals on the protective earth (PE) conductor should not flow into the fixed electrical wiring of the facility that supplies electricity to the EVSE.

Control signals and any related devices, should not impair the correct functioning of any protective device, including devices installed to provide the automatic disconnection of supply (eg RCD).

2.5 Other equipment

Electric vehicle socket-outlets

Socket-outlets 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 20 A

b. IEC 60309-2 and have a rated current not exceeding 16 A

c. AS/NZS 3123 and have a rated current not exceeding 20 A per phase, or

d. BS 1363-2 and have a rated current not exceeding 13 A.

Location of outlets

The mounting height of an electric vehicle socket-outlet of a Mode 3 or Mode 4 charging station should be at least 800 mm above the finished ground or floor level.

Every socket-outlet for electric vehicle should be located as close as practicable to the electric vehicle charging location to be supplied.

Portable socket-outlets, including EPOD and PSOA, must not be used for electric vehicle charging.

Limitation to single vehicle

Each electric vehicle socket-outlet or connecting point should supply only one electric vehicle at a time.

Use of EV adaptors

The supply lead for the connection of the electric vehicle should be in one piece. An electric vehicle adaptor may only be used if it is specifically supplied by the vehicle manufacturer or by the EVSE manufacturer.

2.6 Checking and testing following installation

AC charging station

In addition to the testing required to comply with AS/NZS 3000, the following should be carried out for every AC charging station:

a. verification of the RCD type and residual current rating for all RCDs
b. verification that the rating of any over current protective devices not supplied by the charging station manufacturer is compatible with the conductor size
c. verification of earth continuity monitoring
d. confirmation that voltage and frequency marked on the EVSE is compatible with the power supply it is connected to
e. confirmation of earth continuity from the EVSE to the supply source
f. testing of all RCDs using a purpose-built RCD tester to verify the performance of the RCD in accordance with the requirements for the type of RCD under test
g. testing of the charging station safety functions, including earth continuity monitoring using purpose-built test equipment, and
h. any additional testing as required in the manufacturer's instructions for the RCD or the electric vehicle charging station.

The results of this testing should be recorded with the relevant certification.

DC charging station

In addition to the testing required to comply with AS/NZS 3000, the following should be carried out for every DC charging station:

a. verification that the rating of an over current protective devices not supplied by the charging station manufacturer is compatible with the conductor size
b. verification of earth continuity monitoring
c. confirmation of earth continuity from the EVSE to the supply source
d. confirmation that voltage and frequency marked on the EVSE is compatible with the power supply it is connected to
e. testing of the charging station safety functions, including earth continuity monitoring using purpose built test equipment, and
f. any additional testing as required in the manufacturer's instructions for the electric vehicle charging station.

The results of this testing should be recorded with the relevant certification.

Mode 2 socket-outlets

In addition to the testing required to comply with AS/NZS 3000 the following should be carried out for every socket-outlet for Mode 2 charging installed:

a. verification of the type and rating of all RCDs
b. verification of the type and rating of all over current protective devices
c. testing of all RCDs using a purpose built RCD tester to verify the performance of the RCD in accordance with the requirements for the type of RCD under test
d. any additional testing as required in the manufacturer's instructions for the RCD, and
e. confirmation of polarity of conductors.

The results of this testing should be recorded with the relevant certification.

Where a charging station is supplied with both DC and AC connecting points, both test requirements should be undertaken.

2.7 Periodic assessment

The safety of EVSE, including an IC-CPD, cannot be demonstrated by testing in accordance with AS/NZS 3760.

AC charging station

The assessment for an AC charging station should include the following:

a. inspection of the electric vehicle supply leads and plugs
b. inspection of the case and coverings
c. verification of earth continuity monitoring
d. verification of the RCD type and residual current rating for the RCD protecting the final sub-circuit
e. verification of the correct rating of the over current protection device supplying the final sub-circuit
f. verification of the operation of any emergency stop devices
g. verification that the data plate of the charging station indicates that the charging station is compatible with the New Zealand power supply
h. testing of all RCDs using a purpose built RCD tester to verify the performance of the RCD in accordance with the requirements for the type of RCD under test
i. testing of the charging station safety functions, including earth continuity monitoring using purpose built test equipment, and
j. any additional testing as required in the manufacturer's instructions for the RCD or the charging station.

A record of the assessment should be completed by the person carrying out the assessment.

Note: Should an item not be present on the EVSE under test, this should be noted.

DC charging station

The assessment for a DC charging station should include the following:

a. inspection of the electric vehicle supply leads and plugs
b. inspection of the case and coverings
c. verification of earth continuity monitoring

d. verification of the correct rating of the over current protection device supplying the EVSE
e. verification of the operation of any emergency stop devices
f. verification that the data plate of the charging station indicates that the charging station is compatible with the New Zealand power supply
g. testing of all RCDs using a purpose built RCD tester to verify the performance of the RCD in accordance with the requirements for the type of RCD under test
h. testing of the charging station safety functions, including earth continuity monitoring using purpose built test equipment, and
i. any additional testing as required by the manufacturer of the charging station.

A record of the assessment must be made by the person carrying out the assessment.

Note: Should an item not be present on the EVSE under test, this should be noted.

Combined charging stations

If EVSE comprises both AC and DC connecting points, both assessments apply.

Tag requirements

Following an assessment where the electric vehicle charging station passes the tests indicated in 2.7 above, in addition to the provisions in Part 1 of these guidelines, the person who carried out the assessment should affix a durable, non-reusable tag to the assessed electric vehicle charging station, in a position that will be seen by users of the electric vehicle charging station.

The tag should display the following:

a. the words ‘periodic assessment tag’
b. the expiry date (being no more than 12 months from the date of the assessment), and
c. the name and authorisation number of the person who carried out the assessment.

An electric vehicle charging station should not be used, without the tag referred to in this section.

Nothing prevents the first tag as detailed above from being issued by the person connecting the EVSE following the issuing of the Electrical Safety Certificate for the charging station.

Records

The person responsible for carrying out the assessment should retain a copy of the assessment record for a period of no less than three years.

The operator of the EVSE should retain a copy of the assessment record for a period of no less than three years.

3.0 Electric vehicle supply equipment

IN THIS SECTION:

3.1 Application

This part of the Electric Vehicle Charging Safety Guidelines applies to EVSE and provides guidance for suppliers of EVSE. It is to be read in conjunction with the Electricity (Safety) Regulations 2010 (ESR).

Note: Refer to the appendices for the Terms and Definitions used throughout this guide.

3.2 Introduction

Part 3 is intended to assist suppliers, installers and users of EVSE to meet the fundamental safety requirements of the ESR and does not remove any obligation to comply with those Regulations, or any other legislation.

This part of the guidelines provides specific guidance for the selection, supply and use of EVSE.

3.3 Specification of In Cord–Control and Protection Devices (IC-CPD) and supply leads

IC-CPD and supply leads should not be sold or offered for sale unless they:

a. comply with IEC 62752

b. until 1 December 2020 comply with IEC 61851-1:2010 in conjunction with IEC 62196, or

c. have been certified as compliant with UL 2251 for operation when supplied at 230, 400 or 230/400 V AC, and 50 Hz.

An IC-CPD or supply lead is not suitable for use in New Zealand unless it is rated and labelled to operate at a voltage of 230, 400 or 230/400 V AC, and at a frequency of 50 Hz.

An IC-CPD is not suitable for use in New Zealand unless the inlet supply cord to the IC-CPD is 2 m or less in length.

3.4 Presence of water

Where an IC-CPD, supply lead, or other equipment is intended to be used outdoors or in a damp location, it should be selected with a degree of protection of at least IPX4 in accordance with IEC 60529.

3.5 Inlet supply plugs for IC-CPDs

To be suitable for use in New Zealand, the inlet supply cord of an IC-CPD must be fitted with one of the following:

a. A plug compliant with AS/NZS 3112 rated at 10 A, with an IC-CPD which either:
   i. restricts the maximum current to 8 A, or
   ii. restricts the maximum current to 10 A and uses temperature sensing on the pins of the plug to limit the temperature of the pins to safe levels specified by the manufacturer of the plug.

b. A plug compliant with IEC 60309-2 rated at 16 A, with an IC-CPD which either:
   i. restricts the maximum current to 12 A, or
   ii. restricts the maximum current to 16 A and uses temperature sensing on the pins of the plug to limit the temperature of the pins to safe levels specified by the manufacturer of the plug.

c. A plug compliant with AS/NZS 3123 rated at 20 A, with an IC-CPD which either:
   i. restricts the maximum current to 16 A, or

ii. restricts the maximum current to 20 A and uses temperature sensing on the pins of the plug to limit the temperature of the pins to safe levels specified by the manufacturer of the plug.

d. A plug compliant with BS 1363-1 rated at 13 A, with an IC-CPD which:

i. was originally designed by the manufacturer of the IC-CPD for use in the United Kingdom; and

ii. has the original plug fitted by the manufacturer of the IC-CPD.

Any IC-CPD that permits the user to adjust the maximum current must have a plug fitted by the manufacturer which is rated for the highest adjustable current.

A person should not supply or use any other plug for the inlet connection of an IC-CPD.

3.6 Vehicle supply adaptors

Vehicle supply adaptors (electric vehicle adaptors) should only be used if specifically intended and supplied by the vehicle manufacturer or by the EVSE manufacturer for that purpose.

Electric vehicle adaptors should comply with the requirements of IEC 61851:2017. The adaptors shall be marked to indicate any specific conditions of use allowed by the manufacturer.

3.7 Supplier Declaration of Conformity (SDoC)

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

Note: These guidelines refer 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.

Appendices

IN THIS SECTION:

Appendix 1: Glossary – terms and definitions

TERM	DEFINITION
Adaptor electric vehicle adaptor	An accessory incorporating both a plug portion and a socket-outlet portion for the purpose of converting a vehicle connection or EVSE socket-outlet.
Adaptor socket-outlet adaptor	An accessory incorporating both a plug portion and one or more socket-outlet portions for the purpose of converting an installation socket-outlet.
Charging station	A charging station is a location in which EVSE is permanently installed for the purpose of charging an electric vehicle.
Domestic or similar installation	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.
Electric vehicle charging station operator	A person who owns, operates or manages EVSE that provide public charging for electric vehicles.
Electric vehicle supply equipment (EVSE)	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.
In-Cable Control and Protection Device (IC-CPD)	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.
Mode 1 charging	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.
Mode 2 charging	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.
Mode 3 charging	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.
Mode 4 charging	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.
Public charging	Charging an electric vehicle using EVSE that is intended for use by the public. **Note**: 1. Public charging includes the use of an electronic key or similar device to control or enable charging using the EVSE. 2. Public charging includes (but is not limited to): – roadside charging, and – charging in public places or commercial facilities open to the public. 3. Public charging excludes: – charging in locations that are not accessible to the public; – charging from socket-outlets that are not installed with the specific intention of being used for electric vehicle charging (eg socket-outlets used to provide power to caravans and motorhomes in caravan parks), and – charging provided by accommodation facilities, for exclusive use by their guests.
Supply	When used in relation to equipment, including EVSE, the term ‘supply’ or ‘supplying’ includes sale or supply and offer for sale or supply.

Appendix 2: Referenced standards

AS/NZS 3000	AS/NZS 3000:2007 *Electrical installations* (known as the Australian/New Zealand Wiring Rules) **Note**: At the time of publication of these guidelines, the Electricity (Safety) Regulations recognise AS/NZS 3000:2007, not the subsequent edition AS/NZS 3000:2018.
AS/NZS 3112	AS/NZS 3112:2011 *Approval and test specification – Plugs and socket-outlets* or AS/NZS 3112:2017 *Approval and test specification – Plugs and socket-outlets*
AS/NZS 3123	AS/NZS 3123:2005 (R2016) *Approval and test specification – Plugs, socket-outlets and couplers for general industrial application*
AS/NZS 3760	*In-service safety inspection and testing of electrical equipment*, incorporating Amendments No. 1 and No. 2 **Note**: Reliance on this standard for assessing the in service of EVSE is deprecated.
AS/NZS 3820:2009	AS/NZS 3820:2009 *Essential safety requirements for electrical equipment*
BS 1363-1:2016	BS 1363-1:2016 *13 A plugs, socket-outlets, adaptors and connection units. Specification for rewirable and non-rewirable 13 A fused plugs* or BS 1363-1:2016+A1:2018 *13 A plugs, socket-outlets, adaptors and connection units. Specification for rewirable and non-rewirable 13 A fused plugs*
IEC 60309-1	IEC 60309-1 *Plugs, socket-outlets and couplers for industrial purposes – Part 1: General requirements* Edition 4.2
IEC 60309-2	IEC 60309-2 *Plugs, socket-outlets and couplers for industrial purposes – Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories* Edition 4.2
IEC 60529	IEC 60529 Ed 2.2 *Degrees of protection provided by enclosures* (IP Code) **Note**: AS 60529-2004 (R2018) *Degrees of protection provided by enclosures* (IP Code) is also acceptable.
IEC 61439-7	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
IEC 61851-1	IEC 61851-1:2017 *Electric vehicle conductive charging system – Part 1: General requirements* Edition 3.0 or, until 1 December 2020 IEC 61851-1:2010 *Electric vehicle conductive charging system – Part 1: General requirements* Edition 2.0
IEC 61851-22	Until 1 December 2020 IEC 61851-22:2001 *Electric vehicle conductive charging system – Part 22: AC electric vehicle charging station* Edition 1.0
IEC 61851-23	IEC 61851-23:2014 *Electric vehicle conductive charging system – Part 23: DC electric vehicle charging station* Edition 1.0
IEC 62196-1	IEC 62196-1 *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 1: General requirements* Edition 3.0
IEC 62262	IEC 62262 *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts* (IK code) Edition 1.0
IEC 62423	IEC 62423 *Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses* Edition 2.0
IEC 62752	IEC 62752:2016+AMD1:2018 *In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)* Edition 1.1

IEC 62955	IEC 62955:2018 *Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles* Edition 1.0
ISO 17409	ISO 17409:2015 *Electrically propelled road vehicles – connection to an external electric power supply – Safety requirements*
UL 2202	UL 2202 *Standard for Electric Vehicle (EV) Charging System Equipment* Edition 2
UL 2251	UL 2251 *Standard for Plugs, Receptacles, and Couplers for Electric Vehicles* Edition 4

Appendix 3: Abbreviations and definitions

ABBREVIATION	DEFINITION
A	Ampere
AC	Alternating current
DC	Direct current
DIN-rail	A method of supporting electrical fittings
EPOD	Electrical portable outlet device
ESR	Electricity (Safety) Regulations 2010
EV	Electric vehicle
EVSE	Electric vehicle supply equipment
Hz	Hertz
IC-CPD	In-Cord Control and Protection Device
IK07	A degree of protection against mechanical damage (see IEC 62262)
IPX4	A degree of protection against the ingress of water or solid particles (see IEC 60529)
kW	Kilowatt
mA	Milliampere
MEN	Multiple earth neutral
mm	Millimetre
PCBU	Person conducting a business or undertaking
PE	Protection earth conductor
PEW	Prescribed electrical work
PSOA	Portable socket-outlet assemblies
RCD	Residual current device
RDC-DD	Residual direct current detecting devices
SDoC	Supplier declaration of conformity
TT	A system of electricity supply where the neutral of the supply is not connected to earth at each installation
TNC-S (MEN) TN-C-S (MEN)	A system of electricity supply where the neutral of the supply is connected to earth at each installation
V	Nominal voltage

Notes

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ADDENDUM: SECOND EDITION

Electric vehicle charging safety guidelines

Introduction

This Addendum to the Electric Vehicle Charging Safety Guidelines – Second Edition (the guidelines) provides updated advice on electric vehicle charging safety to address emerging technology and applications. It should be read alongside the guidelines noting that in some instances this additional advice replaces the advice given in the guidelines.

This Addendum applies from the date of publication.

Principles of safety for EV charging

The following principles are intended to ensure that charging equipment will provide acceptable levels of safety when connected to supply of electricity in New Zealand, consistent with New Zealand supply configuration and earthing arrangements.

1. The charging supply to an electric vehicle, vessel or aircraft must provide protection from electric shock through a system that is compatible with an EV charging supply and minimises waveform distortion. The system must also provide safety if AC and/or DC leakage occurs and must also include a means of monitoring and ensuring the continuity of the earthing connection to the vehicle, vessel, or aircraft, during the charging process.
2. Where any safety function is not provided as part of the installed charging station or IC-CPD, the safety function shall be installed at the origin of the supplying final subcircuit.
3. Where an EVSE is installed at a residential installation, the charging final subcircuit shall be protected by a type B RCD and the subcircuit shall originate from a MEN switchboard.
4. All safety function fittings operating at low voltage shall be rated to operate at 230 or 400 V as applicable.
5. Every RCD shall comply with the relevant IEC Standards for that type of RCD.
6. Every charging station shall comply with IEC 61851 as appropriate.
7. Any RDC-DD shall comply with IEC 62955.
8. Every IC-CPD shall comply with IEC 62752.

Use of RDC-DDs

While the guidelines do not recognise the use of an RDC-DD incorporated into an IC-CPD, they do not prevent the use of an RDC-DD in compliance with IEC 62955 in combination with a type A RCD as an alternative to the use of a type B RCD, provided the RDC-DD and the type A RCD are installed in accordance with the relevant IEC Standards.

While the guidelines do not recognise the use of EVSE that incorporates a type B RCD, they do not restrict the use of EVSE that incorporates a type B RCD without the need to install a Type B RCD protecting the final subcircuit.

Note: AS/NZS 3000 requires an RCD that provides protection for new final subcircuits installed in a residential installation.

Use of 32 A or similarly rated socket outlets

Installing a socket outlet to supply a 32 A or higher rated IC-CPD is not restricted for residential (domestic) installations. However the impact on the supplying

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installation of an EVSE operating for extended periods at this current rating, including any voltage reduction, needs to be taken into account. It is unlikely that a domestic installation would have been designed for an additional, steady, 32 A load. An assessment of the maximum demand is necessary, and some form of load management is recommended.

The supply of an IC-CPD fitted with a 32 A supply plug, while not in accordance with the guidelines, is not restricted by the ESR. However the IC-CPD should be accompanied by a warning that some domestic installations may not be able to reliably, or safely, supply a sustained 32 A changing load without taking into account the other loads being supplied during the same period.

Load management

Where advanced load management is employed with a 32 A (7.5kW) or similar IC-CPD or charging station, it is likely that sufficient charge to complete a typical day's driving distance can be achieved without increasing the peak consumption of a typical domestic installation.

Likewise, there is an expectation that the same would apply to apartment building carparks.

Note: In both cases, it is expected that public high speed chargers may be required for substantially longer journeys.

For vehicles having a range of 350 km or more, where a full charge is required overnight, some upgrading of the installation wiring may be required.

Employer-owned EVs

The guidelines strongly discourage allowing a staff member with an employer owned vehicle to charge the vehicle at home using Mode 2 charging with an in-cable control and protection device (IC-CPD). This is because it relies on the safety and integrity of the home's wiring, something that the employer has little control over.

When home charging for a vehicle used for business purposes is considered appropriate, a dedicated charging station should be installed at home for charging the vehicle. Before the installation of the charging station, the condition of the house wiring including the earthing system should be checked.

The charging station should be supplied from a dedicated final sub-circuit protected by a type B RCD or RCBO.

Any charging station supplying greater that 20 A should have load management to prevent its operation from overloading the home wiring.

Charging should take place in a garage. The garage should be considered a workplace for the purposes of charging the vehicle and the risk assessed for the user and also the other residents.

The charging station and the RCD/RCBO should be tested for its safety annually. Employees should be required to report to their employer any electric shocks from anywhere in the house and immediately stop using the charger until the cause is investigated and remedied.

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Energy Safety

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ADDENDUM: SECOND EDITION
INCLUDING AMENDMENT 1

Electric vehicle charging safety guidelines (EVCSG)

Introduction

This addendum to the *Electric vehicle charging safety guidelines – second edition* including amendment 1 (the guidelines) updates the guide's recognition of certain standards.

This addendum applies from the date of publication.

Summary

This amendment changes the end date that the EVCSG recognises certain standards.

Revised text

Edition 2 of the EVCSG is amended as follows; the amendments should be inserted in the appropriate places.

1. In Appendix 2: Referenced standards – in the section for IEC 61851-1, delete the year '*2020*' and replace with '*2021*'.
2. In Appendix 2: Referenced standards – in the section for IEC 61851-22, delete the year '*2020*' and replace with '*2021*'.

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