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Electric Vehicle Charging Safety Guidelines

Part 1: Safety Fundamentals

1 Application

- 1.1 These Guidelines, with the exception of section 8 of Part 1 apply to electric vehicle charging stations installed and IC-CPD offered for sale on or after 5 November 2016.
- 1.2 Section 8 applies to all electric vehicle charging stations from the date of issue of these Guidelines.
- 1.3 Nothing in this guide prevents the use of a socket outlet for the supply of an EV where that socket outlet has been installed for another purpose e.g, a connectable installation provided that the socket outlet is protected by an RCD.
- 1.4 These guidelines will be reviewed before 12 months from the date of application.

- 2 1.5 These guidelines do not apply to supplies for electric vehicles where the supply to the vehicle is at extra low voltage.

3 Introduction

- 3.1 These Electric Vehicle Charging Safety Guidelines provide guidance for the safe specification, supply, installation and operation of charging stations for electric vehicles (EVs) consistent with New Zealand's electricity supply systems and infrastructure. They are intended to enable suppliers, installers and users to comply with fundamental safety requirements of the Electricity (Safety) Regulations 2010 and do not remove any obligation to comply with those regulations.
- 3.2 These Guidelines are intended to be read in conjunction with the Electric Vehicle Charging Safety Guidelines Parts 2 and 3, and with the Electricity (Safety) Regulations 2010, and definitions used in those regulations apply to these Guidelines.
- 3.3 Workplace health and safety legislation places additional duties on workers and persons conducting businesses or undertakings (PCBU). 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.

4 Interpretation – terms and definitions

- 4.1 In these Guidelines (including Parts 1, 2 and 3), unless the context otherwise requires:
 - 4.1.1 **Electric vehicle charging station operator** means a person who owns or operates electrical fittings that provide public charging.

- 4.1.2 **Electric vehicle charging station** has the meaning as set out in IEC 61851-1 for an a.c. or d.c. EV charging station.
- 4.1.3 **In Cable Control and Protection Device (IC-CPD)** has the meaning as set out in IEC 62752.
- 4.1.4 **Location** has the meaning given to it in Regulation 74I of the Electricity (Safety) Regulations 2010.
- 4.1.5 **Public Charging** means charging provided where there is no direct control or supervision exercised by the charging station operator over access to or persons who may take a supply of electricity for the charging of an electric vehicle.
- 4.1.6 **Domestic or similar installation** means an electrical installation in a private dwelling or that portion of an electrical installation associated solely with a flat or living unit.
- 4.1.7 **Supply lead** has the same meaning as cable assembly.
- 4.1.8 **Electric vehicle (EV)**, also known as **electric road vehicle**, means any vehicle propelled, partly or wholly, by an electric motor drawing current from a rechargeable storage battery or from other portable energy storage devices (rechargeable, using energy from a source off the vehicle such as a residential or public electricity service), which is manufactured primarily for use on public streets, roads or highways.
- 4.1.9 **Connecting point** means the point where one electric vehicle is connected to the electrical installation or is contained within dedicated electric vehicle charging (supply) equipment.

NOTE 1: The connecting point is a socket-outlet or a vehicle connector.

NOTE 2: The connecting point may be part of the fixed installed electric vehicle supply equipment in accordance with the IEC 61851 series.

- 4.1.10 **Mode 1 charging** has the same meaning as IEC 61851-1:2010, 6.2 "EV charging modes, mode 1 charging".

In New Zealand, it is not permitted to use or install a socket outlet to provide Mode 1 charging for an electric vehicle.

- 4.1.11 **Mode 2 charging** means connection of the EV to the a.c. supply network (mains) utilizing standardized single-phase or three-phase socket-outlets not exceeding 20 A and not exceeding 250 V a.c. single-phase and utilizing the live and protective earth conductors together with a control pilot function and system of personnel protection against electric shock (RCD) between the EV and the plug or as a part of the in-cable control box.

In New Zealand it is not permitted to install or use a socket outlet to provide Mode 2 charging for an electric vehicle for public charging.

- 4.1.12 **Mode 3 charging** means connection of the EV to the a.c. supply network (mains) utilizing dedicated electric vehicle supply equipment where the control pilot function extends to control equipment in the electric vehicle supply equipment permanently connected to the a.c. supply network (mains).

In New Zealand it is permitted, in accordance with these guidelines, to install Mode 3 electric vehicle charging equipment.

4.1.13 **Mode 4 charging** means connection of the EV to the a.c. supply network (mains) utilizing an off-board charger where the control pilot functions extends to equipment permanently connected to the a.c. supply. *This mode supplies the EV with a DC supply.*

In New Zealand it is permitted, in accordance with these guidelines, to install Mode 4 electric vehicle charging equipment.

4.2 A term used in connection with a particular standard has the meaning used in that standard, unless the term is defined in the Electricity Act 1992 or the Electricity (Safety) Regulations 2010, in which case it has that meaning.

4.3 A term used in these Guidelines, and not defined in the Electricity Act 1992 or Electricity (Safety) Regulations 2010, has the meaning (if any) given:

- (a) in this Part of the Guidelines or, if not defined in the Guidelines,
- (b) in the following:
 - (i) In the case of installations, in AS/NZS 3000
 - (ii) In the case of electric vehicle supply equipment, in IEC 61851-1
 - (iii) In all other cases, in IEC 60050.

4.4 These Guidelines use terms 'must', 'must not', 'it is not permitted' and 'no person may' to refer to practices that it is essential to follow, or to avoid as the case may be, in order to conform to the Guidelines.

4.5 Clauses prefixed by 'NOTE:' provide additional guidance or clarification. They do not form part of the controls and should not be relied upon for the purposes of determining what is required for conformance to these Guidelines.

5 General requirements for installing electric vehicle charging stations

5.1 All electric vehicle charging stations must be designed, installed, tested, certified, inspected and connected in accordance with Part 5 of the Electricity (Safety) Regulations 2010.

5.2 All electric vehicle charging stations must, in addition to the Electricity (Safety) Regulations 2010, be designed, installed, tested, certified, inspected and connected in accordance with the following requirements:

- (a) All electric vehicle charging stations must:
 - (i) be protected by an RCD providing personal protection that is compatible with a charging supply for an electric vehicle
OR in the case of a charging station supplying DC, a device that monitors the safety isolation of the DC supply.
 - (ii) provide an earth continuity monitoring system that disconnects the supply in the event that the earthing connection to the vehicle becomes ineffective. This monitoring system must fail to safety.
 - (iii) provide protection against the overload of the charging supply fittings.
 - (iv) provide protection against the overload of the incoming supply fittings.
 - (v) be supplied from a TNC-S (MEN) system of supply.
 - (vi) be installed so that any socket outlet for connection to the electric vehicle charging station is at least 1.2 m above the finished ground level.

- (b) No electric vehicle charging station may provide an a.c. charging supply that:
 - (i) exceeds standard low voltage.
 - (ii) is not at a nominal frequency of 50 Hertz.

6 Verification

6.1 Any person installing an electric vehicle charging station must:

- (a) verify that the charging station has been designed, constructed and labelled to be compatible with a supply of standard low voltage at a nominal frequency of 50 Hertz; and
- (b) verify that a supplier declaration has been made for the charging station; and
 - (i) sight the relevant test certificate – in respect of charging stations complying with IEC standards;; or
 - (ii) verify the relevant UL certification– in the case of charging stations complying with UL standards; and
- (c) verify that the charging station installation has been carried out in accordance with AS/NZS 3000, these Guidelines, and the manufacturer’s installation instructions.

7 Competence

7.1 No person may design, an electric vehicle charging station unless they are competent to do so.

7.2 No person may install, test, certify, inspect or connect an electric vehicle charging station unless they are licensed competent to do so.

Note: the installation of a electric vehicle charging station itself, is not defined as high risk PEW.

7.3 No person may carry out a periodic assessment of an electric vehicle charging station unless they are licensed to inspect PEW and competent to do so.

8 Periodic assessment of electric vehicle charging stations

8.1 Every electric vehicle charging station, owned, or operated, by an electric vehicle charging station operator, must be subject to periodic assessment commencing on or before the first anniversary of connection of the charging station to a supply of electricity.

8.2 Subsequent periodic assessments must take place at intervals of no more than twelve months.

8.3 A electric vehicle charging operator must:

- (a) establish and implement a safety assessment programme for regularly assessing the electrical safety of electric vehicle charging equipment, conductors and fittings, and
- (b) keep records of:
 - (i) the results of every periodic assessment; and
 - (ii) details of any issues found during the assessment; and
 - (iii) any actions required to be taken in relation to those issues.

8.4 Any person carrying out a safety assessment of an electric vehicle charging station must record that assessment on the Electricity and Gas high risk database.

9 General requirements for In-Cord Control and Protection Device

9.1 All In-Cord Control and Protection Devices must:

- (a) incorporate an RCD to provide protection against electric shock.
- (b) provide an earth continuity monitoring system that disconnects the supply in the event that the earthing connection becomes ineffective. This monitoring system must fail to safety.
- (c) provide protection against the overload of the charging supply fittings.
- (d) provide protection against the overload of the incoming supply fittings.
- (e) be designed to operate at standard low voltage and be supplied from a nominal 50 Hertz supply.

9.2 In addition to the requirements of section 9.1, all functions of an IC-CPD must fail to safety.

9.3 Any person offering for sale or supplying an IC-CPD must have, and must make available to a purchaser or potential purchaser on request:

- (a) a supplier declaration of conformity, and
- (b) either
 - (i) in respect of IC-CPD complying with IEC standards, the relevant test certificates; or
 - (ii) in the case of IC-CPD complying with UL standards, the relevant UL certification verification.

10 Unsafe practices

10.1 The following are considered unsafe for the purposes of Part 2 of the Electricity (Safety) Regulations 2010, and no person may charge an electric vehicle by any, or any combination, of the following means:

- (a) use of any plug adaptor that does not comply with IEC 61851-1:2010 clause 6.3.3;
- (b) cascading of 2 or more supply leads; or
- (c) use of an extension lead.

10.2 No person may supply electricity for public or fleet charging of an electric vehicle other than through a charging station.

- (a) EXEMPTION 1 TO 10.2: This does not preclude the supply of electricity through an IC-CPD to electric vehicles located in a repair facility approved or accredited by the manufacturer of the vehicle.
- (b) EXEMPTION 2 TO 10.2: This does not preclude the supply of electricity using Mode 2

charging (use of an IC-CPD) from a domestic or similar installation.

11 References

(Normative)

11.1 The Guidelines refer to the following documents, in whole or in part. To the extent the Guidelines refer to them, they form part of these Guidelines and are indispensable for their application. For dated references, only the edition cited applies.

11.2 Australian (AS) Standards

AS 60269 (all parts), Low voltage fuses

AS 60529 Degrees of protection provided by enclosures (IP code)

11.3 Joint Australian – New Zealand (AS/NZS) Standards

AS/NZS 3000:2007 including amendments 1 and 2 (all parts), Electrical installations (known as the Australia/New Zealand Wiring Rules)

AS/NZS IEC 60898 (all parts), Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations

AS/NZS 60947-2, Low-voltage switchgear and control-gear – Part 2: Circuit-breakers

AS/NZS 60947-6-2, Low-voltage switchgear and control-gear – Part 6-2: Multiple function equipment – Control and protective switching devices (or equipment) (CPS)

AS/NZS 61008-1:2011, Residual current circuit-breakers without integral overvoltage protection for household and similar uses (RCCBs) – Part 1: General rules

AS/NZS 61009-1:2011, Residual current operated circuit-breakers with integral overvoltage protection for household and similar uses (RCBOs) – Part 1: General rules

11.4 International Electrotechnical Commission (IEC) Standards

IEC 60309-1:1999, Plugs, socket-outlets and couplers for industrial purposes – Part 1: General requirements

IEC 60309-2, Plugs, socket-outlets and couplers for industrial purposes – Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories

IEC 61140:2001, Protection against electric shock – Common aspects for installation and equipment

IEC 61439-7, Low-voltage switchgear and control gear assemblies – Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicles charging stations

IEC 61557-8, Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems

IEC 61557-9, Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1

500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 9: Equipment insulation fault location in IT systems

IEC 61558-2-4, Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers

IEC 61851 (all parts), Electric vehicle conductive charging system

IEC 62196 (all parts), Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles

IEC 62196-1, Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 1: General requirements

IEC 62196-2, Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories

IEC 62262, Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK document)

IEC 62423, Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses.

12 **Bibliography** (Informative)

12.1 The following documents provide information which may be useful for understanding these Guidelines but they are not indispensable for application of the Guidelines.

IEC 60050-691:1973, International Electrotechnical Vocabulary – Chapter 691: Tariffs for electricity

IEC 60309-4, Plugs, socket-outlets and couplers for industrial purposes – Part 4: Switched socket-outlets and connectors with or without interlock

IEC 60364-5-51:2005, Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules

AS/NZS 60884-1, Plugs and socket-outlets for household and similar purposes – Part 1: General requirements

IEC 61439-7, Low-voltage switchgear and control gear assemblies – Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicles charging stations

IEC 61851 (all parts), Electric vehicle conductive charging system

IEC 61851-1:2010, Electric vehicle conductive charging system – Part 1: General requirements

IEC 62196 (all parts), Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles

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