Utilities (Technical Regulation) (Light Rail Regulated Utility (Electrical) Network Code) Approval 2016

Disallowable instrument DI2016-18

made under the

Utilities (Technical Regulation) Act 2014, section 14 (Technical codes—approval)

1 Name of instrument

This instrument is the *Utilities (Technical Regulation) (Light Rail Regulated Utility (Electrical) Network Code) Approval 2016.*

2 Commencement

This instrument commences on the day after it is notified.

3 Determination of code

I determine the Light Rail Regulated Utility (Electrical) Network Code set out in the schedule.

4 Public access

This Code is available for inspection by the public between 8:30 am and 4:30 pm, from Monday to Friday except for public holidays, at Access Canberra at South Building, Dame Pattie Menzies House, 16 Challis Street Dickson ACT. Copies of the Code can be also made at Access Canberra. Electronic copies of the Code are available on the Access Canberra website

at https://www.accesscanberra.act.gov.au/app/answers/detail/a_id/2203/~/water-and-energy-utilities-technical-regulation. No charge will apply.

Simon Corbell MLA Minister for the Environment and Climate Change

08 March 2016



Light Rail Regulated Utility (Electrical) Network Code

February 2016

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1 INTRODUCTION

1.1 Technical Codes

The Light Rail Regulated Utility Network Code (this Code) is a technical code under part 3 of the *Utilities (Technical Regulation) Act 2014* (ACT) (the Act).

1.2 Regulated Utility to Comply with Technical Codes

Under section 14 of the Act, the Minister may approve a technical code as recommended by the technical regulator. If this Code applies to a regulated utility and the regulated utility fails to comply with this Code and is negligent in compliance activities in relation to this Code, the offence provision under section 16 of the Act will apply.

2 PURPOSE AND APPLICATION OF THIS CODE

2.1 Purpose

This Code provides technical requirements for a light rail regulated utility (light rail utility) to design, construct, operate and maintain the light rail regulated utility network (light rail utility network) in safe and reliable manner and in a way that prevents interference with, and damage to, other infrastructure including other utilities.

2.2 Application

- (1) This Code applies to a light rail utility that is an operator of a light rail utility network.
- (2) Under the Utilities (Technical Regulation) (Light Rail—Regulated Utility Service) Regulation 2016, the Minister determined that a light rail regulated utility service (light rail utility service) is a prescribed regulated utility service for section 10 of the Act.

2.3 Effect of Prescription of Utility

- (1) Any light rail utility network service prescribed under section 10 of the Act is subject to the obligations, rights and entitlements under the Act, unless otherwise limited by a regulation, operating certificate or direction of the technical regulator.
- (2) Regulated utilities that provide prescribed regulated utility services may exercise functions to protect networks and facilities under part 5 of the Act. Part 5 of the Act includes criminal offences that apply to persons who unlawfully interfere with utility networks and facilities.

3 DICTIONARY

The dictionary at the end of this Code is part of this Code.

4 OTHER APPLICABLE CODES

Other technical codes including the Light Rail Utility (Electrical) Boundary Code and the Utility Coordination Code also apply to a light rail utility.

5 SAFETY MANAGEMENT

5.1 Network Safety Management

- (1) A light rail utility must develop and implement an Electricity Safety Management System in compliance with AS 5577 Electricity network safety management systems.
- (2) In relation to subclause 5.1(1), the light rail utility may refer to ENA Doc 001 National Electricity Network Safety Code.
- (3) A light rail utility must submit its Electricity Safety Management System to the technical regulator upon request.

5.2 Safe Work Zones

- (1) A light rail utility must establish a safe work zone system in consultation with relevant ACT Government regulators including WorkSafe ACT. The safe work zone system must include:
 - (a) necessary information on the procedures that need to be followed by third parties in order to obtain clearance to undertake works;
 - (b) information on the precautions that must be taken when working on, near or adjacent to the light rail utility network;
 - (c) information on any control or exclusion zones that apply to works near, or adjacent to, the light rail utility network;
 - (d) a means to permit individuals or entities to undertake work within the zones, including urgent work and emergency work; and
 - (e) criteria that would prohibit work within established control or exclusion zones.

- (2) A light rail utility may refer to a system established for the purpose of the Rail Safety Law as the safe work zone system for the purpose of this Code, provided that the system under the Rail Safety Law meets requirements of the safe work zone system in this Code.
- (3) The safe work zone system may refer to the network protection provisions in part 5 of the Act and relevant criminal offences that apply to unlawfully interfere with networks and facilities.

5.3 Energy Regeneration and Storage

If energy regeneration and storage is to be part of the design of the traction system, associated equipment and related controls must not compromise essential safety requirements and must not impact adversely on other utilities.

5.4 Reverse Power Blocking

A light rail utility must prevent inadvertent energisation of the a.c. supply from the d.c. network at all times. Where tractions substations are providing supply to the d.c. traction circuits concurrently, suitable protection and control schemes must be installed and operate instantaneously.

6 ASSET AND OPERATIONAL MANAGEMENT

6.1 Asset Management Plan

- (1) A light rail utility must develop and implement an asset management plan.
- (2) In preparing an asset management plan, the light rail utility must give consideration to the Asset Management Guidelines published by the Office of the National Rail Safety Regulator as updated from time to time.
- (3) The light rail utility must follow the principles of AS ISO 55000 series Asset Management or an equivalent standard, in managing its assets.
- (4) The asset management plan must specifically address how the light rail utility will ensure:
 - (a) continuity of the light rail utility network operation;
 - (b) public safety;
 - (c) safety of light rail utility workers;
 - (d) protection of the environment; and
 - (e) reliability of the light rail utility network.

- (5) A light rail utility may use documentation prepared for the purpose of the Rail safety Law as the asset management plan for the purpose of this Code, provided that the documentation meets requirements of the asset management plan in this Code.
- (6) The light rail utility must maintain records of its underground and aerial infrastructure. The records must contain sufficient details to enable this infrastructure to be identified and must be available to the public during its business hours.
- (7) A light rail utility must submit its asset management plan to the technical regulator upon request.

6.2 Minimum Technical Requirements

- (1) Subject to subclause 6.2 (3) of this Code, the design, construction, testing, operation and maintenance of a light rail utility network must comply with the relevant parts of standards in the Schedule.
- (2) For any element of the design, construction, testing operation and maintenance of a light rail utility network not contemplated by the Schedule, the design, construction, testing operation and maintenance must comply with any relevant Australian Standards published by Standards Australia or in the absence of specific Australian Standards, must be informed by the principles of relevant Australian Standards or international standards.
- (3) As an alternative to subclause 6.2 (1), a light rail utility may choose to comply with transport standards published by the Asset Standards Authority of Transport for NSW in relation to the design, construction, testing operation and maintenance of a light rail utility network.

6.3 Lightning Protection

- (1) A light rail utility must, in accordance with, but not limited to, AS 1768 Lightning protection:
 - (a) assess whether lightning protection measures for light rail infrastructure are required to reduce lightning damage and its consequential effects; and
 - (b) take appropriate actions to implement identified lighting protection measures.
- (2) When undertaking the assessment in subclause 6.3 (1), the light rail utility must consider:
 - (a) the need for protection and the level of protection applied taking into account an assessment of risk due to lightning, and management of that risk to an acceptable level; and

- (b) the risks and impacts of lightning damage risk extending beyond the light rail network boundary, including the risk of potential damage of adjacent structures and unrelated gas, water and sewerage and electricity assets above and below ground.
- (3) Before the light rail utility is connected to the electricity distributor's network, design of earthing and lightning protection must be approved by the electricity distribution utility.

7 UTILITY LIAISON

7.1 Prudent Avoidance

A light rail utility must take all prudent measures to avoid any adverse impacts upon local infrastructure, including but not limited to any electricity distribution and transmission networks during the construction, testing, operation and maintenance of the light rail network.

7.2 Clearances and Separations

- (1) A light rail utility must ensure its infrastructure maintains minimum clearances to and separations from buildings, vegetation, structures and other circuits.
- (2) The light rail utility must identify minimum clearances and separations in accordance with the principles of:
 - (a) parts 2 and 3 of the *Utility Networks (Public Safety) Regulation* 2001 under the *Utilities Act 2000*;
 - (b) section 3 of AS/NZS 7000 Overhead Line Design —Detailed Procedures;
 - (c) EN 50122-1 Railway Applications Fixed Installations Electrical Safety, Earthing And The Return Circuit - Part 1: Protective Provisions Against Electric Shock

Subclause 7.2 (a) prevails if there is an inconsistency between subclause 7.2 (a) and (b).

(3) The light rail utility must take reasonable steps to notify the public of the minimum clearance and separation identified in subclause 7.2.

7.3 Electromagnetic Compatibility (EMC)

(1) A light rail utility must give consideration during the design, construction, testing, operation and maintenance phase to the concepts and practical application of electromagnetically compatible systems.

(2) A light rail utility must consider the distinction between electromagnetic compatibility standardised tests and tests carried out at the location where the light rail network is planned for installation.

7.4 Electromagnetic Coupling

- (1) A light rail utility must assess the risks of electromagnetic coupling occurring during the design, construction, testing, operation and maintenance of the light rail utility.
- (2) If any electromagnetic coupling risk is discovered by the light rail utility, the light rail utility must mitigate the electromagnetic field that is generating the electromagnetic coupling risk, including by implementing reasonable design measures.

7.5 Load Sharing Capacities of Section of the Distribution Network

- (1) The light rail utility's load profile, both integrated across the electricity distribution network and individually at each connection point, must aim to minimise the impact on the supply integrity of the electricity distribution network for both normal operation and operation with the loss of a single element in the supply system.
- (2) Traction power connection points for the route length of the light rail network must be designed not to adversely affect the electricity distribution network for both normal operation and operation with the loss of a single element in the supply system.
- (3) The light rail utility must ensure that its load profile is coordinated with the electricity distributor on short and long term load fluctuations and that the electricity distribution network is not compromised with its power quality or adequate capacity.

7.6 Mitigation of Harmonics and Maintenance of Quality of Supply

- (1) The light rail network design, construction, testing, performance and maintenance planning must address the mitigation of excessive harmonics and maintenance of quality of supply. Excessive harmonics are harmonics that exceed the electricity distributor's requirements.
- (2) The light rail utility must ensure that issues of quality of supply are addressed in an agreement with the electricity distribution utility.

7.7 Connection Agreement

If a light rail utility network connects to an electricity distribution network, the light rail utility must negotiate with the relevant electricity distributor in relation to the terms and conditions of a connection agreement. Any connection agreement must consider:

- the Electricity Service and Installation Rules published by the electricity distributor under the Electricity Service and Installation Rules Code, and the relevant Boundary Code;
- (2) ensuring existing and anticipated future network load capacities are configured into the light rail load requirements along the light rail corridor; and
- (3) the load profile of the light rail system, at each point of connection to the electricity distribution network, and as a whole across all points of connection to the electricity distribution network.

8 STRAY DIRECT CURRENT (d.c.)

8.1 Stray Current Working Group (SCWG)

- (1) A light rail utility must manage the risk of damages by stray direct current from a light rail traction supply to metallic assets in the proximity to the light rail network.
- (2) The light rail utility must establish a SCWG during the design stage of the light rail utility network.
- (3) The SCWG must be ongoing until the light rail utility ceases its operation.
- (4) The following parties must be entitled to representation on the SCWG:
 - stakeholders who have structures or underground assets in the vicinity of the light rail tracks that may be at risk of suffering electrolysis stray current corrosion as a result of stray current from the light rail traction supply, including utilities;
 - (b) the technical regulator and government representatives of the technical regulator;
 - (c) any other stakeholder as directed by the technical regulator.
- (5) The light rail utility must provide the parties referred to in subclause 8.1 (4) with notifications of all SCWG meetings at least two weeks in advance of each meeting and minutes of each meeting within 7 days of the meeting.
- (6) The light rail utility must propose the terms of reference of the SCWG to the SCWG members.
- (7) The roles of the SCWG must include:

- (a) making a list of assets that are susceptible to risk of damage arising from stray current emanating from the light rail utility network (susceptible assets) in the vicinity of the light rail tracks.
- (b) reviewing and making recommendations in relation to:
 - the light rail utility's process of approval for the electrical earthing, bonding and cross bonding design, track insulation, and stray current management of the traction system and the related issues raised by stakeholders;
 - the light rail utility's process for testing and measurement to monitor stray current during construction and related issues raised by stakeholders;
 - (iii) the results of testing during construction and analysis of those results;
 - (iv) the results of monitoring stray current and assessment of trends in these results during the operation of the light rail utility;
 - (v) other issues as might arise from time to time relating to stray current emanating from the light rail network during the operation of the light rail utility; and
 - (vi) the qualifications and experience of persons involved in oversight of the stray direct current management;
- (c) providing ongoing advice to the operators of cathodic protection schemes installed during the operation of the light rail utility; and
- (d) reporting on the above matters to the technical regulator.
- (8) In the event of a matter not being resolved by agreement within the SCWG, the matter may be referred to the Electrical Technical Reference Group in clause 9.

8.2 Stray Current Management Plan

- (1) A light rail utility must develop and implement a stray current management plan to manage the risk of damages by stray direct current from the light rail traction supply to metallic assets in the proximity.
- (2) The light rail utility must create the stray current management plan in consultation with the SCWG.
- (3) The stray current management plan must include:
 - identification of specific structures and underground assets that may be at risk of electrolysis stray current corrosion resulting from the light rail traction supply;
 - (b) ongoing communication with third parties that may have assets at risk;

- (c) design measures to minimise stray currents;
- (d) design processes that ensure that third party risks are considered; and
- (e) a program to monitor stray currents by taking measurements at suitable locations and at suitable intervals for the lifetime of the light rail network and address issues as they arise.
- (4) The stray current management plan must be endorsed by the SCWG.
- (5) The light rail utility must submit its stray current management plan to the technical regulator upon request.

9 ELECTRICAL TECHNICAL REVIEW GROUP

- (1) The technical regulator may establish and chair an Electrical Technical Review Group that provides an independent and impartial review of the design, construction, testing, operation and maintenance of the light rail network.
- (2) If the Electrical Technical Review Group is established, the technical regulator may invite members including an electricity distributor, to the Electrical Technical Review Group, who are experts in technical fields relevant to the light rail network (for example, electricity, gas, water and sewerage utilities, telecommunication bodies, and relevant industry asset managers).
- (3) The light rail utility may propose to the technical regulator, members for the Electrical Technical Review Group.
- (4) In consultation with stakeholders including the SCWG, the Electrical Technical Review Group may determine limits for the average anodic and cathodic shifts in voltage on various classes of asset as a result of stray direct current during the operation of the light rail utility network.
- (5) In relation to clause 9 (4), the determined limits may be reviewed by the Electrical Technical Review Group upon a request of two or more members of the SCWG.
- (6) The Electrical Technical Review Group may recommend the technical regulator to issue a direction that includes a determination made by the Electrical Technical Review Group.

10 TECHNICAL APPROVAL

10.1 Initial Design and Construction

For initial design and construction prior to the issue of the first operating certificate, a light rail utility:

- (1) must conduct a technical analysis in relation to the matters referred to in this Code with supporting data and references considering, at a minimum, site specific characteristics, and technical feasibility of the project life cycle;
- (2) must submit the technical analysis with supporting data and references for each technical matter, to the technical regulator for the purpose of assessing the operating certificate;
- (3) must comply with a request from the technical regulator for additional information such as technical data, schematics, plans and references that support the technical specifications if the technical regulator considers that such information would be of assistance:
- (4) may seek guidance from the Electrical Technical Review Group in relation to technical matters related to the design, construction, testing, maintenance and operation of the light rail network.

10.2 Variations and Operation

For variations of design and construction and the operation of the light rail network after the issue of the first operating certificate, the light rail utility:

- (1) must consult stakeholders that could be affected by variations of design and construction and/or the operation of the light rail network. Stakeholders include the SCWG, relevant utilities, telecommunication bodies, and asset managers, including building owners, adjacent to or affected by the existing or proposed light rail utility infrastructure;
- (2) must submit any technical analysis, with supporting data and references for each technical matter to the technical regulator;
- (3) must comply with a request from the technical regulator for additional information such as technical data, schematics, plans and references that support the technical specifications if the technical regulator considers that such information would be of assistance; and
- (4) may seek guidance from the Electrical Technical Review Group in relation to technical matters related to the design, construction, testing, maintenance and operation of the light rail network.

11 EMERGENCY PLANNING

(3) A light rail utility must comply with the *Emergencies Act 2004* (ACT) and the emergency management plan requirements of the Rail Safety Law.

- (4) The light rail utility must prepare an emergency plan that contemplates response, communication and coordination with emergency management agencies.
- (5) The light rail utility must review an emergency plan annually and submit it to the technical regulator for approval by the end of each financial year.
- (6) The emergency plan of the light rail utility must establish a framework for:
 - (a) internal management of emergencies;
 - (b) protocols for complying with relevant agencies under the *Emergencies Act* 2004 (ACT); and
 - (c) protocols for complying with any direction issued under the *Emergencies Act 2004* (ACT), including a direction issued by an Emergency Controller appointed under the *Emergencies Act 2004* (ACT).
- (7) A light rail utility may use documentation prepared for the purpose of the Rail Safety Law as emergency plan for the purpose of this Code, provided that the documentation meets requirements of the emergency plan in this Code.

12 REPORTING

- (1) The technical regulator may require the light rail utility to report to the technical regulator periodically in relation to its performance against its operation and maintenance.
- (2) The technical regulator may audit the light rail utility, or request the light rail utility to have independent audit undertaken, for compliance against the light rail utility's operation and maintenance.

SCHEDULE RELEVANT TECHNICAL REFERENCES

- (1) AS1882: Earth and bonding clamps
- (2) AS2067: Substations and high voltage installations exceeding 1 kV a.c.
- (3) AS 2832 series: Cathodic protection of metals
- (4) AS 5577: Electricity network safety management systems
- (5) AS 60038: Standard voltages
- (6) AS ISO 55000 series on Asset Management
- (7) AS/NZS 1429 series: Electric cables—Polymeric insulated
- (8) AS/NZS 1768: Lightning protection
- (9) AS/NZS 3000: Electrical installations
- (10) AS/NZS 3008 series: Electrical installations—selection of cables
- (11) AS/NZS 61000 series: Electromagnetic compatibility
- (12) AS/NZS 7000: Overhead Line Design —Detailed Procedures.
- (13) AS/NZS IEC 60947.1 and 2 Low-voltage switchgear and control gear
- (14) EN 50119: Railway applications Fixed installations: Electric traction overhead contact lines for railways
- (15) EN 50121: Railway applications Electromagnetic compatibility
- (16) EN 50121-1: Railway applications Electromagnetic compatibility Part 1: General
- (17) EN 50121-2: Railway applications Electromagnetic compatibility Part 2 : emission of the whole railway system to the outside world
- (18) EN 50121-3-1: Railway applications Electromagnetic compatibility Part 3-1: rolling stock Train and complete vehicle
- (19) EN 50121-3-2: Railway applications Electromagnetic compatibility Part 3-2: rolling stock Apparatus
- (20) EN 50121-4: Railway applications Electromagnetic compatibility Part 4: emission and immunity of the signalling and telecommunications apparatus

- (21) EN 50121-5: Railway applications Electromagnetic compatibility Part 5: Emission and immunity of fixed power supply installations and apparatus
- (22) EN 50122: Railway applications Fixed installations
- (23) EN 50122-1: Railway applications Fixed installations Electrical safety, earthing and the return circuit - Part 1: Protective provisions against electric shock
- (24) EN 50122-2: Railway applications Fixed installations Part 2: Protective provisions against the effects of stray currents caused by direct current traction systems
- (25) EN 50123: Railway applications Fixed installations D.C. switchgear
- (26) EN 50124: Railway applications Insulation coordination
- (27) EN 50125-2: Railway applications Environmental conditions for equipment Part 2: Fixed electrical installations
- (28) EN 50125-3: Railway applications Environmental conditions for equipment Part 3: Equipment for signalling and telecommunications
- (29) EN 50155: Railway applications Electronic equipment used on rolling stock
- (30) EN 50159: Railway applications Communication, signalling and processing systems Safety-related communication in transmission systems
- (31) EN 50159-1: Railway applications Communication, signalling and processing systems Part 1: Safety-related communication in closed transmission systems
- (32) EN 50159-2: Railway applications Communication, signalling and processing systems Part 2: Safety-related communication in open transmission systems
- (33) EN 50160: Voltage characteristics of electricity supplied by public electricity networks
- (34) EN 50162: Protection against corrosion by stray current from direct current systems
- (35) EN 50163: Railway applications supply voltages of traction systems
- (36) ENA EG1: Substation earthing guide, and other relevant ENA substation earthing standards
- (37) ENA Doc 001: National Electricity Network Safety Code
- (38) Guide for Measuring of Interference caused by Cathodic Protection and Railway Drainage Systems NSW Electrolysis Committee

((39)	IEEE 519: Recommended practices and requirements for harmonic control in electrical power systems

DICTIONARY

- (1) Act means the Utilities (Technical Regulation) Act 2014 (ACT).
- (2) **Australian Standard** or **AS** means an Australian standard published by Standards Australia as current at the time.
- (3) Australian/New Zealand Standard or AS/NZS means an Australian/New Zealand standard published by Standards Australia as current at the time.
- (4) **Asset Management Guideline** means a guideline for asset management published by the Office of the National Rail Safety Regulator.
- (5) **Asset Standards Authority** is an independent network design and standards authority within Transport for NSW of the NSW Government.
- (6) **Electricity Law** means a totality of the *National Electricity Law* and the *National Electricity Rules published by the Australian Energy Market Commission.*
- (7) **electricity distributor** means a utility that provides an electricity distribution service under section 6 of the *Utilities Act 2000* (ACT).
- (8) **electricity distribution network** means an electricity network under section 7 of the *Utilities Act 2000* (ACT).
- (9) **emergency work** means work that must be completed urgently to safeguard life, the environment, plant or property.
- (10) **EN** means an European standard published and maintained by the European Committee for Standardization, the European Committee for Electrotechnical Standardization, or the European Telecommunications Standards Institute.
- (11) **ENA** means a standard published by the Energy Network Association.
- (12) **IEC** means a standard published by the International Electrotechnical Commission.
- (13) **IEEE** means a standard published by the Institute of Electrical and Electronics Engineers.
- (14) **light rail regulated utility (light rail utility)** means a regulated utility that provides a regulated utility service prescribed by the *Utilities (Technical Regulation)* (*Light Rail—Regulated Utility Service*) Regulation 2016 under section 10 of the Act. Under the Regulation, a light rail utility is a person who provides a service that is a light rail utility service. A light rail utility service is the supply of electricity from a light rail utility network. A light rail utility network means infrastructure that consists of: an electricity network to supply power to rolling stock and associated infrastructure; substations and facilities to supply and regulate power to the network; and any electrical zone related to the effect of stray current or the management of the effect of electrical current, such as

- cathodic protection. For the avoidance of doubt, it includes rail tracks but does not include rolling stock.
- (15) **Minister** means the Minister responsible for administering the Act.
- (16) **operating certificate** means a certificate under part 6 of the Act.
- (17) Office of the National Rail Safety Regulator means an independent body corporate established under the *Rail Safety National Law (South Australia) Act 2012* (SA).
- (18) **technical regulator** is as defined under part 9 of the Act.
- (19) **transport standard** is a transport standard published by the Asset Standards Authority.
- (20) **Rail Safety Law** means the of the Rail Safety National Law as applied under the *Rail Safety National Law (ACT) Act 2014* (ACT).
- (21) **regulated utility** is as defined under part 2 of the Act.
- (22) **Standards Australia** is the national peak standards organisation authorised by the Commonwealth Government to prepare and publish the standards.
- (23) **technical code** means a code approved by the Minister under part 3 of the Act.
- (24) **urgent work** means work necessary to restore supplies of water, gas, electricity, telecommunications or any other form of basic services. Services include publicly or privately owned.
- (25) **Work Safe ACT** means a statutory office of the Work Safety Commissioner and the Work Safety Council established by the *Work Health and Safety Act 2011* (ACT).