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Capital Projects Group

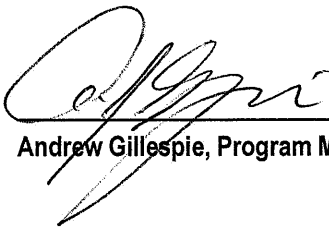
Interim Standards for the Selection of New Electronic Devices and Cables in Metrolinx Facilities to Mitigate Potential EMI Effects Generated by the RER Electric Traction System

MX-ELEC EMI-SPEC-2017

April 4, 2018

Authorization

Approved by:



Andrew Gillespie, Program Manager, Electrification (Gannett Fleming)

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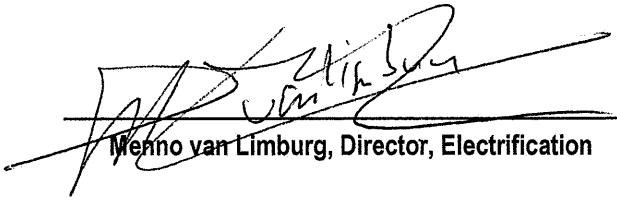

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Revision	Description	Date	By
0	Initial release to Metrolinx	September 14th, 2017	Gannett Fleming
1	Revised release to Metrolinx	September 21st, 2017	Gannett Fleming
2	Included stakeholders comments	April 4, 2018	Gannett Fleming

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1. Introduction

1.1 Purpose

This document provides guidance for the selection of electronic equipment and associated cables within the ROW and at MX locations to enhance the immunity from the potential effects of EMI generated by the implementation of RER Electrification.

1.2 Scope

The electronic devices exclude signal equipment and wayside inspection devices, including associated cables, which are covered by dedicated specifications.

The MX locations include passenger stations, layover facilities and maintenance buildings.

1.3 Applicable Codes and Standards

Typical EMI/EMC certifications and approvals for Electromagnetic Compatibility of an electronic device in a commercial (Class A) setting are shown below. While separate references could be shown for EN 55032 and CISPR 32, these standards are generally interchangeable, and will therefore be shown via a single reference. The same thing is true for CISPR 24 and EN 55024.

1.3.1 Emissions

[1] 47 CFR 15, FCC Class A Part 15, Radio Frequency Devices

[2] EN 55032:2012 (**new**) Electromagnetic Compatibility of Multimedia Equipment – Emission Requirements (Also known as: CISPR 32-2012.) Supersedes EN 55022: 2010.

1.3.2 Immunity

[3] EN 55024:1998 with A1:2001, A2:2003, Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement (Also known as: CISPR 24:2010.)

1.3.3 Other Useful Standards

[4] **Transport Canada Standard E-17** – *Railway Signal & Traffic Control Systems Standards*

[5] **AREMA Part 10.3.10** – *Recommended Design Criteria for Line Wire*

[6] **AREMA Part 11.5.2** – *Recommended Electromagnetic Compatibility Immunity and Emissions Testing for Signaling Products*

[7] **ICES-003** – Pertinent to Canadian practices, entitled, "Information Technology Equipment (Including Digital Apparatus) – Limits and Methods of Measurement."

[8] **ICES-005** – Pertinent to Canadian practices, entitled, "Lighting Equipment."

[9] **Industry Canada Standard RSS-210** – *Licence-Exempt Radio Apparatus: Category I Equipment*

[10] **Industry Canada Standard RSS-220** – *Devices Using Ultra-Wideband (UWB) Technology*

[11] **Industry Canada Standard RSS-Gen** – *General Requirements for Compliance of Radio Apparatus*

2. Guidelines

1.4 General Device Guidelines

All Commercial of the Shelf (COTS) equipment shall have the CE Mark, which indicates that these devices have been tested to meet the requirements found in the CENELEC Standards. In the case where the device has been tested for immunity, but the manufacturer did not attest to the CE Mark, the immunity standards noted under **Section 1.3.2** shall apply. In North America, a device that has been tested against requirements such as those in the EN 61000 family of standards will clearly state it, even if it does not have the CE Mark.

Equipment and devices not identified in the Specific Device Guidelines below will be subject to the provisions in these General Device Guidelines. Such devices would include, but not be limited to:

- Electronic Control System for generator systems near platform level;
- Elevator Equipment Control Panels at platform level;
- Existing CHUBB Security Equipment;
- HVAC and Snow Melt Control at platform level;
- Commercial Vending Machines.

1.5 Cabling Guidelines

For cabling, follow TIA/EIA-568-B.1-2, Commercial – Building Telecommunication Cabling Standard.

1.6 Specific Device Guidelines

The guidelines below are intended to address specific classes of devices that may be deployed in the system, outside the realm of cables.

1.6.1 Electronic Devices, such as, but not limited to: CCTV,Electronic Signage

Device shall have the CE Mark. If CE Mark is not available, product shall have been tested for immunity against EN 55024 or CISPR 24 and for emissions against EN 55032 or CISPR 32.

1.6.2 Public Address System

Device shall have the CE Mark. If CE Mark is not available, product shall have been tested for immunity against EN 55024 or CISPR 24 and for emissions against EN 55032 or CISPR 32.

1.6.3 Ticket Vending Machines, Related Fare Devices

Device shall have the CE Mark. If CE Mark is not available, product shall have been tested for immunity against EN 55024 or CISPR 24 and for emissions against EN 55032 or CISPR 32.

1.6.4 Commercial Vending Machines

Device shall have the CE Mark. If CE Mark is not available, product shall have been tested for immunity against EN 55024 or CISPR 24 and for emissions against EN 55032 or CISPR 32.

1.6.5 Cameras and Related Devices

Device shall have the CE Mark. If CE Mark is not available, product shall have been tested for immunity against EN 55024 or CISPR 24 and for emissions against EN 55032 or CISPR 32.

1.6.6 Cabling for Wired Communications

Shielded Twisted-Pair, Coaxial, or Fiber Optic Cable shall be used unless it is verified that no EMI / EMC concerns exist for a specific application. Power cables are exempted from this requirement. All such cabling should meet the requirements expressed in the ANSI Commercial Building Telecommunications Cabling Standard, cited above.

1.6.7 Wi-Fi Communications Equipment

Equipment used for Wi-Fi communications shall meet all requirements of Canadian Spectrum Management and Telecommunications Standard generally, including RSS-Gen — General Requirements for Compliance of Radio Apparatus, and Industry Canada Standard RSS-210, specifically.

1.6.8 LED Lighting Control

Equipment for the illumination and control of LED lighting shall conform to the specific requirements of CSA 22.2 – *Light emitting diode (LED) equipment for lighting applications*, and the general requirements regarding EMC found in ICES-005 – *Lighting Equipment*.

1.6.9 Enclosures

The specification of custom enclosures shall be governed not by specific standards, but by design principles. While the performance of an enclosure based upon these design principles is most accurately determined via testing described in documents such as IEEE-299.1, entitled, "Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures and Boxes Having all Dimensions between 0.1 m and 2m," they may be summarized as follows. To prevent EMI emissions from negatively impacting apparatus inside a custom enclosure, that enclosure shall exhibit several qualities, which are:

- The enclosure shall be constructed of conductive materials;
- The enclosure shall be grounded, to a source dissimilar to the apparatus inside;
- Opening(s) in the enclosure to the outside shall be minimized;
- Any such openings shall be gasketed, with the door, should one exist, attached to the rest of the enclosure via a conductor.

If verification of the EMC performance of the enclosure is required, is shall be conducted against a standard such as IEEE-299.1.

1.6.10 Conduit

Materials used for carrying conductors, either flexible conduit or fixed conduit, shall conform to the general requirements of CSA 22.1-06 – *Canadian Electrical Code, Part I*, and the specific requirements of CSA 22.3 – *Canadian Standards for Interconnect of Distributed Resources and Electricity Supply Systems*, as applicable.

END OF SECTION