Standard

Telecommunication Equipment – Physical Interfaces and Environmental Conditions

Version 1.0
Issued Date: 03 October 2014

Important Warning

This document is one of a set of standards developed solely and specifically for use on the rail network owned or managed by the NSW Government and its agencies. It is not suitable for any other purpose. You must not use or adapt it or rely upon it in any way unless you are authorised in writing to do so by a relevant NSW Government agency.

If this document forms part of a contract with, or is a condition of approval by, a NSW Government agency, use of the document is subject to the terms of the contract or approval.

This document may not be current. Current standards are available for download from the Asset Standards Authority website at www.asa.transport.nsw.gov.au.

© State of NSW through Transport for NSW
Standard governance

Owner: Lead Telecommunications Engineer, Asset Standards Authority
Authoriser: Chief Engineer Rail, Asset Standards Authority
Approver: Director, Asset Standards Authority on behalf of ASA Configuration Control Board

Document history

<table>
<thead>
<tr>
<th>Version</th>
<th>Summary of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>First issue</td>
</tr>
</tbody>
</table>

For queries regarding this document, please email the ASA at standards@asa.transport.nsw.gov.au or visit www.asa.transport.nsw.gov.au
Preface

The Asset Standards Authority (ASA) is an independent unit within Transport for NSW (TfNSW) and is the network design and standards authority for defined NSW transport assets.

The ASA is responsible for developing engineering governance frameworks to support industry delivery in the assurance of design, safety, integrity, construction, and commissioning of transport assets for the whole asset life cycle. In order to achieve this, the ASA effectively discharges obligations as the authority for various technical, process, and planning matters across the asset life cycle.

The ASA collaborates with industry using stakeholder engagement activities to assist in achieving its mission. These activities help align the ASA to broader government expectations of making it clearer, simpler, and more attractive to do business within the NSW transport industry, allowing the supply chain to deliver safe, efficient, and competent transport services.

The ASA develops, maintains, controls, and publishes a suite of standards and other documentation for transport assets of TfNSW. Further, the ASA ensures that these standards are performance based to create opportunities for innovation and improve access to a broader competitive supply chain.

This standard specifies the physical interfaces and environmental conditions for telecommunication equipment installed within fixed premises and on rolling stock.

This standard is a first issue.
# Table of contents

1. Introduction ............................................................................................................................................ 5  
2. Purpose ................................................................................................................................................... 5  
   2.1. Scope ............................................................................................................................................... 5  
   2.2. Application ..................................................................................................................................... 5  
3. Reference documents ........................................................................................................................... 5  
4. Terms and definitions ........................................................................................................................... 7  
5. Power supply interfaces ....................................................................................................................... 8  
6. Earth connections ................................................................................................................................. 8  
7. Rack and rail mounts ............................................................................................................................ 9  
8. Equipment cords ................................................................................................................................... 9  
9. Environmental conditions ................................................................................................................... 11  
10. Electromagnetic emissions and immunity ......................................................................................... 12
1. **Introduction**

The TfNSW rail communications networks comprise a myriad of equipment from different manufacturers, arranged for multiple purposes. The complex interconnectivity and varied installations call for standardisation of the interfaces between the equipment and control of installation conditions.

2. **Purpose**

This document provides a standard for the physical interfaces and installation environments to telecommunication equipment. It aims to ensure that equipment is able to operate in its installed environment and minimise the level of customisation of installations.

2.1. **Scope**

This document specifies the physical interfaces and environmental conditions for telecommunication equipment installed within fixed premises and on rolling stock. Fixed premises include buildings, shelters, containers or cubicles as defined in EN 50125-3.

This document does not fully specify the installation requirements for telecommunication equipment in unprotected outdoor installations such as antennas.

2.2. **Application**

This standard applies to all TfNSW rail telecommunication equipment.

3. **Reference documents**

**International standards**

BS 6853 Code of practice for fire precautions in the design and construction of passenger carrying trains

ANSI/TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises

ECIA EIA/ECA-310-E Cabinets, Racks, Panels, and Associated Equipment

EN 50022 Low voltage switchgear and controlgear for industrial use - Mounting rails - Top hat rails 35 mm wide for snap-on mounting of equipment

EN 50121-3-2 Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus

EN 50121-4 Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the signalling and telecommunications apparatus
EN 50125-1 Railway applications - Environmental conditions for equipment - Part 1: Rolling stock and on board rolling stock

EN 50125-3 Railway applications - Environmental conditions for equipment - Part 3: Equipment for signalling and telecommunications

EN 50155 Railway applications - Electronic equipment used on rolling stock

EN 55022 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

EN 55024 Information technology equipment - Immunity characteristics - Limits and methods of measurement

IEC 11801 Information technology - Generic cabling for customer premises

IEC 60297 Mechanical structures for electronic equipment - Dimensions of mechanical structures of the 482.6 mm (19 in) series - Subtracks and associated plug-in units. Design overview

IEC 60603-7-2 Connectors for electronic equipment - Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz

IEC 60603-7-4 Connectors for electronic equipment - Part 7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz

IEC 60754-1 Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content

IEC 60754-2 Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity

IEC 60793-2-10 Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres

IEC 60793-2-50 Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres

IEC 61034-2 Measurement of smoke density of cables burning under defined conditions - Part 2: Test procedure and requirements

IEC 61076-2-101 Connectors for electronic equipment - Product requirements - Part 2-101: Circular connectors - Detail specification for M12 connectors with screw-locking

IEC 61156-6 Multicore and symmetrical pair/quad cables for digital communications - Part 6: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz - Work area wiring - Sectional specification

IEC 61754-7 Fibre optic interconnecting devices and passive components - Fibre optic connector interfaces - Part 7: Type MPO connector family – One fibre row
IEC 61754-20 Fibre optic interconnecting devices and passive components - Fibre optic connector interfaces - Part 20: Type LC connector family

Australian standards

AS/NZS 3112 Approval and test specification - Plugs and socket-outlets

AS 60038 Standard voltages

Transport for NSW standards

T HR TE 21002 ST Communications Earthing and Surge Suppression

4. Terms and definitions

The following terms and definitions apply in this document:

ANSI American National Standards Institute

AS Australian standards

ECA Electronic Components, Assemblies, Equipment & Supplies Association

ECIA Electronic Components Industry Association

EIA Electronic Industries Alliance

telecommunication equipment machine used for the purpose of electronic communication

EN European norms

halogen acid gas content amount of halogen acid gas evolved, except hydrofluoric acid, expressed as milligrams of hydrochloric acid per gram of total test specimen

IEC International Electrotechnical Commission

NZS New Zealand standards
5. Power supply interfaces

Telecommunication equipment shall use one or more power supply interfaces where installed within shelters, containers or buildings. Table 1 shows the required power supply interfaces.

<table>
<thead>
<tr>
<th>Nominal interface</th>
<th>Voltages</th>
<th>Plug (to socket)</th>
<th>Coupler (to device)</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal 230 V ac with earth.</td>
<td>Single-phase three-wire systems, 50 Hz, nominal 230 V as defined in AS 60038.</td>
<td>Three-pin 10 A or 15 A plug 250 V max. as defined in AS/NZS 3112.</td>
<td>Class I appliance couplers as defined in IEC 60320.</td>
<td>Installed in shelters, containers and buildings.</td>
</tr>
<tr>
<td>Nominal - 48 V dc.</td>
<td>- 40 V dc to - 60 V dc</td>
<td>Not defined.</td>
<td>Connectors that are keyed and bonded in pairs of red and black, or red and blue. Connector contacts rated for current. Cable from device to coupler to be not longer than 0.5 m.</td>
<td>Installed in shelters, containers and buildings.</td>
</tr>
</tbody>
</table>

Other power supply interfaces may be used for installations in cubicles or for signals or rolling stock applications.

6. Earth connections

Telecommunication equipment used in telecommunications applications shall comply with T HR TE 21002 ST Communications Earthing and Surge Suppression.

Other earth connection interfaces may be used for installations in signals and rolling stock applications.
7. **Rack and rail mounts**

Telecommunication equipment installed in shelters, containers or buildings as defined in EN 50125-3 shall be supplied with commercial off the shelf mounting equipment for direct fastening to either of the following permitted racks or rails:

- two-post 19-inch rack compliant with IEC 60297 or ECIA EIA/ECA-310-E
- 35 mm x 7.5 mm top-hat ‘TS35’, commonly known as ‘DIN’, rail compliant with EN 50022

Other racks, rails, or other mounting equipment including shelves, shall not be used to mount telecommunication equipment in shelters, containers or buildings.

8. **Equipment cords**

Where telecommunication equipment is connected to a distributor defined in IEC 11801 it shall use one or more equipment cord interfaces. Table 2 shows the required equipment cord interfaces.

<table>
<thead>
<tr>
<th>Class / Category</th>
<th>Cable</th>
<th>Connector (to device)</th>
<th>Termination</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 11801 Class D or ANSI/TIA-568-C.0 Category 5e.</td>
<td>Unscreened stranded category 5e (Cat5e) cable as defined in IEC 61156-6.</td>
<td>8-way unshielded 100 MHz connector as defined in IEC 60603-7-2.</td>
<td>Eight-position jack pin/pair assignments compliant with T568A or T568B as defined in ANSI/TIA-568-C.0.</td>
<td>Installed in shelters, containers and buildings.</td>
</tr>
<tr>
<td>IEC 11801 Class E or ANSI/TIA-568-C.0 Category 6.</td>
<td>Unscreened stranded category 6 (Cat6) cable as defined in IEC 61156-6.</td>
<td>8-way unshielded 250 MHz connector as defined in IEC 60603-7-4.</td>
<td>Eight-position jack pin/pair assignments compliant with T568A or T568B as defined in ANSI/TIA-568-C.0.</td>
<td>Installed in shelters, containers and buildings.</td>
</tr>
<tr>
<td>IEC 11801 Class D or ANSI/TIA-568-C.0 Category 5e.</td>
<td>Screened stranded category 5e (Cat5e) cable as defined in IEC 61156-6.</td>
<td>M12 connector with screw-locking and D-coding defined in IEC 61076-2-101.</td>
<td>Not defined.</td>
<td>Rolling stock, Signals installed in cubicles.</td>
</tr>
<tr>
<td>IEC 11801 type OS1 single mode.</td>
<td>Type B1 as defined in IEC 60793-2-50.</td>
<td>Type LC connector as defined in IEC 61754-20.</td>
<td>Not defined.</td>
<td>All</td>
</tr>
</tbody>
</table>
### Class / Category | Cable | Connector (to device) | Termination | Application
---|---|---|---|---
IEC 11801 types OM1, OM2 multimode. | Type A1a as defined in IEC 60793-2-10. | Type LC connector as defined in IEC 61754-20. | Not defined. | All
IEC 11801 types OM3, OM4 multimode. | Type A1a as defined in IEC 60793-2-10. | Type LC connector as defined in IEC 61754-20. | Not defined. | All
IEC 11801 types OM3, OM4 multimode. | Type A1a as defined in IEC 60793-2-10. | Type MPO connector as defined in IEC 61754-7. | Not defined. | All

Equipment cords used in rolling stock applications shall comply with BS 6853.

Equipment cords shall be low smoke zero halogen and satisfy the following test conditions:

- minimum light transmittance shall be not less than 60% tested in accordance with IEC 61034-2
- the amount of halogen acid, expressed as milligrams of hydrochloric acid per gram of test specimen shall be less than 0.5% or 5 mg/g tested in accordance with IEC 60754-1
- pH of the test solution shall be not less than 4.3 and conductivity shall be not greater than 10μS/mm tested in accordance with IEC 60754-2

Other equipment cords shall not be used.

*Note that the connector to the backbone or fixed horizontal cable as defined in IEC 11801 is not in scope of this standard.*
9. Environmental conditions

Telecommunication equipment used in signals and telecommunications applications shall comply with the environmental conditions as defined in EN 50125-3. Table 3 shows the environmental class and conditions for the relevant application.

<table>
<thead>
<tr>
<th>Application</th>
<th>Pressure – Altitude</th>
<th>Temperature</th>
<th>Humidity</th>
<th>Pollution – Chemical active substances</th>
<th>Pollution – Biological active substances</th>
<th>Pollution – Mechanical active substances</th>
<th>Vibrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signals</td>
<td>A1</td>
<td>T1, except that the lowest temperature for external ambient and in cubicle is -10 °C</td>
<td>T1</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Outside the track (from 1 m to 3 m from the rail)</td>
</tr>
<tr>
<td>Telecommunications – installed in cubicles</td>
<td>A1</td>
<td>T1, except that the lowest temperature for external ambient and in cubicle is -10 °C</td>
<td>T1</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Based on track side position</td>
</tr>
<tr>
<td>Telecommunications – installed in shelters/containers and buildings</td>
<td>A1</td>
<td>T1, except that the lowest temperature for external ambient and in cubicle is -10 °C</td>
<td>T1</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Based on track side position</td>
</tr>
</tbody>
</table>

Telecommunication equipment used in rolling stock applications shall comply with the environmental service conditions of operation as defined in EN 50155. Environmental classes and conditions for rolling stock applications are defined in EN 50125-1 for pressure - altitude A1, and temperature and humidity T3.

Telecommunication equipment used in rolling stock applications shall comply with any additional requirements in EN 50155.
10. **Electromagnetic emissions and immunity**

Telecommunication equipment shall comply with the electromagnetic emissions and immunity requirements for the relevant application shown in Table 4.

**Table 4 Electromagnetic emissions and immunity**

<table>
<thead>
<tr>
<th>Application</th>
<th>Electromagnetic emissions</th>
<th>Electromagnetic immunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signals, Telecommunications – installed in cubicles</td>
<td>EN 50121-4</td>
<td>EN 50121-4</td>
</tr>
<tr>
<td>Telecommunications – installed in shelters/containers and buildings</td>
<td>EN 55022 class A</td>
<td>EN 55024</td>
</tr>
<tr>
<td>Rolling stock</td>
<td>EN 50121-3-2</td>
<td>EN 50121-3-2</td>
</tr>
</tbody>
</table>