

Category 1 Standard

S1222 Electromagnetic Compatibility (EMC)

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MAYOR OF LONDON



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1 Purpose

- 1.1 The purpose of this Standard is to describe the basic framework to ensure that the Electromagnetic Compatibility (EMC) aspects of Equipment (i.e. both Apparatus and a Fixed Installation) for installation within London Underground (LU) are adequately addressed in company specifications and procurement processes. Such arrangements are necessary to comply with both legal and internal approval requirements in that respect. Further technical details are covered in the various references cited, especially, EMC Guidance document G222.
- 1.2 The business objective of this standard is to ensure that LU meets the requirements of the European Union (EU) Directive on EMC ("the Directive"), the corresponding United Kingdom (UK) Regulations, applicable railway and product standards.

2 Scope

- 2.1 This standard applies to the vast majority of electrical and electronic Equipment and affects LU in the following ways:
- a) New or modified Equipment;
 - b) Equipment manufactured in-house;
 - c) Maintenance of Equipment;
- Safety implications are discussed in section 5.2.
- 2.2 This standard replaces 1-222, A1. Any major changes are listed in Section 6.5 - Document History.

3 Requirements

3.1 General

- 3.1.1 The following instructions will ensure that LU remains in compliance with the Directive and has a process to address Equipment EMC. This process includes the requirements for and implementation of an EMC Control Plan. A set of railway standards (references, BS EN 50121) has also been published to apply specifically to the major categories of railway Equipment.

Note: Readers must ensure that all appropriate requirements are met in order to avoid project delays because additional requirements may be contained within other LU standards (e.g. S1196 Signalling and Signalling Control – Concept and Requirements).

- 3.1.2 It should be noted that the basic requirement to harmonise the electromagnetic environment also applies to in-house developed Equipment and appropriate considerations must therefore be applied in their design, implementation and maintenance.
- 3.1.3 An EMC assessment shall include any credible detrimental Equipment performance effects that could be caused by:
- a) Manufacturing tolerances;
 - b) Ageing;
 - c) Usage;
 - d) Corrosion.

Note – The issues to be addressed could include the following examples:

- a) Manufacturing tolerances – Excessive variations in filter attenuation or surge device clamping performance due to production tolerances;
- b) Ageing – Degradation in the shielding effectiveness of a cabinet door gasket due to mechanical shock, vibration, an excessive number of compressions, temperature, humidity or solar radiation;
- c) Ageing – Failure of surge protection devices due to an excessive number of voltage clamping operations;
- d) Usage – The circumvention of Apparatus shielding performance due to damage, an access door or panel not being correctly closed or secured;
- e) Usage – The loosening of a 360° cable screen termination due to vibration;
- f) Corrosion – A reduction in filtering performance due to a corroded/high impedance bonding connection;
- g) Corrosion – A reduction in cable containment shielding effectiveness due to corroded metalwork or loose bonds.

Suppliers should address these issues during the design process, by the proper selection of components & materials etc, and include any necessary mitigation during the periodic inspection and maintenance cycles.

- 3.1.4 The EMC Control Plan or specifications prepared from this standard shall clearly define the methods by which the requirements of the standard are to be verified, taking account of any measurable criteria and tests described herein.

3.2 New Equipment

3.2.1 Apparatus

Most Apparatus supplied is required to be CE marked for the environment in which it is to be used and confirming that any other relevant directives have been met.

Documentary evidence shall be provided in all cases, whether or not any product is CE marked, to confirm that any Apparatus is suitable for use within LU.

Note: Where Apparatus falls within the scope of BS EN 50121, then the relevant part of that standard shall be applied.

Note: Apparatus that is not included within the scope of the BS EN 50121 series, or by any other LU EMC requirement, that has been tested and certified to a current industrial based product standard may be considered to be compliant, subject to agreement with LU. Further guidance of suitable test requirements can be found within G222 or by contacting the LU Professional Head of EMC at LULEMC@tfl.gov.uk.

3.2.2 A Fixed Installation

The Directive implements a separate regulatory regime for a Fixed Installation. Suppliers shall develop and implement EMC installation processes and policies to ensure that a Fixed Installation is installed in such a way as to achieve EMC and compliance with the Directive. Documentary evidence shall be provided to LU in all cases but no CE marking of a Fixed Installation is required.

3.2.3 Further guidance

Further guidance on these issues can be found in

- a) The 2008 Department for Business Enterprise & Regulatory Reform Guide to the EMC Regulations 2006. Ref URN 08/1192;
- b) EMC Guidance G222.

3.3 Maintenance

3.3.1 General

An assessment shall be made as to whether the electromagnetic characteristics of Equipment are likely to be affected by maintenance operations. If this is the case, e.g. if like-for-like replacement is not possible, the modified Equipment shall be treated as for new Equipment (Section 3.2). The Maintenance Manager will carry out such assessments or refer them to other appropriately qualified personnel.

3.3.2 Like-for-like replacement

A formal EMC assessment is required in accordance with 3.3.1 unless the electrical properties of the replacement are identical with those of the substituted item.

3.4 Modifications

Project Managers and Project Engineers shall ensure that the electromagnetic characteristics of Equipment are assessed within the project. If any modification might affect these characteristics, a formal and documented EMC assessment shall be required.

3.5 Advice

The LU Professional Head of EMC is responsible for advice on specific issues and can be contacted at LULEMC@tfl.gov.uk.

3.6 LU specific needs

Some specific LU needs are not covered in detail in BS EN 50121. Project Managers and Project Engineers or their nominated representative(s) shall therefore ensure that these aspects, listed below, are addressed within a project:

3.6.1 Signalling compatibility

These requirements are set out in standard S1193 and must be met for both normal and credible fault conditions to ensure that the signalling integrity is not compromised.

3.6.2 Psophometric noise

The basic principles are covered in BS EN 50121-3-1, and International Telecommunications Union (ITU) Directives "Protection of telecommunications lines against harmful effects from electrical power and electrified railway lines" – Vol. VI Danger and Disturbance, which stipulates a maximum psophometric interference level of 1 mV for analogue telecommunications.