Owners and operators of buildings and installations – The new EMC Directive is here and it affects you!

By Ken Webb, TUV Product Service Ltd

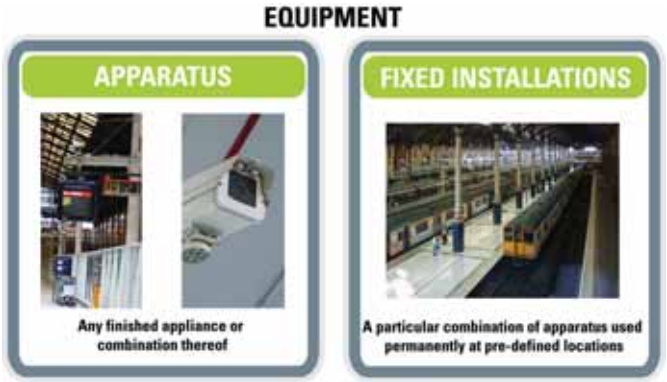
Details of the new requirements for fixed installations, the responsibilities of the 'EMC Responsible Person' (for all new or modified fixed installations) and explains what this means in practice. Also described is the gap analysis process which is helpful in identifying EMC performance shortfalls of components used in fixed installations.

What do the EMC Regulations cover?

The new EMC Directive is enacted into UK law by the EMC Regulations 2006 No. 3418.

This document sets out to regulate the electromagnetic compatibility of electrical and electronic equipment. Although it applies to most electrical and electronic equipment, it does not regulate equipment that is inherently benign in terms of electromagnetic compatibility.

The Directive applies to ***Equipment*** and separates this into *Apparatus* and *Fixed Installations. W*hile both have their own compliance regime they are subject to a coherent and comprehensive set of EMC protection requirements given in the essential requirements.



What are the Directive's essential requirements?

The Directive's essential requirements cover both protection requirements and specific requirements for fixed installations. These are:

1. Protection requirements

Equipment needs to be designed and manufactured, having regard to the state of the art, as to ensure that:

(a) the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment or other equipment cannot operate as intended; and

(b) it has a level of immunity to the electromagnetic disturbance to be expected in its intended use, which allows it to operate without unacceptable degradation of its intended use.

2. Specific requirements for fixed installations

A fixed installation shall be installed applying good engineering practices, and respecting the information on the intended use of its components, with a view to meeting the protection requirements set out above. Those good engineering practices shall be documented and the documentation shall be held by the person(s) responsible, at the disposal of the relevant enforcement authorities for inspection purposes, for as long as the fixed installation is in operation.

What is a fixed installation?

A fixed installation is a particular combination of several types of apparatus and, where applicable other devices, which are assembled, installed and intended for permanent use at predefined locations. The extent to which fixed installations generate electromagnetic disturbance, or are affected by it, will depend upon its own unique electromagnetic compatibility characteristics.

Based on the definition given above, the following examples could be considered 'fixed installations':

- Railway stations
- Airports
- Control centres
- Other large systems that fit the description given above.

The Directive contains requirements for 'mobile installations' for which the conformity assessment process for Apparatus must be followed. In the example of the rail sector and railway stations, trains are considered to be 'mobile' apparatus, and therefore must follow the appropriate conformity assessment route to compliance.

Adopting good EMC engineering practices

The specific requirements for fixed installations state, good engineering practices must be applied taking account of the information on the intended use of the components. A number of definitions of good engineering practices can be found, but

essentially it is the expression of sound technical custom, based on accumulated understanding and experience.

In employing such practices in a fixed installation it is implicit that in order to comply with the essential requirements for electromagnetic compatibility, good *EMC* engineering practices have to be employed and that these are suitable for the particular site in question.

The Responsible Person has a duty to ensure that good EMC engineering practices have been adopted and equipment is properly installed, maintained and used for its intended purpose.

Fixed installations shall be installed applying good EMC engineering practices

Maintaining documentary evidence

Good EMC engineering practices adopted need to be documented. The person responsible for the fixed installation has responsibility for maintaining documentary evidence of compliance, for as long as the installation is in operation.

Ensuring compliance of Fixed Installations requires an understanding of EMC

This documentation will need to be updated, as and when necessary, to take account of changes to the installation that could affect its EMC characteristics. The detail should be sufficient to enable an enforcement authority to determine whether good practices have been followed.

Appointing an EMC Responsible Person

Since 20 July 2007 there must be a person, or persons, taking responsibility for ensuring that a fixed installation complies with the EMC regulations. This person, referred to as the 'Responsible Person in relation to a fixed installation', could be the owner of a site, or the operator, maintainer or controller of the installation. In some cases the Responsible Person may be determined contractually between the parties, but even where this is not the case, one still needs to be appointed.

While the 'Responsible Person' does not have to be an EMC expert and may seek appropriate advice in fulfilling their obligations, they cannot delegate their responsibility.

Duties of the EMC Responsible Person

The Responsible Person must hold a position of responsibility sufficient to control the configuration of the fixed installation and by virtue of their control of the fixed installation, be able to demonstrate that the installation complies with the essential requirements, as laid out in the regulations. The Responsible Person's responsibilities also extend to ensuring that apparatus taken into service (in his fixed installation) complies with the Directive's essential requirements when properly installed, maintained and used for its intended purpose.

It is strongly recommended that the Responsible Person obtain compliance documentation for all the apparatus used within the fixed installation and take appropriate measures to ensure that equipment taken into service complies with the requirements of the Directive. Any precautions to be taken for ensuring compliance of the apparatus when incorporated into the fixed installation should be followed.

All apparatus that is placed on the market and commercially available should bear the 'CE' marking, attesting to compliance with the Directive. In the case of 'certain apparatus', defined in the Directive as 'apparatus intended for incorporation into a given fixed installation and otherwise not commercially available', the accompanying documentation should identify the fixed installation and its electromagnetic compatibility characteristics. It should be noted that apparatus defined as 'certain apparatus' does not need to undergo conformity assessment, although other regulations still apply.

Manufacturer's guidance which refers to any special installation measures to ensure EMC compliance (e.g. use of screened cables, shielding, filtering etc.) should be followed. In the absence of such information the guidance in published standards such as the IEC 61000-5 series should be followed

Assessing the compliance of apparatus within fixed installations

Most fixed installations will comprise a whole variety of commercial off-the-shelf apparatus, e.g. IT equipment, lighting, CCTV, passenger information systems, PA systems, etc. There are very sound technical and commercial reasons for using such apparatus; typically employing the latest technology, this equipment is readily available and more cost-effective than bespoke apparatus.

There can be, however, a downside to the advantages offered by off-the-shelf apparatus. In many cases their EMC performance is geared towards less onerous electromagnetic environments than would be expected in the rail, aerospace or industrial sector, particularly regarding immunity. Therefore, if those involved with fixed installations are to realise the technical and cost benefits offered by off-the-shelf apparatus, they need to be able to demonstrate that they are fit for purpose and have a sufficient level of immunity when used in a hostile EMC environment.

The EMC gap analysis

A risk assessment method is normally adopted for large projects and the process is described below:

1. Define the electromagnetic environment of the fixed installation

In order to evaluate the acceptability of the EMC performance of off-the-shelf apparatus, it is necessary to define the electromagnetic (EM) environment in which the equipment will be operated. This may be obtained by carrying out an RF and power quality survey. In other cases the operator or owner of the installation may decide that the electromagnetic environment can be specified entirely by the limits and levels specified in the generic EMC standards.

2. Evaluate EMC specification and compliance evidence

This process or gap analysis identifies the shortfalls in the existing EMC performance of off-the-shelf apparatus. In order to achieve this, the EMC standards, test methods and limits applied to the apparatus must be identified and compared to the equivalent electromagnetic phenomena identified from a survey or railway/generic EMC standards. The detailed comparison of test methods is complex and expert help may be required. Once the gaps and missing tests have been identified they can be assigned a risk rating of Low, Medium or High, depending on the extent of the deviation.

3. Assess risk against functional criticality

The risks identified in the previous process must now be compared to the criticality of the apparatus and the criticality of the environment or application in which the apparatus will be operated. Nil to Low risk will generally be acceptable. In some non-critical situations Low to Medium risk may be acceptable. In all cases a High risk is unacceptable unless some mitigating action is applied.

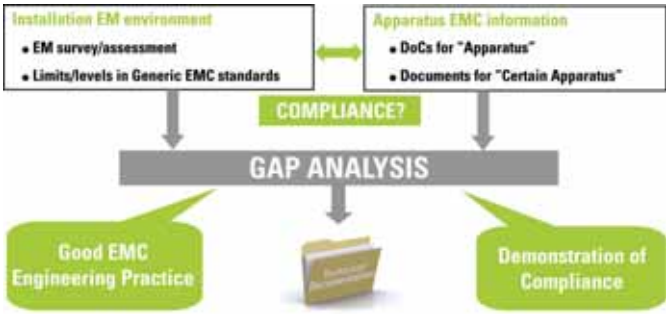
4. Mitigate risk through design and/or retest (this process comprises two options)

(a) Remedial design can be achieved by adding the appropriate protection 'barriers' to reduce the 'worst case' coupled RF fields or currents the apparatus could be exposed to or could emit, to below the levels it was originally required to meet. Examples of protection measures include:

- Shielding
- Filtering
- Use of screened cables
- Segregation and separation
- A combination of the above.

(b) Test the apparatus to determine compliance with the fixed installation EM requirements. This is technically a good approach as any subsequent required protection can be properly specified and over-protection will be avoided. However the disadvantage of this approach is the cost implications of the additional testing required.

The processes above are described in outline only and in order to implement these processes effectively it is necessary to ensure that personnel with relevant EMC competencies perform the environment definition, evaluation, risk assessment and mitigation.



Further information

Draft Guide for the EMC Directive 2004/108/EC
DTI Guidance document URN 07/743

IEC 61000-5 Part 2:1997 and IEC/TR 61000-5-6:2002
Installation and mitigation guidelines

EN 50174 Parts 1-1/2: 2001 and -3:2003
Information technology – cabling installation

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If you would like help in understanding how the new EMC Directive applies to your business, please call 01489 558100 or email info@tuvps.co.uk

For further information contact TUV Product Service/BABT, Octagon House, Concorde Way, Segensworth North, Titchfield, Fareham PO15 5RL. Tel: (01489) 558100
Email: info@tuvps.co.uk, Web site: http://www.tuvps.co.uk