



Data Sheet

Electromagnetic compatibility (EMC)

Introduction

The problems associated with electromagnetic (radio) interference are not new and have plagued designers and users of equipment for many years, not only with radiated but also conducted interference. In order to minimise these problems some countries have imposed various regulations and standards, notably Germany and the USA. German regulations are drafted, validated and enforced by the FTZ and VDE authorities and have been mandatory since 1969. In the USA the standards are enforced by the FCC and have been mandatory since 1980. Other countries have applied various types of government legislation.

Where standards differ between countries the recent removal of trade barriers can actually cause technical barriers. With the drive to create a single market and hence the free movement of goods there is a need to harmonise technical standards to overcome the technical barrier problem.

The Directive

The Electromagnetic Compatibility Directive (89/336/EEC) encompasses in its scope, apparatus liable to cause electromagnetic disturbance or the performance of which is liable to be affected by such disturbances. 'Apparatus' is defined as all electrical or electronic appliances together with equipment and installations containing electrical and or electronic components. 'Electromagnetic disturbance' is defined as any electro-magnetic phenomenon which may degrade the performance of a device, unit or system.

Excluded from the Directive is apparatus subject to other directives containing EMC requirements. At present this comprises only motor vehicles spark ignition systems, non-automatic weighing instruments, agricultural and forestry tractors, active implantable medical devices and certain electricity tariff meters. Amateur radio apparatus which is not commercially available is also specifically excluded.

The Directive has two basic requirements:

- (i) Equipment shall not cause interference.
- (ii) Equipment shall be immune from interference.

This creates two basis protection requirements which must be fulfilled by manufacturers.

1. Apparatus must be constructed to ensure that any disturbance it generates allows radio and telecommunications equipment and other apparatus to operate as intended.
2. Apparatus must be constructed to provide an adequate level of protection against disturbances (ie. 'immunity' - the ability of apparatus to function in the presence of an electromagnetic disturbance without loss of performance).

Formal title

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC) as amended by Directive 92/31/EEC of 28 April 1992.

Timetable

The implementation was effective 1 January 1992, however, transitional arrangements exist until 31 December 1995. Member States must continue to allow to be placed on the market or to be put into service apparatus that conforms to the national regulations in force in their territory on 30 June 1992. Full implementation will be effective 1 January 1996. Failure to comply with these requirements will be made a criminal offence.

Coverage

The Directive applies to individual items of apparatus first placed on the Community market or first taken into service in the Community on or after 1 January 1992 even if other items of the same design have been placed on the market or taken into service before that date.

The European Commission (DTI in the UK) has produced an informal explanatory document on the Directive.

Components, according to the document, are outside the scope of the Directive. This applies both to simple components and to more complex items, so long as the item in question does not have an intrinsic function and its only purpose is to be incorporated inside the apparatus.

The document also states that systems must meet the requirements of the Directive, a system being defined as 'several items of apparatus combined to fulfil a specific objective and intended to be placed on the market as a single functional unit'.

The explanatory document defines an installation as several combined items of apparatus or systems put together in a given place to fulfil a specific objective but not intended to be placed on the market as a single functional unit. It goes on to state that each apparatus or system used in an installation is subject to the provisions of the Directive and that each apparatus or system must comply with the installations laid down by their manufacturer in order to ensure the proper operation of the installation itself.

Requirements

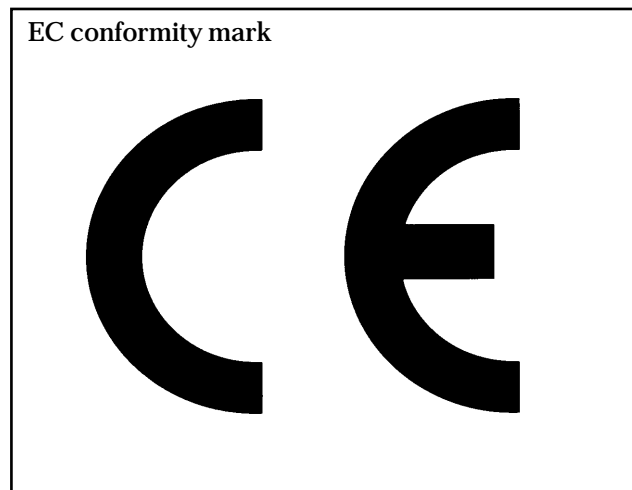
Manufacturers and distributors of imports from outside the Community are required to provide a statement that their equipment complies with the objectives of the Directive. However, they have three choices whereby the compliance can be demonstrated. The simplest method is 'self certification'. This is achieved by satisfying relevant standards either by in-house tests or contracting the tests to an independent test house. The Directive delegates responsibility for standards to CENELEC, the European electrotechnical standards body, which is required to produce harmonised standards in the form of European Standards (EN). These generally follow the recommendations of CISPR, a committee of the International Electrotechnical Commission (IEC) concerned with radio interference.

The alternative method is to keep a 'technical file', this must be available for inspection by the national body or bodies responsible for policing the Directive. This form of certification implies that the technical file should demonstrate compliance with the objectives of the Directive. Achievement may be by setting out the design procedures used to ensure EMC performance of the equipment and/or appropriate tests and must include a technical report from a 'competent body'. One of the qualifications for competent body status is to be a National Accreditation and Measurement Service (NAMAS) accredited laboratory. After 1 January 1996 this method of claiming compliance will be obligatory if there is no appropriate relevant standard.

The third method of demonstrating compliance only applies to telecommunications transmitting and receiving equipment which requires an EC type examination certificate to be obtained from a notified body. The draft legislation identifies three such bodies in the UK; the Radiocommunications Agency (RA) of the DTI, the Civil Aviation Authority (CAA) and the Defence Research Agency (DRA).

A declaration of conformity can be made once the compliance has been demonstrated. This declaration must contain a description of the apparatus to which it refers, referenced to the specifications under which conformity is declared, identification of the signatory empowered to bind the manufacturer, and where appropriate, reference to the 'EC type - examination certificate' issued by a 'notified' body.

Having made a declaration of conformity, the EC conformity mark CE (Communauté Européenne), may be affixed to the product or be included in the operating instructions, on the guarantee certificate or on its packaging. The EC conformity mark shall consist of the letters CE as set out at the top of the next column and the figures of the year in which the mark was affixed.



Legislation

Apparatus which complies with the objectives of the Directive may not be impeded from being placed on the market. However, if a 'competent authority' finds that the apparatus does not conform, then the apparatus must be prohibited from the market and its movement restricted. The European Commission must be informed, which in turn will inform all the administrations of the national competent authorities. Effectively this will 'ban' the equipment throughout Europe including, for UK manufacturers and distributors, the UK.

The draft UK regulations are arranged in eight parts:

- Part I Preliminary
- Part II Application
- Part III General Requirements
- Part IV The Standards Route to Compliance
- Part V The Technical Construction File Route to Compliance
- Part VI The EC Type Examination Route to Compliance for Radiocommunications Transmission Apparatus
- Part VII Enforcement
- Part VIII Miscellaneous and Supplemental.

UK enforcement

This relates to Part VII and details how the EMC Directive is to be enforced within the UK. It defines the enforcement authorities, procurement of test purchases, the powers granted to an enforcement officer (search, seizure of apparatus), prohibition and suspension notices, offences, misuse of the CE mark, penalties, power of the court and recovery of enforcement expenses.

Enforcement authorities come under two groups:

Group 1 - enforcement for specific apparatus comprise;

1. the RA
2. the DRA
3. the CAA
4. the Director General of Electricity Supply for electricity meters.

Group 2 - enforcement authorities for relevant apparatus other than that defined under Group 1 comprise;

1. the Secretary of State
2. in Great Britain the weights and measures authorities
3. in Northern Ireland the district councils.

The Directive requires member states to take 'all appropriate measures' to ensure compliant apparatus is placed on the market or taken into service. This has been interpreted as requiring national legislation having adequate sanctions for breaches of the Directive's EMC requirements.

The following offences are included in the draft regulations:

1. Knowingly supplying, or taking into service relevant apparatus contravening the regulations.
2. Knowingly affixing the CE mark to non-compliant apparatus and/or issuing a declaration of conformity for that apparatus.
3. Contravention of a prohibition or suspension notice.
4. Provision of false or misleading information in the required documentation.
5. Affixing the CE mark or an inscription which may be confused with it on non-compliant apparatus.
6. Failure to assist an enforcement officer (obstruction)
7. Failure to retain the full documentation.

Penalties

A person found guilty of offences 1 to 4 is liable upon conviction to; imprisonment for up to 3 months, or a fine up to level 5 on the standard scale (£5000 on 1 July 1992), or both. A person guilty of offences 5 to 7 is liable to a fine up to level 5 only.

Remedial action

Where a person is convicted of offences 1 or 2 and it is in the court's opinion that the person can take remedial action in order for equipment to become compliant, the court may order the person to take remedial action within a specified period of time. This period may be extended by order of the court.

Forfeiture

An enforcement authority may apply under this regulation for the forfeiture of any relevant apparatus contravening the regulations. An application may be made to a magistrates court where proceedings have been brought against a person committing either offences 1, 2 or 3. The application for forfeiture may be for some or all of the apparatus. The magistrates court will only grant a forfeiture order if it is satisfied that the equipment does not satisfy the protection requirements. Forfeited apparatus will either be destroyed, disposed of for reconditioning or disposed of for scrap as directed by the court.

Conclusions

Despite the transitional period up to 31 December 1995 the EMC Directive became effective on 1 January 1992. Particularly concerning is the fact that product specific standards and primarily immunity standards are still lacking. However, the onus is upon companies to describe the electromagnetic performance of their products correctly and additional costs will inevitably be incurred. The time to consider EMC is during the initial design phase and not as an afterthought, good practices at the pcb level will pay dividends later.

The information contained within this data sheet was extracted from the DTI Draft United Kingdom Regulations dated July 1992 and was correct at time of going to press.

Further information is available from:

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