European Union Commission EMC Guidelines

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Updated guidelines on the interpretation of the EMC Directive are now available.

Introduction

The EMC Directive of the European Union was published in 1989, with an intended implementation date of 1 January 1992. Although this was delayed until 1 January 1996, concerns over the interpretation of the Directive caused the Commission (the "civil service" of the EU) to publish a guidance document in 1993. An updated version was made available by the Commission in March 1996, but was never officially published.

A description of the provisions of the Directive, taking into account the March 1996 Guidelines, was published in *ITEM Update* 1996.[1]

The new version,[2] officially the second edition of the Guidelines, was published in 1997, and has taken into account views expressed by industry and Member State Governments.

The result is a much clearer and more pragmatic guide to interpreting the EMC Directive. The new Guidelines are roughly twice the length of those made available in March 1996, and succeed in reducing uncertainties of interpretation. However, no set of guidelines can deal with all specific cases, and manufacturers will still need to interpret the Guidelines for their own specific circumstances.

The Commission no longer states that the Guidelines do not represent their official view, but describes in the introductory notes the process through which they have been produced: "These guidelines have been prepared by the competent services of the General Directorate III Industry of the Commission in collaboration with the group of government experts of Member States, representatives of European Industry, European Standardization bodies, and bodies entrusted with the technical tasks related to third-party intervention in the conformity assessment procedures." As before, they are not legally binding. "The legally binding provisions are those transposing the EMC Directive," i.e., the laws in each Member State. In the majority of cases, these laws will not be changed as a result of the Guidelines, but their interpretation may change.

Member States are those of the European Economic Area (EEA), the 15 Member States of the European Union plus Iceland, Liechtenstein and Norway, who have also implemented the EU trade directives.

The Objective of the Directive

The Guidelines remind us that the main objective of the Directive is the free movement of goods throughout the EEA; this is achieved by a "harmonised and acceptable level of protection." This is not a guarantee of absolute protection in EMC terms; zero emission and total immunity is not the goal.

A major feature in the new Guidelines is the concept that the manufacturer is the "sole and ultimately responsible person" for the EMC performance of the product. This allows the manufacturer to make decisions on the need for compliance, and the route to be followed, by carrying out an "EMC analysis" to decide if the apparatus is covered by the Directive, and if so, which requirements apply.

Improved Definitions

The Guidelines clarify a number of definitions and introduce some new concepts. The first two definitions are important because they define the point at which the Directive applies to a product.

Placing on the market applies to the first time the product is made available for the purpose of distribution and/or use in the EEA, and takes place when the apparatus passes from the manufacturing stage to the market. This can be a physical handover or a change of ownership. It does not include disposal to an authorized representative, export to countries outside the EEA, or display of products in catalogues, at trade fairs or at exhibitions.

Taking into service is the first use of the product by its end user.

In the past, the definition of *manufacturer* has been something of a grey area where more than one manufacturing stage has been employed. The

Guidelines define the manufacturer as the person responsible for the design and construction with a view to placing on the market on their own behalf. The manufacturer may subcontract some functions, such as design, or assembly when the manufacturer is the designer, and may use ready-made items without losing status as the manufacturer.

Authorized representatives are appointed in the EEA expressly by the manufacturer to act on behalf of the manufacturer, and can affix the CE marking and sign the Declaration of Conformity (DoC). Importers place apparatus on the market which has been imported from outside the EEA. They keep the documentation but cannot sign the DoC or affix the CE marking.

The definitions also introduce a new concept of *other responsible persons.* Where neither the manufacturer, nor the authorized representative, nor the importer is established within the EEA, any other person resident in the EEA who places the apparatus on the EEA market has obligations under the scope of the Directive to "retain the necessary documentation."

Scope of the Directive

An interesting comment is added to the clarification of "electromagnetic disturbance." *If an apparatus, when used as intended, does not degrade the performance of others in its electromagnetic environment, both present and foreseeable, it should be considered compliant with the emission essential requirement of the directive.* This could mean that enforcement would be more difficult for products not in conformity with harmonized standards if no cases of interference have been recorded. Comments by enforcement bodies in the UK suggest that this does not change the responsibility of the manufacturer to comply with the Directive, and cases of interference will not be required for a successful prosecution. Indeed, this has been the case in two recent prosecutions in the UK.

The Guidelines also introduce the concept that the level of protection must be "proportional to the objectives pursued," although the example given, that users would not buy more expensive electronic musical greeting cards to obtain a higher level of electromagnetic immunity, does not help with practical interpretation for the majority of products. The Guidelines suggest that the manufacturer defines the level of performance of the apparatus with respect to response to disturbances. Enforcement authorities accept this with the proviso that the declared performance must be reasonable — the product must be fit the purpose in the intended environment.

The manufacturer's EMC analysis is intended to determine the extent to which the provisions of the Directive should be applied, but the Guidelines warn that even if harmonized standards are not applied in the design and manufacture of the apparatus, they should be taken into account in the analysis. A flow chart is provided to assist manufacturers in their task (Figure 1).

While the sections on application to systems and installations have been greatly expanded, there is still the possibility of different interpretations.

Instructions for use have a greater prominence in these Guidelines. Products should always be provided with such instructions, even if supplied only to an original equipment manufacturer (OEM) for incorporation into another product. Such instructions are intended to assist the OEM in assembly.

Passive EM equipment is excluded from the scope. This is defined as electromagnetically benign products, which when used without additional filtering or shielding and without user intervention, do not create nor produce any switching or oscillation of current or voltage and are not affected by electromagnetic disturbances. Examples include:

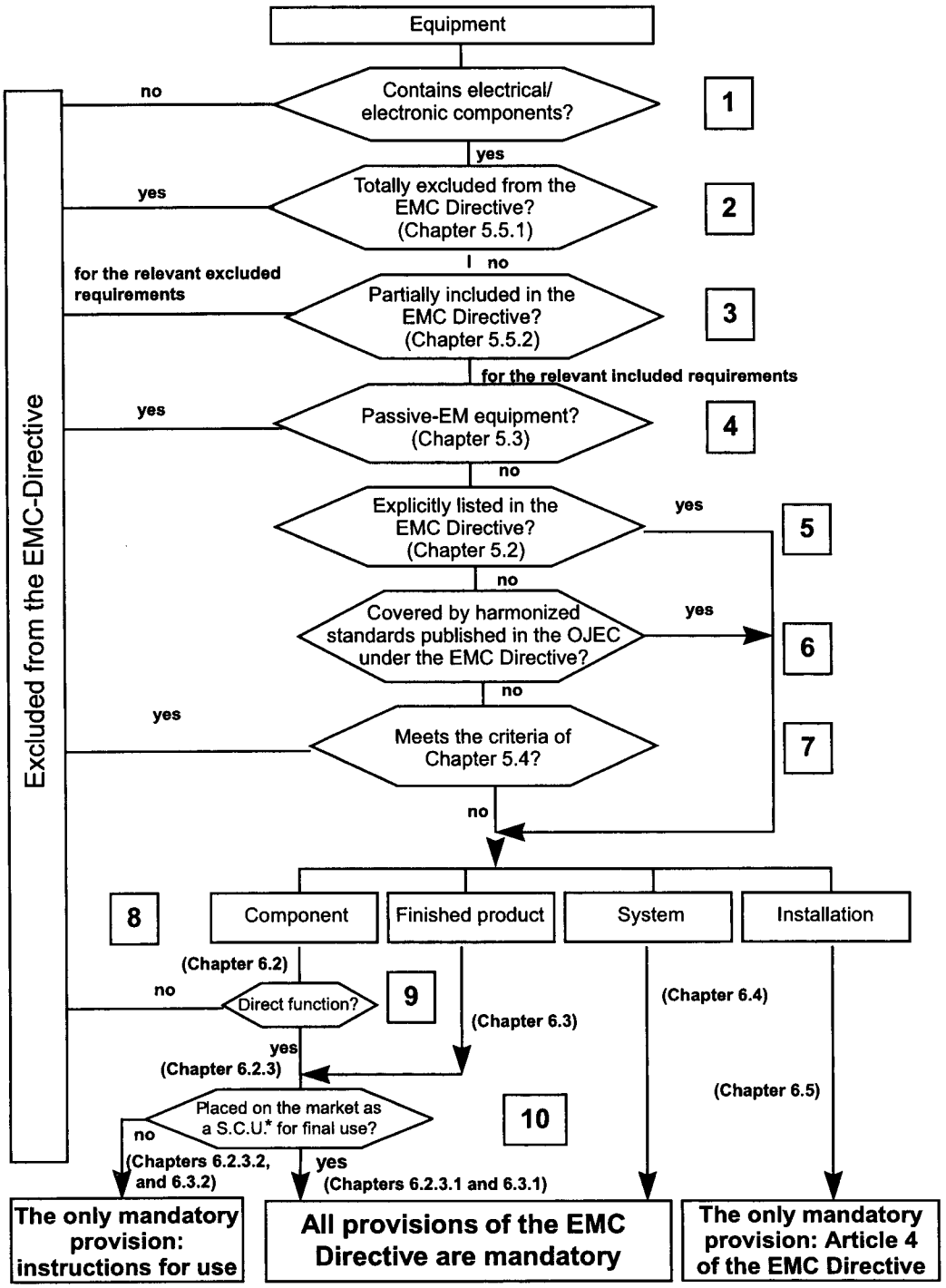
- Equipment containing only resistive loads (without automatic switching devices such as thermostats)
- Batteries and accumulators
- Manual switches
- Protection equipment which produces transitory disturbances of very short durations, such as fuses and passive circuit breakers
- Induction motors (but not other types of motors)
- Quartz wristwatches without other functions
- Filament light bulbs

Application to Components

The definitions and illustrative examples provide a clearer explanation of the previously grey areas of application to components, *direct function,* and *single commercial units.* Components which perform a direct function for an end user may be used with only simple adjustments and which are placed on the market as a single commercial unit *are* covered by the directive. Components sold only to a manufacturer for incorporation into apparatus are outside the scope. Components having a direct function, but which cannot be used without more complex adjustments and connections, *must not* be placed on the market to an end user and are therefore outside the scope. Components which do not perform a direct function are always outside the scope. Once again, Figure 1 assists the manufacturer in making decisions.

Application to Systems

While the sections on application to systems and installations have been greatly expanded, there is still the possibility of different interpretations.



* S.C.U.: single commercial unit

Specific provisions are detailed in the chapters indicated and have to be carefully considered.

Figure 1. *Decision Flow Chart for New Apparatus.*

1

Determine whether the equipment contains electrical and/or electronic parts or components.

2–3

Examine total/partial inclusions/exclusions quoted in the EMC Directive. Detailed guidance is given in Chapter 5.2, especially in relation to exclusions explicitly given in the EMC Directive, and specific Directives within the meaning of Article 2.2 of the EMC Directive. In case of partial exclusions, the extent to which the protection requirements are harmonized by other regulations, especially specific Directives, is identified. The EMC Directive shall then be applied to apparatus or protection requirements where they are not covered by the specific directives or regulations.

4

Apply Article 2.1 to determine whether the electrical equipment may be considered as passive from an EMC viewpoint. (In this case it is excluded from the scope of the EMC Directive.) Chapter 5.3 gives the definition for passive EM electrical equipment as well as illustrative examples.

5

Determine whether the equipment is mentioned explicitly in the list appended (Annex III) to the EMC Directive (Chapter 5.2).

6

Check if any harmonized product standard or family product standard, published in the *OJ* under the umbrella of the EMC directive can be applied. (See Annex 7 of the Guidelines.)

7

Determine whether the equipment may be considered exempted from the EMC Directive with regard to the criteria described in Chapter 5.4 which are commonly accepted by all parties involved in writing these Guidelines.

8 to 10

The manufacturer has to determine the classification of the electrical apparatus as component, finished product, system or installation. This technical-commercial classification is based on the definitions given in this guide together with the detailed clarifications and different cases given in the relevant chapters for components, finished products, systems and installations.

Note 1: *If the manufacturer uses the flow chart described above and if he concludes that his equipment is excluded from the EMC Directive, then he is not obliged to provide an EC declaration of conformity nor to CE mark the equipment for EMC. However, the manufacturer (or his authorized representative, the importer, or any person who places the equipment on the market) is strongly advised to keep documentation available at the disposal of the competent authority for inspection purposes under the same conditions as the EC declaration of conformity, in which the reasons for his decision are clearly stated. This is particularly important in the case of the seventh step if he concludes that the equipment meets the criteria of Chapter 5.4.*

Figure 2. *Decision Flow Chart for New Apparatus, Steps Explained.*

For a computer "system" described as a collection of compliant apparatus chosen by the customer, and therefore not placed on the market as one functional unit, further measures are not required. Yet a "system designed or put together by the same person" (considered the "system manufacturer") as a single functional unit is considered "apparatus" and must comply as a whole.

The commission has addressed the contentious issue of products assembled from CE-marked parts. The Guidelines make it clear that the person assembling such products is responsible for their performance, and warns that *"combining two or more CE marked subassemblies may not automatically produce a system which meets the requirements of the relevant standard, e.g., a combination of CE marked PLCs [programmable logic controllers] and motor drives within a machine tool ... may fail the requirements, whereas a hi-fi system ... is quite likely to maintain its compliance."* The responsibility for complying with the EMC Directive is on the company assembling the system. The two recent successful prosecutions in the UK involved small manufacturers of computers, who had assembled the CPUs from CE-marked parts, but had done nothing to assess the overall EMC performance of the finished computers.

The Guidelines suggest that systems with various configurations may be placed on the market "without further verification" if a worst case configuration can be determined and made compliant. This makes it clear that a Technical Construction File is not always required in such circumstances.

For the modification of products, the concept of *electromagnetically relevant* and *electromagnetically irrelevant* components has been introduced. These are components which will or will not, respectively, affect the EMC performance of the apparatus when they are incorporated. This is not the same as *passive* or *benign* components, since a length of cable may affect the EMC

characteristics of a product. If the manufacturer's analysis shows that changes have been brought about by electromagnetically irrelevant additions, then a reassessment is not necessary.

Application to Installations

Fixed installations which are not placed on the market as a single functional unit must nevertheless comply with the essential requirements of Article 4 of the Directive. This appears to contradict the "excluded installation" concept of the UK Regulations. Any problems should be fixed on a case-by-case basis among the manufacturers of the parts incorporated into the installation, the user, and if applicable, the installation contracting company.

Responsibilities of installers are covered for the first time in these Guidelines. If an installer followers the instructions for use supplied by the manufacturer of a compliant system, the installer may assume that the installed system "is in conformity with the relevant provisions."

A new concept of *movable installations* is introduced, the sole example being an outside broadcast vehicle for a TV or radio station. These have been considered systems in the past. However, since the Guidelines suggest that such "installations" should be treated as a system, there is no conflict with current practice.

Application to Used and Repaired Apparatus, and Spare Parts

New guidance on dealing with repaired, reconditioned, and upgraded apparatus is included. Second-hand apparatus, even if restored to its original condition, or upgraded within the original range of compliant options, is excluded from the scope of the directive. However, a new concept of "as-new apparatus" is introduced. This is (in the Guidelines' definition) not restored to previous condition, but *upgraded to the latest specification,* to which the Guidelines add "it makes sense to request compliance with the EMC Directive." Anyone merely restoring a pre-1996 product to original condition would therefore be wise to avoid the claim that it is *as new*!

Modifications by end-users are excluded from the scope of the directive, but they must correct any problems to other apparatus arising from their actions, and cannot sell the apparatus without applying the EMC Directive.

The Directive does not apply to repaired apparatus if no new features are added, and if no other modifications are introduced. In many cases, an identical replacement part is not available, but the Directive is not applied or reapplied unless the repair produces a product with a worse EMC performance than the original. The Guidelines comment that manufacturers of such parts should warn customers of potential EMC behavior.

The Directive does not apply to spare parts unless they are also placed on the market in their own right, in which case the guidance for components becomes relevant.

Routes to Compliance

In the enlarged section on routes to compliance, the Guidelines note that, when following the standards route, the manufacturer is not obliged to create or retain a technical file to demonstrate the steps taken to show compliance (but add that it is a good idea so to do). Manufacturers would certainly be wise to document their actions, and to assist in a defense against any enforcement action.

The guidance on Technical Construction Files is expanded. The Guidelines note that "this is a delicate article in the Directive that needs careful analysis." The reason for this is that the Directive introduced the concepts of Technical Construction Files without details of what they should contain, and Competent Bodies, without defining their role. The new Guidelines make it clear that the Competent Body only assesses the content of the TCF; the manufacturer's responsibilities are again emphasized. Even under the Technical Construction File route, the manufacturer still has sole responsibility for the Declaration of Conformity.

The Guidelines also describe the Type Examination route for intentional transmitters. There are no new concepts added in this section.

INSTRUCTIONS FOR USE

The Guidelines place great emphasis on instructions for use. They should provide information on:

- Installation
- Assembly
- Adjustment
- Taking into service
- Use
- Maintenance

and where necessary, warnings about limitations of use.

Interaction with Other Directives

Additional guidance is offered on the interaction between the EMC and directives covering satellite earth station and telecommunications terminal equipment, machinery, motor vehicles, medical devices, active implantable medical devices, and equipment to be fitted into aircraft. The forthcoming In Vitro Diagnostic Medical Devices and Marine Equipment Directives are also addressed. The Guidelines also note a proposal for a directive covering certain measurement instrumentation which is subject to legal control.

Informative Annexes

A number of informative annexes have been added to the Guidelines. They provide the text of the original directive and the directive as modified, the titles of the legislation in each member state and the government departments responsible for it, lists of Competent and Notified Bodies, and the standards listed in the *Official Journal of the European Communities* up to June 1997, an overview of the standardization program, and some names and addresses of standards bodies and pan-European trade associations.

Availability of the Guidelines

This article can only provide an overview of the content of the new Guidelines and consultation with the document itself is recommended.

At the time of writing, an official printed version of the Guidelines is not yet available. Those copies that have been distributed are available on floppy discs. It is expected that the printed version will be available from the Commission in early 1998.

The text of the Guidelines is available on the UK's Radiocommunications Agency web site: http://www.open.gov.uk/radiocom/rahome.htm (follow the links via "Library" and "Type Approval and Electromagnetic Compatibility") and on a number of commercial web sites.

References

1. B. Jones, "The European EMC Directive" *ITEM Update 1996*, pp. 33–40.
2. Guidelines on the application of Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to Electromagnetic Compatibility (Directive 89/336/EEC, amended by Directives 91/263/EEC, 92/31/EEC, 93/97/EEC) published by the Commission of the European Union.

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