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Giude to EMC comfomity of apparatus designed for military and other purposes

Guide to EMC conformity of apparatus designed for military and other purposes

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Guide to EMC conformity of apparatus designed for military and other purposes

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CENELEC
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This guide has been prepared by WG5 of CENELEC TC210 to determine the procedure to be applied to dual purpose apparatus designed for military and other purposes in respect of the protection requirements of the EMC Directive, 89/336/EEC.

Military EMC-Standards for several decades have successfully verified the compatibility of apparatus, systems, and installations, though their test methods differ from those used in harmonised European test standards.

This guide contains the requirements to be met by apparatus designed and manufactured for military and other purposes to allow conformity with the EMC Directive. An example of the rationale for the use of national military EMC standards is included in Annexe E.

This guide was approved for publication by the CENELEC Technical Board on 2000-04-01.

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Introduction

The EMC Directive, 89/336/EEC, amended by 92/31/EEC and 93/68/EEC, has a very wide scope and in practice there are few exclusions from its provisions. Military apparatus used in a military environment, or military apparatus operated for military purposes in a non-military environment, may be excluded from the provisions of the directive under Article 223.1.b, of the Treaty establishing the European Economic Community (Treaty of Rome). Apparatus having dual purpose i.e. as defined in Clause 1, is considered to come within the scope of the directive and if the apparatus is placed on the market as a single functional unit, then conformity with the essential requirements of the Directive is necessary.

Many items of dual use apparatus may be designed and manufactured to a procurement specification which refers to an EMC standard intended primarily for a military application e.g. MIL STD 461 or DEF STAN 59-41. Currently such apparatus also require testing to civil standards or the compilation of a Technical Construction File (TCF) to meet the EMC Directive. Examples of dual use apparatus are given in Annex A.

1 Scope

Apparatus coming within the scope of these guidelines is:

a) Apparatus that is designed specifically for military purposes and subsequently procured for civil applications.

b) Apparatus that is designed from the outset for military and civil purposes.

This document does not include apparatus designed for a civil application and subsequently procured for military use. Such apparatus has to meet the EMC Directive by virtue of its original application.

This guide has been drafted on the assumption the apparatus concerned complies with one of the national or international military EMC specifications listed in 4.2.

2 Objectives

The objectives of this guide can be summarised as follows:

1) To assist manufacturers of apparatus coming within the scope of this document to follow the Technical Construction File (TCF) route to conformity under the EMC Directive (Art 10.2).

2) To reduce the need for duplication of testing where it can be demonstrated that compliance with the military standards to which the apparatus was designed and constructed satisfies the protection requirements of the Directive.

3 Electromagnetic environment

There are many differences between the military and civil EMC standards. These differences concern the primary aims of the standards which address the principal problems arising from their respective operating environments. Military EMC specifications primarily concentrate on intra-system compatibility of sub-assemblies, such that complete system level compatibility is achieved in a potentially high packing density situation. The harmonised European EMC standards adopted as relevant under the EMC Directive are more concerned with inter-system compatibility and generally involve greater protection distances. These guidelines have been drafted taking into consideration the differences between civil and military environments and test methods and procedures.

Dual purpose apparatus is to be designed to meet a range of EM phenomena where the designer will choose those appropriate for the product, and its intended environment. In most dual purpose apparatus, conformity with a minimum range of phenomena may be demonstrated by compliance with the relevant tests included in the military test specification listed in 5.2. For those apparatus which have interfaces with public utility supplies, or other apparatus not constructed to military standards, additional EMC assessments may be required.

4 Applicable EMC standards

4.1 Standards elaborating the essential protection requirements of the EMC Directive

The EMC Directive refers to relevant harmonised European standards. Apparatus in compliance with the relevant standards enjoy the presumption of conformity with the directive's essential requirements. The Official Journal of the Commission of the European Union publishes standards which are considered relevant and can be used in a declaration of conformity. These are:

a) product and product family standards.

b) generic standards for applicability in particular environments where no product standard is available.

Product standards take precedence over generic standards and contain more information on the configuration and operation of the apparatus under test together with specific details on the monitoring and setting of performance levels.

The harmonised European Generic standards, EN 50081-1, and EN 50082-1, for emissions and immunity respectively, apply to the residential, commercial and light industrial environment, and EN 50081-2 and EN 50082-2 apply to the industrial environment.

The Generic standards refer to Basic standards which contain information on the test methods, limits or disturbance levels. The raft of Basic standards assembled for the Generic standards has been considered by CENELEC to include the range of EMC phenomena which cover the essential requirements. The Generic standards therefore provide a basis for comparisons with the phenomena covered in military standards.

These civil standards are primarily intended to cover the situations where interactions with other apparatus e.g. radio communications apparatus due to emissions from the product are tested typically over a 10 - 30 m range. The immunity standards effectively replicate the electromagnetic environments in which the apparatus is intended to operate.

4.2 Applicable military standards

Examples of military standards that can be used are listed below:

MIL-STD 461-462	(USA)
DEF-STAN 59-41	(UK)
VG 95373	(Germany)
STANAG 3516	(NATO)
GAM EG13	(France)

Military standards may vary in severity for any particular EM phenomenon. It is the responsibility of the Manufacturer State reviewing the military EMC standard(s) used in the product to justify technical equivalence with the essential protection requirements of the EMC Directive.

These Military standards are primarily intended to ensure compatibility of co-located systems on a platform. Radiated emissions and immunity tests are made at 1 m distance to reflect the more severe types of intra-system effects in addition to the inter-system effects.

NOTE These standards can be obtained from the appropriate National Defence Standards Directorates.

5 Factors affecting the sale of dual purpose apparatus on the European market

5.1 Legal position

The EC EMC Directive may not apply to apparatus specifically designed for military purposes, i.e. those included in the list of products produced under Article 223.2, see Annex B. The list of products which are considered military and may be excluded from the EMC Directive by a Member State are included in Council Decision 255/58, and repeated in Annex C.

The current position of Member States in this aspect is given in Annex D. The EC EMC Directive applies to apparatus coming within the scope of this guide as defined in clause 1.

Member States can apply national provisions relating to the protection of the environment or the working environment, and notify the Commission of these provisions, under Article 100a.4.

Where a contract is placed by a company in one Member State on a company in another Member State, the law that applies is stated in the contract. This is normally the law of the Member State in which the originating company is established.

Manufacturers need to be aware that there are EMC requirements over and above those required by a military procurement specification if the apparatus is also to have a civil application.

Manufacturers of military apparatus specially designed for military purposes should consider the likelihood of the apparatus causing electromagnetic disturbance. Where that disturbance is liable to degrade the performance of other apparatus which might reasonably be expected to be present in the environment associated with the military apparatus's use, prudent measures should be taken to reduce or eliminate that disturbance.

5.2 Technical requirements

All apparatus placed on the market in Europe and coming within the scope of the EMC Directive 89/336/EEC shall satisfy the protection requirements of the directive and its amendments. Products placed on the market are required to follow the conformity assessment procedures of Article 10 of the Directive. Relevant apparatus shall be supplied with a valid declaration of conformity, bear the CE mark, and shall be installed and used in accordance with the manufacturer's instructions.

6 Requirements for dual purpose apparatus

6.1 General principles

Dual purpose apparatus should satisfy the EMC requirements imposed by the various environments in which it is intended to work. Apparatus intended for a military environment needs to satisfy procurement specifications appropriate to the particular application. As might be expected, a high degree of commonality exists between the EM phenomena considered in both regimes and thus the opportunities for a cost effective approach are apparent.

The requirements for dual purpose apparatus are based on the following assumptions and strategy:

1) The military standards provide adequate protection for the military environment.
2) The military EM environment is recognised as being at least as severe, and in some cases considerably more severe, than the residential, commercial and light industrial and industrial environments.
3) Based upon a technical rationale, as given in the example in Annex E, compliance with the appropriate class of military standard will ensure conformity with the protection requirements of the EMC Directive.

4) The total set of requirements for dual purpose apparatus should comprise the following:
   a) a core of EMC tests common to both the military and civil environments where the military standards will be applied.
   b) additional conformity requirements to address EM phenomena, not covered by the military standards, which are considered essential for conformity with the requirements of the Directive. Harmonised European standards should be applied.

6.2 Specific requirements

Annex E presents an example of the use of a national military EMC standard in place of civil standards where there are common phenomena. Where necessary, additional tests to a civil standard are also identified. Manufacturers are advised to prepare and retain a file describing the military and EN tests and limits applied and how these relate to the general protection requirements.

7 Conformity assessment procedure

Dual purpose apparatus shall be declared in conformity with the protection requirements of the Directive.

Manufacturers should prepare a Technical Construction File on their apparatus and submit the file for assessment by a Competent Body based in the EU and appointed by one of the Member States.

NOTE Apparatus comprising or containing radio transmission apparatus will be subject to the provisions of Article 10.5 of the EMC Directive and applicable national regulations.

For guidance the EMC standards considered useful to apply are listed in Tables 1 to 4.

The Technical Construction File should state which military standards have been applied and the harmonised European standards also applied for any additional phenomena. Military standards contain limits and levels appropriate for a range of environments and circumstances and the technical rationale in the TCF should discuss the equivalence of the applied limits or levels to the civil requirements.

The Competent Body should verify the equivalence of the military standards with essential requirements taking note of different antenna distances and detector functions etc.

The manufacturer shall produce a declaration of conformity then apply the CE marking.

NOTE The apparatus also has to meet the requirements of all relevant new approach directives.

8 Non-compliance

For non-compliance with a particular military test as a result of a dispensation or concession request, the impact on conformity with the essential requirements of the EMC Directive must be addressed separately and a record of the justification for conformity included in the TCF. Furthermore this procedure is critical in cases where concessions or dispensations may have been granted in determining compliance with military EMC standards.

9 Reference documents

1) Council Directive 89/336/EEC of May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.
2) European Commission Guidelines on the application of Council Directive 89/336/EEC – June 1997.
3) CENELEC Guide n° 25, Guide on the use of standards for the implementation of the EMC Directive.

Table 1 - Technical requirements for dual purpose apparatus - Emission - Industrial environment

Phenomena	Standard
Conducted 0,15 MHz - 30 MHz:	
Power line - continuous	EN 55011
Power line - discontinuous	Not applicable
Signal and control lines	Not applicable
DC power lines	Not applicable
Radiated 30 MHz - 1000 MHz:	EN 55011
Harmonics 0 - 2 kHz	
Flicker	

Table 2 - Technical requirements for dual purpose apparatus - Emission - Residential, commercial and light industrial environment

Phenomena	Standard
Conducted 0,15 MHz - 30 MHz	
Power line continuous	EN 55022 Class B
Power line discontinuous	EN 55014
Signal and control lines	EN 55022
DC power	EN 55022
Radiated 30 MHz - 1000 MHz	EN 55022 Class B
Harmonics 0 - 2 kHz	EN 61000-3-2
Flicker	EN 61000-3-3