CE Marking of Military Equipment: It is the Law!
How to do it?

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Abstract—Several European Union Members States exempted the implementation of the EMC Directive for defence contracts. According to the lawyers, and validated in a court case, this is illegal, and thus the EMC Directive is applicable for military equipment too, except when an exemption for a clearly defined case has been granted. The European Commission confirmed this conclusion in an interpretative communication. The EMC Directive only gives essential requirements. The default route, giving presumption of conformity, is making use of harmonized standards. The alternative route is the use of standards which have not been harmonised. Military standards are not harmonised, and are already in use as the reference in contracts between supplier and customer/user. Using the (test) evidence based on the military standards can therefore be used to prove compliance with the essential requirements of the EMC Directive, making additional testing superfluous. This paper describes the routes to compliance for military equipment.

Keywords; EMC Directive, military equipment

I. INTRODUCTION

The Treaty of the European Community [1] contains an article (Article 296 TEC), which gives Member States measures they consider necessary for the protection of their essential security interests. Article 296 TEC refers not to the protection of security interests in general, but to the protection of essential security interests. This specification underlines the exceptional character of the derogation and makes it clear that the specific military nature of the equipment included in the 1958 list is, by itself, not sufficient to justify exemption from EU procurement rules. The aim of these conditions is to prevent possible misuse and to ensure that the derogation remains an exception limited to cases where Member States have no other choice than to protect their security interests nationally. Several member states used Article 296 TEC as an argument not to implement the EMC Directives [2][3] in national legislation. The EMC Directive is the legal instrument intended to secure respect for the basic provisions of the Treaty relating to free movement of goods and services as well as freedom of establishment in the area of public procurement. The Court of Justice has consistently made it clear that any derogation from the rules intended to ensure the effectiveness of the rights conferred by the Treaty must be interpreted strictly. Therefore, both the field and the conditions of application of Article 296 TEC must be interpreted in a restrictive way. The interpretative communication COM (2006) 779 final [4] intends to prevent possible misinterpretation and misuse of Article 296 TEC in the field of defence procurement by National Authorities in the European Internal Market. This communication states that military items included in the 1958 list (Council Decision 255/58) are not automatically exempted from the rules of the Internal Market. The practical implication is that the exemption can be granted, on a case-by-case basis, which is described in the next section. However, in nearly all cases the exemption will not, or cannot be given. As a result, the EMC Directive is applicable to military equipment. A Technical Report was produced by CLC/TC 210 (EMC) in 1998, and updated in 2002 [3] in order to provide guidance to manufacturers of military equipment to comply with the EMC Directive 89/336/EEC [5]. This report focused on military equipment used in civil environment, i.e. the dual-use equipment. The current situation is that military equipment in military environments have to comply with the essential requirements of the (current) EMC Directive [2]. A Guide has been published in 2007, and updated in 2010 [6]. CENELEC TC210, WG9 produced technical report TR50538 [7], ‘Guide to EMC Directive conformity of equipment designed for military purposes’, which gives several routes to compliance with the essential requirements. This is described in the next sections. Several countries, such as The Netherlands, interpreted the EMC Directive already in 1996 in a correct manner.

II. HOW TO APPLY ARTICLE 296 TEC

The only way for Member States to reconcile their prerogatives in the field of security with their Treaty obligations is to assess with great care, for each procurement contract, whether an exemption from Community rules is justified or not. Such case-by-case assessment must be particularly rigorous at the borderline of Article 296 TEC where the use of the exemption may be controversial. This means in particular that contracting authorities have to evaluate:

- which essential security interest is concerned?
- what is the connection between this security interest and the specific procurement decision?
- why is the non-application of the Public Procurement Directive in this specific case necessary for the protection of this essential security interest?

Keeping proper records is important in the event of a challenge from the European Commission and/or industry. The European Commission may seek to verify whether the conditions for exempting contracts form the Regulations are being applied correctly by a Member State in particular. In such cases, the Member State has to provide, at the Commission’s request, the rationale for use of an exemption for a specific contract. At the same time, Article 296(1)(b) TEC stipulates that measures taken under this Article "shall not adversely affect the conditions of competition in the common..."
market regarding products which are not intended for specifically military purposes. In the area of defence procurement, this can be the case for offsets, in particular for indirect, non-military offsets. Member States must therefore make sure that offset arrangements related to defence contracts covered by Article 296(1)(b) TEC do respect this provision. In most cases it will be extremely difficult to exempt from the application of the EMC Directive.

III. HOW TO SHOW COMPLIANCE WITH THE ESSENTIAL REQUIREMENTS

A. Other Directives

Civilian aircraft or equipment fitted to civilian aircraft referred to in Regulation (EC) No. 1592/2002 [8], radio amateur equipment and inherently benign equipment are exempted from the EMC Directive. Also all equipment in the scope of the R&TTE Directive 1999/5/EC [9] is excluded from the EMC Directive, because the EMC aspects of equipment within the scope of the R&TTE Directive are covered by that Directive. Military equipment is excluded in the R&TTE Directive. It can be concluded that equipment that falls outside the scope of the R&TTE Directive is therefore within the scope of the EMC Directive, although this would be a nice court case. The Automotive EMC Directive 2004/104/EC [10] applies to cars, trailers and their electronic sub-assemblies, and compliance with Directive 2004/104/EC is demonstrated by affixing ‘e-marking’ to the equipment or vehicle. Directive 96/98/EC [11] amended by Directives 98/85/EC, 2001/53/EC and 2002/75/EC applies International Maritime Organisation (IMO) standards to assess the compliance of equipment related to safety at sea (navigation and radio communications) and pollution prevention. This is a type approval process and compliance with the directive is demonstrated by affixing a “wheelmark” to such equipment. All non-safety related equipment is assessed following the EMC Directive 2004/108/EC.

B. Apparatus and Installations

The EMC Directive defines apparatus and installations. The following definitions are extracted from the EMC Directive 2004/108/EC, Article 2, for clarification on the two types of equipment/system covered by the directive:

a) ‘apparatus’ means any finished appliance or combination thereof made commercially available as a single functional unit, intended for the end user and liable to generate electromagnetic disturbance, or the performance of which is liable to be affected by such disturbance. Apparatus is subject to the full provisions of the directive including a Declaration of Conformity (DoC) and CE marking;

b) ‘fixed installation’ means a particular combination of several types of apparatus and, where applicable, other devices, which are assembled, installed and intended to be used permanently at a predefined location;

The procedure is actually the same for apparatus and fixed installation, except that installations do not require a Declaration of Conformity (DoC) and do not have to be CE marked, but of course have to fulfil the essential requirements of the EMC Directive.

C. Harmonised standards

A very common mistake is that the EMC Directive requires compliance with respect to harmonized standards. This is not correct. Article 5 of the EMC Directive describes essential requirement. These are explained in Annex 1 of the EMC Directive, ‘essential requirements referred to in article 5’.

Protection requirements

Equipment shall be so 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;

(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.

This has been explained in more detail in the Guide for the EMC Directive [6]. This guide gives the conformity assessment procedure in a flow chart as shown in Figure 1.

Figure 1. Conformity assessment procedure

Three methods are possible for the EMC assessment:

1. Application of EMC harmonised standards.
2. An EMC assessment where no harmonised standards have been applied and the manufacturer applies his own methodology.
3. Mixed assessment, combining the two previous methods. For example, one could use the harmonised standards to cover emission phenomena and a detailed technical EMC assessment for immunity aspects.

Following route 1, using European harmonised standards, provides a recognised methodology to demonstrate compliance to the protection requirements. It is the most frequently used and recommended way to demonstrate compliance. When an individual apparatus is placed on the market, that complies with the EMC requirements of the relevant harmonised standards for use with the EMC Directive it has a Presumption of Conformity to the protection requirements of the EMCD.
D. Detailed EMC assessment using no harmonised standards

Using harmonised standards result in a presumption of conformity, but it is not the only route to comply with the essential requirements of the EMC Directive, as shown in Figure 1. The second route, depicted most left, is described in the Guide [6] as ‘An EMC assessment where no harmonised standards have been applied’. Contracts for military equipment contain in nearly all cases requirements for electromagnetic compatibility. These requirements are often based on military standards, such as MIL-STD 461, GAM, VG, Def-Stan or STANAG [12]. CEN Workshop 10 Expert Group 7 was assigned the task to define a single preferred standard on electromagnetic environments for defence procurement [12]. The expert group concluded that no single standard family was better than another, and decided that the STANAG 4370, AECTP500 series would be the best reference as single EMC standard for defence procurement. The expert group also concluded that (harmonised) civil standards were too limited to cover the electromagnetic environment as encountered by military systems. Because the essential requirements of the EMC Directive are referring to the ‘intended use’ of the equipment, the use of harmonised standards for showing compliance with the EMC Directive is thus not possible, except for the cases where the military equipment would be used solely in a civil environment.

Thus the most appropriate way to show compliance with the essential requirements is the use of military standards. In the Guide this is clearly stated: ‘A manufacturer may wish to declare the conformity of his apparatus (read: military equipment) directly to the protection requirements, without reference to harmonised standards, by making his own EMC assessment. This assessment needs to follow a technical methodology to ensure that the requirements of the EMC Directive are met. The manufacturer will need to provide clear evidence of compliance.’

The assessment for military equipment shall include:
- Description of the equipment characteristics
- The intended use of the equipment
- Performance criteria for immunity/susceptibility
- The military standard and class, which includes already:
  - The operational EMC environment, and
  - Types of disturbances created by or affecting the equipment

The EMC Directive requires the manufacturer to document all steps taken and decisions made to check the conformity of the apparatus for those aspects for which the manufacturer has chosen this method of assessment. It may encompass (but is not limited to) the following:
- Description and definition of the equipment operating conditions and its intended purpose. This should also cover the power supply voltage and frequency aspects relevant to the equipment;
- Specification, descriptions and classification of the environments in which the equipment will be used. This may cover also aspects relevant for equipment that may be moved and must have emission and immunity/susceptibility characteristics appropriate for several environments. This selection is the responsibility of the manufacturer based on knowledge of the electromagnetic environment and awareness of the statistical aspects involved;
- Clear specification of relevant sources and effects of the electromagnetic phenomena covered and compatibility levels applied;
- Specification of the performance criteria of the equipment. These should be set taking into account of the reasonable expectations of the user;
- Test levels with regard to the immunity/susceptibility of the equipment;
- Limits adopted for emission;
- Reference to available documents such as military standards, handbooks, any European harmonised standards, recommendations;
- Indication of any deviations made to available reference documents. These deviations may concern the phenomena considered, tests methods, test facilities or test levels, etc., and included waivers;
- EMC design considerations and/or calculation results;
- Statistical evaluations, theoretical studies or other examinations carried out, presenting background theory, arguments, results and conclusion. This may include information on the levels of occurrence and statistical distribution of the disturbances;
- Description on how components are selected;
- Information on shielding, cable screening and routing, filters, ferrites etc;
- Any description of the solutions adopted in order to comply with the protection requirements;
- Any specification of general or specific requirements taken to limit emission of disturbances;
- Assessment of whether general or specific requirements taken to limit emission of disturbances;
- Assessment of whether any specific precautions have to be taken when the equipment is assembled, installed, maintained or used, in order to ensure that, when put into service, the equipment is in conformity with the protection requirements;
- Worst case selection criteria for series of equipment with similarities.

Actually, these requested items for documentation are already included in the documentation used for the contractual requirements between manufacturer and customers in the military domain and thus should not result in an extra burden.

E. Mixed assessment

The third routed, the mixed assessment route, is still being discussed. It could be interpreted as the preferred route for ‘dual use’ equipment. This is equipment which could be used in a civil as well as a military environment, although it might be more appropriate to perform dual-testing, i.e. one against the military standards and one against the harmonised standard applicable for the intended civil environment.
IV. CASES

A military radar system is installed on a naval vessel. Contractual requirements between customer (a navy) and a supplier will refer to a military standard applicable for the naval operational environment. If the system fulfills the requirements of this military standard then the system fulfills the essential requirements of the EMC Directive.

A motor generator for supplying power to military equipment in a ground based environment will already fulfill the contractual military standards. Assume that the emission level at 90 MHz is 10 dB above the military standard requirement. Preventive measures appear to be difficult. The standard procedure is to request a waiver. Because 90 MHz is not a frequency used by military, the waiver is granted. Some people might argue that 90 MHz is used in the civil environment. However, the generator is put on the market for military purposes, and therefore has to fulfill the military requirement in order to fulfill the essential requirements of the EMC Directive.

Assume a series of laptop computers are being used inside military shelters. Due to cost arguments, the laptop computers are commercial off the shelf, and thus are fulfilling the requirements for information technology equipment. If the door of the shelter is opened, the laptop computers are failing, because high power transmitters nearby couple into the mouse cables. The supplier of the laptop computers cannot be held liable because the intended operational environment was household and light-office use, and the user has to take measures to prevent interference.

Military wireless communication equipment is not under the R&TTE directive and thus has to fulfill the EMC Directive. Assume that during planned training sessions the equipment is meant to be used in a residential environment. In that case, the operational environment would include the light-industrial and household environment. Because the system is wireless, we can assume there is no connection to the mains, and power line conducted interference effects can be excluded. For unwanted radiated effects we have to compare the emission levels of military equipment with the requirements for the civil environment, and from this comparison we can conclude there is no risk of interference. An exceptional phenomenon is ESD (electrostatic discharge). In several military standards ESD is not included. The easiest way to show compliance is to perform an ESD test on the wireless communication equipment.

Often military shelters are equipped with motor generators. Sometimes the shelter can be connected to the mains supply, which is in most cases a 60Hz supply via a motor-generator set. In exceptional cases, for instance for special maintenance or an exhibition, public mains could be used. Some people might conclude that therefore the equipment shall fulfill the requirement for light- or heavy-industrial environment. But this is not correct: the EMC Directive allows such exceptional cases. The intended operational environment is the military environment, not the civil one. It is of course advisable that the system will not cause interference when connected to the public mains.

V. CONCLUSION

The EMC Directive is also applicable to military equipment. Because the intended use of military equipment is the military environment, the use of military standards is the preferred route to compliance with the essential requirements of the EMC Directive. Because these military standards are not harmonised the rationale for this choice has to be documented, but because this documentation is usually already performed due to the requirements in the contracts, the process of compliance with the EMC Directive should not be an additional burden for defence industry.

REFERENCES