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## Informing the Customer

*Helping you solve your EMC problems*

# Informing the Customer

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The Protection Requirements in the EMC Directive, to which every EU Declaration of Conformity is a legal statement of compliance, requires products not to cause or suffer from interference "when used as intended".

The Product Liability and General Product Safety Directives, which are mandatory (although do not involve CE marking or Declarations of Conformity) require that products are safe "as far as is reasonably practicable" - a legal concept that requires the manufacturer to take account of how his product will actually be used and misused, and the environments it might be subject to.

Similar issues concerning how and where the product might be used are involved in a manufacturer's compliance with the Low Voltage and Machinery Safety Directives, and the UK's Trade Descriptions Act ("fitness for purpose"). Employers face similar issues and various mandatory Health and Safety directives, including PUWER.

All these hinge on how the product has been marketed, what the customer might reasonably expect to get for his money, and whether the product was used according to the user manuals provided by the manufacturer. Informing the customer is thus a key issue for all manufacturers.

"Failure to warn" is an increasingly likely legal claim, and in this respect Europe is following the example set in the US in recent years. We joke about the necessity for putting warnings on microwave ovens warning users not to use them for drying domestic pets, but there is a real issue here, and this article will discuss its EMC implications.

Many manufacturers know that if they meet the harmonised EMC standards which are most relevant to their products, they will have a presumption of conformity to the EMC Directive's Protection Requirements. (Note the legal use of the word "presumption", and refer to Article 9 of 89/336/EEC if you want to know what this actually means).

Looking into the harmonised generic EMC standards we find that they specify the environment they cover in general terms, but reading their small print we find that they have carefully specified exclusions, e.g. EN 50081-1:1992 includes the statements: "The limits in this standard may not, however, provide full protection against interference to radio and television reception when the apparatus is used closer than 10m to the receiving antenna (e)." and "In special cases, for instance when highly susceptible apparatus is being used in proximity, additional mitigation measures may have to be employed to reduce the electromagnetic emission further below the specified levels." EN 50082-1:1994 includes a similar statement, with the "protection distance" extended to 30 metres. Both EN 50082-1:1992 and EN 50082-1:1997 include statements that they do not cover safety requirements, and also state: "In special cases situations will arise where the levels of disturbances may exceed the test levels specified in this standard e.g. where a hand-held transmitter is used in proximity to an apparatus. In these instances special mitigation measures may have to be employed."

EN 50082-2:1995, the toughest harmonised immunity standard we have available under the EMC Directive, includes the following statements: "Safety considerations are not

covered in this standard." and " In special cases situations will arise where the level of disturbances may exceed the test levels specified in this standard e.g. where an apparatus is installed in proximity to ISM equipment as defined in EN 55011 or where a hand-held transmitter is used in close proximity to an apparatus. In these instances special mitigation measures may have to be employed."

Restrictions on the scope of the standards and the intended use of the equipment which meets them are not limited to the generic standards: EN 55022:1994 (information technology equipment) includes the following statement: "Additional provisions may be required for cases where interference occurs.". EN 55103-1:1996 (emissions) and -2:1996 (immunity), despite offering a choice of five electromagnetic environments for the professional audio, video, and lighting industry equipment they cover, repeat the same statements as for the generic standards EN 50081-1:1992 and EN 50082-1:1992 respectively. EN 55014, EN 55104, and EN 55014-2 all also include similar statements.

How many customers purchasing goods which have been CE marked on the basis that they meet EN 50081-1 will be using them closer than 10 metres to a radio or TV antenna? How can the customer tell whether, by spending more money, they will get a product which will cause less interference when placed near their home theatre installation? - the presence of a CE mark does not tell them anything, they need information from the manufacturer.

A manufacturer whose products just scrape under the emission limits in EN 50081-1:1992 (or similar product standards) should repeat the above statement (or the relevant one taken from the product standard) in his user manual, as long as it is reasonable for him to do so. It would not be considered reasonable to include warnings about the possibility of interference with radio and TV receivers whose aerials are closer than 10 metres if the product was marketed as something that could be used in close proximity to a domestic entertainment centre, although it may be possible to get away with this if the customer was warned before purchase, in terms a layman would understand, that interference was a possibility in such circumstances.

Manufacturers who made better-quality products which meet EN50081-1:1992 (or similar) with a good safety margin, could then advertise their products as being less likely to cause interference than similar products sold for less. Customers could then make an informed choice.

Looking at a quite different situation, how many purchasers of CE marked industrial equipment that has been declared compliant with EN 50082-2:1995 expect their operators to use private mobile radio walkie-talkies (or, increasingly, cellphones) as a part of their job? Experience suggests that most manufacturing and process plant operators, and their security personnel, expect or intend to use mobile radio-communications and assume (incorrectly) that the CE mark means they will have no problems with this. But the marketing of the equipment they buy, and the manuals they are provided with, do not warn against this despite the fact that the test standards used specifically state that they don't cover such environments.

So, at the very least, it is recommended that manufacturers copy the limitations to use statements from the EMC standards they have applied to achieve their "presumption of conformity" in their product manuals. It is also recommended that they take the necessary steps to make sure that their marketing and sales is appropriate given the limitations of the standards they have applied.

Consider a merchant bank or insurance company that has provided everyone with

networked desktop PCs and do not wish to put a complete ban on the use of mobile phones by their staff (such a ban is increasingly impractical, in any case). It is reasonable to expect that someone will use a cellphone whilst sitting near to, or actually using, a networked computer. The immunity standard applied by the computer manufacturer to apply his CE mark does not cover this situation. When a computer network in such a place crashes, it can lose its users more than €20 million in lost profits every hour. Under the Product Liability Directive financial losses like this can be recovered from equipment suppliers under civil law, "on the balance of probabilities", with no upper limit for the damages awarded.

Do you think that the courts would take the side of the computer manufacturer who did not warn the user about the possibilities of interference from cellphones? Or with the computer networking company which, like many of them, does not employ engineers who are competent to ask the right questions about electromagnetic interference of their equipment suppliers? Maybe the lawyers working for the insurance company or merchant bank would sue the cellphone supplier instead, on the basis that they can afford more and are also more likely to settle out of court for failing to warn that they might interfere with computers and their networks.

In many such cases lawyers will work for a percentage of the winnings, knowing that most companies will settle out of court (to avoid damaging publicity) when they are revealed as having failed to provide the necessary information on the correct use of their product as required by the various laws.

What about the humble VDU? Everyone in the VDU manufacturing industry knows that they generally do not give a correct or stable image in the presence of low-frequency magnetic fields above about 0.5 microTesla (the health and safety limits for human exposure are currently set around 1,600 microTesla). Such fields are common near to the main power conductors in larger buildings, near to electric traction systems, and in certain industries, and problems with VDUs in such environments are commonplace.

The most relevant immunity standard EN 50082-1:1992 for VDUs used in commercial and light industrial environments does not include a low-frequency magnetic field test, but despite this most VDU manufacturers do not warn their customers not to use their products in environments where such magnetic fields may occur.

The new immunity standard EN 50082-1:1997 does include a 50 Hz magnetic field test at 3 Amps/metre, and it also sets a limit for VDU image stability, but only at 1 Amp/metre. The industrial immunity standard EN 50082-2:1995 also includes a 50 Hz magnetic field test at 30 Amps/metre, but states that VDU image interference is allowed above 3 Amps/metre.

The Display Screens Directive makes it mandatory for employers to provide staff who work at VDUs with a stable image, but this cannot be guaranteed by merely purchasing CE-marked VDUs.

A recent catalogue of "industrial computer products" boasts CE marked computers and VDUs, all mounted in impressive steel cabinets, some even sealed to IP65, clearly intended for use in process plant and manufacturing industries. But in the appendix saying how good they were at meeting the EMC directive they list the immunity standard they applied as EN50082-1:1992, which is only appropriate for commercial and light industrial environments. How many computer manufacturers provide this level of detail? How many purchasers could be expected to know enough about EMC to understand such details? How many purchasers know that even the use of the correct immunity standard (EN 50082-2:1995) would not ensure, on its own, that the screens will enable them to meet the VDU

Directive?

All this would easily be taken care of if manufacturers supplied their customers with full information on the electromagnetic environment that their products were intended to be used in. The language would best be in layman's language wherever possible, with recommendations to obtain more expert advice where any doubt exists.

For VDUs, purchasers would be able to choose which would be most likely to work in their office or plant, and would be less likely to sue suppliers if they used the VDUs in inappropriate environments. They could spend more on VDUs with better resistance to magnetic fields where they knew they were likely to have such problems (a simple site survey for magnetic fields can easily be performed by ordinary technical staff using low-cost hired test equipment).

This would lead to advantages for VDU manufacturers too, as they would no longer be impaled on the horns of the dilemma common in product design and manufacturing: whether to try to provide what the customer needs, or to provide merely what the customer is prepared to pay for because he does not know what he actually needs.

How about switch-on surges? These may eventually be controlled by EN 61000-3-3 when it finally comes into force on 01/01/2001, but at the moment all the generic and product emissions standards ignore such surges. It is known that the initial supply current surge taken by the de-gaussing circuits of larger VDU monitors (such as those used in SCADA systems in industry), or by some vacuum cleaners and other appliances and machines with AC motors in them, can cause the mains voltage to dip by so much that computers connected to the same supply can crash. Computer crashes are no fun when they lose a day's production, or when they scramble financial records and the backups are out of date. But the information provided with the computers, the VDUs, or the vacuum cleaners, rarely inform the customer of this possibility or how to deal with it, leaving purchasers open to risks of significant financial losses and manufacturers exposed to risks of criminal and civil legal actions under a number of laws and Directives. Reducing the likelihood of such switch-on surge problem is straightforward enough and within the capacity of most industrial and commercial purchasers to understand and employ, if only they were provided with the necessary information: power either the computer or the interfering item from a suitably lower impedance on the same supply circuit, or else from a different supply circuit. Alternatively, pay extra for products from suppliers who can provide evidence of compliance with EN 50082-1:1997 or EN 50082-2:1995 (especially their supply dips and dropouts requirement), and/or compliance with the switch-on supply surge requirements of EN 61000-3-3.

There are many other examples of this sort of EMC lack-of-information problem that could be included here, for example, many manufacturers appear not to be publishing in their product data sheets the performance criteria they actually applied during their EMC immunity tests.

We have all become so used to advertising that pretends that every product is the answer to everyone's needs that marketing and sales people are very shy of admitting that their products have any limitations or shortcomings at all.

Unfortunately, the laws we now have require manufacturers to inform the customer about everything he needs to know to purchase the correct product for his needs, and then to use it exactly as intended by its manufacturer.

There are ways of writing the necessary information, limitations, and warnings in a way

which enhances the professionalism of the manufacturer and gives them more credibility, as well as educating the customer so that they are more wary of products which do not provide the same level of information.

There is no reason to prevent people from buying lower quality products, providing they know enough about the product to understand what they are getting. What is not often realised is that even warnings, if properly written, can make a product more valuable to a customer (because he now knows what to do rather than work in the dark) maybe even allowing it to be sold with higher gross margins.

The present lack of the provision of reasonable information just exposes customers to higher risks of financial losses, exposes manufacturers to higher risks of legal claims, and tends to level everything down to the perceived quality of lowest common denominator third-world import - discouraging manufacturers from offering added-value products that address real market needs.

Informing customers about the performance and limitations of products is a legal requirement, a professional duty, a responsible approach to reducing the risks of doing business, and a marketing opportunity.

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