The adoption on June 26th, 2013 of the European Directive 2013/35/EU relating to the exposure of workers to electromagnetic fields warrants some explanation as to the consequences for different employee groups: Company Management, health and safety, occupational hygiene and of course the workers themselves, plus anyone else who could reasonably be expected to visit. We also consider how to carry out an assessment regarding EMF levels in different sectors.

Electromagnetic fields (EMF) appear where electricity is used. It has long been known that the exposure of people to electromagnetic fields can lead to effects on health. At low frequencies the effect of EMF is most likely to affect the central nervous system of the body, while at higher frequencies heating effects can lead to an increase in body temperature. (Just like a microwave oven!)

These effects and their severity depend on several parameters such as frequency (Hz) of the EMF, the power level, the duration of each exposure and the how often the exposure takes place. In order to understand this better, and determine what level of controls to put in place we need to be able to measure, record and evaluate all of these aspects of EMF. With that knowledge it can be determined what, if any, appropriate actions need to be taken to limit exposure.

The Directive
Focusing on prevention, the European Union adopted the new Directive 2013/35/EU relating to the exposure of workers to electromagnetic fields. The Directive applies to any and all work activities where workers are exposed to the risks from electromagnetic fields. Additionally, it sets out the obligations of employers, who must be able to show that they have taken appropriate steps to minimise risk. Typically this means carrying out a risk assessment (which can be delegated out to a competent person using suitable equipment), that will monitor the magnitude of the EMF and then taking steps to eliminate or minimise any risks that have been found in the workplace.

What is covered?
1) All the known direct biophysical effects and other indirect effects. At the same time the board issues a mandate to CENELEC (European Committee for Electrotechnical Standardization) to develop regulations that will help companies to assess EMF.

2) The equipment, installations and assessments concerning the measurement of EMF both nationally, developed by CENELEC, and internationally by the IEC (International Electrotechnical Commission) and this is (or will be) written into local UK legislation.
Potential exposure areas:

EMF exists wherever electricity is used, so it would be impossible to provide an exhaustive list, but as a general rule of thumb, the thicker the cable going to the machine, the more likely it is that you will have significant EMF levels, some will be seen along the cable runs themselves, but the EMF may well be radiated at the point of use – let’s look at some examples. The groupings are by the type of power used based on power levels and frequency (Hz) of the supply.

It’s not all EMF!

Manufacturing
Any electrical equipment creates a general underlying EMF which needs to be assessed, but high power equipment and processes such as robotic welding systems, and any process-driven heating – either induction or radio frequency (RF) as is often used for hardening and/or drying processes are likely to need early attention.

Energy transmission and use
The power generating system from power station to end use takes in a wide variety of equipment and transmission cables that operate at very low frequency (50/60 Hz) and very high power, causing significant EMF. Chemical processes such as electrolysis, and power systems for electric trains and trams also fit into this category.

Telecommunications
Mobile telephony, radio and television transmissions all depend on a network of fixed antennas, or base stations, which using radio waves. The number of base stations has multiplied with the introduction of new generations of mobile phone technologies and this will increase as we all move more data more often.
Anyone employed to operate, inspect and maintain telecommunications infrastructure, as well as those who are stationed near the masts erected on their premises must monitor to prove compliance.
This list of who should do it is bigger that it might initially appear as it covers schools, hospitals and office blocks that have mobile phone masts on top of them plus anyone else that relies on their own communications systems such as taxi firms, fire, police and ambulance services as they may also have “hot-spots” in or around their buildings.

Medical
Both medical staff and patients are exposed to EMF generated by different medical equipment, either as part of an investigation, or as part of a treatment regime. Examples of such equipment are the magnetic resonance instruments (MRI scanners), diathermy tools and systems, and other
procedures such as local or regional hyperthermia, electro-surgery. They all produce EMF and the employer must be able to show an understanding of the levels and implement any corrective actions that are required.

**Proximity detection of goods and people**

Radio Frequency Identification Systems (RFID), or Near Field Communication (NFC) are two types of electronic detection for items or people. They are very common in public spaces, being used for things as diverse as stock movement and theft detection to taking contactless payment for low value goods, and these systems generate complex electric fields to create uniquely identifiable signals. Once again, if there are people spending their working day close to these systems, then those areas need monitoring.

**General Appliances**

By now you will all be looking out for your particular specialist items for your industry, but don’t forget the standard electrical appliances found in most workplace kitchens: microwave ovens, fluorescent lamps, industrial ovens and water heaters. The list will vary from place to place, but every piece of electrical or electronic equipment that is switched on will generate electromagnetic fields and the combined effects need to be considered. For most office-type environments the levels are very likely to be well within safe limits but you won’t know until you measure it.

**Making the assessment**

For some, there will be a “tick in the box” mentality – someone has checked it, and everything is fine, so it’ll get checked again next year. For those who are in more complex environments assessments will be more often, and where levels are seen to be “potentially hazardous” it could be considered prudent to put in place a permanent device – typically wall mounted, with 24/7 monitoring of the EMF levels with the results logged to a database or website.

EMF is a physical phenomenon that affects people, yet much of it is not perceived by them, unlike noise pollution, smoke or vibration, for example. Therefore, it is necessary to have approved, correctly calibrated devices that are able to detect measure and record the EMF accurately, and the people operating the equipment need to be trained in how to use it. Having the information time-stamped and given a GPS location is also of great benefit should anyone want to audit the authenticity of the data.

An initial assessment can be done with hand-portable equipment, and the information gained should be used to determine the type of on-going measurements required.

**Mandated requirements**

The EU directive needs to be written into national law in each of the member states and in the UK this is being currently being done, and until it is published we cannot be certain, but we fully expect it to follow the route that has been taken for vibration and noise:

The directive will place the burden of compliance on the employer and the expected wording is likely to use expressions such as “must assess”, “competent person”, “take appropriate measurements” with “approved equipment” so as with other forms of potential health hazards all employers and their occupational hygiene
advisors will need to know how and when to assess the EMF levels, and since we know that that the EMF cannot be seen or felt in the same way that noise and vibration can, some form of measuring equipment needs to be used.

For a successful assessment the monitoring equipment needs to have many characteristics to make it easy to use and compliant and these are probably the most important:

- It can take and store and measurements, when and where you want to, as often as you want to. This could mean vehicle mounted, or wall mounted or hand-portable.
- It should have no external electrical connections that would interfere with readings being taken.
- It should have pre-set measurement algorithms built-in, to avoid operator error, eg: simply select “ICNRP” and the measurements will be taken for the correct length of time and averaged correctly so producing correct results.
- It must cover the frequencies you are interested in. Initially this will be everything from “low” (1Hz) to “high” (18Ghz and beyond) frequencies.
- It must perform spectral analysis at low frequencies as well as “heat” measurements.
- It must be certified accurate. The directive calls for ILAC/ENAC accredited calibration of the instruments.

There are many other attributes that can also make a huge difference in how easy (or not) the equipment is to use, especially when taking into account how often measurements will be taken, so be sure to seek advice.

Now that you know what you want, ask for a demonstration of the monitoring device(s) and that way you will be shown the best way to use it, what any limitations are, and how suitable it is for what you need. Having got your 1st measurements at almost no cost, you as the occupational hygienist can recommend areas for further in-depth analysis, or be assured that levels are under prescribed limits and have the information to demonstrate it.

But one thing is certain: EMF can no longer be ignored.

For more information on how to make competent assessments please contact Charlie McClelland at Aspen Electronics on 0208 868 1311, or by e-mail charlie.mcclelland@aspen-electronics.com

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