Personal radiation monitors – Safety in electromagnetic fields

When the new health and safety regulations on electromagnetic fields came into effect on 1st July 2016, the protection of employees from health risks due to EMF in the workplace became legally binding. The main aim is to prevent employees from being exposed to high field strengths for longer periods of time. If it is not possible to avoid exceeding the permitted levels, such as when working in the vicinity of antennas or industrial welding equipment, the use of personal protective equipment (PPE) that gives a warning of critical exposure levels is compulsory.

The direct short-term negative effects of electromagnetic fields on humans have been proven scientifically. Everybody knows what non-ionizing radiation can do simply by looking at a microwave oven. Enough heat is generated by the absorption of high frequency radiation to cook food. The same process can occur within our bodies. Dangerous heating of body tissues must be prevented.

When the new health and safety regulations on electromagnetic fields came into effect on 1st July 2016, the protection of employees from health risks due to EMF in the workplace became legally binding. The main aim is to prevent employees from being exposed to high field strengths for longer periods of time. If it is not possible to avoid exceeding the permitted levels, such as when working in the vicinity of antennas or industrial welding equipment, the use of personal protective equipment (PPE) that gives a warning of critical exposure levels is compulsory

Typical sources of danger

There are certain areas in everyday work where extra care must be taken with regard to critical electromagnetic fields. As well as radar antennas, these areas primarily include broadcasting and cellular communications transmitters and industrial plant that uses high frequency for welding or smelting.

Persons who are exposed to such situations – when carrying out maintenance work or just keeping the system running – must be given the maximum protection at all times, even if the plant cannot be switched off or there is uncertainty about its operating condition, or when the risk situation is unknown because of the plant is faulty.

In areas where it is not possible to completely exclude the possibility that the limit levels for EMF will be exceeded, radiation monitors such as the RadMan from Narda Safety Test Solutions are very useful (figure 1). This device gives reliable and timely warning of the invisible danger. It emits a loud warning signal as soon as it measures a level corresponding to just half of the

Figure 1: Personal radiation monitor for high frequency signals: RadMan

maximum permitted field strength. An earphone can be connected for situations where there is a lot of background noise. Four LEDs also provide a visible stepwise indication of the actual radiation flux density.

The device records the electromagnetic field directly on the person without affecting the measurement accuracy. Special absorbers are used to minimize any falsification of the results due to reflections from the body (figure 2).

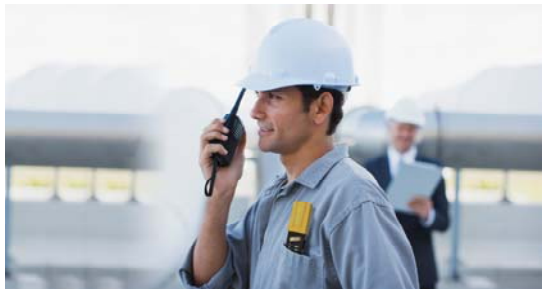

Figure 2: Personal radiation monitors are generally worn close to the body.

Features

The best possible state of the art protection can only be achieved if all the relevant interactions are accurately known. This means that the parameters of any radiation monitor must accurately reflect the actual conditions of occupational use.

The person needing protection during their work will not normally be an expert in measuring equipment. For this reason, operation of the device should be kept a simple as possible: just switch on and the device is ready to use. An automatic self test, battery test and a general function check are performed as soon as the RadMan is switched on. These features are essential for simple operation.

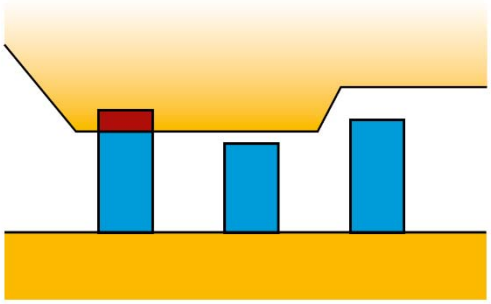

Figure 3: Shaping ensures automatic standard compliant weighting across the entire frequency range up to 40 GHz (schematic diagram).

No assumptions should be made either that the operator is familiar with the radiation sources or the field situation. The warning device must therefore be capable of covering a wide range of applications (frequencies between 1 MHz and 40 GHz). Different frequencies are emitted by different sources or services, and the different frequencies have different limit levels. Despite this, a shaping filter in the RadMan ensures that all the services are correctly weighted automatically according to the standard (figure 3). This ensures that the wearer of the device is always warned of excessive exposure.

These monitors use six field strength sensors to simultaneously an independently detect both E fields (electric) and H fields (magnetic). Only the highest value of the two fields is indicated. Weighting filters for the sensors that correspond to the limit level profile of the particular standard automatically ensure that the correct action level is used. Isotropic capture of the measurement data guarantees that all hot spots in the E and H field are indicated reliably, regardless of the device orientation. This practically eliminates incorrect assessments, because the device effectively does not have a “dead zone”.

Even the best radiation monitor is useless if it is not carried or is not comfortable to wear. Apart from needing to be robust enough for the intended use, it also needs to be convenient to use. It must not restrict the wearer’s freedom of movement in any way when attached to the person.

Narda Safety Test Solutions GmbH
Sandwiesenstrasse 7
72793 Pfullingen, Germany
Phone: +49 (0) 7121-97 32-0
Fax: +49 (0) 7121-97 32-790
E-mail: info.narda-de@L3T.com
www.narda-sts.com

Narda Safety Test Solutions
435 Moreland Road
Hauppauge, NY 11788, USA
Phone: +1 631 231-1700
Fax: +1 631 231-1711
E-Mail: NardaSTS@L3T.com
www.narda-sts.us

Narda Safety Test Solutions Srl
Via Leonardo da Vinci, 21/23
20090 Segrate (Milano) - Italy
Phone: +39 02 269987 1
Fax: +39 02 269987 00
E-Mail: nardait.support@L3T.com
www.narda-sts.it