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INTRODUCTION

The Electromagnetic Fields (EMF) Standard applies to EMF at the University that presents a significant risk to health and safety. It applies to:

- static electric and static magnetic fields 0-1Hz
- low frequency magnetic and electric fields 1-10MHz
- high frequency fields 100kHz - 300 GHz
- intermediate frequency fields 100 kHz - 10MHz

It forms part of the University's Health and Safety Policy for controlling health and safety risks arising from non-ionising radiation sources and compliance with the [Control of Electromagnetic Fields at Work Regulations 2016](#).

If you are responsible for EMF sources the regulations require you to ensure exposure is below a set of exposure limit values (ELVs) and assess the levels of EMF and the risk to which employees, students and others may be exposed. You should eliminate or minimise exposure, take into account people at particular risk, provide information and training and take appropriate action when employees are exposed to EMF in excess of the ELVs. Examples of EMF sources are welding, telecommunication antenna and some analytical instruments.

GENERAL PRINCIPLES

There are two main consequences from EMF exposure: indirect and direct effects. Indirect effects include uncontrolled attraction of ferromagnetic metals, interference with active or passive medical devices, electric shocks and sparks that trigger fires or explosions. Direct effects include sensory and health effects experienced by the person who is in the field. Sensory effects are caused by a stimulation of the central or peripheral nervous systems resulting in nausea, vertigo, metallic taste in the mouth and flashes to the eyes. Health effects are thermal stress in body tissue, tingling and muscle contractions and heart arrhythmia.

People at particular risk should be identified in your risk assessment. The risk assessment should be reviewed periodically and updated as the nature of the work changes. The outcomes should be communicated to the people at risk.

DEFINITIONS

EMF: static electric, static magnetic and time varying, magnetic and electromagnetic fields with frequencies up to 300GHz

Direct biophysical effects: effects in the human body directly caused by its presence in an EMF including

- Thermal effects such as tissue heating through energy absorption from EMF fields in the tissue
- Non thermal effects, such as the stimulation of muscles, nerves or sensory organs
- Limb currents

Indirect effects: caused by the presence of an object in an EMF, which may become the cause of a safety or health hazard, such as

- Interference with medical electronic equipment and devices, including cardiac pacemakers and other implants or medical devices worn on the body
- The projectile risk from ferromagnetic objects in static magnetic fields
- The initiation of electro-explosive devices (detonators)
- Fire and explosions resulting from the ignition of flammable materials by sparks caused by induced fields, contact currents or spark discharges
- Contact currents

Exposure limit Values (ELV): Values established based on biophysical and biological considerations, short term and acute direct effects. ELVs should not be exceeded. They are limits specified to protect workers from the health and sensory effects of EMFs.

Health effects ELV (HEELV): Those ELV's above which workers might be subject to adverse health effects, such as thermal heating or stimulation of nerve and muscle tissue. Health effect ELVs are used to prevent possible harm from tissue heating and electrical stimulation of nerves and tissue. Sensory effect ELVs are used to prevent people feeling sick, experiencing vertigo or a metallic taste caused by EMF exposure.

Action Levels (AL): operational levels established for simplifying the process of demonstrating the compliance with relevant ELV's. Action levels (AL's) relate to the direct health and sensory effects of EMF exposure and can be used to demonstrate that exposure levels are below particular exposure limit values (ELVs). ALs are external to the body, whereas ELVs relate to exposure inside the body. This makes ALs easier to assess and cheaper to measure than the ELVs. When it has been demonstrated that the relevant ALs are not exceeded, the risk of exposure is likely to be very low.

If exposure is above the ALs but below the ELVs it will often be safe. However, in some circumstances it can present additional risk to people and should be considered in the risk assessment.

RESPONSIBILITIES

- In accordance with Health and Safety Policy, staff and students are required to comply with the EMF standard.
- Managers, principal investigators and academic supervisors will be referred to as responsible persons in this standard. Refer to non-ionising radiation for general roles and responsibilities.
- The responsible person must carry out a suitable and sufficient risk assessment to ensure that hazardous EMF exposure is below ALs and does not exceed ELVs. An adequate risk assessment will cover the lifecycle of the work and include indirect and direct effects and people at particular risk.
- It is the Faculties/Service Departments responsibility to conduct and produce risk assessments for their own equipment.

Hazardous sources

The responsible person will identify hazardous EMF sources and record them on the departmental inventory managed by DNIRPA. Updated copies of the inventory are kept by the department and available to the UNIRPA. The AURPO's guidance notes on the safe use of lasers on education and research (.pdf), appendix 1, has a template that can be modified to record your EMF sources.

Exempt sources

Some sources are exempt from the Regulations. You can find out whether your source falls into this category and what your responsibilities are here: [Exemptions to EMF Regulations](#).

All other sources

For all other EMF sources you should understand how your source is hazardous. This will help you make an informed decision about the risk it poses to the people exposed. Below is guidance on what type of information you will need and where you can get it.

- Source frequency, level, duration and type of exposure, including the field distribution over the person's body and variations between workplace areas
 - Multiple sources of exposure and simultaneous exposure to multiple frequency fields.
 - The direct biophysical effects
 - The indirect effects
 - Emission information and other safety related data provided by the manufacturer or distributor of equipment used by the employer;
 - Sector or industry standards and guidelines, eg AURPO guidance notes on use of non-ionising radiations in research and teaching (.pdf);
 - The [EU \(non-binding\) EMF Practical Guide to Good Practice](#);
 - The HSE HSG 281. [A Guide to the Control of Electromagnetic Fields at Work Regulations 2016](#)
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- Even if your assessment shows you're in compliance with the ALs and ELVs, you must give special consideration to the safety of people at particular risk, such as pregnant women or those with medical devices.
 - Exposure to EMF can interfere with the normal operation of medical devices causing them to malfunction or cause injuries. They are active implanted medical devices (AIMDs), passive implanted medical devices (PIMD), body worn medical devices (BWMD) or items that may contain ferromagnetic materials in the body. Below are examples of common devices.

Active implanted medical devices	Passive implanted medical devices	Body worn devices
Cardiac pace makers	Orthopaedic implants or joints	Insulin pumps
Implantable cardiac defibrillators	Pins, plates, screws	Hormone infusion pumps
Cochlea implants	Surgical staples and slips ie tubal ligation clips – used in female sterilisation and aneurism clips	Hearing aids
Brainstem implants	Stents	Continuous glucose monitoring
Inner ear prostheses	Heart valve prostheses	Metalized drug delivery patches (over the counter or prescription)
Neurostimulators	Annuloplasty rings	-
Retinal encoders	Intrauterine contraceptive device (IUD) or other metallic contraceptive device	-
Implanted drug infusion pumps	Penile implants used to treat erectile dysfunction	-

Before work starts, those who have been identified as at risk must complete the Electromagnetic Fields (EMF) Health Screening Form and return it to the University’s Occupational Health Service to ensure it’s safe for them to work. Once this has been completed they can be registered with the department.

- The responsible person for the EMF source will identify authorised EMF workers and ensure they are registered in the department with the RPA. Anyone intending to work with any hazardous sources or could be exposed to EMF during other work activities should be registered. The department will maintain an up to date record of departmental EMF workers and have it available to the University RPA.
- If you believe you may have been over exposed to EMF you should seek medical assistance immediately. You should know your emergency details because they are part of the departmental controls.

Health and safety incidents should be reported as soon as possible to the faculty safety advisor using the University's health and safety [incident reporting procedure and forms](#). Health surveillance advice will be sought from the University's Occupational Health Service where any employee is exposed to EMFs above the health exposure limit value and reports experiencing an undesired or unexplained health effect which is suspected of being associated with the exposure.

TRAINING

- All staff are required to read this procedure and risk assessments associated with the work.

FORMS

EMF health screening form [Link](#)

RELATED DOCUMENTS

Further information

- [HSE website on Electromagnetic fields](#)
- [A Guide to the Control of Electromagnetic Fields at Work Regulations 2016](#)
- [The Electromagnetic Fields \(EMF\) Directive and current information](#)
- [RR1018 – Electromagnetic Fields \(EMF\) in the welding environment](#)
- [Control of Electromagnetic Fields at Work Regulations 2016](#)
- [Electromagnetic fields in working life. A guide to risk assessment](#)