Health&Safety recap

Radiations

Every day in the United Kingdom, a wide range of radiation types are used in industrial, medical, research and communications applications. Some of these applications cause harmful exposure risks that must be effectively controlled.

What are the main types of radiation?

Radiation is generally classed as either 'ionising' or 'non-ionising', with the former generally having more energy than the latter.

Ionising radiations
These include X-rays, gamma rays and particulate radiation (alpha, beta and neutron radiation) produced from X-ray sets or radioactive substances.

They are typically used in medical exposures, industrial radiography equipment and gauges used in industry for process control, but may also be produced from naturally occurring radioactive substances, including radon gas.

Non-ionising radiations

- Radiofrequency and microwaves, such as those emitted by plastic welding and some communications transmitters.
- Infra-red rays, such as those from very hot, glowing sources in glass and metal production.
- Ultraviolet (UV) rays, such as those from welding or the sun.
- Visible radiation from high-intensity light sources, such as lasers.

What are the hazards?

- Ionising radiations can cause dermatitis, burns, cell damage, cataracts and changes to blood chemistry.
- Microwaves and radio frequencies can cause heating of any exposed part of the body.
- Infra-red rays can cause skin burns and cataracts.
- UV light can cause skin burns, skin cancer, conjunctivitis and arc eye.
- Lasers can cause permanent, severe damage to the eye and skin.

Exposure to ionising and UV radiation can damage DNA and can cause health effects, such as cancer, later in life. The risks are small for low levels of exposure but exposure to high levels of ionising and non-ionising radiations can cause acute effects such as burns and tissue and organ damage.

What do I have to do?

Identify all sources of ionising and non-ionising radiation in your workplace and the risks they pose. Once you have identified the significant risks, you must control them.

Try to reduce any exposure to ionising and UV radiation as far as possible. For example, you may be able to use safer alternative processes or equipment, such as ultrasonic, non-destructive testing instead of X-rays.

the law

England, Scotland and Wales
The Ionising Radiations Regulations 1999 apply to most work with ionising radiations, including exposure to naturally occurring radon gas.

The Control of Artificial Optical Radiation at Work Regulations 2010 require businesses with hazardous sources of bright light (such as lasers and welding processes) to ensure their workers' eyes and skin are protected.

Northern Ireland
The Ionising Radiations Regulations (Northern Ireland) 2000

The Control of Artificial Optical Radiation at Work Regulations (Northern Ireland) 2010

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Dos and don'ts of radiation safety

Do...

- Be aware of the different potential sources of radiation in your workplace, particularly all sources of ionising radiations, UV light and high-power lasers.
- Consider getting advice from a radiation protection adviser (RPA); this is a legal requirement when working with ionising radiations.
- Consider whether staff should be subject to medical surveillance. An RPA will help with this.
- Consider radon gas exposure as part of your risk assessment. This is naturally occurring and may be present in your workplace even if you don't do any other work with radiation.
- Ensure appropriate shielding and personal protective equipment is used to reduce exposure when working with ionising radiation and to protect the skin and eyes when working with hazardous sources of infra-red and UV.
- Seek expert advice where lasers are used for displays (such as at bars, nightclubs and stage shows) and where there could be a risk to the public.

Don't...

- Override any interlocks preventing access to high-voltage electrical equipment, X-ray cabinets, laser enclosures or machinery containing lasers.
- Use potentially harmful germicidal UV lamps as replacements in otherwise safe insect-killing devices or other fluorescent light fittings. Make sure you replace these with the correct type specified by the manufacturer.

Remember…

The Radiation (Emergency Preparedness and Public Information) Regulations 2001 may apply if your work with ionising radiations could produce a radiation emergency (that is, an event that could lead to a member of the public receiving a dose of ionising radiation above certain levels).

Businesses are required to manage general risks in the workplace. This includes sources of non-ionising radiation, such as electromagnetic fields (EMFs). The HSE currently advises employers to use the recommendations of the International Commission on Non-Ionising Radiation Protection (found at www.icnirp.org) as the basis for assessing the risks arising from exposures to EMFs.

Case Study #1:

Scenario – X-Rays	How to Prevent the Accident
A scrap metal dealer bought a hand-held X-ray fluorescence analyser (sometimes called an XRF gun) to analyse the alloy content in scrap. These guns generate an intense beam of X-ray radiation at the front end of the equipment, and also result in a scattering of X-rays when they strike the test material. When used properly, pointing away from all parts of the body, the radiation risks to operators and others will be minimal. However, if the equipment is damaged, incorrectly set up or misused, there is the potential for exposure to high-radiation fields.	The manager of the scrap yard consulted an RPA, who helped the company carry out a risk assessment. The assessment recommended that workers be trained in how to use the analyser safely and not to operate the gun without fully covering the X-ray aperture, or to hold the item being tested in their hand. Users were also trained in what to do if the analyser was dropped or damaged. They were advised to buy an interlocked test box from the suppliers so they could test small parts safely. The RPA also agreed to measure the dose rates of the device in use to help the business meet its legal requirements. By taking this action, the employer ensured that his workers and others were protected.

Case Study #2:

Scenario – Radon	How to Prevent the Accident
After media reports claiming some homes were prone to radon, the manager of a local engineering firm was approached by a number of workers wanting assurances that they were not at risk while at work. The manager used the Health Protection Agency's website to confirm the premises were in a Radon Affected Area, and that many employees spent their working day in ground-floor rooms, where radon gas is more likely to accumulate.	The manager used the HSE's guidance to carry out a radon assessment, which included making measurements. The results showed very high levels (and possibly significant radiation doses) in two rooms. He consulted an RPA on how to reduce his employees' exposures. Following this, he contacted a radon remediation specialist, who quickly installed a simple, underfloor sump/extract system to prevent the gas from entering the premises. Repeat measurements showed this was extremely effective in affording long-term protection, as the levels of radon were now very low.