ELEMENT 8 – PHYSICAL AND PSYCHOLOGICAL HEALTH HAZARDS AND RISK CONTROL

8.1 Outline the health effects associated with exposure to noise and appropriate control measures.
8.2 Outline the health effects associated with exposure to vibration and appropriate control measures.
8.3 Outline the health effects associated with ionising and non-ionising radiation and appropriate control measures.
8.4 Outline the meaning, causes and effects of work-related stress and appropriate control measures.

8.1. NOISE

Noise is the result of air being continuously compressed followed by rarification, the frequency or number of compressions per second will determine the pitch, the pressure exerted will determine the loudness.

Example: A high pitch noise, like a high note on a piano, will be at a far higher frequency than a deep rumble of thunder.

Noise is an unwanted sound which has the potential to cause injury. Noise levels of over 80 decibels at the A weighting (dB(A)) are believed to damage the hearing mechanism. Noise damage is usually accumulative and can occur over a long period of time.

The sounds which can be detected by the human hearing mechanism are over a vast **frequency** range, if measured in Watts /m^3 they would range from 0.000 000 000 001 to 1 Watt. Therefore to simplify measuring sound we use the **Decibel**, this ranges from 0, which is the threshold of the human ear, upwards, at 140 dB the human ear can be damaged and the threshold of pain is reached. The decibel measures the **intensity** of the sound energy or loudness. The **pitch or frequency** of the sound is measured in Hertz, the higher the number of cycles, the higher the pitch of the sound.

The (A) weighting, also used with the term dB, refers to a special filter which adapts a noise meter to ensure it only picks out the sounds heard by the human hearing mechanism and not sounds which the human hearing mechanism cannot hear.

Exposure to noise can be measured in dB (A) as at one moment in time but noise can also be measured to give a person's exposure over an eight hour shift. This is shown as L_{epd}. (Long Term Exposure Period) or Lex (length of exposure) e.g. 87 dB(A) lepd 8 hours.

The loudest or peak noise is shown as dB(C).

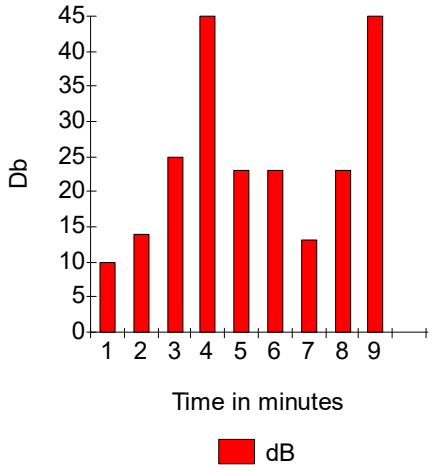
8.1.1. DECIBELS MEASUREMENTS - A few examples

Task	Avg. Noise Level (dBA)
Operating forklift	87
Cutting Wood	93
Cutting lawn	94
Installing trench conduit	95.8
Welding	98.4
Grinding	99.7
Chipping Concrete	102.9
Working near generator	116

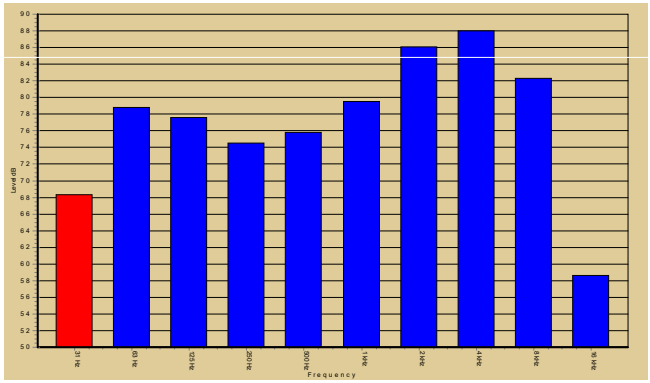
8.1.2 MEASURING NOISE

The first graph below shows noise levels in decibels as recorded with a basic integrating noise level meter, the second graph shows a frequency band analysis; this is a more detailed assessment where the pitch or tone of each sound is recorded separately.

Noise Measurements



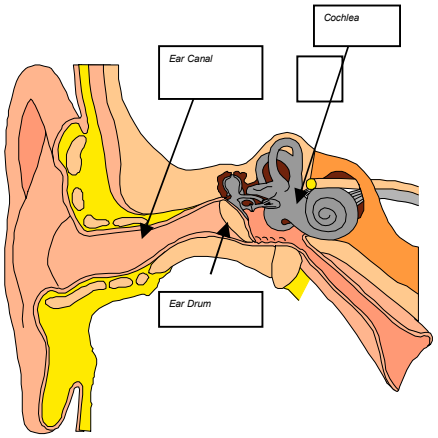
Frequency Band Analysis



8.1.3 THE HEARING MECHANISM

The following explanation is a simplified explanation of how humans hear.

The sound wave travels through the pinna (outer ear) down the ear canal, vibrating the ear drum. This vibration is passed on through the three little bones (hammer, anvil, stirrup) into the cochlea. In here there are millions of little nerve endings which detect sound of different pitches. As they detect relevant sounds they sway and create an electric signal which is sent to the brain, thus we hear.



8.1.4 WHAT INJURIES CAN WE SUFFER?

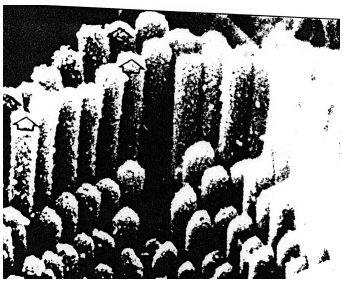
Temporary Threshold Shift

This is when the small nerve endings within the cochlea sway to pass on sound waves, however if they are subjected to loud noise for any period of time, these nerve endings will start to lean over, thus reducing our perception to sound.

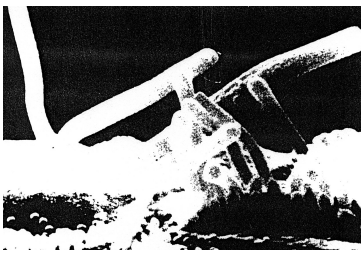
This explains why when listening to the car radio, after a short period of time the radio seems quieter, our natural reaction is to turn the radio up. If we forget to turn the radio off when we get out the car, the following morning the radio blasts out. The reason that this sounds so loud the following morning is because on the journey home we were experiencing a temporary threshold shift which reduces the ability to hear certain tones.

Noise Induced Hearing Loss

If we are subjected to noise levels on a continuous basis over a period of time, our nerve endings will not just bend over but will wear away completely. If this happens, our perception to sound is not just reduced but will be completely destroyed at the frequency of the noise experienced. There is no cure for noise induced hearing loss, even a hearing aid will not be able to restore our hearing sufficiently if the nerve endings have completely worn away.



Nerve Endings in Normal Position



Damaged Nerve Endings

Tinnitus

This is a ringing or buzzing in the ears, it can be brought on after being subjected to high and continuous levels of noise. The quieter the surrounding noise levels are, the louder the buzzing that is heard by the individual. There is no known cure for this condition however it can affect some people on a temporary basis. This can be an acute or chronic condition.

Presbycusis

This is the way in which we all naturally lose our perception to sounds in the higher frequency ranges. Even though this occurs naturally, it can be brought on prematurely by being subjected to noise.

Acute Acoustic Trauma

After a sudden explosion or very loud sound the hearing mechanism can be damaged irreversibly. This is an acute condition and can lead to total deafness.

Stress / Fatigue

Even low levels of noise at certain pitches can prove stressful and annoying in the workplace. People may lose concentration and therefore be more likely to have an accident.

Occupational Deafness

If a person loses a considerable amount of their hearing they may be eligible for a disability benefit. If sounds have to be 50 dB(A) before they can be heard by the individual this could be classified as occupational deafness if exposure to loud noise has been caused by work.

8.1.5 CONTROL OF NOISE AT WORK REGULATIONS 2005

These regulations set a number of different levels at which action must be taken by the employer.

Lower exposure action values

If the employee's daily dose is 80dB (A) daily or weekly or if there is a peak sound pressure of 135 dB(C) then the lower exposure action value is reached. The employer must then:-

- Carry out a suitable and sufficient risk assessment
- Takes steps to eliminate or if not possible take action so far as is reasonably practicable, to ensure the noise is as low a level as possible
- Provide ear defenders and make them available
- Provide health surveillance if they are identified as being at risk from the effects of noise
- Use and maintain equipment to reduce noise
- Employees to report any problems

Upper Exposure Action Values

If the employee's daily dose is 85dB (A) daily or weekly, or if there is a peak sound pressure of 137 dB(C) then the upper exposure action value is reached. The employer must then:-

- Carry out a suitable and sufficient risk assessment
- Take steps to eliminate the noise

- Establish a programme of organisation and technical issues to reduce exposure to as low a level as is reasonably practicable (hierarchy of control)
- Provide ear defenders and ensure they are used
- Set up noise zones with signs
- Prohibit entry unless ear defenders are used
- Provide health surveillance if they are identified as being at risk from the effects of noise
- Use and maintain equipment to reduce noise
- Employees to report any problems

Exposure Limit Values

Additionally there is a limit value of 87dB(A) daily; the employee must not be subjected to noise of over this level at their hearing mechanism. For instance if the noise level in the workplace is 120 decibels then hearing protection worn must reduce the noise at the ear to less than 87 decibels. The data from manufacturers can be used, taking into account whether the ear defenders when in good condition and properly worn will provide the protection required.

Finally no employee should be exposed to any noise levels of 140 dB(C) even for a millisecond.

8.1.6 NOISE RISK ASSESSMENTS (REG 5)

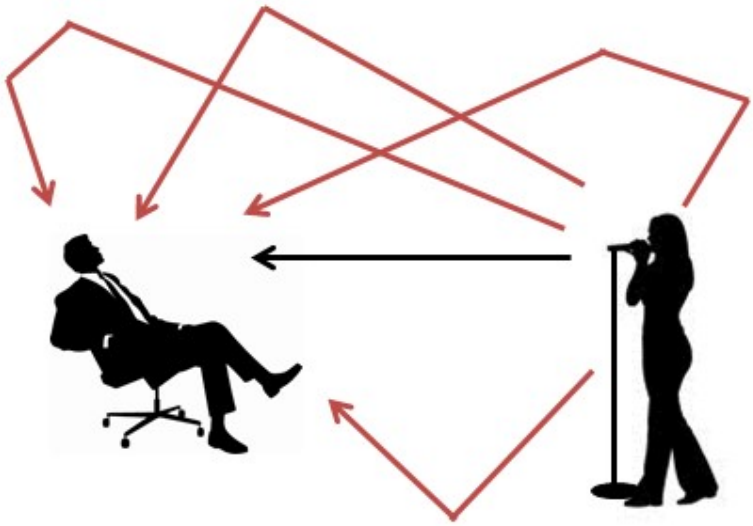
Any employer likely to expose employees to the lower action limit or above must complete a suitable and sufficient assessment of the risk.

This should consider:-

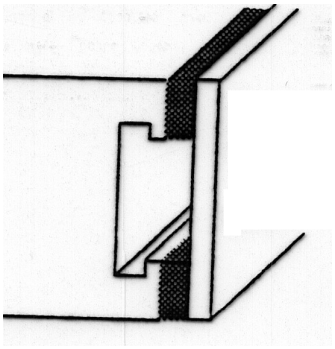
- Observation of working practices
- Information on equipment/noise sources
- If necessary measurement of noise
- Type, level and duration of noise
- Any peak sound pressures
- Employees at risk
- Effects of any substances which may increase in a noisy environment
- Indirect effects of noise (impact with vehicles etc.)
- Availability of equipment to reduce noise
- Extension of exposure (i.e. working double shifts)
- Reference to health surveillance findings

8.1.7 NOISE TRANSMISSION

Noise is transmitted by its source directly through the air, however it will also vibrate through the floor and reverberate from the ceilings and walls. All three paths must be considered when selecting the best way to reduce noise levels.



8.1.8 NOISE CONTROL METHODS

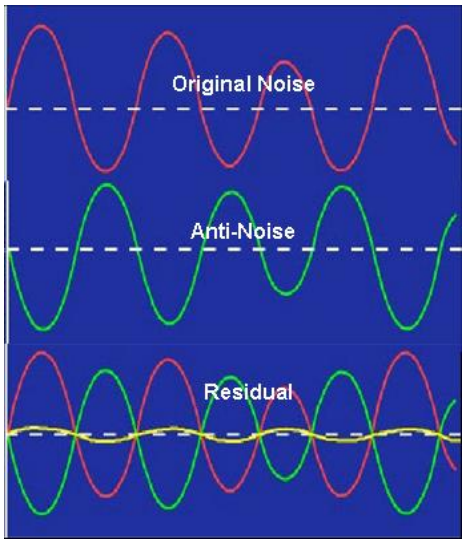


Design - design out noise sources.
Substitution - for example pressing instead of hammering.
Insulation - this provides a barrier to prevent noise energy passing through. High density, low stiffness materials are best e.g. lead, brick & concrete. Timber is a reasonable alternative.
Absorption - this principle is used to reduce noise energy reflected from surfaces (mineral wool/porous materials are best). This includes pipe lagging and ceiling baffles.
Damping - this can be used to reduce impact noise or to minimise noise radiating from vibrating surfaces. Springs and rubber mountings can be used, equally the surface of the material can be thickened as this makes it vibrate less, thus less noise is produced.

Isolation – this is where the noise/vibration is isolated from the surrounding surfaces, this could be the fitting of wooden pieces to a piece of metal which is vibrating, flexible pipes. Another form of isolation is where the machine is placed into a room or enclosure on its own.
Noise Enclosures - noise enclosures are commonly used to control noise exposure. They incorporate a combination of basic noise control principles such as insulation, absorption, damping and isolation. Basic features include a basic insulating shell composed of heavy insulating material with an inner absorptive lining.

Acoustic Screens/Barriers - these can be effective when placed close to the source or close to the recipient. Good sound-insulating materials provide the best screens. Reflecting surfaces should be lined with sound absorbing material.
Silencers - silencers are used to reduce air noise by progressive absorption either by lining a duct with absorbing material.
Baffles – to absorb the sound before it reaches the walls and ceiling**.** (See picture).
Distance - moving people away from noise sources can be a cheap and effective means of reducing exposure.

Sound Havens - these enclose the people rather than the noise source.
Maintenance/Cleaning - lack of maintenance is a frequent cause of unnecessary noise exposure.
Anti-noise - a recently developed technique using noise interference to produce another sound wave which is the exact opposite of the original sound wave. The two waves cancel each other out and remove the noise.



Administrative options

These can include:-

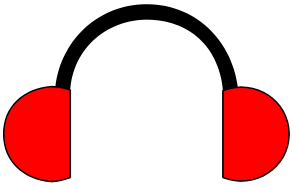
- Reducing the use of noisy equipment
- Purchasing of noise-controlled new machinery
- Restricting access to noisy areas

8.1.9 HEARING PROTECTION

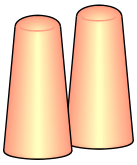
For circumstances where it is not reasonably practicable to achieve sufficient reduction of high noise levels, ear protection can be used to reduce employees' exposure.

There are essentially three types: **muffs, valves and plugs**. Their selection depends on the nature and level of noise, the protection afforded, compatibility with work and other protective equipment, fit, comfort and individual preferences.

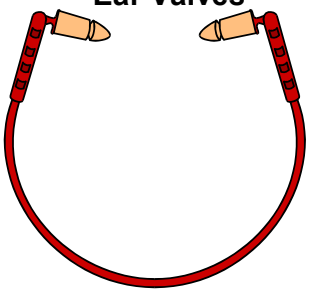
Ear Muffs



Ear Plugs



Ear Valves



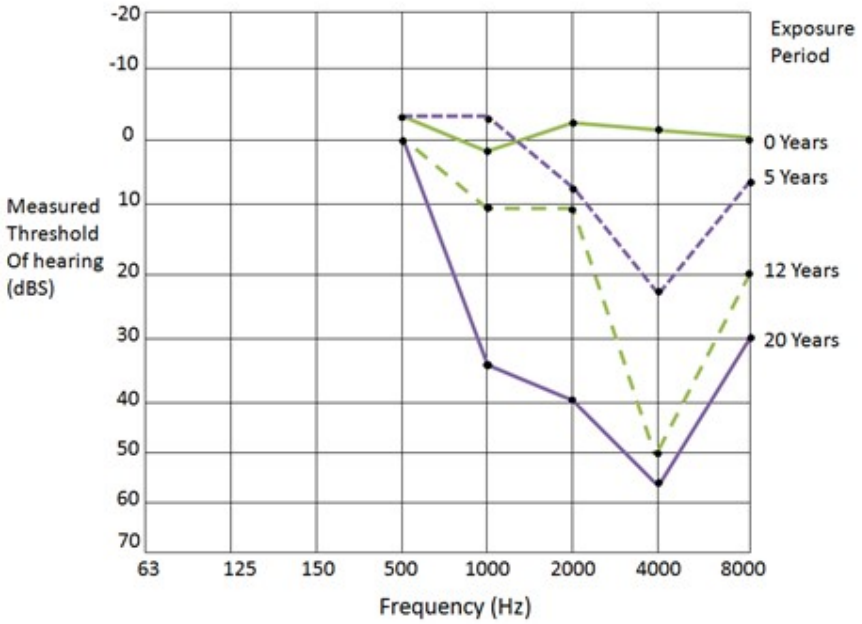
It is insufficient both in terms of protection and legal duty to simply issue hearing protection. Where it is decided that ear protectors are necessary, an appropriate hearing protection programme should be introduced. Issues to be considered include selection of equipment, involvement of employees, education and training, and clear instruction as to use of equipment. Responsibilities need to be clarified on administrative details for issue, storage etc.

Supervision is important as well as reinforcement of training. Records should be kept and the programme timetable kept under review. Audiometry can provide a means of establishing just how well the programme is working.

8.1.10 AUDIOMETRY – HEALTH SURVEILLANCE

- To measure hearing by sending tones to each ear through headphones
- To show how one's hearing compares to normal hearing based on age
- To determine whether hearing is being conserved

- To alert employee and employer for noise, age or medical-related hearing loss



Noise-induced hearing loss

Audiometry refers to the measurement of the hearing acuity of exposed individuals. Measurements are taken for each ear, in octave bands. Audiometry is now a requirement as part of health surveillance for those specifically at risk identified under the Control of Noise at Work Regulations.

Audiometry measures hearing loss and
s between presbycusis, noise-
ss and disease-related hearing

Audiometry allows:

– *Establishment of baseline hearing levels (pre-employment or at start of employment)*
– *Check whether controls are adequate*
– *End of employment testing, in case of litigation*

Audiometry limitations

– *Not preventative*
– *May precipitate claims*
– *Doesn't identify source*
– *Possible inaccuracies*
– *Needs expertise and good facilities*

8.2 THE RISKS OF VIBRATION

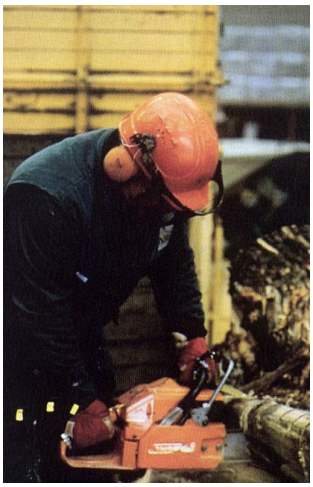
Hand Arm Vibration (HAV) is vibration transmitted from power tools such as road breakers and lawn mowers or by holding materials being processed by machines such as grinders.

Regular and frequent exposure to high levels of vibration can be hazardous, infrequent use should not cause a problem.

The main symptoms are pain and numbness, loss of the sensation of touch, pins and needles and loss of grip. This may make it difficult and painful to handle tools and equipment.

The following types of equipment can expose operators to high levels of hand arm vibration:-

- Chain saws
- Abrasive wheels
- Hammer drills
- Hand held grinders or sanders
- Concrete breakers
- Powered lawnmowers & strimmers



Most manufacturers are trying to reduce the amount of vibration their tools produce but it is important that new equipment be assessed prior to purchase. This is to ensure that it is suitable for the task and that it does not present a vibration risk to its user. The lowest vibration level should be selected, this is normally measured in metres per second.

Whole body vibration can lead to nausea and sickness, this can be caused by driving vehicles such as tractors, lorries and rider-operated mowers.

8.2.1 THE CONTROL OF VIBRATION AT WORK REGS 2005 – OVERVIEW

- Exposure limit values and action values set where the employer must take action to manage the risks
- Assessment of the risk to health created by vibration at the workplace where there is a risk of injury.
- Elimination or control of exposure to vibration at the workplace.
- Health surveillance for those at risk
- Information, instruction and training for employees.

Exposure Limit Values and Action Values

For hand-arm vibration -
(a) the daily exposure limit value is 5 m/s2 A(8) – must not be exceeded
(b) the daily exposure action value is 2.5 m/s2 A(8) – manage the risks

For whole body vibration -
(a) the daily exposure limit value is 1.15 m/s2 A(8) – must not be exceeded
(b) the daily exposure action value is 0.5 m/s2 A(8) – manage the risks

Suitable and Sufficient Assessment of the Risks

This needs to be done by observation of specific working practices, referring to manufacturer's guidance and if necessary a measurement of the vibration likely to be above the exposure action value or above an exposure limit value.

Risk Reduction Measures

This must include considering the elimination of the risk or reducing exposure to the lowest level possible. Where an exposure action value is likely to be reached or exceeded, the employer shall reduce exposure to as low a level as is reasonably practicable by establishing and implementing a programme of organisational and technical measures appropriate to the activity.

8.2.2 CONTROLLING THE RISKS

The risks of vibration must be assessed and steps taken to reduce and manage the risk which will include:-

- Providing suitable equipment – newer versions of equipment may vibrate less
- Maintaining and lubricating equipment
- Providing information to employees on the safe use and health risks involved
- Providing training to employees on the sources of hand-arm vibration, the health effects, risk factors, how to recognise signs of injury and ways to minimise the risks.
- Providing health surveillance to those at greatest risk. (e.g. questionnaires, visual checks on hands and clinical tests to check the nerves in the fingers and hands.)
- Minimising the time spent using high vibrating equipment – job rotation
- Design the job so it can be completed with good posture
- Replacing vibration mounts before they are worn out
- Keeping tools sharp
- Ensuring rotating parts are balanced on a regular basis
- Can extra anti-vibration mounts be fitted?
- Equipment with heated handles – to keep fingers warm and improve circulation
- Gloves to keep hands warm – helps to improve circulation
- Regular breaks
- Reducing trigger times – the actual time the device is on and being held

8.2.3 WHOLE BODY VIBRATION

Although less common than HAV, whole body vibration (WBV) may cause musculoskeletal disorders. Typically this affects drivers of lorries, tractors, off-road vehicles, etc. The Control of Vibration at Work Regulations 2005 set an exposure limit and action value for whole body vibration. However, for agricultural equipment put in to use before 2007, the exposure limit did not come in to force until 2014.

- exposure action value (EAV) of 0.5 m/s^2 *A*(8)
- exposure limit value (ELV) of 1.15 m/s^2 *A*(8).

Some machines which typically cause high levels of whole body vibration include:

- Mobile crushers
- Compactors
- Punching/hammering machines
- Construction vehicles
- Quarrying machinery
- Agricultural vehicles
- Forestry vehicles

WBV can cause harm in a number of ways, principally:

- Motion sickness (low frequency)
- Abdominal pain / digestive disorders.
- Urinary problems.
- Balance, headaches and visual problems.
- Usually damage to the spine
- Vertebrae and disc damage
- Severe chronic back pain
- Arthritis

How could an employer in agriculture reduce the risks to his workers from WBV when using tractors?

Isolation of cab from body

Isolation /damping of vibration from engine

Isolation of seat and controls

Damping of vibration from wheels

- Maintenance
- Consideration of ground conditions
- Usage time
- Careful selection on basis of vibration levels
- Health surveillance

Correct Inflation of tyres

- Training and awareness of users
- Speed restrictions
- Right vehicle for the job

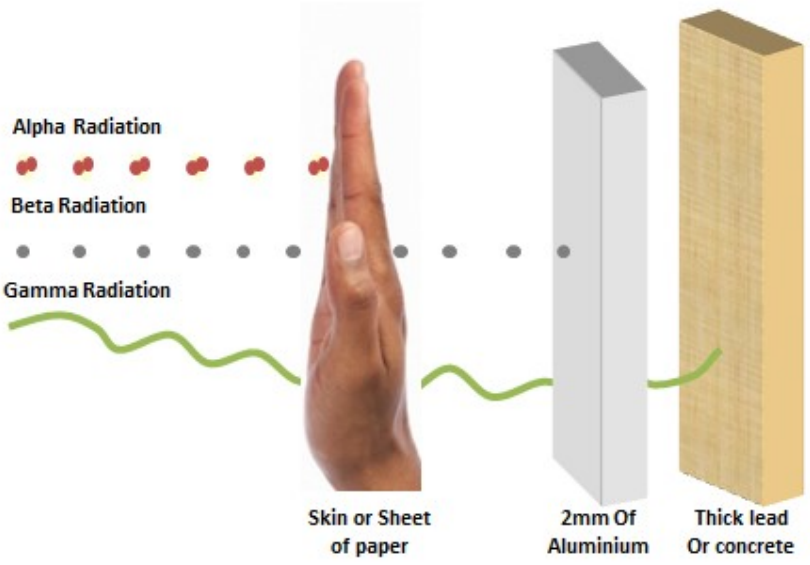
8.3 IONISING RADIATION

This is energy which is transmitted or emitted in wave or particle form, electromagnetic radiation. There are two main types: ionising and non-ionising, with quite varying effects on living tissue.

Ionising is high power radiation which has the power to bring about changes in the very structure of matter, e.g. atoms. Radioactive isotopes are unstable and emit radiation. All ionising radiation has short wave lengths.

Non-Ionising radiation has long wavelengths and does not have the power to ionise matter and mainly generates heat.

Most elements are made up of stable atoms but there are some which are unstable, these are known as radioactive and they transform or decay to loose their energy. (e.g. uranium). During this process radiation can be emitted as either particles or waves. The smallest particle is the atom, this is made up of at least one Electron (-), Proton (+) & Neutron. The electrons orbit around the neutron and proton, which are in the centre of the atom. Nuclear atoms are positively or negatively charged, stable atoms are neutral.



Alpha particles – these are relatively slow moving and can penetrate only into the surface of the skin. As such having skin protection can reduce the risk, however if these particles are inhaled or ingested into the body they can be harmful because their effects are more concentrated in one area.

Beta Particles – these are high speed electrons which can penetrate into the body to around 5mm in depth.

Gamma Rays – these are small packets of energy which are emitted in waves. They are high powered and can pass through a human body and most other materials. These are often used in non-destructive testing of components as they have the ability to penetrate through and identify whether there are any faults below the surface.

X rays – These rays are produced by high speed beta particles and can also penetrate through the body.

Radon Gas - Radon-222 is one of the decay products of uranium-238 which occurs naturally in many rocks and soils. Radon is a gas and high levels within the air in soil are possible, especially if the local **geology contains rocks** with higher levels of uranium. **Granite** tends to have high levels of uranium and so radon levels are particularly high in some granite areas within the UK.

Radon can seep out of the ground and build up in confined spaces. High concentrations can also be found in buildings because they are usually at slightly lower pressure than the surrounding atmosphere and so tend to suck in radon (from the soil) through cracks or gaps in the floor. Buildings with cellars and basements are at specific risk.

Most radon gas breathed in is immediately exhaled and presents little radiological hazard. However, the decay products of radon (radon daughters) are solid and are themselves radioactive. These decay products attach to atmospheric dust and water droplets which can become lodged in the lungs and airways when breathed in. They are thus likely to irradiate the respiratory tract. Some radon daughters are alpha emitters and will cause significant damage to the cells of the respiratory tract. Radon gas is measured in Becquerels per cubic metre, Bq/m 3 (i.e. air activity concentration).

Radon is now recognised to be the second largest cause of lung cancer after smoking and is estimated to cause 2,500 cancer related deaths in the UK every year. Radon contributes by far the largest component of background radiation dose received by the UK population.

Radon is a radioactive gas that comes from the natural decay of uranium found in nearly all soils. It typically moves up through the ground and into the air entering buildings through cracks and other holes in the foundations. Any home, workplace or school may have a radon problem including new or old, well-sealed or drafty homes or buildings with or without basements.

Radon gas from the soil produces the highest levels, however, in a limited number of cases radon can enter a building through the water supply.

Radon enters a building through:

- Cracks in solid floors
- Construction joints
- Cracks in walls
- Gaps in suspended floors
- Gaps around service pipes
- Cavities inside walls
- The water supply

It's estimated that nearly 1 out of every 17 buildings in Europe harbour elevated levels of radon gas. Whilst radon can be a particular problem in certain high risk areas elevated levels can be found in almost any building in almost any area.

8.3.1 ILL-HEALTH EFFECTS

Ionising radiation can have varying effects on the individual exposed this can include burns, nausea, vomiting, leukaemia, cell destruction, cancer and ultimately death.

Radiation also has the ability to affect an individual's offspring; high exposure can lead to damage to reproductive cells, change in sex ratio of off-spring and an increased risk of miscarriage.

The amount of radiation absorbed into the body will depend on the distance from the source, its strength and the adequacy of any shielding or control measures. Although there is great concern about the risk of ionising radiation most people will receive a higher dose from medical treatment and natural sources (radon gas) than they will from the discharges from a nuclear power plant.

There are a range of different scales used to measure radiation, these include the Curie, Becqueral, Gray and Sievert.

8.3.2 OVERVIEW OF IONISING RADIATION REGULATIONS 2017

Principles

- every practice must be justified
- all exposures as low as reasonably possible
- the sum of the dose must not exceed certain limits

Authorisation This must be sought to carry out certain processes where ionising radiation will be used e.g. medical treatment, processing of products

Notification Except small low risk sources, in all instances of using Ionising radiation the employer must notify the HSE (nature, source, strength). Any changes must also be notified.

Risk assessment Before new activities begin – to prevent accidents, limit consequences and give sufficient information, instruction and training to staff.

Restrict exposure All reasonably practicable steps to restrict employee exposure

Engineering controls:

- shielding
- containment
- minimise contamination
- systems of work
- ventilation
- safety features & warning devices
- PPE

Employees must take reasonable care & use PPE provided.

Maintenance and examination of engineering controls and PPE.

No eating, drinking or smoking in controlled areas

Dose limitation - dose limits 20 m Sv / Year (Other limits for lens of eyes, skin & abdomen, trainees, women of reproductive age and members of the public)

Co-operation between employers: where employees using radiation are from different organisations (e.g. several NHS trusts all sharing one X-Ray unit)

Designated areas Controlled Area where more specific controls are required.

- Access to classified workers only
- Restrict access unless under written system

Key People

Classified worker – This is a person who may receive a dose of greater than 6 mill sieverts in a year or someone who may be subject to over 30% of any dose limit. These people must receive regular medical surveillance from a qualified doctor.

Radiation Protection Adviser – to oversee arrangements within the organisation

Radiation Protection Supervisors – for local areas / departments to co-ordinate safe working practices.

REDUCING THE RISKS OF RADON GAS

The most effective way to deal with radon is to fit a 'radon sump' to a property to vent the gas into the atmosphere. A sump has a pipe connecting a space under a solid floor to the outside. A small electric fan in the pipe continually sucks the radon from under the house and expels it harmlessly to the atmosphere. Modern sumps are often constructed from outside the building so there is no disruption inside.

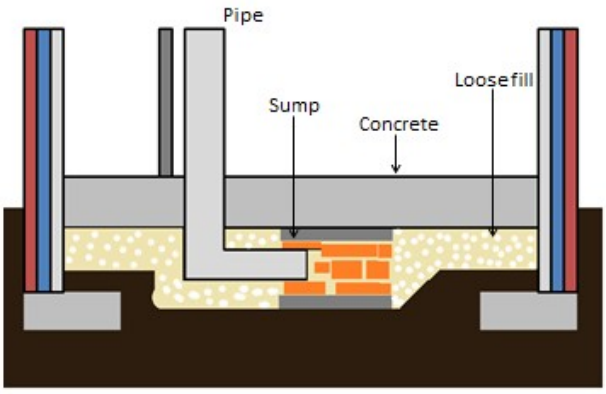
Radon enters a building primarily by airflow from the underlying ground and protection measures for reducing levels inside workplaces vary depending upon the severity of the problem and the type of building construction. New buildings can be protected during construction by installing a ‘radon proof barrier/ membrane’ within the floor structure and, in more seriously affected areas, provision of a ventilated sub-floor void or a 'radon sump'

A radon sump is a small, bucket sized, cavity under the floor with an electric pump drawing air from it. This reduces the normal under floor pressure with respect to radon in the soil and vents the radon gas outside the building where it quickly dissipates.

In existing buildings, it is not possible to provide a radon proof barrier and so alternative reduction measures are used depending upon the severity of the problem. Such measures include improved under floor and indoor ventilation in the area, sealing large gaps in floors and walls in contact with the ground, positive pressure ventilation of occupied areas, and installation of radon sumps and extraction pipe work.

If it is necessary to reduce radon levels by engineered means, the employer should ensure that the radon levels in the area are remeasured immediately after installation in order to verify its effectiveness.

Radon pump diagram



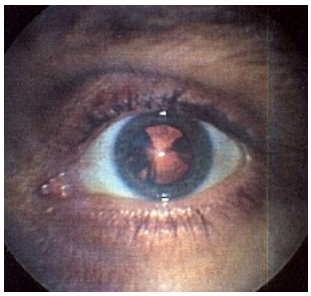
8.4 NON-IONISING RADIATION

8.4.1 Ultra Violet

This form of radiation lies midway in the spectrum between non-ionising and ionising radiation and as such has both capabilities but is mainly non-ionising. It is the radiation associated with the blue light seen from electric arc welding or sun lamps. The main parts of the body at risk are the eyes (retina, cornea & lens) and the skin.

Sources:

- Electric arc welding
- Sun light
- Mercury lamps



Injuries:

Cornea – photokeratatis – pains and spasms in the eye
Lens – cataracts
Retina – burns

8.4.2 Infra Red

This is the heat given off from processes which can heat the body's temperature. The eye again is at risk as it does not have an effective way of cooling itself. Injuries include cataracts, retina damage and burns.

Sources:

- Sunlight

- Welding
- Glass blowing

Injuries: Lens – cataracts, retina damage, skin burns, heat exhaustion & dehydration

8.4.3 Lasers

This is the “Light Amplification by the Stimulated Emission of Radiation” or laser for short. Lasers are a concentrated beam of light and can be produced from UV, IR and visible light. As such not all lasers are visible, these can be very dangerous if not controlled.

Lasers are classified according to the danger they present (BS7192). Low power lasers can damage the eye but blinking will give some protection, high power lasers will damage the eye and blinking affords little protection – as such lasers should never be set at eye level.

Sources - surgery/ CD players/ pointing devices / printers

Injuries: Burns to skin and eyes in particular.

8.4.4 Radio / Micro Waves

These are waves which have the ability to heat tissue, they can also cause cataracts and tissue damage.

Sources: Radio transmitters / RADAR / industrial plastics sealing / cooking

8.4.5 GENERAL CONTROLS FOR NON-IONISING RADIATION

- Personal Protective Equipment – goggles with suitable filters, face shields, gloves, sun block
- Reduce exposure times
- Contain source – maintenance of seals
- Shielding and non-reflective surfaces
- Increase distance from source
- Signs – lasers in particular
- Limit access

Radiation Exercise Answer

Radiation Type	Sources	Possible injuries	Controls
Alpha / beta particles	Radioactive waste – nuclear power	Cell destruction, radiation sickness, diarrhoea, cancer, leukaemia	Minimise source strength, safe systems, limit access, reduce exposure time, PPE, training, sealed sources
Gamma Rays	Medical photography Testing of metal components	"	"
X Rays	Radiography, Dentists	"	Lead aprons, training, isolation, monitor exposure, PPE
Ultra Violet	Mercury lamps Sun lamps The sun Electric arc welding	Skin cancer Cornea damage Arc eye Premature aging of skin	Photo electric monitors, film badges, PPE, protective cream, reduce exposure time, goggles, visors.
Infra red	Molten glass Oxyacetylene welding Furnaces Sunlight	Retina damage Cataracts Burns Heat exhaustion Dehydration	PPE – body protection Increase distance Work breaks Ventilation
LASERS	Medical processes, cutting	Burns Eye damage	PPE, limit access, safety signs, no lasers at eye level, PPE
Radio waves	Radio & TV transmitters Radar Telecom Cookers	Heating of tissue Cataracts Nervous system damage Tissue damage	Isolate Testing of equipment Training PPE Increase distance

8.5 STRESS

Stress is becoming the biggest cause for concern due to the millions of days lost from work being recorded every year. Stress is in fact not an illness but a reaction to certain situations. Different people can accept different amounts of stress, what one person may find stressful another may readily accept as part of their role. Stress is a normal reaction to a situation, however, adverse levels of stress can affect human performance and health.

Job factors can contribute towards stress levels, these can include poor working conditions, working long hours or doing repetitive work. If the person is not clear about their role, its aims and objectives, this can make completing a task to the accepted standard difficult. Pressure outside work can also prove stressful, issues such as changing jobs, moving house and Christmas can be some of the most stressful activities people find themselves involved in.

8.5.1 What is stress?

The stress response is a package of physiological changes which have the general effect of preparing us for action. It is potentially damaging if it continues for too long. What makes an individual a bad stress risk is not so much the size of their initial response to stress as the fact that their nervous system is slow to return to its resting, unstressed state.

Anything and everything that forces us to adapt, react or make any significant adjustment is a stressor i.e. a source of stress, according to the definition used by doctors and psychologists.

8.5.2 Typical causes of workplace stress

- Not having the right skills for the job
- Working too many hours
- Finding the job too easy - just as stressful as a job they cannot cope with
- Lack of recognition from manager / organisations
- Lack of responsibility
- Lack of autonomy
- Threat of redundancy

8.5.3 Recognising the symptoms of stress

Your own body functions as an effective early-warning system. The most important physical warning signs are: chest pains, diarrhoea persisting for more than a few days, headaches, indigestion, insomnia, palpitations and tiredness.

There are also mental signs that the pressure is too great: inability to relax properly at any time, irritability and short-temper, inability to concentrate, impulsive behaviour, inability to finish tasks which you have started, uncontrollable emotions, for example crying, and over-reacting to small things.

8.5.4 HSE Standards

The HSE have published a number of publications designed to assist employers in managing these risks, a number of stress standards have been developed to give guidance on specific areas such as:-

- Workload & demands
- Control & support
- Relationships
- Clarify role

- Organisational change
- Recruitment & selection
- Work related training
- STRESS awareness
- Rehabilitation
- Counselling/employee assistance

WORKLOAD & DEMANDS

Includes issues like workload, work patterns, and the work environment
The standard is that:

- Employees indicate that they are able to cope with the demands of their jobs; and systems are in place locally to respond to any individual concerns.

What should be happening / states to be achieved:
- The organisation provides employees with adequate and achievable demands in relation to the agreed hours of work
- People's skills and abilities are matched to the job demands
- Jobs are designed to be within the capabilities of employees and
- Employees' concerns about their work environment are addressed

CONTROL

How much say the person has in the way they do their work. The standard is that:

- Employees indicate that they are able to have a say about the way they do their work and
- Systems are in place locally to respond to any individual concerns

What should be happening / states to be achieved:

- Where possible, employees have control over their pace of work
- Employees are encouraged to use their skills and initiative to do their work
- Where possible, employees are encouraged to develop new skills to help them undertake new and challenging pieces of work
- The organisation encourages employees to develop their skills
- Employees have a say over when breaks can be taken; and
- Employees are consulted over their work patterns

SUPPORT

Includes the encouragement, sponsorship and resources provided by the organisation, line management and colleagues

The standard is that:

- Employees indicate that they receive adequate information and support from their colleagues and superiors and
- Systems are in place locally to respond to any individual concerns

What should be happening / states to be achieved:
- The organisation has policies and procedures to adequately support employees
- Systems are in place to enable and encourage managers to support their staff
- Systems are in place to enable and encourage employees to support their colleagues

- Employees know what support is available and how and when to access it
- Employees know how to access the required resources to do their job and they receive regular and constructive feedback

RELATIONSHIPS

Includes promoting positive working to avoid conflict and dealing with unacceptable behaviour.

The standard is that:

- Employees indicate that they are not subjected to unacceptable behaviours, e.g. bullying at work and
- Systems are in place locally to respond to any individual concerns
  What should be happening / states to be achieved
- The organisation promotes positive behaviours at work to avoid conflict and ensure fairness
- Employees share information relevant to their work
- The organisation has agreed policies and procedures to prevent or resolve unacceptable behaviour
- Systems are in place to enable and encourage managers to deal with unacceptable behaviour and
- Systems are in place to enable and encourage employees to report unacceptable behaviour

ROLE

Whether employees understand their role within the organisation and whether the organisation ensures that the worker does not have conflicting roles.

The standard is that:

- Employees indicate that they understand their role and responsibilities
- Systems are in place locally to respond to any individual concerns

What should be happening / states to be achieved:

- The organisation ensures that, as far as possible, the different requirements it places upon employees are compatible
- The organisation provides information to enable employees to understand their role and responsibilities
- The organisation ensures that, as far as possible, the requirements it places upon employees are clear and
- Systems are in place to enable employees to raise concerns about any uncertainties or conflicts they have in their role and responsibilities

CHANGE

How organisational change (large or small) is managed and communicated in the organisation.

The standard is that:

- Employees indicate that the organisation engages them frequently when undergoing an organisational change and
- Systems are in place locally to respond to any individual concerns

What should be happening / states to be achieved:

- The organisation provides employees with timely information to enable them to understand the reasons for proposed changes
- The organisation ensures adequate employee consultation on changes and provides opportunities for employees to influence proposals
- Employees are aware of the probable impact of any changes to their jobs. If necessary, employees are given training to support any changes in their jobs
- Employees are aware of timetables for changes
- Employees have access to relevant support during changes

Information Sources: HSE guidance and standards.