Agenda

- Definition of Noise
- Legislation
- Occupational Exposure Limits
- Health Effects of Noise Exposure
- Preventative Measures
- Lighting within the workplace
- Lighting and Legislation
- Health Effects of Inadequate Lighting
- Lighting Assessments

Noise

- Defined as unwanted sound, which is a pressure wave in the atmosphere (Asfahal, 2003).
- Described in terms of intensity (perceived as loudness) and frequency (perceived as pitch)
- Both the intensity, frequency and the duration of noise exposure predict the potential for damage to the hair cells of the inner ear. Even sounds perceived as “comfortably” loud can be dangerous
- Sound intensity is measured as sound pressure level (SPL) using a logarithmic decibel (dB) scale.
- Noise can cause permanent hearing loss at chronic exposures equal to an average SPL of 85 dB(A) or higher for an eight-hour period.

Occupational Noise Monitoring

- Employers have a legal duty to protect the safety and health of employees from all noise-related risks at work and the legislative requirements for the control of noise at work are regulated Safety, Health and Welfare at Work (General Application) Regulations 2007 Chapter 1 of Part 5 (physical agents)

- If there is reasonable grounds to believe that the noise exposure exceeds the lower exposure action values, a risk assessment must be carried out which may then indicate the need for noise monitoring.

- Noise measurements taken are compared with action levels and limit levels as set out in Irish legislation. The results of the noise assessments then indicate what action if any employers need to take to protect employees and comply with Irish legislation.

Exposure limit values

- Exposure limit values:
  - exposure of 87dB(A)
  - peak sound pressure of 140 dB(C)

- Upper exposure action values:
  - exposure of 85 dB(A)
  - peak sound pressure of 137 dB(C)

- Lower exposure action values:
  - daily or weekly exposure of 80 dB(A)
  - peak sound pressure of 135 dB(C)

Sectors presenting most risks

- Construction
- Agriculture
- Call Centers (acoustic shock)
- Entertainment
- Food manufacturing
- Metal manufacturing
- Transports
- Education

(source : Ergonoma Journal, February 2006)

Noise Levels

- **Example of noise level**:

A normal conversation may be about 65 dB and someone shouting typically can be around 80dB. The difference is only 15 dB but the shouting is 30 times as intensive. To take into account the fact that the human ear has different sensitivities to different frequencies, the strength or intensity of noise is usually measured in A-weighted decibels (dB(A)).

Some Noise Levels Recorded in Studies

- A study of noise in kindergartens found some averaging noise levels over 85dB
- During a performance of Swan Lake, a conductor was recorded as being exposed to 88dB
- Truck drivers can be exposed to 89dB
- Staff in nightclubs can be exposed to up to 100dB
- Noise on pig farms has been measured up to 115dB

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Noise Exposure and Performance

Noise has negative impacts on cognitive performance.

For recall and reading, a reduction of the day and night noise level by 5 dB(A) within the range of 65–80 dB(A) was shown to improve performance by almost 10%.

For attention and memory, a 5 dB(A) reduction in average noise level results in approximately 2–3% improvement of performance. These adverse impacts of noise on cognitive performance can lead to a reduction in the productivity at work

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Effects of Noise Exposure on Health

- Elevated workplace noise can cause hearing impairment, hypertension, annoyance and sleep disturbance
- Hearing loss can be temporary or permanent
- Hearing loss caused by exposure to occupational noise, results in a disability that is 100% preventable
- Hearing loss is not the singular health issue. Can also endure tinnitus, a distressing condition that can lead to disturbed sleep
- Other rarer conditions include
  - hyperacusis (abnormal sensitivity to sounds)
  - diplacusis (a distortion of pitch)
- Noise-induced hearing loss is the second most common form of sensor neural hearing deficit, after presbycusis (age-related hearing loss).

Prevention of Noise-induced Hearing Loss

- Avoiding noise exposure and using hearing protection (ear plugs/ earmuffs) stops further progression of the damage
- Engineering controls are the first option for reducing hazardous noise levels.
- Three principal means to achieve this aim
  - to reduce the sound energy generated by the source
  - cutting the path of the sound energy from the source to the receiver
  - to isolate the receiver from the source

Lighting Within the Workplace

- It is important that lighting in the workplace:
  - allows people to notice hazards and assess risks;
  - is suitable for the environment and the type of work (for example, it is not located against surfaces or materials that may be flammable);
  - provides sufficient light (illuminance on the task);
  - allows people to see properly and discriminate between colours, to promote safety;
  - does not cause glare, flicker or stroboscopic effects;
  - avoids the effects of veiling reflections;
  - does not result in excessive differences in illuminance within an area or between adjacent areas;
  - is suitable to meet the special needs of individuals;
  - does not pose a health and safety risk itself;
  - is suitably positioned so that it may be properly maintained or replaced, and disposed of to ensure safety;
  - includes, when necessary, suitable and safe emergency lighting.

Legislation - Lighting within the Workplace

- Part 2, Chapter 1 (8) refers to Natural and artificial lighting of the Safety, Health and Welfare at Work (General Application) Regulations 2007.
- *It is the duty of the employer to ensure that places of work receive sufficient natural light and are equipped with artificial adequate for the protection of the safety and health of the employer's employees,*
- *(b) lighting installations in rooms containing workstations and in passageways are placed in such a way that there is no risk of accident to the employer's employees as a result of the type of lighting fitted, and*
- *(c) places of work in which the employer's employees are especially exposed to risks in the event of failure of artificial lighting are provided with emergency lighting of adequate intensity.*

Lighting Levels

- There are no specific lighting levels set out in Irish legislation.
- Generally measurements taken can be compared to international standards/guidance such as the CIBSE Code of Lighting or ISO 8995 – 2002 Lighting of indoor work places.
- The HSA have not completed a comparison study between CIBSE and ISO levels so using either set of levels represents a feasible approach.

Health Effects of Inadequate Lighting in the workplace

- Poor lighting makes the visual system work harder and may lead to symptoms commonly described as eyestrain. Symptoms of eyestrain vary according to the lighting conditions and the task being carried out.

- They can disappear after taking adequate rest or breaks away from a particular activity. Symptoms include:
  - irritation, eg inflammation of the eyes and lids
  - Itchiness
  - breakdown of vision, blurred or double vision
  - referred symptoms, eg headaches, fatigue, giddiness.

- Can also cause other, more indirect effects. The natural response to insufficient illuminance or veiling reflections, for example, is to get closer to the task or to look at it from a different direction. This can mean adopting unsuitable postures that lead to other forms of discomfort such as neck- and backache.

Inadequate Lighting and Its Impact in the Workplace

- Poor lighting at work can represent a significant cost to business in the form of:
  - time off work as a result of accidents and injuries
  - increased absenteeism
  - reduced staff efficiency and productivity

Lighting Assessments

- A Lighting Assessment is a careful examination of the lighting condition in the work environment. Its purpose is to:
  - Identify the potential hazards arising from the work activity under the current lighting condition in the workplace, such as insufficient illumination, excessive contrast, glare or flicker
  - Decide who may be harmed
  - Evaluate the risks and decide whether improvement measures are needed to protect the employees, including but not limited to the lighting provision

Discussion