

The British Occupational Hygiene Society
Faculty of Occupational Hygiene

MODULE SYLLABUS

**M302 - MEASUREMENT AND ASSESSMENT OF NOISE
IN THE WORKPLACE**

AIM: To enable the student to appreciate the nature of noise hazards in the workplace, to carry out an assessment in the workplace (as required by the Control of Noise at Work Regulations) and to determine the significance of measurement data in relation to the various standards for compliance.

On successful completion of this module the student should be able to:-

- appreciate the consequences to health and well being of excessive exposure to noise;
- understand the measurement (including dosimetry) of noise in relation to current standards;
- conduct surveys in the workplace to assess risks from noise;
- understand current legislation and standards in these fields.

CONTENT:

	TOPIC	TIME ALLOCATION
1.	PHYSICS OF NOISE	20%
2.	HUMAN RESPONSE TO NOISE	20%
3.	MEASUREMENT AND ASSESSMENT OF NOISE RISK	55%
4.	NOISE LEGISLATION	5%

Note: Reference is made in this syllabus to HSE guidance or other documentation. This may not be the most up-to-date relevant publications from HSE/other sources and is intended as guidance for candidates only.

RECOMMENDED DOCUMENTATION

- i) The Control of Noise at Work Regulations 2005
- ii) Hearing and noise in industry, W Burns and D W Robinson 1970, HMSO
- iii) Guidance on the Control of Noise at Work Regulations 2005 (L108-2005)

1. PHYSICS OF NOISE (20%)

1.1 Properties of sound

Propagation of sound by longitudinal wave motion
Relationship between frequency, wavelength and velocity
Velocity of sound - dependence on temperature and bulk modulus
Infra sound and ultra sound - definitions and common sources
Simple harmonic motion

1.2 Definitions and measurements units - noise

Range of sound pressures in audio range
Definition and application of decibel scale
Sound pressure and sound pressure level
Sound intensity and intensity level, reference values
Relationship between sound pressure and sound power level
Time varying sources, definition and use of equivalent continuous sound level
Characteristics of impulse and impact noise
Continuous Equivalent sound level and usage
Understanding of weighting scales A and C, comparison with linear levels and awareness of other weighting scales
Frequency characteristics of sound source
Simple and periodic spectra, complex spectra
Time functions and frequency spectra
Octave, third octave and narrow band spectra
Summation of sound pressure levels and calculation of sound power levels

Educational objectives

The student should know the basic concepts and the definitions of the various terms that are used to measure noise.

2. HUMAN RESPONSE TO NOISE (20%)

2.1 The ear and its response to sound

Structure of the ear - outer, middle and inner ear
Frequency selectivity and auditory filter, masking, stereo cilia, aural reflex
Trauma, tinnitus, damage to hair cells
Temporary threshold shift and recovery times, Permanent threshold shift
Noise induced hearing loss
Noise hazard, relationship between hearing loss, noise exposure levels and exposure times
Speech frequencies - speech frequency components
Speech interference levels, loudness and phon scales

2.2 Noise exposure levels

Exposure Action Values and Exposure Limit Values of The Control of Noise at Work Regulations 2005
Risk of hearing damage between Lower and Upper action levels
Exposure standards for infra sound and ultra sound
Calculation of LEP,d from time varying exposures
Use of weekly exposure values LEP,w
Use nomogram in Guidance Notes for calculation of LEP,d
Calculation of dB (A) values from octave band analysis

Educational Objectives

The student should be aware of the main effects on the body following exposure to noise and the various noise limits.

3. MEASUREMENT AND ASSESSMENT OF NOISE RISK (55%) (to include ½ Day Practical)

3.1 Sound level meters

Basic principle of operational components with consideration of simple digital processing techniques
Understanding of type classification in accordance with BSEN61672-1:2003 (1)
Sound level meters.
Understanding of type and the accuracy at reference and in field conditions
Microphone types; polarised, pre-polarised, piezoelectric and knowledge of others
Directional characteristics of sound level meter and microphones
Calibration - BS 7580:1997 (2)

3.2 Frequency Analysis

Octave band and third octave band analysis - characteristics and filter band widths
Analogue and digital filters
Narrow band analysis
Current instrumentation for real time analysis
Uses of frequency analysis for noise source identification
Time history analysis and techniques

3.3 Personal noise dosimetry

Principles of instrumentation operation, field accuracy and sources of error
Importance of supporting dosimeter assessments with appropriate sound level meter measurements
Instrument types BS EN 61252:1997 (3) and facilities, supporting software
Sampling techniques and sources of error

3.4 Sound power and sound intensity measurements

Uses and significance of sound power and intensity
Sound power - reference sources and field measurement
Sound intensity - instrumentation for measurement

3.5 Suitable and sufficient noise assessments

Observation of work practices and processes

Sampling techniques for noise dosimetry, selection and standardisation of location of sound level meter measurements
Significance of measurement periods
Source identification and ranking
Use and significance of SPL, Leq, Lmin, Lmax, LEP,d, dB(A), dB(C), dB(lin)
Report requirements and presentation
Ear protection zones
Noise contouring

Educational Objectives

The student should have the theoretical knowledge and be provided with sufficient practical “hands on” experience in the use of sound pressure level meters/dosimeters to enable him/her undertake a basic noise survey and prepare a technical report.

The student should be aware of the standard noise control techniques, including their limitations and be able to select the appropriate ear defenders for specific situations.

4. NOISE LEGISLATION (5%)

Health and Safety at Work etc Act 1974
The Control of Noise at Work Regulations 2005
Guidance on the Control of Noise at Work Regulations 2005 (L108-2005)

Educational Objectives

The student should have a knowledge of the main UK legislation pertaining to the protection of workers from noise including any applicable EC legislation.

References

- (1) BSEN 61672-1:2003 Electroacoustics. Sound Level meters. Specifications
- (2) BS 7580:1997 Specification for the Verification of Sound Level Meters
- (3) BS EN 61252:1997 Electroacoustics. Specifications for personal sound exposure meters