CERTIFICATE OF COMPETENCE IN WORKPLACE NOISE RISK ASSESSMENT

Entry Requirements

The Institute of Acoustics is committed to an open access policy. The main principle is to admit all who will benefit from the Certificate programmes. However students will need to be numerate and to be able to carry out scientific calculations. If the Certificate is used towards satisfying the educational requirements for Technician membership of the IOA (**TechIOA**) relevant passes at GCSE level may be necessary also.

Study Modes

Students take the Certificates at an Accredited Centre (see separate list). Attendance at the Centre is usually for four days, plus the examination day. Examinations for CCWPNRA take place twice per year, usually on a Friday in April and September. It is important to check on the local arrangements for the examination.

Assessment

To obtain a Certificate, a candidate is required to;

1) Pass both parts of a written examination

2) Produce a competent report following a practical test.

The written examination papers are set by the Chief Examiner, who is responsible to the CCWPNRA Committee. Members of the Committee review and moderate the marking of all papers at their meetings held shortly after each course.

The detailed logistical arrangements for the practical test and report submission are made by the Accredited Centre. However the requirements for the practical test and the report are overseen by the CCWPNRA Committee.

Aims and Objectives

The aims of the CCWPNRA Course are two-fold.

- To enable candidates to appreciate the nature of noise hazards in the workplace and the need to protect the hearing of employees.
- To enable candidates to advise and assist employers to meet statutory duties relating to noise in the workplace.

After completing the course, candidates should be able to:

- Explain the requirements of the current legislation and regulations.
- Understand the elements of a noise risk assessment, and the part that noise exposure assessment plays.

  Make satisfactory measurements of noise levels in workplaces.
- Assess daily noise exposure levels of employees from information about noise levels and work patterns.
- Advise on the components of a noise action plan.
- Select suitable hearing protection.
- Identify areas where noise reduction is required and discuss basic noise control techniques.
- Assess the effectiveness of noise control measures.

SYLLABUS (with approximate timings)

1. BASIC CONCEPTS (½ day)

Sound pressure and sound power. Pure tones, frequency, the audio range, broadband noise, analysis of broadband noise into octave bands. Sound pressure level, sound power level and the decibel scale. The range of decibel levels and the significance of level changes (3dB, 10dB, 20dB, etc) in terms of energy content and subjective impression. The procedures for combining and manipulating decibel values. Background levels, noise control strategies including the case of multiple sources. The variation of hearing sensitivity with frequency and the A-weighted scale. Steady and time-varying levels. L_{eq}, L_E (SEL), and the equal energy principle.

Calculations: combining and manipulating numerical levels, calculation of L_{eq} and L_{EPd} given levels and durations, application of frequency-weightings to, and summation of, octave band levels.

Generation of sound by the vibration of solid surfaces or by direct disturbances of a fluid medium (e.g. air, water). Sound propagation - the effects of distance, reflection, absorption, diffraction and scattering. Direct and reverberant sound and standing waves.

2. MEASUREMENT AND INSTRUMENTATION (½ day)

Types of sound level meter; integrating and non-integrating types (L_{eq} and L_E). Frequency weightings (A, C and linear (Z)), frequency analysis (octave bands). Types of microphone (free field, pressure response, etc), directionality. Tolerance limits - classes 1 and 2 (with reference to types in older instruments). Fast and Slow time weightings. Measurement of peak sound pressures. Measurement of L_{Aeq} for time-varying levels and of L_{AE} for transient events.

The use of a sound level meter. Calibration, factors affecting choice of microphone position, use of windshields, background levels. Sources of error. The need for periodic verification of instrumentation by an accredited laboratory.

The use of dosemeters. Single figure and data logging instruments, calibration, fitting, instructions to wearers; potential factors leading to incorrect readings.

3. LEGAL ASPECTS (¼ day)

The Health and Safety at Work etc Act 1974, especially sections 2, 3, 6 and 7. The powers of inspectors, improvement notices and prohibition notices.

The content and purpose of the Control of Noise at Work Regulations 2005 and associated guidance issued by HSE. Particular emphasis should be placed on the legal requirements relating to:

i) General duty to eliminate or minimise risk of hearing damage
ii) Action levels and limit values
iii) Risk assessment
iv) Noise exposure reduction to as low a level as is reasonably practicable
v) Hearing protection and hearing protection zones
vi) Health surveillance
vii) Worker information, instruction and training
viii) Maintenance and use of equipment (employer and employee duties)

Introduction to sources of information available from HSE publications, including L108 “Controlling noise at work”, October 2005 (ISBN 0-7176-6164-4) - candidates will be expected to have a copy of this guidance document.

Management of Health and Safety at Work Regulations 1999 (principles of prevention, competent advice on health and safety matters); Elementary introductions to: i) Supply of Machinery (Safety) Regulations 1992 (as applicable to noise-reduced design and declarations of noise emission); ii) Provision and Use of Work Equipment Regulations 1998.

4. NOISE RISK ASSESSMENT AND EXPOSURE ASSESSMENT (1½ days)

Basics of noise risk assessment: identifying noise hazards; identifying potential for harm; evaluating risks; developing an action plan; recording and reviewing. Skills and knowledge necessary to undertake the various aspects of a risk assessment.

The role of noise exposure assessment in risk assessment. Sources of data for exposure assessment; the importance of reliable and representative data. The use of ready-reckoners and simple checks.

Measurement of noise exposure in the workplace. Selection of appropriate measurement strategies for different types of work pattern and workplace, including the need to ensure that all significant noise exposures are identified. Selection and use of appropriate measurement instrumentation Measurement positions. Measurement durations and sampling strategies

Collection of other relevant information - employee work patterns (durations and locations), use of portable hand tools, other parameters which characterise the work (e.g. machine speed or load, rate of work)), acoustic conditions in the workplace (e.g. presence of sound absorbing or reflecting surfaces, standing waves)

Calculation of daily personal noise exposure levels, including the interpretation of dosemeter results.

Factors affecting the uncertainty in the assessment of exposure, for example:

1) the difficulties of determining durations of exposure,

2) the limitations of the instrumentation,

3) problems in making representative measurements,

4) effects of reflection and scattering of sound (including from the machine operator) and of standing waves.

Use of the results of noise exposure assessment a) to inform the risk assessment, including the concept of “likely to be exposed” and precautionary principles, and b) in developing the action plan to comply with legal duties, to tackle immediate risks and prioritise further measures.

5. HEARING, HEARING LOSS MEASUREMENT, AND PROTECTION (½ day)

Hearing, simple explanation of how the ear works - the functions of the outer, middle and inner ear. Hearing loss, descriptions of various types of hearing loss due to disease and ageing. The nature of noise induced hearing loss. Temporary and permanent threshold shifts and acoustic trauma. Tinnitus and its possible association with noise-induced hearing loss. Variations of individual susceptibility and the statistical nature of noise-induced loss – the use of ISO1999 in predicting the degree of noise-induced hearing loss from a given exposure over an extended time.

An appreciation of the nature of the social effects of hearing loss - attempts at adaptation, communication difficulties, isolation etc, Audiometry and audiograms, principles and limitations of audiometry.

Hearing protection, a description of the various types of protectors available. Performance, attenuation produced by hearing protectors in octave bands. Individual variability in attenuation, mean attenuation and standard deviation, assumed protection.

BS EN458:2004 Hearing protectors - recommendations for selection, use, care and maintenance. Evaluation of noise reduction performance using three methods as set out in BS EN24869; i.e. octave band, HML, and SNR methods. Reduction in performance when protectors are worn for less than 100% of the exposure period. Overprotection, problems arising from it and selecting to avoid overprotection.

The selection of hearing protectors - the need to choose protectors which are suited to the job, taking into account factors such as weight, cost, comfort, adjustability, compatibility with other PPE etc. as well as performance, European and British Standards, EN352 series, CE marking and quality assurance.

The use of hearing protectors and the need to explain to employees when, where and why they should use hearing protectors, and for instruction about how to fit them properly. Hygiene and cleanliness considerations. The need for regular inspection and maintenance of protectors. Factors affecting “real-world” attenuation of hearing protectors. HSE guidance on accounting for “real-world” attenuation.

The need for continuing programmes to encourage the use of protectors by employees (e.g. signs and warning notices, personal example by management, continuing information and training, monitoring of usage).

6. NOISE REDUCTION TECHNIQUES (¾ day)

The aim here is not to attempt an in-depth treatment, but rather to give the course delegates an insight into the range of noise reduction techniques available and make them aware of their own limitations.

Noise reduction by good housekeeping, by planning, maintenance and general good management. The need for noise reduction measures to be included at the design stage of machines and factories. The essential elements of a positive purchasing policy to take noise in to consideration when selecting tools and machinery.

The simple source-transmission path-receiver model used to illustrate a number of important points about the noise control process. The importance of correct diagnosis of sources and paths prior to implementing noise control solutions, the preference for noise control at source wherever possible (because of the possibility of multiple energy flow paths and other practical problems with transmission path control as mentioned below). A systematic, step-by-step approach to noise control, often involving several solutions, which together are effective but which are separately ineffective.

Examples of noise control at source: reduction of “unnecessary” noise, replacement of a noisy process by a quieter alternative, modification of a process to reduce noise. Reduction of “on-time” of noisy machinery, relocation of noise sources away from personnel, segregation of noisy from quiet areas.

Noise reduction by design: improved design and better engineering (e.g. quieter gears, fans, bearings, etc.) improved maintenance, reduction of machine speed, flow rate, pressure etc. Reduction and “smoothing” of noise generating forces (e.g. the replacement of impact processes by the application of a steady pressure, modified air discharges.) Use of damping in/on vibrating parts.

Examples of specialist research solutions (e.g. quieter fans and gears, helical cutter blades for woodworking machines, etc) which eventually become standard solutions.

Examples of noise control in the transmission path: use of absorption to control reflected sound in rooms, ducts, attenuators and enclosures; use of sound insulation in partitions, screens and enclosures; use of vibration isolation to reduced structure-borne sound, use of damping materials.

A simple qualitative description of the behaviour of sound in rooms (i.e. direct and reverberate sound).

Examples of noise control at receiver, noise refuges, control of exposure time, job rotation, personal hearing protection.

Practical limitations to noise control; cost (installation and running costs), effects on operating conditions and working efficiency; inconvenience in use; maintenance, materials for hostile environments, problems of access, overheating and fire risk.

It is envisaged that one day will be spent on tutorial revision and the examinations.

Courses are normally offered twice a year, depending upon demand, at Accredited Centres. Information on the Centres and dates of examinations may be obtained from the Institute.