

## **M0-EN.5 Noise Assessment**

The World Health Organization (WHO) defines noise as “any unwanted sound”. Noise can be generated by road, rail or air traffic, industry, music and any other activity, and can be a serious nuisance and a health hazard.

Noise is described in terms of intensity or amplitude (perceived as loudness) and frequency (perceived as pitch). The potential of damage to the hair cells of the inner ear is determined by the intensity and the duration of the noise exposure. The loudness of a noise is measured in units called decibels (dB). The potential damage of a noise cannot be assessed by simply measuring its intensity since the human ear does not respond equally to all frequencies. Therefore, most sound level meters are equipped with a filter that is designed to de-emphasize the physical contribution from frequencies to which the human ear is less sensitive. This filter is referred as the “A filter”, and measurements taken using this filter are reported as dB(A). A 3 dB(A) increase doubles the noise and the damage it can cause. The noise is loud enough to damage employees’ hearing (more than 85 dB(A)) if two persons that are 1 m away from each other are forced to shout when they speak.

Excessive noise is a serious health hazard. Exposure to noise accelerates the normal hearing loss that occurs with age. Hearing loss can be temporary or permanent. Temporary deafness is often experienced after leaving a noisy place. Even though hearing recovers within a few hours, this should not be ignored. It is a sign that if exposure to the noise continues, permanent damage will occur. The latter, can be caused immediately by sudden, extremely loud, explosive noises. In most cases, hearing loss is usually gradual due to prolonged exposure to noise. Another problem occurring from noise exposure is tinnitus (ringing, whistling, buzzing or humming in the ears). This distressing condition can also lead to disturbed sleep. Less obvious side effects such as increased pulse rate, blood pressure and breathing rate indicate that noise causes stress. This can be a safety hazard at work, interfering with communication and making warnings harder to hear.

### **M0-EN.5.1 Legal Framework**

The 1<sup>st</sup> directive adopted by the Council on the protection of workers from the risks related to exposure to noise at work was in 1986 (Directive 86/188/EEC). The new **Directive 2003/10/EC** of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (17<sup>th</sup> individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) establishes a clear and coherent prevention strategy. This new directive covers all sectors of the economy, including the maritime and air transport sectors (being excluded in the Directive 86/188/EEC). Recognizing the specificity of the music and entrainment sectors, the new Directive provides a two-years transitional period during which codes of practice will be established.

According to the Article 5(1) of the Directive, the risks arising from exposure to noise must be eliminated at their source or reduced to a minimum, taking into account technical progress and the available control measures.

The Directive foresees the following Daily Equivalent Exposure Limits (this is the mean daily exposure for an 8-hours working day):

- **87 dB(A)** (and 200 Pa): no worker may be exposed to this noise level or higher , a noise assessment should be carried out and an action plan has to be introduced
- **> 85 dB(A)**: further action for reducing noise must be taken, ear protection zones must be marked, and all exposed employees must wear ear protectors
- **80 – 85 dB(A)**: ear protection equipment has to be provided to the workers

All operators exposed to noise levels above 85 dB, must participate in a preventive medical surveillance program.

### **M0-EN.5.2 Organization of the Noise Risk Assessment**

The risk assessment must be carried out by a competent person or team. This assessment requires greater degree of technical expertise than other types of risk assessments. For the assessment of noise the realization of measurements is required. The noise measurement instruments must be in good working condition and be accompanied by an update calibration certificates.

The workplace can be divided into different sections according to the activities that take place and the equipment that is being used. Information that needs to be gathered prior to the initiation of the risk assessment include information on:

- The processes / activities that result in excessive noise levels
- The latest available and reliable measurements of the noise level that took place, provided that no change of processes, and/or equipment has been taken place since then
- The duration of the noise emission at the different levels
- The exposure of the employees at the different noise levels
- The position of the employees related to the noise sources
- The available medical record related to the hearing surveillance of the employees

### **M0-EN.5.3 Factors to be Considered During the Noise Risk Assessment**

<b>Factor</b>	<b>Main issues to be considered</b>
<b>Source of noise</b>	<ul style="list-style-type: none"> <li>• Noise from office equipment</li> <li>• Noise from machines</li> <li>• Noise from people communication</li> <li>• Noise from near-by traffic</li> <li>• Noise from movement (including fall) of products</li> <li>• Noise from near by industrial establishments</li> </ul>

<b>Noise exposure reduction measures</b>	<ul style="list-style-type: none"> <li>• Selection of non noisy machinery, if available</li> <li>• Reduction in noise generation</li> <li>• Acoustic enclosures for noisy machinery</li> <li>• Use of noise absorption materials</li> <li>• Reduction in noise transmission</li> <li>• Type of hearing protection provided</li> <li>• Supply and maintenance of hearing protection</li> <li>• Designated hearing protection zones</li> </ul>
<b>Work organization</b>	<ul style="list-style-type: none"> <li>• Job rotation to reduce the duration of exposure to noise</li> <li>• Position of employee in relation to the noise source</li> <li>• Enforcement of the use of hearing protection</li> <li>• Quality, wording and positioning of signs</li> </ul>
<b>Training</b>	<ul style="list-style-type: none"> <li>• Emphasis on the training of employees about noise health effects</li> <li>• Presentation of results of performed noise survey</li> <li>• Frequency of training on how to use correctly the provided hearing protection equipment</li> <li>• Emphasis on the compulsory hearing protection activities</li> </ul>

**M0-EN.5.4 Key Elements for Avoiding or Reducing the Noise Risks**

<b>Measures</b>	<b>Means</b>
<b>Reduction of noise generation</b>	<ul style="list-style-type: none"> <li>• Redesign of noisy processes or activities</li> <li>• Choose quiet machines and equipment, by requiring from the suppliers to provide information on noise levels at operators' positions</li> <li>• Introduction of less noisy work methods or equipment</li> <li>• Maintenance of machines (e.g. replace badly fitting parts, secure loose parts, balance rotating parts, provide good lubrication)</li> <li>• Reduction of vibrating sources (surfaces of fluids)</li> <li>• Place vibrating machines on absorbing pads</li> <li>• Replace metal gears by plastic gears or belts</li> <li>• Use isolating, anti-vibration mountings</li> <li>• Separate vibrating surfaces from moving parts</li> </ul>

	<ul style="list-style-type: none"> <li>• Place absorbing gaskets around doors and lids</li> <li>• Choose centrifugal rather than propeller fans</li> <li>• Use large diameter, low speed fans</li> <li>• Use large diameter, low pressure ductwork</li> <li>• Streamlining ductwork to avoid turbulence</li> <li>• Use low-noise air nozzles or pneumatic ejectors</li> </ul>
<b>Reduction of noise transmission</b>	<ul style="list-style-type: none"> <li>• Place noisy machines in acoustic enclosures</li> <li>• Cover acoustic enclosures' surfaces with sound absorbent materials</li> <li>• Minimize the openings of the enclosures</li> <li>• Install absorbent gaskets around doors, windows, service inlets, etc</li> <li>• Avoid the contact of enclosure with vibrating parts</li> <li>• Use acoustic enclosures for the employees, such as control booth or noise refuge, when the noisy machines are large or there are several noise sources</li> <li>• Apply noise absorbent materials near to the sources, to avoid noise reflection from walls and ceilings of rooms</li> <li>• Position noisy exhaust of extraction systems away from the operators, if possible</li> </ul>
<b>Provision of hearing protection means</b>	<ul style="list-style-type: none"> <li>• Ear muffs, which completely cover the ear</li> <li>• Ear plugs, which completely cover the ear</li> <li>• Semi-inserts (called 'canal caps'), which cover the entrance to the ear canal</li> </ul>

A good quality hearing protection mean reduces the level of noise by 20-25 dB.

When wearing **ear muffs** the operator need to be aware of some precautions such as:

- Earmuffs must cover the operator's ears totally
- Earmuffs must fit tightly with no gaps between the seal and operator's head.
- The headband must not be stretched
- The trap of hair, jewellery, glasses, hats etc under the seal must be avoided
- The seals and foam inside the earmuffs must be kept clean.
- If splits or cracks are found in the seals of the earmuffs another pair must be given

When using **ear plugs** precautions can be taken, such as:

- Earplugs must be inserted properly
- If the operator has ear trouble should ask for advice and instructions
- Disposable earplugs must only be used once