

APPENDIX 2: Applying the EMM to health risks from noise

This information sets out the basis for applying the EMM to health risks from noise. General guidance on applying the EMM principles to health risks, including occupational health descriptors is in [Enforcement Management Model – General guidance on application to health risks](#)

Consequence

Noise-induced hearing loss (NIHL) is a permanent, irreversible condition, the effects of which are compounded by age-related loss. A 25 dB hearing loss averaged over the frequencies 1, 2 and 3 kHz can be considered as a level at which the onset of hearing disability occurs. Evidence has shown that at this level of hearing loss there is a definite interference with social function (Medical Research Council National Hearing Survey, 1989). This level of hearing loss therefore represents a **serious health effect**.

Permanent damage to structures of the inner ear, and/or rupture of the ear drum (acute trauma), which can occur in response to single exposures to very loud noise, is also a serious health effect. However, from the available evidence the peak noise exposures which may result in possible, probable or remote likelihood of a serious health effect cannot be accurately predicted. It is therefore not currently possible to apply the EMM to acoustic trauma caused by high peak sound pressures.

Likelihood

The extent of noise-induced hearing loss is affected by both the level of noise and the duration of exposure. Published HSE research provides tables for the estimation of hearing impairment due to noise as a function of age and duration of exposure. This is an 'interpretive' standard. Reference to these tables has been undertaken to determine percentages of the population experiencing a 25 dB or greater hearing loss at the age of 60 with different levels of noise exposure.

Estimation of hearing impairment (25dB or more hearing loss) at age of 60 with different levels of noise exposure

Noise exposure, $L_{EP,d}$	no exposure (aging alone)	Below 80 dB	85 dB	92 dB
Percentage of population	25~30	25~30	35~40	60~65

In developing the risk matrix it has been assumed that individuals are exposed for up to 40 years throughout their working life and the levels of noise exposure do not take into consideration the effects of the use of personal hearing protection. As the effects of hearing loss caused by exposure to noise are compounded by normal age-related deterioration, the percentage of the population affected by a 25 dB or greater hearing loss incorporates the effect of aging. The data used relates to a normal unselected population.

EMM likelihood descriptor for health risks from noise exposure

DESCRIPTOR	APPLICATION/ INTERPRETATION	LIKELIHOOD			
		PROBABLE	POSSIBLE	REMOTE	NIL/ NEGLIGIBLE
SERIOUS HEALTH EFFECT	NOISE-INDUCED HEARING LOSS 25 dB+	$L_{EP,d}$ Of 92 dB and above	$L_{EP,d}$ of 85-91 dB	$L_{EP,d}$ of 80- 84 dB	$L_{EP,d}$ below 80 dB

Benchmark

The benchmark for exposure to noise is set at a **'nil/negligible'** risk of a **serious health effect** caused by occupational exposure. The serious health effect, in this case, is that hearing loss reaches a disabling severity before retirement age. This benchmark standard is considered to be met if there is full compliance with the Noise Regulations.

Risk gap

In general, inspectors should use the single casualty Table 2.1 in the EMM even if more than one person is at risk.

The risk matrix, when used with Table 2.1 in the EMM, will indicate an **extreme** risk gap for any daily personal exposure above the upper exposure action value (85 dB). For a daily exposure between the lower and upper exposure action values (80 to 85 dB) there is a **substantial** risk gap.

Standards

The principal standards are:

Title	Authority
The Control of Noise at Work Regulations 2005	Defined
L108 'Controlling noise at work', Health and Safety Executive, 2005	Established
Risk matrix in HSE's Noise Topic Inspection Pack, Appendix B	Interpretive
Robinson DW (1988) Tables for the estimation of hearing impairment due to noise for otologically normal persons and for a typical unscreened population as a function of age and duration of exposure. HSE Contract Research Report No. 2/1988	Interpretive
Davies A (1989) Medical Research Council National Hearing Survey 1989	Interpretive