

Noise & Vibration

Good Practice & Practical Applications

Ian Glendenning, Technical Director, VSL

www.vibrationservices.co.uk

(0845) 130 9382



Issues covered



- Noise and vibration awareness
- Good practice standards
- Training
- Hearing protection calculations



Update



- The Control of Vibration at Work Regulations 2005
- The Control of Noise at Work Regulations 2005
- ACOP's and Guidance



HSE good practice guides



- Vibration
 - Foundries, heavy fabrication, construction
- Noise
 - Plastics, woodworking, concrete



Principles of risk control



- Assess
- Control - eliminate or reduce
- Information, instruction and training
- Health surveillance



Risk assessment



- Assessment as a start point
- Don't over quantify
- Beware
 - manufacturer's data
 - overestimates of anger time



Anger Time Overestimate Study



**Table – ‘Anger time’ overestimates study
(HSE CRR 232/1999)**

Source	Anger Time as a percentage of operator estimate
Impact screwdriver	25% (16 - 27%)
Nut Runner	34% (12 – 60%)
Nail/Staple gun	22% (15 – 44%)
Hammer drill	37% (10 – 50%)
Sander	16% (13 – 30%)
Impact wrench	18% (10 – 33%)
Jigsaw	28% (12 – 55%)
Mower	85% (50 – 133%)
Floor polisher	61 % (53 – 73%)
All tools	40% (10 – 133%)

Control



- Eliminate
- Reduce as far as rp
- Action values and limits



Vibration values



- Exposure action value (EAV): $2.5 \text{ m/s}^2 \text{ A}(8)$
 - Not a 'safe' level
- Exposure limit value (ELV): $5 \text{ m/s}^2 \text{ A}(8)$
 - Not a target level

Noise values



- Lower exposure action value (LEAV): 80 dB(A) $L_{EP,d}$
- Upper Exposure Action Value (UEAV): 85 dB(A) $L_{EP,d}$
- Exposure Limit Value (ELV): 87 dB(A) $L_{EP,d}$
 - Can be after hearing protection
- Peak equivalents (dB(C))

Information, instruction, training



- Keep it simple
 - HSE pocket cards (www.hsebooks.com)
 - Results of RA – exposure, what you've done, what they should do
- Record it
- Repeat it regularly



Health surveillance



- Vibration
 - Tiered system (if exposure > EAV)
- Noise
 - Audiometry (if exposure > UEAV)



Principles of risk control



- Assess
- Control - eliminate or reduce
- Information, instruction and training
- Health surveillance
- Need help www.vibrationservices.co.uk



Hearing protection calculations



- Worked example
- Calculators can be found at
<http://www.hse.gov.uk/noise/hearingcalc.xls>

HP Example Data



Measurement data – Gulfstream 3 at luggage hatch									
Frequency	125	250	500	1K	2K	4K	8K	L _A	L _C
dB	92.1	100.6	100.5	91.1	85.8	88.3	85.2	99.7	104.2

Attenuation Data - Peltor Optime II											
Frequency	125	250	500	1K	2K	4K	8K	H	M	L	SNR
Mean attenuation	14.5	20.3	32.6	39.1	35.1	34.7	39.8				
SD	1.8	2.6	2.4	2.5	2.3	2.7	2.5	34	28	20	31
APV	12.7	17.7	30.2	36.6	32.8	32.0	37.3				





This spreadsheet contains calculators for three different methods of estimating the performance of hearing protection.

Each of the methods requires you to have information about the noise, and about the capabilities of the protector you are assessing.

The HML method can be used if you know both the A-weighted and C-weighted noise levels

The octave band method can be used if you know the noise levels in frequency bands

The SNR method can be used if you know the C-weighted noise levels

All three methods are nearly equivalent in their accuracy in the majority of noise situations.

Each calculator is on a separate 'tab' within the spreadsheet. Click on the tab to go to the appropriate calculator.

You can also move between the tabbed sheets by pressing Ctrl+Page Up or Ctrl+Page Down.

The table below gives an indication of the protector factor that is likely to be suitable for different levels of noise. It is based on the single number rating (SNR) value provided with a hearing protection device. The information is intended as a guide.

A-weighted noise level (dB)	Select a protector with an SNR of ...
85-90	20 or less
90-95	20-30
95-100	25-35
100-105	30 or more



Octave band method

You can use this method if you know the noise levels in frequency bands

Octave band centre frequency (Hz) 63 125 250 500 1000 2000 4000 8000 A-weighted

Data on the hearing protector

<i>Mean attenuation (dB)</i>	10	14.5	20.3	32.6	39.1	35.1	34.7	39.8
<i>Standard deviation in attenuation (dB)</i>	3	1.8	2.6	2.4	2.5	2.3	2.7	2.5

<i>Noise levels (dB)</i>	88.1	92.1	100.6	100.5	91.1	85.8	88.3	85.2	100.0
--------------------------	------	------	-------	-------	------	------	------	------	--------------

Enter values in all white cells. If the hearing protector data is stated in terms of 'Assumed Protection Values', APV or similar, then enter the APV values in the 'Mean' row, and leave the 'Standard deviation' row blank or with zeros.

Calculated level at the ear according to
BS EN ISO 4869-2:1995 ($\alpha=1$) 76 dB

HSE recommends allowing 4dB for 'real-world' factors. Assume that this device will give: **80** dB at the ear

Select a protector so that daily exposure is reduced to at least below 85 dB. Ideally, aim for between 80 and 75 at the ear. Avoid protectors resulting in less than 70 dB at the ear - this is 'over-protection' (see BS EN 458:2004).

Colour codes:

- Protector gives adequate protection, and does not 'over-protect'**
- Protector does not give adequate protection, or it 'over-protects'**

Each calculator is on a separate 'tab' within the spreadsheet. Click on the tab to go to the appropriate calculator. You can also move between the tabbed sheets by pressing Ctrl+Page Up or Ctrl+Page Down.



HML Method

You can use this method if you know both the A-weighted and C-weighted noise levels

Enter values in all white cells.

Data on the hearing protector

H	M	L
34	28	20

Noise levels

A-weighted noise level, L_A	99.7	dB
C-weighted noise level, L_C	104.2	dB

Calculated level at the ear according to
BS EN ISO 4869-2:1995 ($\alpha=1$) 74 dB

HSE recommends allowing 4dB for 'real-world' factors. Assume that this device will give: **78** dB at the ear

Select a protector so that daily exposure is reduced to at least below 85 dB. Ideally, aim for between 80 and 75 at the ear. Avoid protectors resulting in less than 70 dB at the ear - this is 'over-protection' (see BS EN 458:2004).

Colour codes:

Protector gives adequate protection, and does not 'over-protect'

Protector does not give adequate protection, or it 'over-protects'

Each calculator is on a separate 'tab' within the spreadsheet. Click on the tab to go to the appropriate calculator. You can also move between the tabbed sheets by pressing Ctrl+Page Up or Ctrl+Page Down.



SNR Method

You can use this method if you know the C-weighted noise levels

Enter values in both white cells.

Data on the hearing protector

SNR

Noise levels

C-weighted noise level, L_C dB

Calculated level at the ear according to BS

EN ISO 4869-2:1995 ($\alpha=1$) 73 dB

HSE recommends allowing 4dB for 'real-world' factors. Assume that this device will give: dB at the ear

Select a protector so that daily exposure is reduced to at least below 85 dB. Ideally, aim for between 80 and 75 at the ear. Avoid protectors resulting in less than 70 dB at the ear - this is 'over-protection' (see BS EN 458:2004).

Colour codes:

Protector gives adequate protection, and does not 'over-protect'

Protector does not give adequate protection, or it 'over-protects'

Each calculator is on a separate 'tab' within the spreadsheet. Click on the tab to go to the appropriate calculator. You can also move between the tabbed sheets by pressing Ctrl+Page Up or Ctrl+Page Down.

Any Comments or Questions?

