



**Hearing Conservation Program  
at  
Fakulti Kejuruteraan Mekanikal & Pembuatan**

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Noise Competent Person  
HQ/15/PEB/00/148

# Today Outline



1. Noise & Legal Requirement
2. Noise Control

Start : 9.00  
am  
End : 12.00  
pm

# General information

- Emergency exit
- Ergonomics learning posture
- Toilet & meal area
- ASK!!! If need further understanding
- Two way communication
- ENJOY



## **PART VII EMPLOYEE INFORMATION AND TRAINING**

### **27. Training.**

(1) The occupier shall institute a training programme for, and ensure the participation of all employees exposed to noise level at or above the action level.

(2) The occupier shall ensure that during the training programme each employee is informed of the following:

(a) the provisions of these Regulations;

(b) the effects of noise on hearing;

(c) the purpose of hearing protection devices, the advantages, disadvantages and attenuation of various types of hearing protection devices, and instructions on their selection, fitting, use and care; and

(d) the purpose of an audiometric testing and an explanation of the test procedures.

(3) The training programme shall be repeated at least once in every two years.



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# INTRODUCTION OF NOISE & LEGAL REQUIREMENT

## OBJECTIVE

**At the end of this session, participant will be able to:**

- Differentiate between sound & noise.
- Identify level of noise that will effect human ear at workplace.
- Identify daily noise dose.
- Understand minimum requirement of legislation in Malaysia.
- Understand responsibilities of employer & employees.

## SCOPE OF PRESENTATION





## REPORTED OCCUPATIONAL DISEASES AND POISONING 2017

Type of diseases	Reported cases
Occupational Lung Diseases (OLD)	102
Occupational Skin Diseases (OSD)	117
<b>Occupational Noise Related Hearing Disorders (HD)</b>	<b>4787</b>
Occupational Muscular - Skeletal Disorders (OMSD)	801
Occupational Poisoning	105
Disease cause by Physical Agent	23
Disease cause by Biological Agent	32
Occupational Cancer	6
Psychosocial Problem	10
Other Types of Occupational Diseases	6
Non Occupational Diseases	31
<b>Total</b>	<b>6020</b>



## SOUND & NOISE





## WHAT IS SOUND?

- A form of energy that is transmitted by pressure variations.
- The vibrating chords set air particles into vibration and generate pressure waves in the air.
- Travel through other media, such as water or steel.
- Mechanical energy in the form of pressure variances in an elastic medium. It cannot travel through a vacuum. There is no sound in outer space.

## WHAT IS NOISE?

- Unpleasant or unwanted sound.
- When unwanted noise gets loud enough:-
  - It is unpleasant.
  - It is distracting.
  - It is tiring & stressful.
  - Higher levels cause permanent hearing damage.



## SOUND & NOISE

### LIKELIHOOD OF DAMAGE

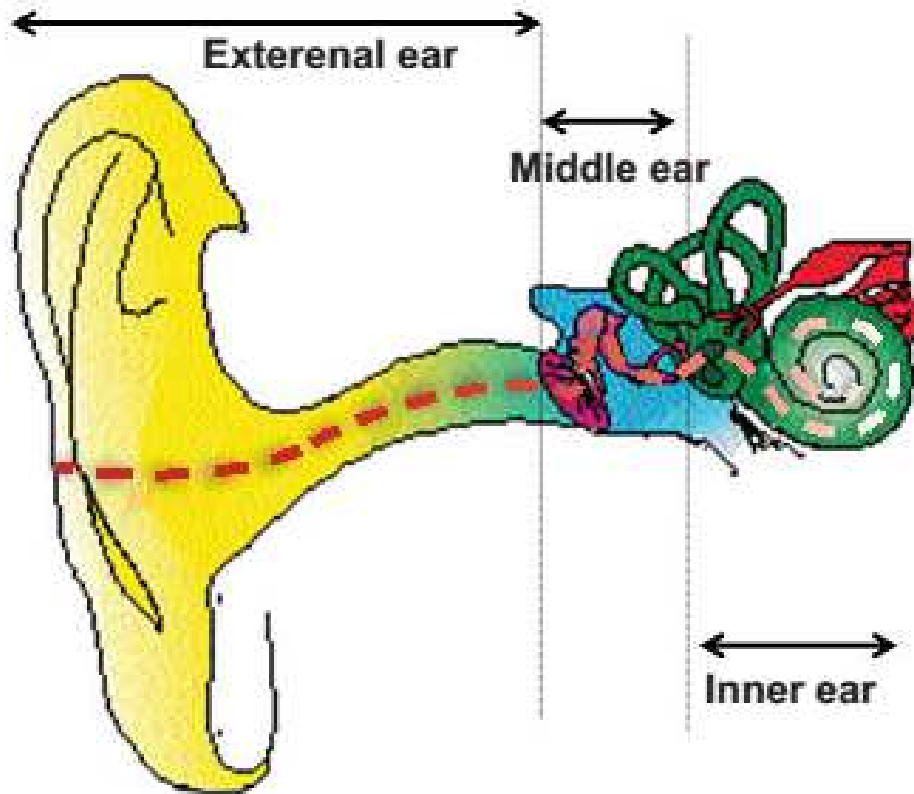


#### Depends mainly on:

- Volume (loudness)
- Frequency (pitch)
- Exposure time
- Can be work exposure, social exposure or both



## HEARING MECHANISM



Results from oscillations in pressure, stress, particle displacement and particle velocity



Pressure variations set the eardrum into motion and produce sound.



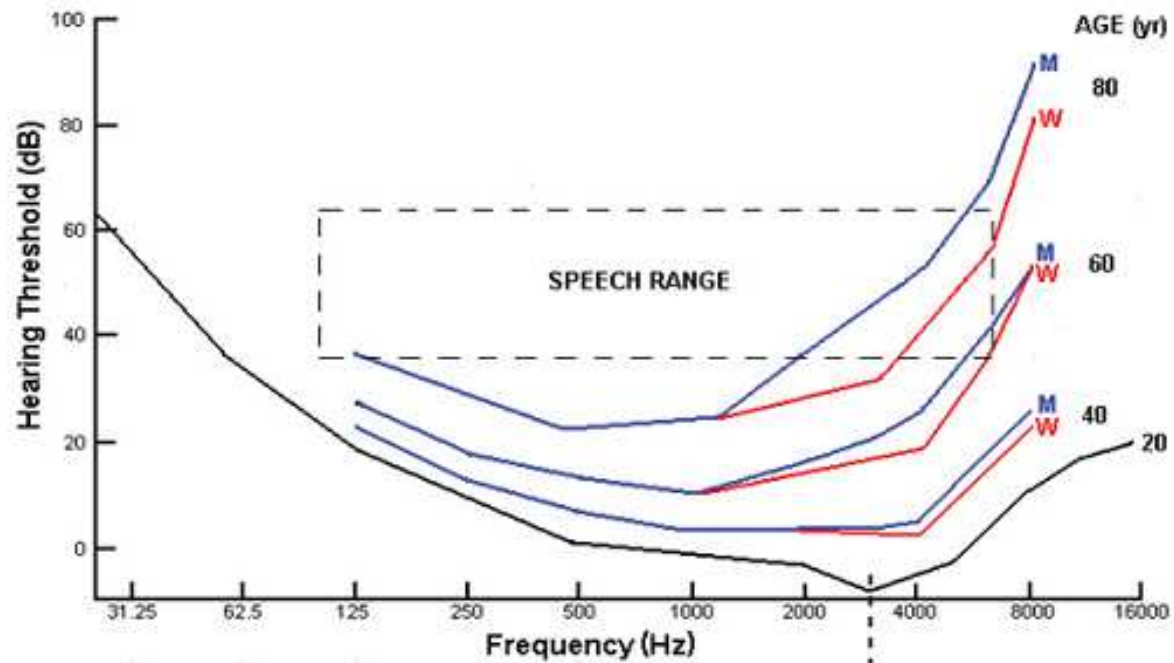
Oscillate to the cochlea converted into electrical signals that continue on to the brain.

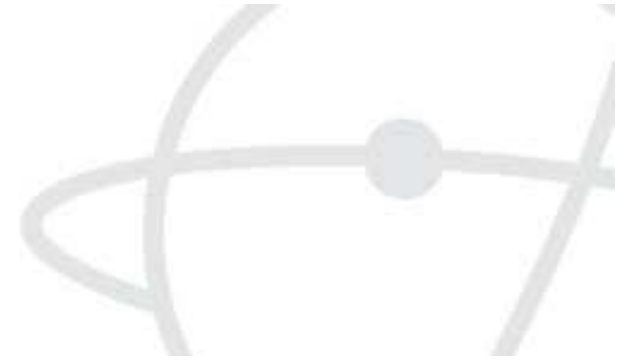
- The human ear can distinguish sound pressure within a very large area.

## SOUND & NOISE

### RANGE OF HUMAN HEARING

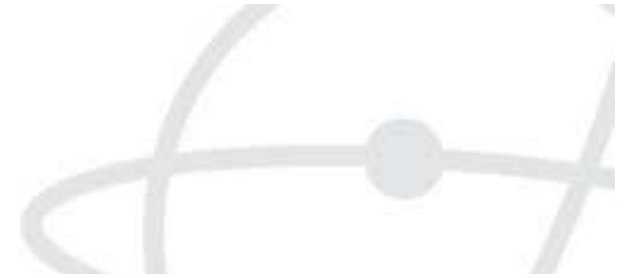
- The human ear is capable of responding to frequencies ranging from 20Hz to 20kHz.
- The ear is less efficient at low and high frequencies.
- 500Hz to 4kHz is most sensitive.





## DEFINITION OF NOISE *in Industrial Hygiene field*

- Noise is defined as the sound that can cause hearing loss if workers are exposed while doing their job.
- Thus, it is directly defined as physical term “Level of Sound Pressure”.
- For example, >90dB(A) for 8-hrs is noise whether it is wanted or not.



## SOUND & NOISE

### TYPES OF NOISE

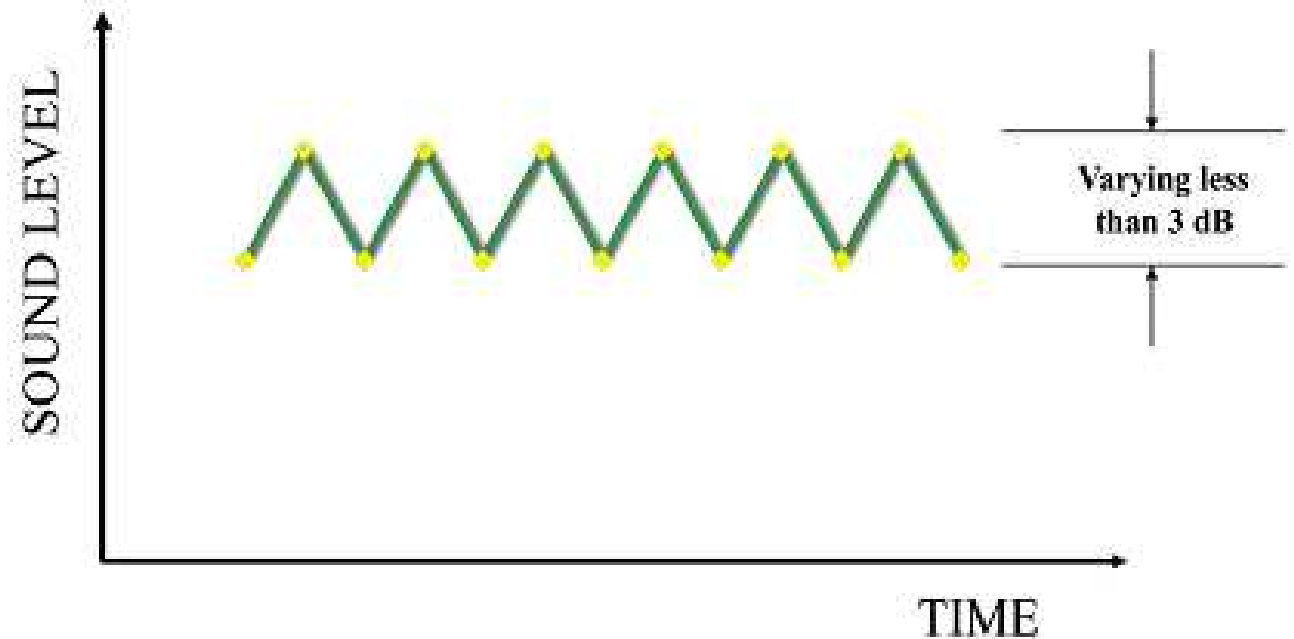
- Steady state
    - Continuous or Non-continuous
  - Fluctuating
- 
- Impulsive
    - Single events
    - Repeated impulses
  - Intermittent
    - Steady or Fluctuating





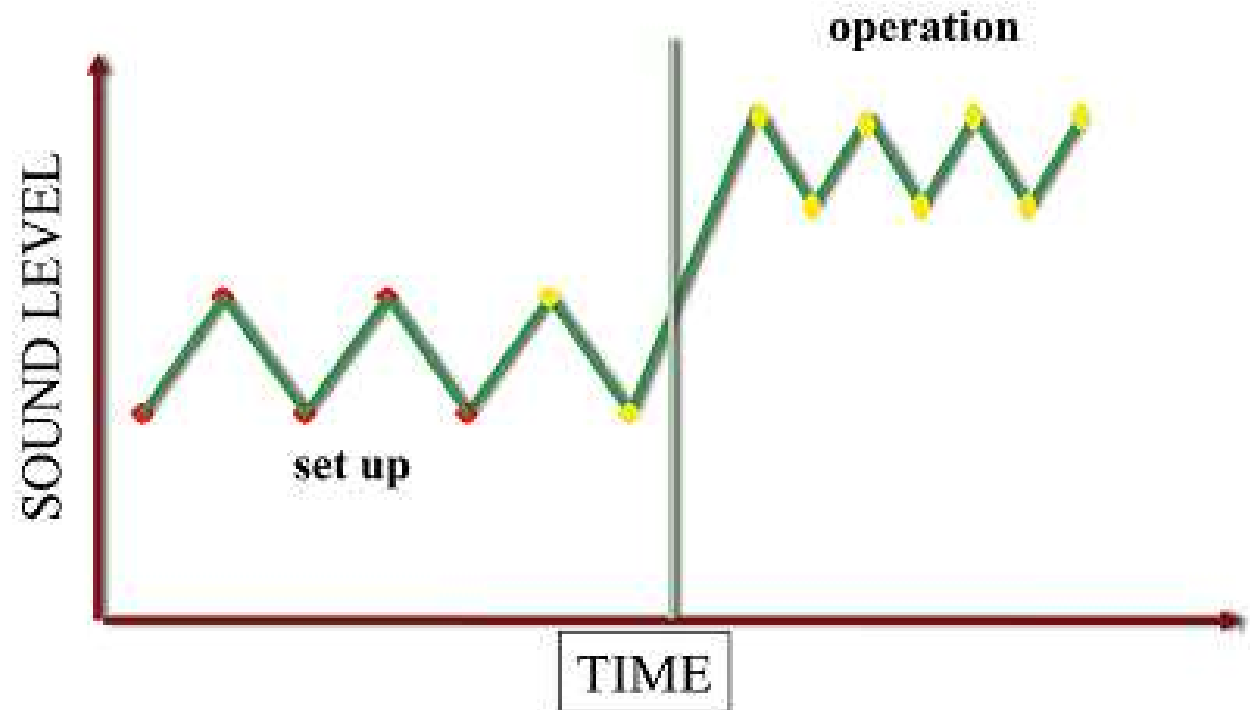
## STEADY-CONTINUOUS NOISE

- Noise which has negligibly small fluctuations of sound level within the period of observation



## STEADY-NON CONTINUOUS NOISE OF TWO DISCRETE TIME SEGMENTS

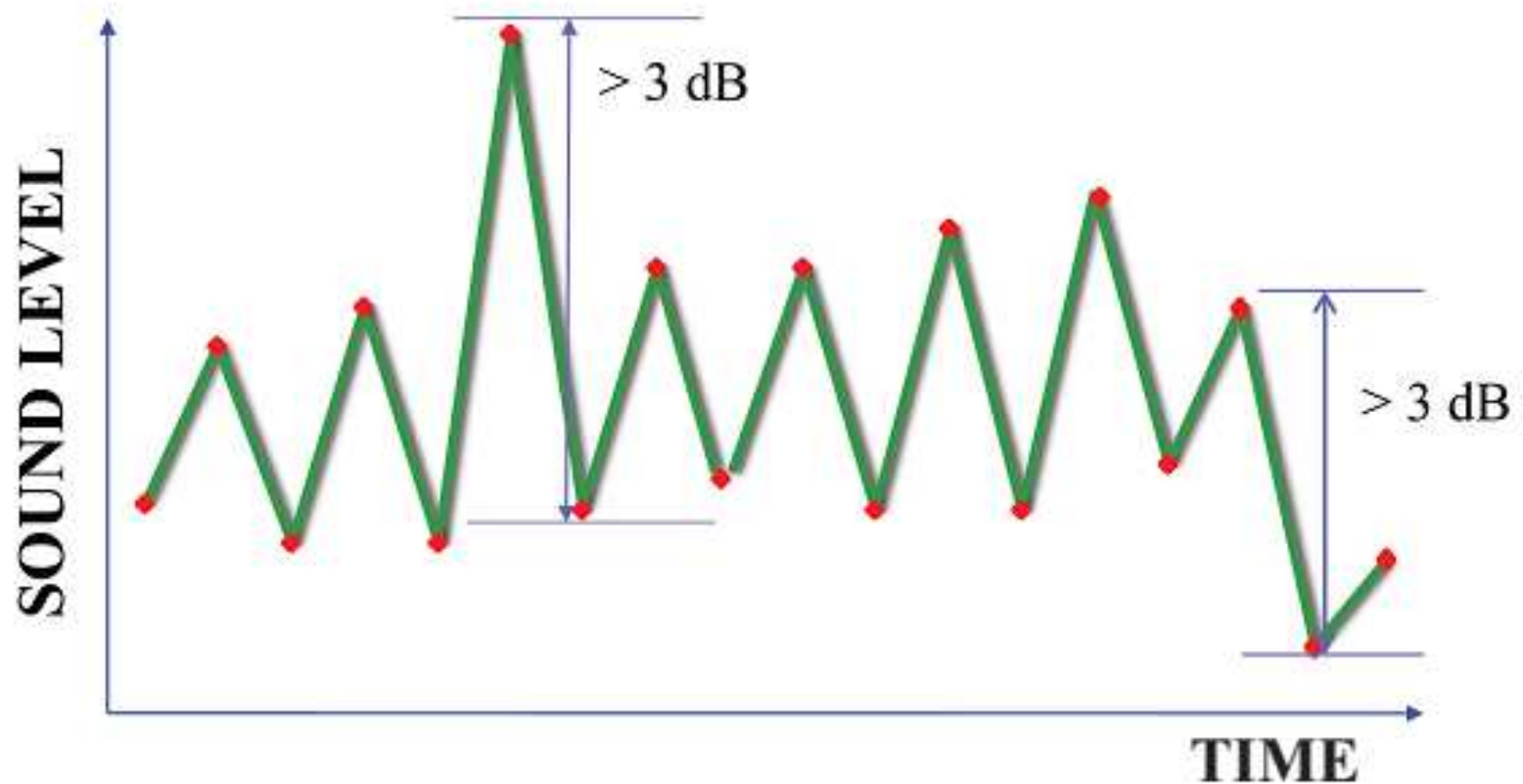
- Noise which has negligibly small fluctuations of sound level within the period of observation





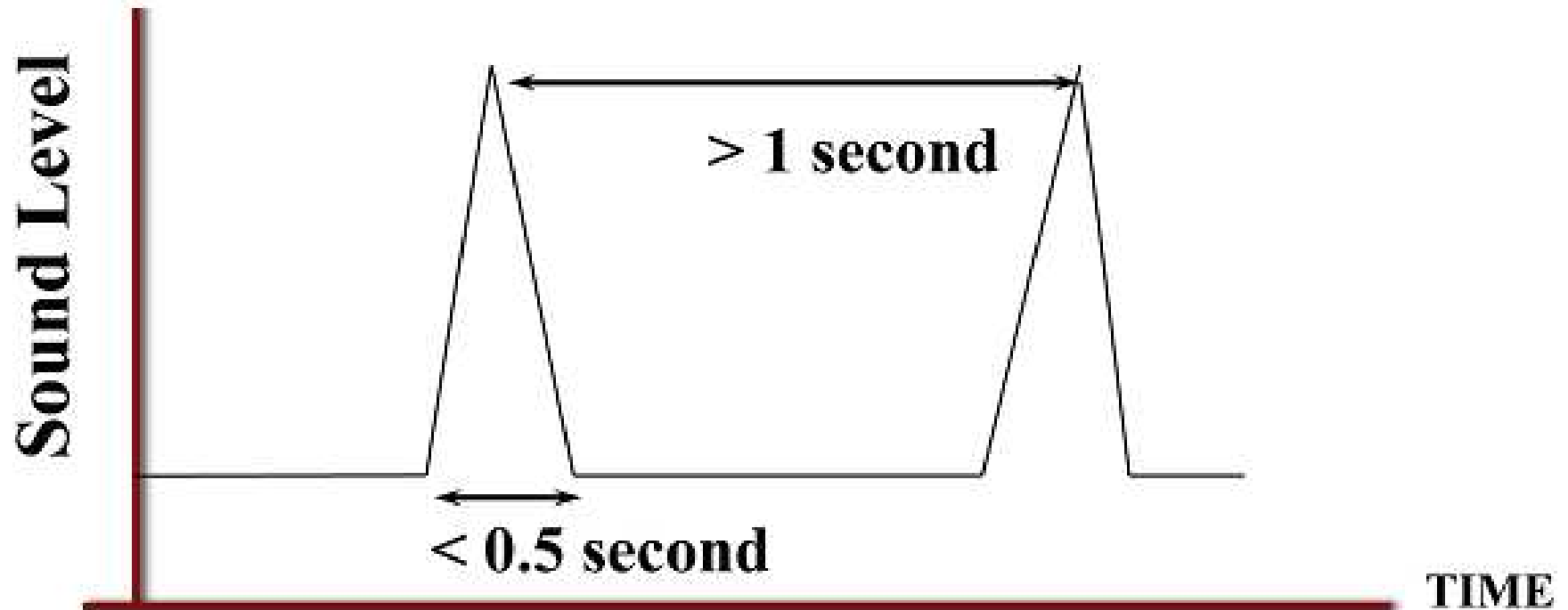
## FLUCTUATING NOISE

- Noise whose intensity rises or falls by more than 3 dB



## IMPULSIVE NOISE

- Rapid rise ( $< 0.5$  sec) in sound level that involve a peak at intervals of greater than one per second

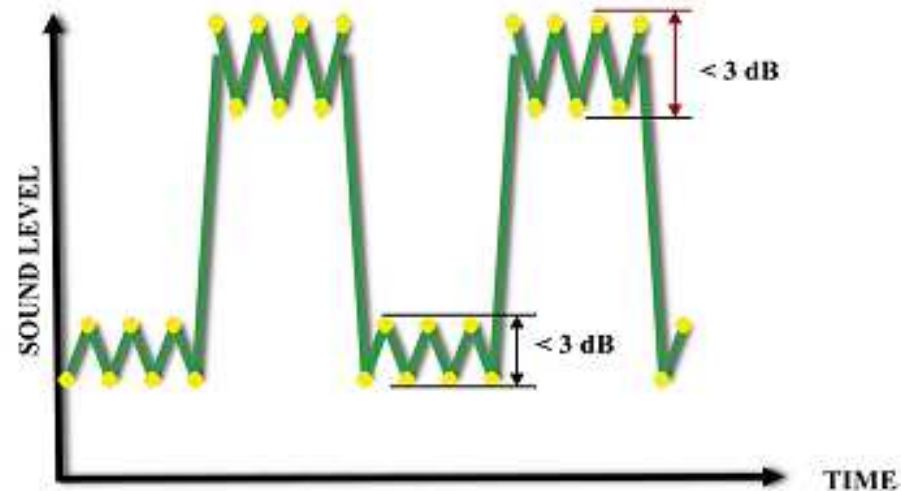


## INTERMITTENT NOISE

- **Steady-Intermittent Noise**
- **Fluctuating-Intermittent Noise**

### » **Steady-Intermittent Noise**

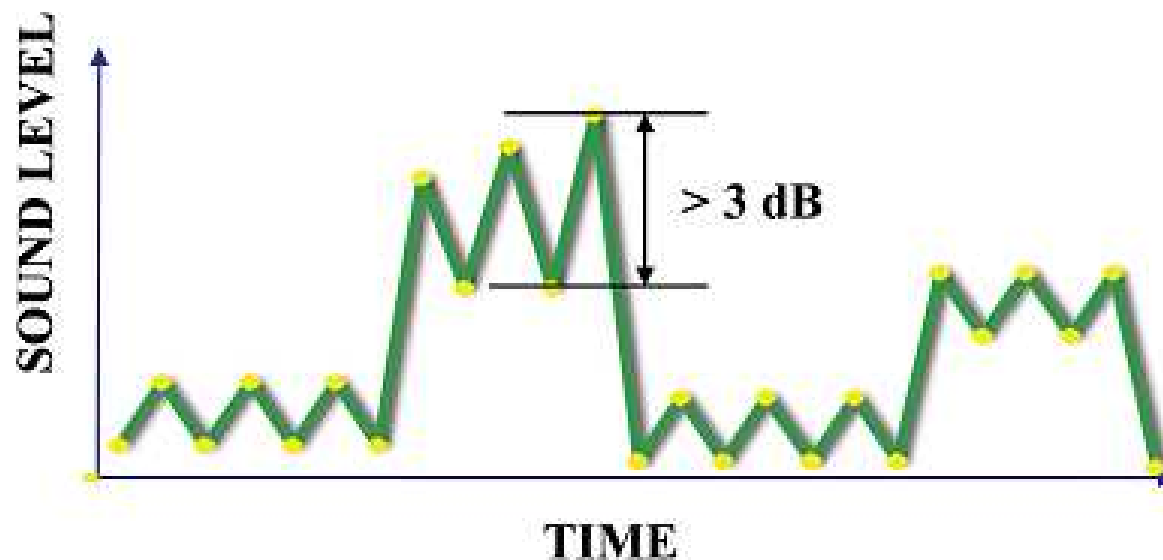
Sound level which suddenly drop to the ambient level several times during the period of observation and the time during which the level remains at a constant value different from that of the ambient level being of the order of one second or more





## » Fluctuating-Intermittent Noise

Sound level which suddenly drop to the ambient level several times during the period of observation and the time during which the level is fluctuating is different from that of the ambient level being of the order of one second or more



## TYPICAL LEVEL OF OCCUPATIONAL NOISE

Task	Avg. Noise Level (dB-A)
Operating forklift	87
Cutting Wood	93
Cutting lawn	94
Installing trench conduit	95.8
Welding	98.4
Grinding	99.7
Chipping Concrete	102.9
Working near Generator	116
Lathe	81
Welding Equipment	94.9
Hand Power Saw	97.2
Screw Gun, Drill	97.7
Rotohammer	97.8
Chop saw	98.4
Stationary Power tool	101.8
Chipping Gun	103.0

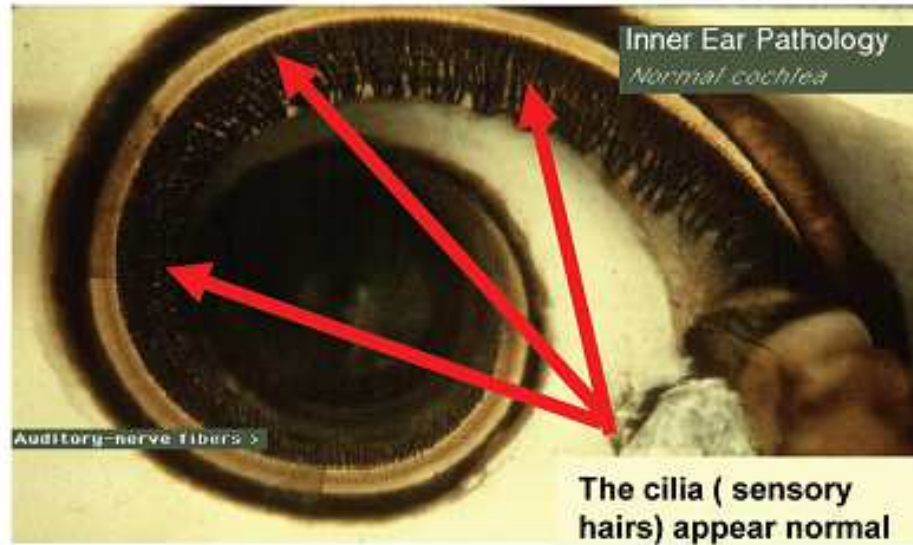
Source: San Diego State University, Environmental Health & Safety





## THE EFFECTS OF NOISE

- **Temporary hearing loss**
  - Cilia (hairline cells) are flattened
  - Hearing returns after a short period away from noise
- **Permanent hearing loss**
  - Permanent damage or destruction of hair cells in the ears.
  - Hearing cannot be restored



**THE EFFECTS OF NOISE**



## THE EFFECTS OF NOISE

### CAUSES OF HEARING LOSS...



**Age related hearing loss  
(Presbycusis)**



**Noise Induced Hearing Loss  
(NIHL)**





Ototoxic drugs



Tumour



Ototoxic chemicals



Trauma / injury



## THE EFFECTS OF NOISE

### SIGNS OF HEARING LOSS

- Difficulty hearing people speak.
- Inability to hear certain high-pitched or soft sounds.
- Noise or ringing in ears.
- Getting complaints that the radio or television is too loud.
- Trouble understanding conversation at a distance or in a crowd
- Others can hear something you can't





## THERE IS NO CURE FOR HEARING DAMAGE!



- Normal hearing can never be restored
- Hearing aids do not restore noise-damaged hearing
- Best, preventions program at earliest/ beginning stage





## THE EFFECTS OF NOISE

### NON-AUDITORY HEALTH EFFECTS

#### Effects of noise on the body

##### Physical stress reaction

- Increase in muscular tension
- Increase in heart rate
- Rise in blood pressure

##### Long-term health effects

- Cardiovascular disease
- Fatigue
- Depression

##### Psychological effects

- Stress
- Anxiety
- Reduced concentration

#### Effects of noise on the company

##### Communication

- Misunderstanding
- Reduced social support
- Auditory fatigue

##### Job performance

- Reduced teamwork
- Reduced productivity
- Reduced precision



## Health & Safety Outcomes

- Absenteeism
- Sickness absence
- Time loss accidents

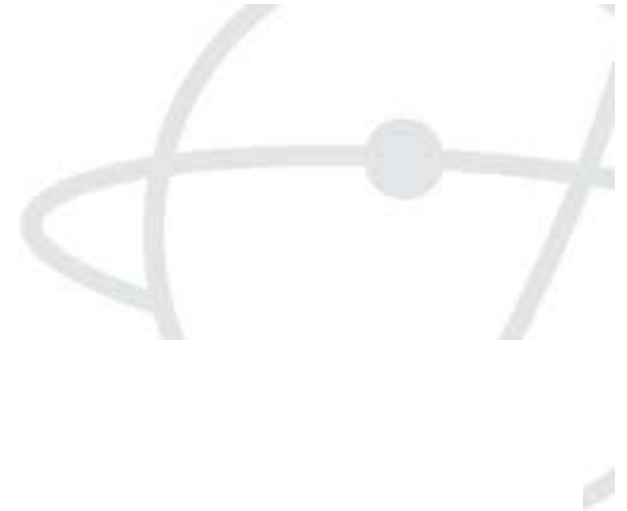
## LEGAL REQUIREMENT

### FACTORIES & MACHINERY (NOISE EXPOSURE) REGULATIONS, 1989

- Made under the Factories & Machinery Act, 1967.
- Come into force on 1 February, 1989.

### OBJECTIVES OF NOISE REGULATIONS

- To prevent the occurrences of noise induce deafness
- Legal guidance (stipulating minimum standard and procedure) to preserve worker's hearing



## EMPLOYER'S RESPONSIBILITIES

- Conduct noise exposure monitoring.
- Reduce employees' exposure to noise through engineering, administration and the use of personal protective equipment.
- Establish audiometric testing program.
- Institute training and education program.
- Establish proper record-keeping.

## LEGAL REQUIREMENT

### PERMISSIBLE EXPOSURE LIMIT

Reg. 5 & 6 - Nobody is allowed to be exposed over:-

- **90dB(A)** for 8hours or First Schedule or Daily noise dose of 1.0
- **115dB(A)** at any time
- **140dB** for impulsive noise



#### First Schedule

Noise Level (dB(A) – Slow)	Duration of Exposure Permitted per day (hours – minute)
85	16-0
90	8-0
95	4-0
100	2-0
105	1-0
110	0-30
115	0-15



## EXPOSURE MONITORING

- Employer shall conduct employee exposure monitoring to determine if any employee may be exposed to noise level at or above the action level .
- Assessment conducted by Competent Person using equipment of IEC standard.
- **EXPOSURE MONITORING**
  - Reg 9 - INITIAL MONITORING
  - Reg 10 - POSITIVE INITIAL EXPOSURE MONITORING
  - Reg 11 - NEGATIVE INITIAL EXPOSURE MONITORING
  - Reg 12 - ADDITIONAL MONITORING WHENEVER CHANGES IN Production, Process , Equipment, Control measures, Personnel
- **EMPLOYEE NOTIFICATION** -Within 2 weeks



# LEGAL REQUIREMENT

## NOISE CONTROL







## AUDIOMETRIC TESTING PROGRAMME

### An occupier shall establish:-

- Valid baseline audiogram
- A record of the medical and occupational history, particularly in relation to past ear diseases and exposure to noise.



within **six months** from the day the employee commences work

**NO COST - EMPLOYEES**



## LEGAL REQUIREMENT

### AUDIOMETRIC BOOTH

An audiometric test shall:-

- conducted by a technician under supervision of a registered medical practitioner.
- Quiet 14hours.
- be carried out in a room with background noise level meeting the requirements specified in second schedule.
- be of pure tone, air conduction, with test frequencies including 500, 1000, 2000, 3000,4000 & 6000 Hz separately



#### AUDIOMETRIC MEASURING EQUIPMENT

Approved type and shall be calibrated and maintained at regular intervals.

## SECOND SCHEDULE

(Regulation 20 (4) (c))

Maximum Allowable Octave - Band Sound  
Pressure Levels for Audiometric Test Rooms

Octave-band centre frequency (Hz)	500	1000	2000	4000	8000
Sound Pressure Level, dB	27	30	35	42	41



## LEGAL REQUIREMENT

### AUDIOMETRIC TESTING PROGRAMME

#### Frequency of Audiometric Testing

1. Every year for an employee exposed to limit prescribed in:-
  - Reg.5(1)

noise level exceeding equivalent continuous sound level of 90dB(A)  
or  
Exceeding the limits specified in the First Schedule  
or  
Exceeding the daily noise dose of unity

- Reg. 5(2) 115dB(A) at any time

2. Every year for an employee whose baseline audiogram shows hearing impairment or annual audiogram show standard threshold shift.

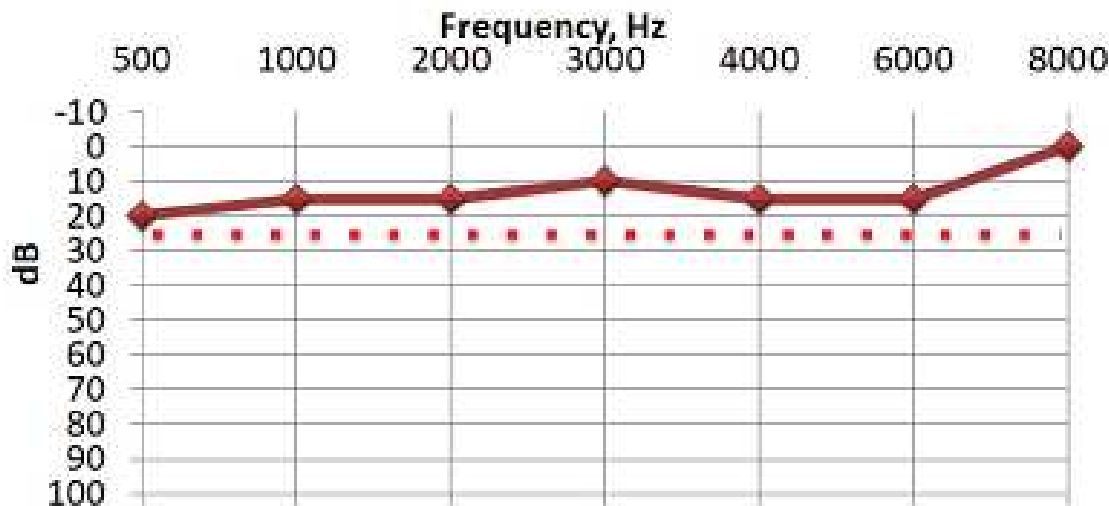
3. Every two years for an employee exposed to noise level at or above the Action Level but less the limit prescribed in Reg.5.



## LEGAL REQUIREMENT

### AUDIOGRAM (NORMAL)

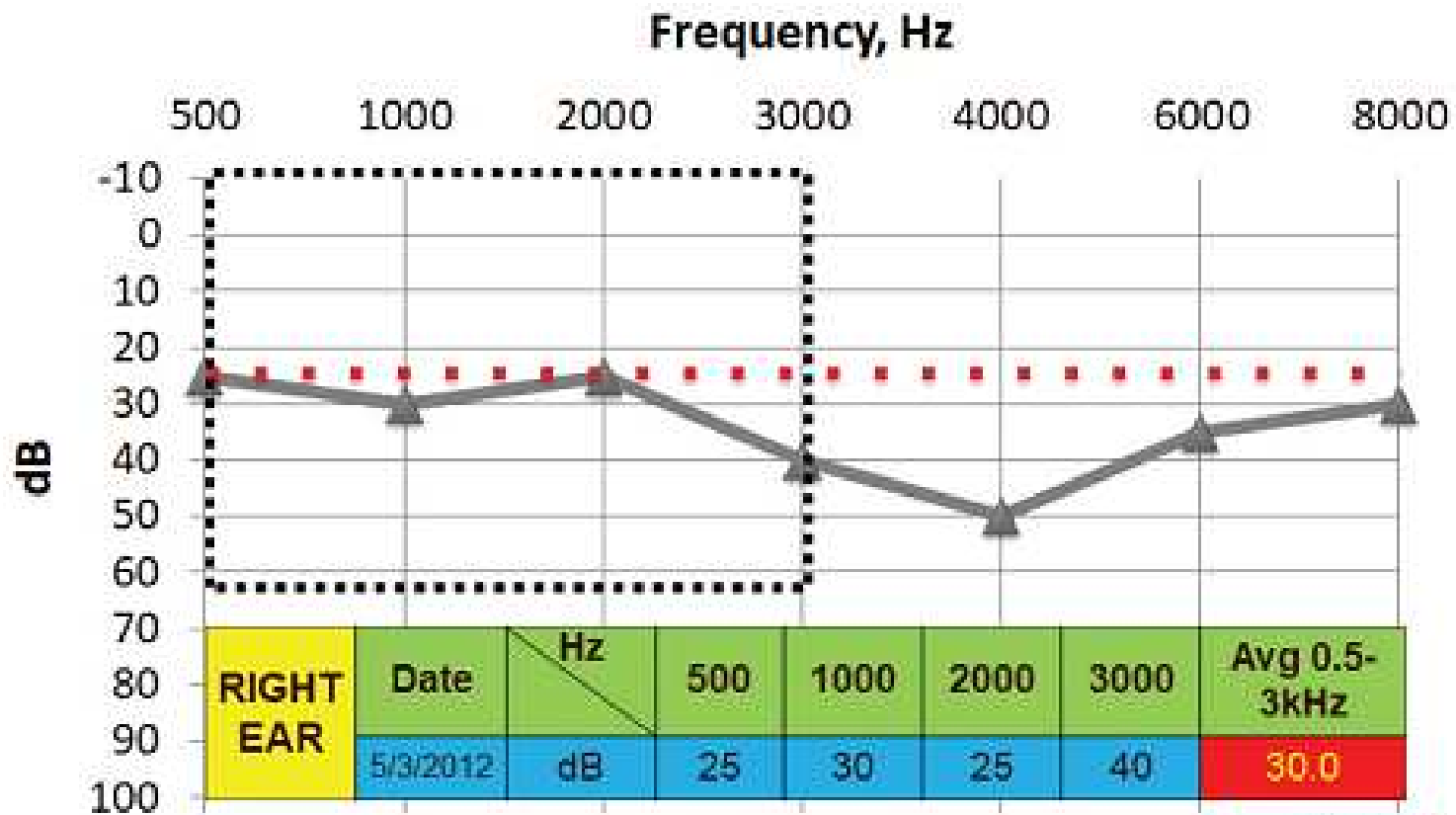
A chart, graph or table resulting from an audiometric test showing an employee's hearing threshold levels as a function of frequency



### AUDIOMETRIC TEST RECORDS

- Name & job location, date audiogram, name of person conducting the test, model, make & serial number of equipment, date of last calibration
- Retain as long as the employee is employed and five years thereafter.

# AUDIOGRAM (HEARING IMPAIRMENT)



shifted by 25 dB  
or more



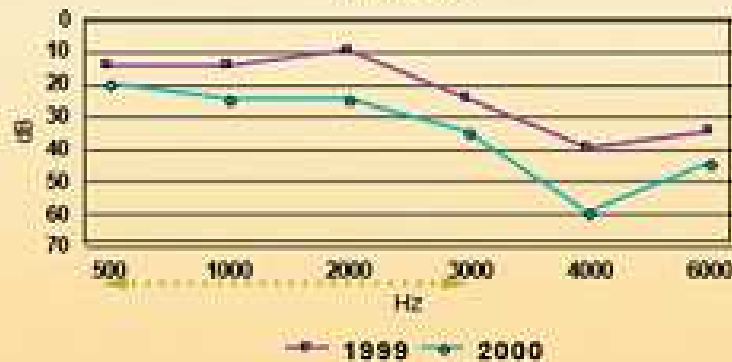
# LEGAL REQUIREMENT

## AUDIOGRAM (STANDARD THRESHOLD SHIFT)

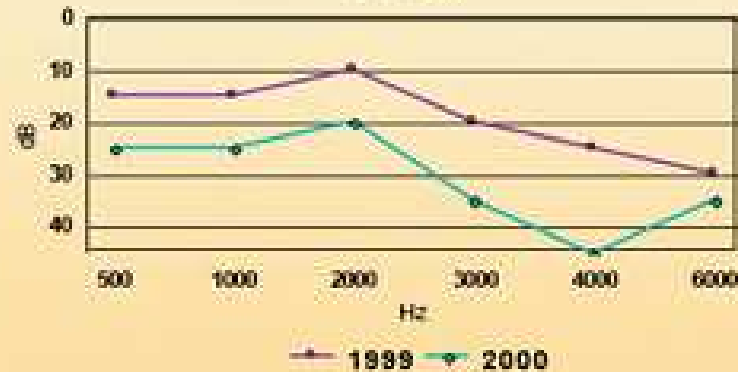
Name: John Smith  
 NRIC no: 200315-71-1234  
 Date of Birth: 15.03.1920  
 Age: 81  
 Sex: M  
 Staff No: 00123  
 Employment Date: 25.12.1974  
 Years of Service: 27

Work Location: Plant B  
 Designation: Technician  
 Noise Exposure Level: 98.9 dB(A)  
 Max Noise Exposure Level: 129.0 dB(A)

**AUDIOMETRIC TEST  
RIGHT EAR**



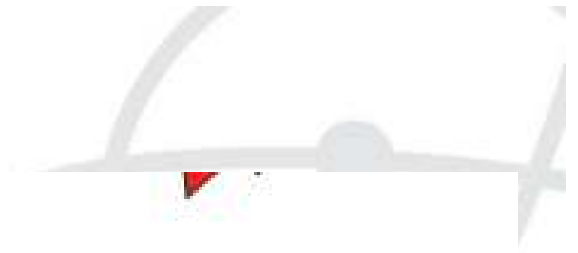
**AUDIOMETRIC TEST  
LEFT EAR**



**Baseline Audiogram**

	Average 1999		Average 2000		STS
	0.5, 1, 2, 3 kHz	2, 3, 4 kHz	0.5, 1, 2, 3 kHz	2, 3, 4 kHz	
Right Ear	16.3	25.0	26.25	40	15
Left Ear	15.0	18.3	26.25	33.33	15.33





## CONCLUSIONS

### Participant will be able to:

- Differentiate between sound & noise

- Sound is a form of energy that is transmitted by pressure variations and below PEL
- Noise is unwanted sound and effect human ear

- Identify level of noise that will effect human ear at workplace.

#### **Nobody is allowed to be exposed over:-**

- 90dB(A) for 8hours/First Schedule/daily noise dose of 1.0
- 115dB(A) at any time
- 140dB for impulsive noise

- Understand minimum requirement of legislation in Malaysia

#### **Factories & Machinery (Noise Exposure) Regulations, 1989**

- Understand responsibilities of employer & employees

- To ensure the safety, health and welfare at work of all his employees
- To co-operate with employer and comply with any instruction or measure on OSH



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# INTRODUCTION TO NOISE CONTROL



## SESSION OUTCOMES

**By the end of this session the participants should be able to:**

- Understand the overall concepts of noise control
- Use noise control methods based on Hierarchy of Control in order to improve workplace from noise hazard.

## WHEN THE NOISE CONTROL REQUIRED?

**Nobody are allowed to exposed over:-**

- **90dB(A)** for 8hours or First Schedule or Daily noise dose of 1.0
- **115dB(A)** at any time
- **140dB** for impulsive noise



**Employer to conduct exposure monitoring that consist of:**

- Area Monitoring
- Personal monitoring

**Regulation 15** – the occupier shall reduce and maintain exposure to noise level below the limits by:-

engineering control as far as reasonable practicable



## KEY ACTIONS OF NOISE CONTROL

**The key actions for controlling noise should include:**

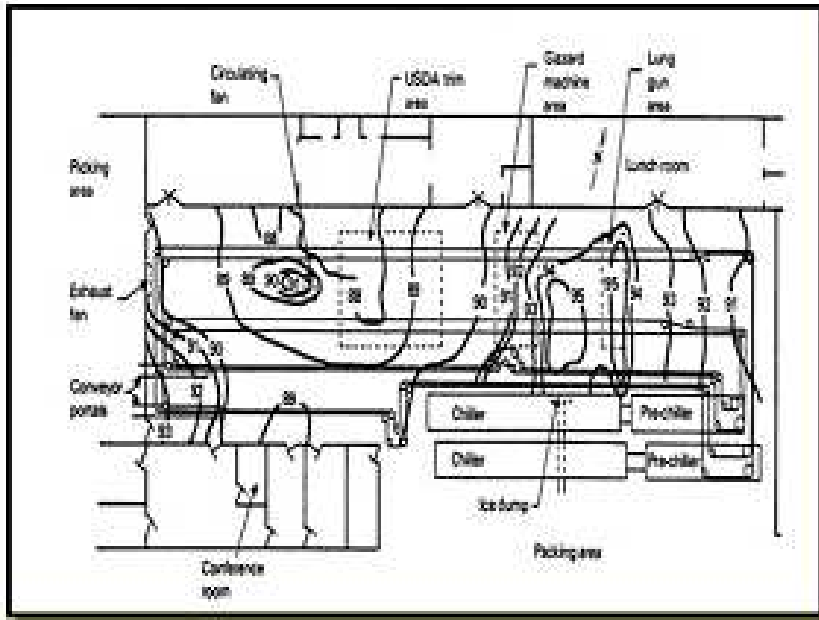
- prioritising and tackling the immediate risks.
- identifying possible methods.
- assessing the reduction levels that can be achieved by introducing cumulative controls.
- assigning responsibilities.
- monitoring controls and performance.

## UTILISING NOISE MAPPING FROM AREA MONITORING

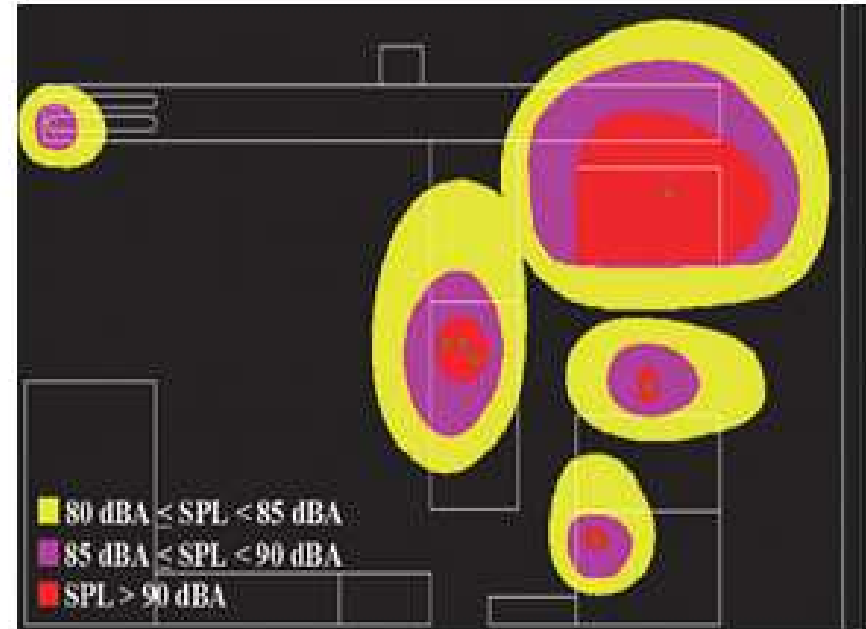
- Noise contours will indicate the noise sources.
- Noise sources with the higher noise level could be identified and action to be prioritised.
- Priority given to higher machines or process emitting higher noise levels.



# UTILISING NOISE MAPPING FROM AREA MONITORING



**Contouring**



**Zoning**



## CONSIDERING FACTORS OF NOISE CONTROL

The employers should consider the following factors:-

- the scale of the noise problem and its impact on the business (including workers).
- cost and effort required to reduce noise exposure.
- the effectiveness of planned control measures.
- the number of individuals who would benefit from those control measures.

## NOISE CONTROL BASIC STRATEGY

**Control at source.**

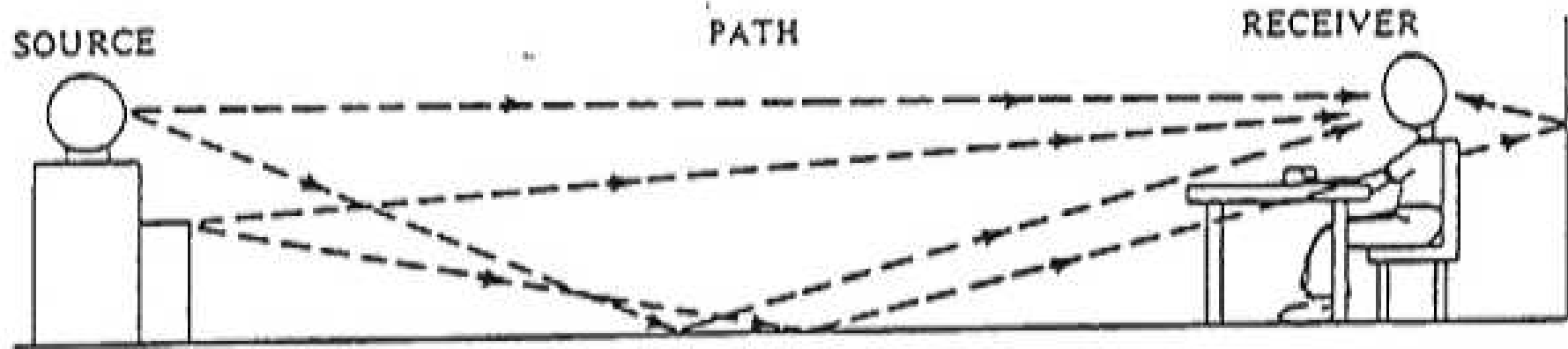
- Example - control at design stage (Prevention through Design (PtD) , reduction of speed and pressure.

**Reduction at path**

- Example - adding barriers or enclosing the equipment, adding sound-absorbent materials.

**Reduction at receiver**

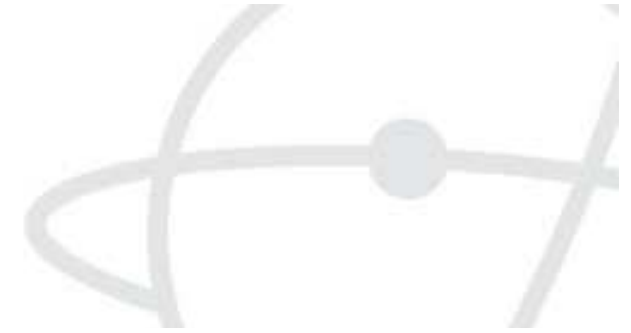
- Example - relocating the employee from the sound field, limiting his working time in the area, or through the use of hearing protective devices (HPD).



*Possible noise control procedures for*

Source	Path	Receiver
<ul style="list-style-type: none"> <li>• Modify</li> <li>• Redesign</li> <li>• Relocate</li> </ul>	<ul style="list-style-type: none"> <li>• Enclosure</li> <li>• Absorption</li> <li>• Barrier</li> </ul>	<ul style="list-style-type: none"> <li>• Enclosure</li> <li>• Absorption</li> <li>• Relocate</li> </ul>

*Source: personal.city.edu.hk*

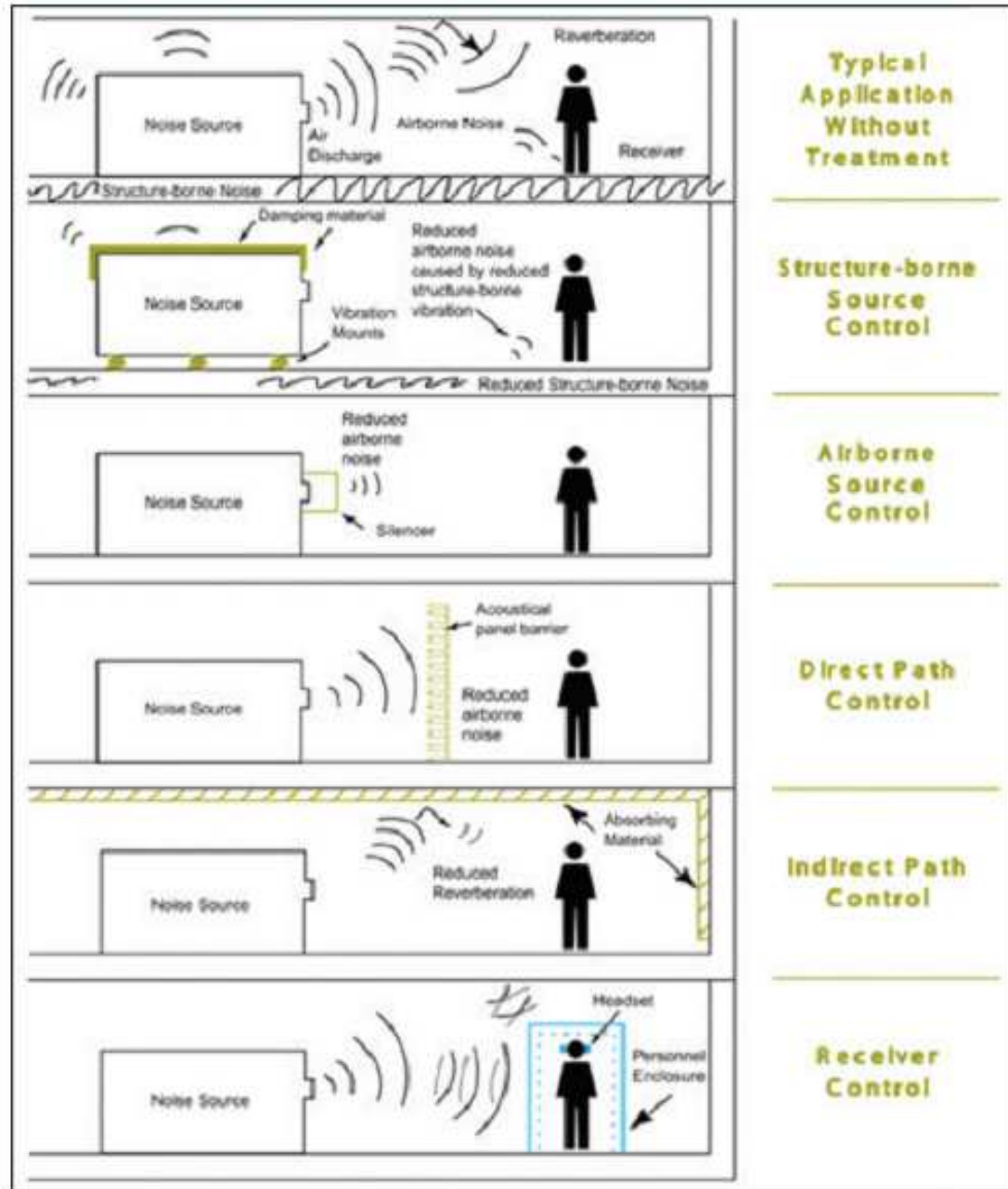


## SOURCE / PATH / RECEIVER MODEL

Basic treatment strategies using engineering controls. "Typical" noise reductions associated with each strategy are listed below :-

SOURCE CONTROL	DIRECT PATH CONTROL	INDIRECT PATH CONTROL	RECEIVER CONTROL
6 to 8 dB	10 to 25 dB & up	4 to 6 dB	10 to 25 dB & up

Source: [Info@CitySoundproofing.com](mailto:Info@CitySoundproofing.com)

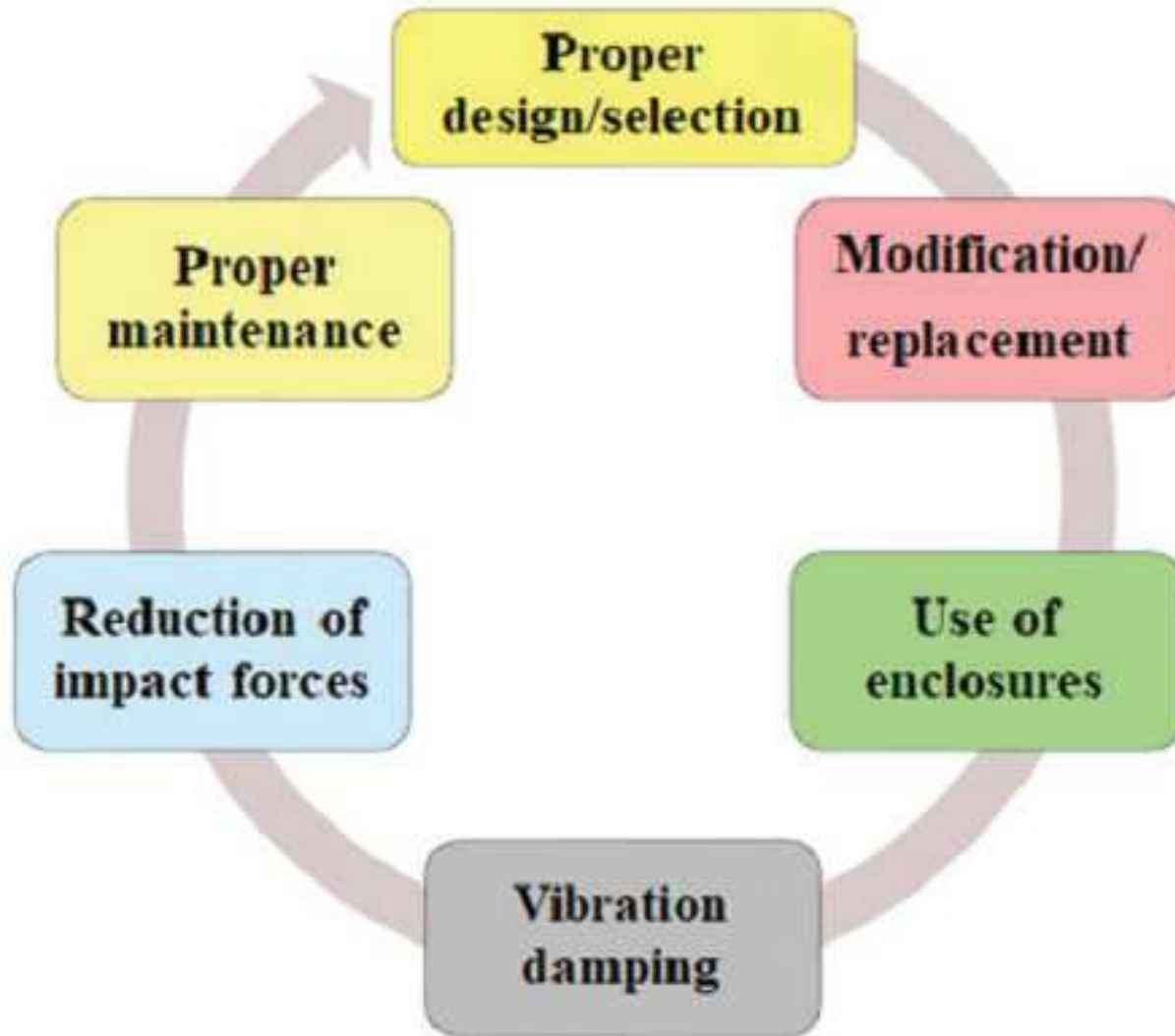


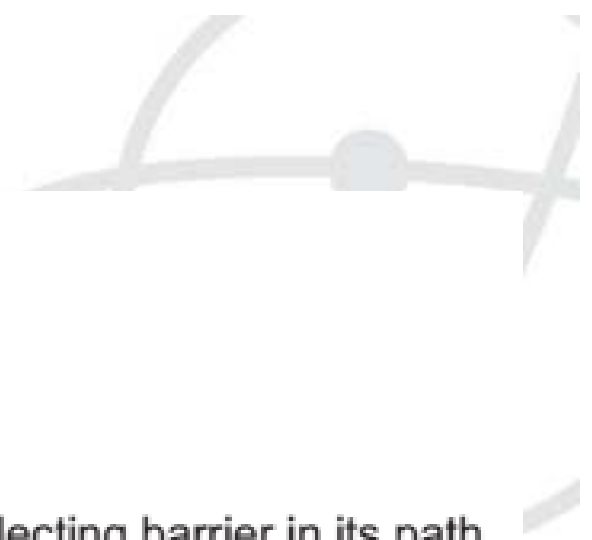


# NOISE CONTROL AT SOURCE

The improvement techniques include the following:

- reduction of impact forces,
- reduction of speed and pressure,
- reduction of frictional resistance,
- isolation of vibrating elements.





## NOISE CONTROL AT PATH

**This can be done in several ways:**

- to absorb the sound along the path,
- to deflect the sound in some other directions by placing a reflecting barrier in its path,
- to contain the sound by placing the source inside a sound-insulating box or enclosure.

## NOISE CONTROL AT RECEIVER

### Protecting the Receiver

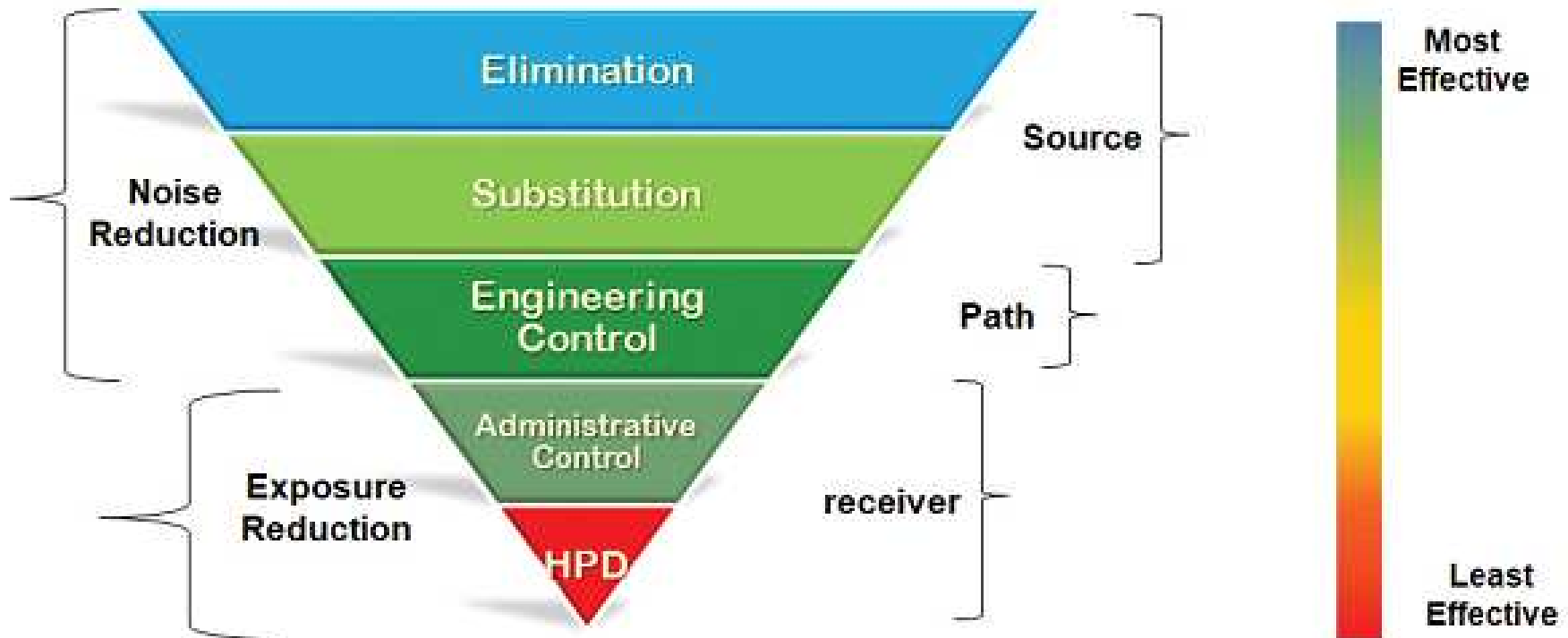
The following two techniques are commonly employed

- Alter work schedule
- HPD





## HIERARCHY OF CONTROL





## ELIMINATION

- Physically removing the hazard
- The most effective hazard control which can be done by changing a work process in a way that will get rid of a hazard

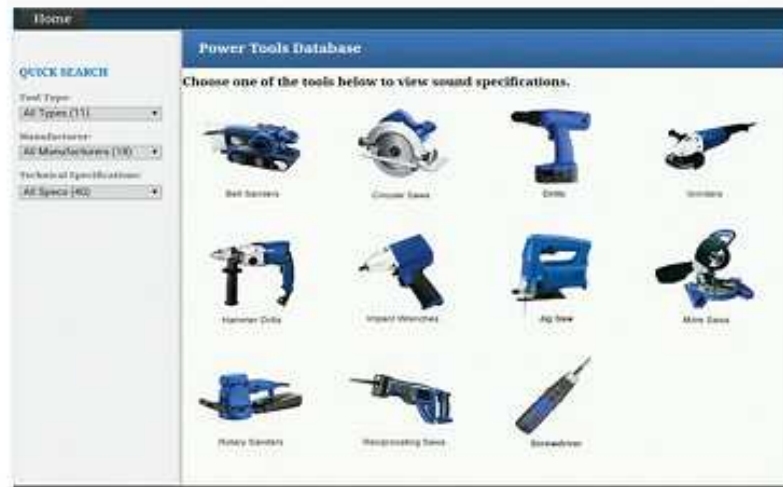
- Is the process necessary?
- Can we achieve what we want in a different way?
- Can we get another option to do it?

## SUBSTITUTION

- The second most effective way to control a hazards
- Involves removing something that produces a hazard (similar to elimination), and replacing with something that does not produce a hazard.

e.g.: substitute quieter process / equipment for noisy ones.

- To be an effective control, the new product must not produce another hazard.
  - i) 'Change of process' – same outcome, different mechanism
  - ii) 'Change of technique' – same objective – different way of getting there
  - iii) 'Change of equipment'



<http://www.hse.gov.uk/noise/buy-quiet/index.htm>



## SUBSTITUTE QUIETER PROCESS OR EQUIPMENT:-



*New quieter generators have sound proofing and produce only 75 dBA at 1 meter and 65 dBA at 7 meters under load.*



*Replacing a large jackhammer with a middle range one reduce the noise level by 10 dBA.*



*New gen set during purchase built in silencer (reduce <85dB)*



*New compressor heatless dryer –no intermittent purging (reduce <70dB)*



## BEFORE



*Individual vacuum pump install at production machine (40 units) . Noise level (90 dB)*

## AFTER



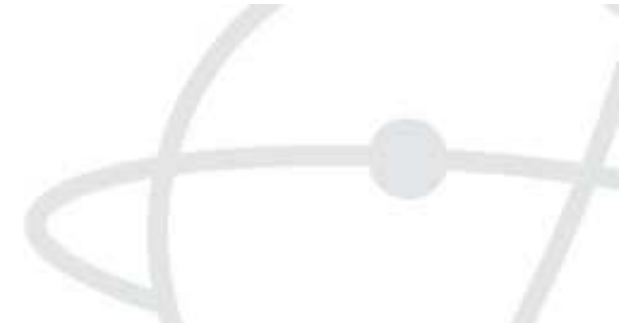
*Installation of centralize vacuum pump at facilities plant building complete with noise absorption material (rockwool with cement board). Noise level reduce to avg < 70 dB*





## ENGINEERING CONTROL

- *Engineering controls* are defined as: “Methods that reduce noise exposure by decreasing the amount of noise reaching the employee through engineering design approaches. Engineering controls *isolate the noise from the worker* through noise reduction” (adapted from NIOSH, 1996a).
- The next best approach to use when a hazard cannot be eliminated or a safer substitute cannot be found.
- Physical changes to the work area or process that effectively minimize a worker’s exposure to hazards.
- These controls focus on eliminating or reducing that actual source of the hazard.



# PRINCIPLES OF ENGINEERING CONTROL

- **A**bsorption
- **I**nsulation
- **D**istance
- **S**ilencer
- **V**ibration isolation
- **D**amping





## ADMINISTRATIVE CONTROL

### Definition

*Administrative controls* are defined as: "Methods that reduce exposure by limiting the time a worker is exposed to noise through administrative approaches. Administrative controls *isolate the worker from the noise* by reducing exposure" (adapted from NIOSH, 1996a).

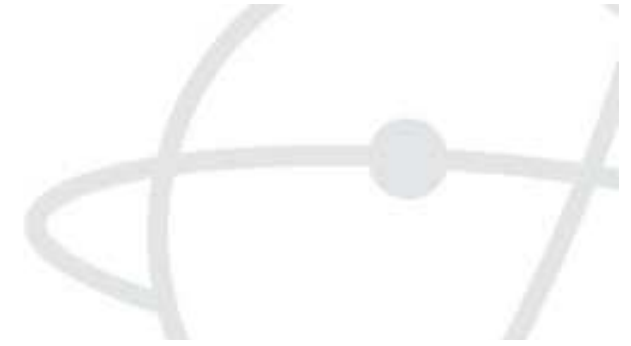
### Administrative Control EXAMPLE

- Organize schedules so that noisy work is done when few workers are present;
- Notify workers and others in advance so they can limit their exposure;
- Provide quiet areas for rest breaks;
- Limit time workers spend in noisy areas. (refer schedule 1).



## Schedule 1: Noise Exposure Regulation

Noise Level (dB (A) – slow)	Duration of Exposure Permitted per day (hours – minute)
85	16 - 0
86	13 - 56
87	12 - 8
88	10 - 34
89	9 - 11
90	8 - 0
91	6 - 58
92	6 - 4
93	5 - 17
94	4 - 36
95	4 - 0
96	3 - 29
97	3 - 2
98	2 - 50
99	2 - 15
100	2 - 0
101	1 - 44
102	1 - 31
103	1 - 19
104	1 - 9
105	1 - 0
106	0 - 52



## HEARING PROTECTIVE DEVICE(HPD)

- Provision of HPD should only be considered when all other control methods are impractical.
- What might be some drawbacks of reliance solely on HPD to protect workers?



## HEARING PROTECTIVE DEVICE

**Employee exposure to excessive noise depends upon a number of factors, including:**

- The loudness of the noise as measured in decibels (dB).
- The duration of each employee's exposure to the noise.
- Whether employees move between work areas with different noise levels.
- Whether noise is generated from one or multiple sources

## HPD REQUIREMENT

- Performing a “hazard assessment” of the workplace to identify and control physical and health hazards.
- Identifying and providing appropriate HPD for employees.
- Training employees in the use and care of the HPD.
- Maintaining HPD, including replacing worn or damaged HPD.
- Periodically reviewing, updating and evaluating the effectiveness of the HPD program.

### **In general, employees should:**

- Properly wear HPD,
- Attend training sessions on HPD,
- Taking care, clean and maintain HPD, and
- Inform a supervisor of the need to repair or replace HPD.

## TYPES OF HPD

### Single-use earplugs

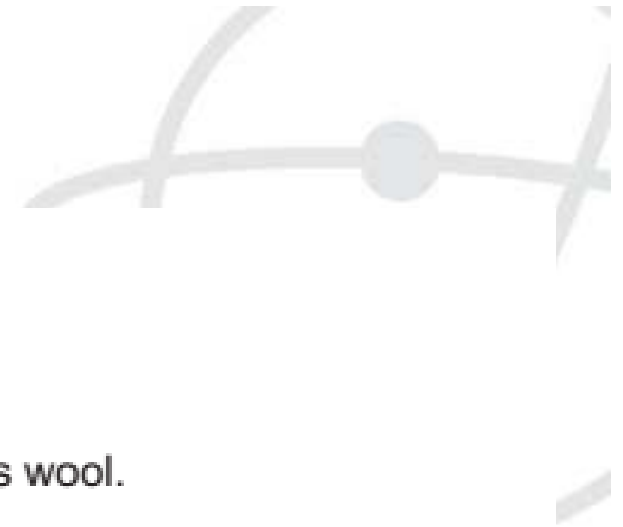
- are made of waxed cotton, foam, silicone rubber or fiberglass wool.

### Pre-formed or molded earplugs

- disposable or reusable

### Earmuffs

- require a perfect seal around the ear
- Glasses, facial hair, long hair or facial movements such as chewing may reduce the protective value of earmuffs.







## TRAINING HPD

**Employees must be trained to know at least the following:**

- When HPD is necessary.
- What HPD is necessary.
- How to properly put on, take off, adjust and wear the HPD.
- The limitations of the HPD.
- Proper care, maintenance, useful life and disposal of HPD.



# PROPER WAY OF WEARING HPD

<p><b>Chimney Earplugs</b> Block noise 15dB to 25dB</p> 	 <p>Roll the bottom of the earplug between the thumb and index finger to compress the foam.</p>	 <p>Roll the earplug between the thumb and index finger to compress the foam.</p>	 <p>Insert the earplug into the ear canal and press the earlobe against the earplug to compress the foam.</p>
<p><b>Acoustic Foam</b> Block noise 15dB to 25dB</p> 	 <p>Roll the earplug between the thumb and index finger to compress the foam.</p>	 <p>Roll the earplug between the thumb and index finger to compress the foam.</p>	 <p>Insert the earplug into the ear canal and press the earlobe against the earplug to compress the foam.</p>
<p><b>Wax Earplugs</b> Block noise 15dB to 25dB</p> 	 <p>Roll the earplug between the thumb and index finger to compress the wax.</p>	 <p>Roll the earplug between the thumb and index finger to compress the wax.</p>	 <p>Insert the earplug into the ear canal and press the earlobe against the earplug to compress the wax.</p>
<p><b>Ear Muffs</b> Block noise 15dB to 25dB</p> 	 <p>Position the ear muffs over your ears and adjust the headband to fit snugly around your head.</p>	 <p>Position the ear muffs over your ears and adjust the headband to fit snugly around your head.</p>	 <p>Position the ear muffs over your ears and adjust the headband to fit snugly around your head.</p>
<p><b>Earplugs with Chin Strap</b> Block noise 15dB to 25dB</p> 	 <p>Position the earplugs in your ears and pull the chin strap over your chin to secure the earplugs.</p>	 <p>Position the earplugs in your ears and pull the chin strap over your chin to secure the earplugs.</p>	 <p>Position the earplugs in your ears and pull the chin strap over your chin to secure the earplugs.</p>

Source : [www.mscdirect.com](http://www.mscdirect.com)

## NOISE REDUCTION RATING (NRR)

The NRR describes the average sound level reduction (attenuation) provided by a hearing protection device (HPD) in a laboratory test. It doesn't take into consideration on:

- the loss of protection that occurs when hearing protectors are **not fit** properly
- they are **not worn** for the entire time that the wearer is exposed to noise

### The NRR on the EPA label

average amount of attenuation

"experimenter fit" method results in rating as high as 33 dB

ratings overestimate the protection that many wearers

effectiveness of an HPD by Reducing the NRR





### An Example of Reducing the NRR

- 8-hour TWA noise exposure: 93 dB(A)
- NRR of hearing protectors: 29 dB

Subtract 7 dB from the NRR:  $29 \text{ dB} - 7 \text{ dB} = 22 \text{ dB(A)}$

Divide by 2:  $22 \div 2 = 11 \text{ dB(A)}$  (Derating)

Subtract 11 dB(A) from the

8-hour TWA noise exposure:  $93 \text{ dBA} - 11 \text{ dB(A)} = 82 \text{ dB(A)}$

Decide if 82 dB(A) (known as the "Protected Exposure") is below the PEL for noise

## SNR

**OUR REF: UC-EP03C**

Soft COEDED PU foam earplugs which expand gradually to conform exactly to the size and shape of virtually any ear canal. Extremely high SNR 37 for very noisy environments. Extremely cost effective.

**EN 352-2:2002**



A simple indication of protection levels

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

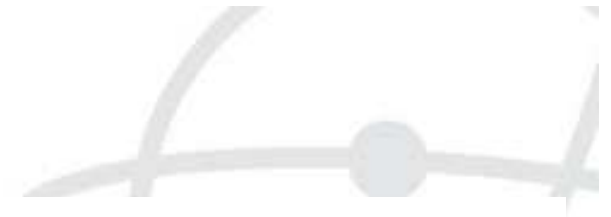
## WHY HPD?

HPDs are often rejected by workers for many reasons, such as :



## FACTS TO KNOW?

- Percentage of workers who wear HPDs can vary from 0% to more than 49% (Suter, 2002)
- 34% of workers exposed to noise never used hearing protection (Tak, et al., 2009).



## FACTS TO KNOW?

- Federal regulations issued by the EPA mandate that hearing protectors be labeled with a noise reduction rating (NRR), which was designed to predict the amount of **protection 98%** of wearers would achieve by wearing the devices correctly.(EPA, 1979).
- Research has shown that fewer than **5%** of workers actually receive the protection predicted by the NRR (Berger, et al., 1994).

## CONCLUSION

- Noise exposure monitoring is essential to determine the needs of noise control.
- Implement noise control based on Hierarchy of Control in order to improve workplace from noise hazard
- Do not depend solely on HPD







# THANK YOU

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