

# Chapter-4

# Noise Pollution

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# Noise pollution:

## Sound and Noise

- **Noise** is unpleasant and unwanted sound.
- **Sound** is what we hear.
- The difference between sound and noise depends upon the listener and the circumstances.

## Unit of Measurement:

### Sound powers:

- It is the sound energy transferred per second from the sources (sound) to the air. Power is expressed in watts (W).

### Sound Power Level $L_w$ :

- Sound power in watts converted to decibel scale is called the sound power level.



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## Sound pressure:

- it is the amount of air pressure fluctuation created by the source of the sound.
- Sound pressure is expressed as Pascal. A healthy young person can hear sound pressure is low pressures as low as  $0.00002\text{Pa}$ .

## Sound Pressure Level (SPL):

- Sound pressure converted to the decibel scale is called sound pressure level.
- Decibel (dB) is used in environmental noise pollution as a measure of sound power level, sound intensity level and sound pressure level.

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## NOISE LEVELS

Once a noise reaches over 85 dB (approximately the level of a vacuum), damage to your hearing may begin.

After this, every 3 dB increase in sound halves the length of time that your ears can handle the noise before damage starts.

You can only listen to personal music players (PMPs) for approximately 3.75 minutes on a high volume before it starts to damage your hearing.

The lower the volume, the longer you can safely listen for.

	Decibel Level (Unit of sound measurement)	How long can you listen without protection?	Noise Source
DANGER	130	0	Jet take off
	120	0	Music concert
HEARING PROTECTION NEEDED	115	Less than 1 minute	Sports event
	109	Less than 2 minutes	Car horn
	106	3.75 minutes	Personal music player at maximum volume
	103	7.5 minutes	Belt sander
	100	15 minutes	School dance, machinery
	97	30 minutes	Motorcycle
	94	1 hour	Electric drill
	91	2 hours	Shouting, lawn mower
Level at which damage begins			
SAFE	85	8 hours	Vacuum cleaner
	55	Safe	Conversation

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## Noise rating system:

- A noise may consist of different type of sound (Continuous, intermittent, and impulse with different pressure levels operating for different time intervals.
- The frequency of this sound may vary. The combined resultant impact of different sound pressure lasting different periods is worked out by using some statistical measures as  $L_N$  and  $L_{eq}$  system.

## The $L_N$ concept:

- The parameter  $L_N$  is a statistical measure indicating how frequently a particular sound level is exceeded.
- The value of  $L_N$  will represent the sound pressure level that will exceed for N% of the gauging time.

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## The $L_{eq}$ concept:

- $L_{eq}$  is defined as the constant noise level, which over a given time, expands the same amount of energy, as is expanded by fluctuating levels over the same time.

## Sources of Noise Pollution

Following are the main sources of noise pollution

- Traffic sources
- Industrial sources
- Constructional sources
- Other miscellaneous sources

### 1. Traffic sources:

- noise created by various means of transport like trucks, tractors, buses, trains, aeroplanes, etc are the traffic related source of noise pollution.

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It may be in the form of:

- Horn of vehicles
- Vehicle with damaged silencer
- Noise produced by a diesel car will be more than that produced by a petrol car.
- A jet aircraft will produce more noise than a propeller type of aircraft.

## 2. Industrial sources

- Noise is the essential by product of industry, its intensity and nature being dependent upon the type of industry.

Industrial noises are usually produced by:

- Reciprocating or rotating machinery
- Cutting of materials, grinding
- Blow hammers
- Generators

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## 3. Constructional sources

- Noises produced by various constructional activities are:
- Rock crusher for production of aggregate
- Pile driving equipment
- Boring and drilling equipment
- Road rollers
- Materials handling by conveyers
- Rock blasting

## 4. Other miscellaneous sources

- **In residential area** – Loud voice of T.V., music systems, radio, etc
- **Public address system** – public functions, Navratry festival etc.
- **Sirens** – Police van, industries, ambulance
- **Military sources** – noise of bomb, grenade explosion, tanks other vehicles, missiles etc.



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## Noise pollution effects:

Major effects:

1. Loss of hearing
2. Annoyance
3. Health effects
4. Interference with communication
5. Working efficiency

### **1. Loss of hearing:**

- Loss of hearing occur due to exposure of noise, which is termed as artificial hearing loss. This loss is divided into two types:

#### **A. Noise Induced Temporary Threshold Shifts (NITTS):**

- This is caused due to exposure to loud noise like bursting of crackers. This can be recovered in a short period of time.

#### **B. Noise Induced Permanent Threshold Shifts (NIPTS):**

- This occurs because of exposure to loud noise for a long period of time.

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## 2. Annoyance:

- This is a subjective matter for a noise. Someone may like classical music, it may annoy other.
- Blood vessels get constricted, breathing rate is affected and musical tension changes.

## 3. Health effects:

### (i) Effects on physical health:

#### **Auditory effects:**

- They are grouped into short time and long time effects.
- Acoustic trauma is caused by a very high intensity impulsive noise of about 150 db or more from explosion.

#### **Non – auditory effects:**

- Exposure to a loud noise may increase the pulse rate and blood pressure changes. Body experiences fear reactions. Disturbed brain waves lead to the interference in vision.

### (ii) Effects on mental health:

- Effect on mental health is less. Lack of concentration at high noise level.

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## 4. Interference with communication:

- A person may face the problem of trying to understand another person talking to him/her in an environment with high background noise level.

## 5. Working efficiency:

- It is found to be decreased drastically whenever a person is working in the noisy environment

## Other effect:

- Sleep interference
- Increased industrial accidents
- Personal comfort interference
- Property value degradation
- Effects on wildlife

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## Control of Noise Pollution:

1. Proper maintenance and lubrication of machine can reduce noise.
2. Sources of noise pollution like heavy vehicles, airports, noise producing industries etc should be located away from populated areas.
3. Silence zones should be created around residential areas, educational institutions and hospitals.
4. Noisy machines should be installed in sound proof chamber.
5. Planting more trees having broad leaves which can absorb sound.
6. Use of loud-speakers and amplifiers should be restricted to a fixed intensity and fixed hours of the day.
7. Occupational exposure to noise can be reduced by using protective devices such as ear plugs.
8. Restricting the unnecessary horn blowing by laws.