



CITY OF CAPE TOWN
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WHAT IS NOISE?

DEFINITION OF NOISE

Noise can be defined as "unwanted sound", and an audible acoustic energy that adversely affects the physiological and/or psychological well-being of people, or which disturbs or impairs the convenience or peace of any person. We can generalise by saying that sound becomes unwanted when it:

- hinders speech communication;
- impedes the thinking process;
- interferes with concentration;
- obstructs activities (work or leisure); or
- presents a health risk due to hearing damage.

It is important to remember that whether a given sound is "noise" depends on the listener or hearer. The driver playing loud rock music on their car radio hears no noise, but the person in the traffic behind them hears nothing but noise.

DEFINITION OF DISTURBING NOISE AND A NOISE NUISANCE	
Disturbing noise	Noise nuisance
<p>PN200/2013: "disturbing noise" means a noise, excluding the unamplified human voice, which:</p> <p>(a) exceeds the rating level by 7 dBA;</p> <p>(b) exceeds the residual noise level where the residual noise level is higher than the rating level;</p> <p>(c) exceeds the residual noise level by 3 dBA where the residual noise level is lower than the rating level; or</p> <p>(d) in the case of a low-frequency noise, exceeds the level specified in Annex B of SANS 10103.</p>	<p>Means any sound, which disturbs or impairs or may disturb or impair the convenience or peace of any person.</p>
<p>Ambient sound level means the reading on an integrating impulse sound level meter taken in the absence of any alleged disturbing noise.</p>	<p>PN200/2013: "ambient noise" means the all-encompassing sound in a given situation at a given time, measured as the reading on an integrated impulse sound level meter for a total period of at least 10 minutes.</p>
<p>Noise level means the reading taken at a measuring point in the presence of any</p>	<p>PN200/2013: "residual noise" means the all-encompassing sound in a given situation at a</p>

alleged disturbing noise at the end of a total period of at least ten minutes after such meter was put into operation, and if the alleged disturbing noise has a discernable pitch, for example, a whistle, buzz, drone or music, to which 5 dBA is added.	given time, measured as the reading on an integrated impulse sound level meter for a total period of at least ten minutes, excluding noise alleged to be causing a noise nuisance or disturbing noise.
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PHYSICAL PROPERTIES OF SOUND

Sound is the result of pressure changes in the air, caused by vibration or turbulence. The "loudness" of these pressure changes is stated in terms of sound level, and the rapidity with which these changes occur is the sound's frequency.

Sound level is expressed in decibels (dB). To hear sounds, air pressure changes must be very rapid. Changes must complete a cycle at least 20 times per second and not more than 20 000 times a second. The rate at which these cycles repeat is called the frequency of the sound and is measured in Hertz (Hz). One Hertz is equal to one cycle per second.

DIFFERENT TYPES OF SOUND

- **Continuous sounds:** are sounds that have little or no variation over a duration of time.
- **Varying sounds:** are sounds that have differing maximum levels over a duration of time.
- **Intermittent sounds:** are sounds that are interspersed with quiet periods.
- **Impulsive sounds:** are sounds that are characterised by relatively high sound levels over a very short duration of time.

Mainly the duration and level of the noise determine the effects of noise. Long lasting, high level sounds are the most disturbing and damaging to hearing and generally the most annoying. Duration of sounds is also important, in that intermittent sounds appear to be less damaging to hearing than continuous sounds because of the ear's ability to regenerate during the quiet periods. However, intermittent and impulsive sounds tend to be more annoying because of their unpredictability.

THE COST OF NOISE

Economic interest has always dominated noise control, but we now have to weigh this against other likely costs such as:

- loss of earnings;

- loss of productivity;
- burden on the health services and the criminal justice system;
- increasing violence;
- human misery;
- social anger; or
- loss of quality of life that noise causes.

Myths about noise

- "You can get used to it" - You never do, even while asleep, your body reacts to it as a warning signal.
- "It's my right to make a noise" - Noise hurts and you have no right to hurt others.
- "Noise has to be loud to be annoying" - A dripping tap or the dull "thump thump" of amplified music can cause extreme stress.

TYPICAL EVERYDAY NOISE LEVELS		
DECIBELS (dB)	COMMON SOUNDS	PERCEPTION
10 dB - 30dB	Whisper or a quiet conversation	Barely audible
30dB - 50dB	Rainfall, quiet office, refrigerator or a computer	Heard faintly
50db - 60db	Dishwasher, normal conversation or a radio	Moderate level
60dB - 70dB	Hairdryer, heavy traffic or a ringing phone	Moderate to loud
70db - 80dB	Noisy office or an alarm clock	Loud
80dB - 90dB	Electric razor, lawnmower or an vacuum cleaner	Loud to very loud
90dB - 100dB	Chain saw, air compressor or a jackhammer	Very loud
100dB - 110dB	Rock concert, power saw or a hifi on full	Extremely loud
110dB - 120dB	Jet take off, nightclub or thunder	Extremely loud to painful
120dB - 130dB	Shotgun	Painful

NOISE AND ITS IMPACT ON HEALTH

The recognition of the noise as a serious health hazard as opposed to a nuisance is a recent development and the health effects of the hazardous noise exposure are now considered to be an increasingly important environmental health problem.

Problems related to noise include hearing loss, stress, interference with communication, sleep loss, effects on performance and behaviour, inability to enjoy one's property or leisure time, and a general reduction in the quality of life and opportunities for tranquility.

Hearing impairment and loss

For most people, a life time's continuous exposure to an environmental average noise level of 70 dB will not cause hearing impairment, but any continuous level above 70 dB will adversely affect one's hearing ability. An adult person's ear can tolerate an occasional noise level of up to 140 dB, but this is not recommended over a prolonged time period. Noise induced hearing impairment is the most common irreversible (and preventable) occupational hazard worldwide.

Interference with communication

Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard involving an accident or even a fatality because of the failure to hear the warning sounds of imminent danger. Noise can disrupt face-to-face conversation, the enjoyment of radio and television in the home. It can also disrupt effective communication between teachers and pupils in schools, and can cause vocal strain and fatigue in those who need to communicate in spite of the noise. Noise also disturbs relaxation time and masks speech, television and music.

Loss of sleep

Noise is one of the most common forms of sleep disturbance, and sleep disturbance is a critical component of noise related annoyance. Noise can cause the sleeper to awaken repeatedly and to report poor sleep quality the next day, but noise can also produce reactions of which the individual is unaware. These reactions include changes from heavier to lighter stages of sleep, increases in body movements during the night, changes in heart rate, and mood changes and this all leads to a diminished work performance or productivity.

Effects on performance and behaviour

Impulsive or sudden loud sounds can produce a startle response that one does not completely grow accustomed to with repeated, predictable exposures. Simple tasks

remain unaffected at noise levels as high as 115dB, while more complex tasks are interrupted at much lower noise levels. Frequency and tempo of noise also play a role. High frequency sound is more disruptive than low frequency sound, and intermittent noise can affect performance more adversely than continuous noise of similar energy. It seems that noise can have an even greater effect on the individual after than during exposure. The most common after effect appearing is the reduced tolerance for frustration and the reduction in willingness to persist in trying to solve complex problems.

Noise has a significant impact on the quality of life, and is a health problem in accordance with the World Health Organisation's (WHO) definition of health. WHO's definition of health includes total physical and mental well being, as well as the absence of disease. Therefore, noise must be recognised as a major threat to human well being. The effects of noise are seldom catastrophic, and are often only temporary, but adverse effects can be cumulative with prolonged exposure. There is also some evidence that it can adversely affect general health in the same manner as stress. More often than not, noise is a nuisance or an annoyance.

NOISE PREVENTION

Noise can be controlled during one of the following stages or combination of stages:

- Control at source
- Control in the transmission path
- Control at the receiver
- Legislation

Other control methods

Zoning

- Zoning ensures the correct siting of factories, industries and residential areas to reduce noise pollution to the minimum.

Noise barriers

- Noise buffers in the form of sand, covered with grass, may be considered as a means of protecting communities from unacceptable noise levels. These barriers need to be large enough to make them effective.

Transportation control

- Noise pollution from aircraft is controlled through the zoning of airfields away from residential areas.

- Road noise can be controlled by setting maximum noise levels for each class of motor vehicle, and through information such as traffic flow, speed, light/heavy traffic mix, etc.

Education

- Communities should be educated on the negative effect of noise on their physical, mental and social life.
- Before development projects commence, potential sources of noise pollution associated with the project should be identified and discussed with the community.

Legislation

- Legislation should be for the effective prevention of noise from the various sources of noise pollution.

Legislation providing for noise control includes the following:

- Environment Conservation Act, which provides noise regulations.
- Road Traffic Act controlling noise levels related to road traffic.
- The Aviation Act to prevent nuisance in relation to air navigation or aircraft related issues.
- Occupational Safety Act which ensures the safety of persons in the workplace.

Town planning

- Proper town planning will ensure that impact assessments for noise are carried out before any development projects are undertaken.

Time limit to control noise

- By-laws make provision for limiting noise emanating from events such as parties, e.g. By setting specific time limits when the noise must cease.

WHAT YOU CAN DO TO MINIMISE NOISE

As a community member, you can do your bit to prevent noise in your neighbourhood by following these guidelines:

- Keep the level of HiFi's, TV's, radio's, and tape players at a level where they cannot be heard from the street, and always keep the bass level turned as low as possible.
- Avoid hosting "home parties" - it is difficult to get guests to cooperate when they have been drinking, rather hire a hall or restaurant.

- Don't hoot when meeting or leaving family or friends, and don't slam car doors or rev engines at night.
- Don't leave dogs alone for long periods; rather have a friend or neighbour check on them.
- Don't let your dogs bark. If they do, attend to the cause immediately, and keep them inside at night.
- Don't carry out noisy DIY jobs in a manner that will cause inconvenience to the neighbours. At least inform them thereof if it is work that must take place and then do this work within reasonable hours.
- Ensure that there is another "key holder" for car and home alarms.
- Make sure that your swimming pool pump and other home equipment is operating silently or acoustically to confine the noise.
- Keep noise levels down at all times.

MEASURING NOISE

The instrument for measuring noise is the basic sound level meter or the integrated sound level meter. Sound meters are designed to measure sounds that the human ear would detect. The ear does not hear very high or low frequencies as well as it can hear middle frequency sounds. Sound meters use special filters to mimic the ear's performance.

The sound level meter

This device performs three basic operations:

- First, it uses a microphone to convert the energy in the sound into an electrical signal.
- When a sound wave hits the microphone, it causes a diaphragm to vibrate, thereby producing electronic signals, which are proportional to the sound pressure causing the vibration.
- Thirdly, this electronic network then conditions the signal to provide meaningful results transmitted through a visual display.

Rule of thumb when measuring noise levels

- The noise source being measured should at least be identifiable.
- Keep the sound level meter at least 3m away from any large reflecting surfaces.
- All measurements are to be made with the microphone at 1.2m - 1.4m above the ground, on a tripod.

Under the decibel scale, when the sound level increases by 3 dB, the actual sound energy doubles. This means that half of the sound energy must be eliminated to

reduce the sound level by 3 dB. Most people would barely notice a 3 dB change, but a 6 dB change would be clearly noticeable, while a 10 dB increase would be perceived by the ear as double the loudness.

The difference between the ear's perception and the amount of sound energy actually produced is critically important. It means that 90% of a given sound energy must be eliminated before most people will judge a sound half as loud.