Noise Glossary of Terms

Absorption

The property of all materials that allows a reduction in the amount of sound energy reflected from it. Incident sound energy is turned into heat inside the material during the absorption process.

Absorption coefficient

A measure of the sound-absorbing ability of a surface. It is defined as the fraction of incident sound energy absorbed or otherwise not reflected by a surface. The value of the absorption coefficient varies in the range from about 0.01 for marble to 1.0 for a room covered in foam sound wedges.

Accuracy

The degree with which a measuring instrument obtains the "true" result. When noise measurements are carried out using a noise meter this will be the dB value representing the true sound pressure plus or minus the error at the time of the measurement. The acceptable limits for the accuracy (or error) of an instrument are usually specified in national and international standards issued by independent bodies such as ANSI or IEC. For noise meters they will cover frequency response, effect of the direction of sound arriving at the instrument and other various environmental effects such as temperature and ambient air pressure.

Acoustics

The science of sound, including the generation, transmission and effects of sound waves, both audible and inaudible.

Acoustic trauma

The damage to the hearing mechanism caused by a sudden burst of high-energy noise such as a blast or gun fire. The term is usually considered to be caused by a single impulsive event with a very high peak sound level.

Action level (dB)

The 8 hour continuous notional noise level at which the employer must undertake certain duties of care for exposed workers. Typical values are 85 and 90 dB measured for a whole working day with the 'A' frequency weighting.

Airborne sound

Sound energy that reaches the point of interest by propagation through air.

Ambient sound

The total amount of all noise present at a particular place and time in the environment at the point of investigation.

Amplitude

The “strength” of a sound signal as detected by the ear or as measured by a sound level meter.

Analog display

A form of readout device that uses a needle moving across a pre marked scale to indicate the instantaneous sound level in decibels. Analog display movements are particularly prone to mechanical damage and are not typically used in higher quality instruments any more. Usually only a single parameter can be displayed on an analog display and so they are only fitted to simple instruments that show the current noise level.

Anechoic chamber

An enclosed space or room that has walls and floors made from nearly perfect absorbing materials. In this case it is possible to obtain almost free field conditions indoors.

Articulation index

A numerically calculated measurement of the intelligibility of transmitted or processed speech. It takes into account the limitations of the transmission path and the background noise at the point of interest. The index can range between 0 and 1.0. if it is less than about 0.1 speech intelligibility is generally low. If it is above about 0.6 speech intelligibility is generally high.

ASTM

The American Society for Testing and Materials in the United States. This organization publishes a wide variety of standards outlining the methodologies to be adopted when carrying out noise measurements in practice.

Attenuation

The reduction of sound energy by a variety of means such as air, humidity, porous materials, distance etc.

Audio frequency

The frequency of oscillation of an audible sound wave usually considered being within the range from 20 Hz to 20 kHz.

Audiogram

A graphical representation of the hearing acuity of an individual as a function of level versus frequency for each ear separately.

Audiometer

A measuring instrument that is used to carry out audiometric testing of the hearing acuity of individuals. These instruments can be manually operated or can be completely automatic.

Average noise level (L_{Aeq}, L_{eq})

This is the energy average noise level considered as a notional steady level that contains the same amount of noise as the actual fluctuating noise level during a specified period of time (based on equal energy principal)expressed as L_{Aeq} sometimes referred to as the Leq.

B weighting

One of the standard frequency correction curves (or weightings) applied to sounds in a measurement device to simulate the hearing capability of the human hearing mechanism. The B weighting is hardly ever used for noise measurements nowadays. Other frequency weightings include the 'A', 'C' and 'Z' curves.

Background noise level

The total noise level of all sources other than that caused by the specific noise of interest. The unit called the 90th percentile noise level, L90%, often identifies this.

Back pressure

The differential pressure drop across a restriction, such as a filter in an air cassette, normally measured in inches of water.

Band

Any range of values such as in the frequency spectrum for noise measurements. For example, the band from 20 Hz to 20,000 Hz.

Band pass filter

A filter for noise measurements that has a single transmission band extending from a lower cutoff frequency greater than zero to some finite upper limit or cutoff frequency.

Barrier

A physical obstruction to the transmission of a stimulus between a source and a receiver. Such barriers in the case of noise can be placed by the side of roads or rail lines to reduce the levels of unwanted noise exposure to local residents living close to such sources.

Broadband noise

Noise with components over a wide range of frequencies, the overall noise without any noticeable tonality.

Broadband noise level

The single number overall measurement of all noise in the audible range (20Hz to 20kHz) measured with one of the standard broadband frequency weightings. This is typically carried out using the ‘A’ weighting network in a sound level meter.

Building acoustics

The science of the behavior of sound within enclosed spaces, such as the size, shape and amount of noise that determines the audibility and perception of speech and music within the room.

C weighting

One of the standard frequency correction curves (or weightings) applied to sounds in a measurement device to simulate the hearing capability of the human hearing mechanism. The C weighting is most often used for the measurement of transient or impulsive noise levels. It is specified in certain noise standards for the response of the meter to peak noise measurements since it has a defined characteristic unlike the linear (or un-weighted) frequency weighting. Other frequency weightings include the 'A', 'B' and 'Z' curves.

Calibration

The process of checking a noise measuring instrument by applying a signal of known level and frequency to verify its operation in the field. Any drift from the nominal reading is usually corrected prior to measurements starting by means of a change to the displayed level shown by the meter. Some standards require that the measurement instrument be also checked at the end of a measurement to verify that no significant drift has taken place during the measurement run. Over a typical 8 hour workplace exposure noise measurement a drift from start to end of more than 1 dB may be considered to be significant and the cause should be investigated. Reasons for the drift in the sensitivity of the instrument could be large fluctuations in the local environmental conditions or a fault in the microphone capsule. Calibration can also apply to an air sampling pump to verify the flow rate before and after a measurement so that the total volume of air drawn through the sample filter is known correctly.

Calibrator

A stand-alone instrument that is used to perform a field check of the overall sensitivity of a measurement device. For noise meters, these devices usually produce a single tone at a single frequency but can have multiple frequencies and levels to verify the meter. The most popular level for an acoustic calibrator is 114 dB and an operation frequency of 1 kHz. If a second level is available it is often at a value of 94 dB also at 1 kHz. For air sampling a calibrator can be a rotameter with a floating ball in a tube or a more accurate electronic device that times the flow of a piston in a precisely machined tube.

Cochlea

Part of the human hearing mechanism located within the inner ear that contains the receptor organs essential to the hearing process. It is shaped like a small snail and contains the hair cells that detect the sound vibrations and convert a mechanical motion into nerve impulses that are sent to the brain for interpretation as sound patterns and noise identification.

Community noise equivalent level

A twenty four hour, single number, equivalent noise level usually calculated from measured hourly equivalent noise levels where certain corrections have been added to the evening and night time noise intervals to represent a penalty factor. The evening period defined from 1900 to 2200 has a penalty of 5 dB added to the measured levels while the night time period of 2200 to 0700 has a 10 dB penalty added. Thus a higher overall level is obtained for the complete 24 hours compared to the actual measured hourly levels obtained by normal logarithmic addition of the 24 separate Leqs. Other shorter periods can be combined to produce the overall CNEL as long as the appropriate corrections are applied depending on the time of day that they were collected, for example 15 minute or 5 minute periods that will provide more detail when inspected at a later time.

Crest factor

This is the ratio between the peak level of an acoustic signal and its energy equivalent, or rms, level. For a continuous sine wave the peak level is 3 dB higher than the rms level when measured in logarithmic terms. When measured in linear unit terms the peak level is 1.41 (square root of 2) times the rms. value. For an impulsive signal such as a blast or an impact sound the peak level can easily exceed the rms level by 25 or 30 dB.

Criterion level

The level of equivalent steady noise that lasts for exactly 8 hours that represents the allowable daily noise exposure or PEL. For OSHA compliance this level is usually taken to be an A weighted noise level of 90 dB but other lower levels are also specified in other regulations. The criterion level is the equivalent decibel level for the 100% noise dose value for the criterion duration of 8 hours.

Cumulative

The total or overall sound level for the whole of a noise measurement interval from the start time to the stop time including everything that occurs during the measurement run.

Cumulative distribution

A distribution of samples of the instantaneous noise level taken at regular intervals during a measurement where the samples are arranged according to their percentage of occurrence. The distribution ranges from 100% to 0% as the dynamic range increases. The 100% point will represent the lower end of the range while the 0% will describe the higher end of the range. There needs to be a suitably large number of samples to construct a distribution to obtain the best estimate of the answer required. While it is possible to calculate a LN10% result from a distribution of only 10 readings it will be much better to have at least 1000 results in the interval of time to calculate the LN10%. Modern instruments typically sample at 100 times a second when directly calculating the distribution so intervals of more than 10 seconds will usually produce valid results for LN% values.

Cumulative distribution level

A distribution of samples of the instantaneous noise level taken at regular intervals during a measurement and classified according to occurrence at increments of amplitude. Typical increments of level are either 1 or 0.5 dB intervals across the measured dynamic range of the instrument plus an over range and under range counter. An instrument with a 70 dB dynamic range classifying samples at 0.5 dB intervals plus over and under range values will have 143 separate bins to store and classify the samples. At least 1000 samples (or preferably many more) are typically needed to produce reliable values for the percentile noise levels generated from such a distribution table.

Cutoff frequency

The frequencies that mark the end of a band or the point at which the characteristics change from a pass to a no-pass band. For example, for an octave filter in a sound level meter centered at 1kHz the lower cutoff frequency will be 707 Hz and the upper cutoff frequency will be at 1,414 Hz. In an idealized filter all other frequencies below and above these two limits will be severely attenuated or completely removed.

Cutoff level

The sound level at which a noise dosimeter starts to accumulate sound into the calculations used to measure a personal noise dose reading. All levels of noise below the cutoff level will be treated as if they were 0 dB and excluded form the calculation of the noise dose value according to the requirements of the OSHA workplace noise standards. Thus, if the noise levels is continuous at 79dB all day there will be no contribution to the day's dose because the readings do not exceed the 80dB cutoff level. The cutoff level is also known as the threshold value. Even though the level below the cutoff is counted as zero contribution the time must still be included in the overall exposure results.

Cycle

The complete sequence of values of a periodic quantity that occurs during one single period.

Cycles per second

A measure of the frequency of a tone and numerically equivalent to Hertz, the preferred unit of frequency according to international standards.

Daily personal noise exposure level

The general name for the level of the amount of noise exposure that an operator is subjected to measured at the workplace. Limits vary according to various national and international Health and Safety regulations for the amount of exposure that is considered allowable for an operator without hearing protection. Typical limit values are an equivalent steady level of 85 or 90 'A' weighted dB for an 8-hour working day. This is also known as the LEP,d or the Lex8hr.

Damping

The dissipation of noise energy with time or distance. The term is usually applied to the attenuation of sound in a structure owing to the internal sound-dissipative properties of the structure or to the addition of sound-dissipative materials.

Data logging

The collection of a regular series of data points during a recording to enable the temporal variations of the measured values to be studied. This can be in a personal noise dosimeter, a heat stress monitor, a real time dust or particulate monitor or a weather monitoring system. All of these examples show the benefit of knowing when certain measured values occurred in order to apply corrective measures properly. Data logging can be done as rapidly as every second for fast changing acoustic signals or as slow as every hour for more slowly varying weather parameters such as atmospheric pressure.

Day night noise level

The 24 hour average noise level of all hourly Leq measurements with a 10 dB penalty added to the levels between 2200 and 0700 hours to reflect people's extra sensitivity to noise during the night. No correction is added to the measured Leq levels taken between the hours of 0700 and 2200 in arriving at the overall single number.

dB

The abbreviation of the decibel used to express the level of a noise or sound. It is a logarithmic quantity that represents the ratio of the actual measured sound pressure (p) to a nominal reference sound pressure (po). The accepted reference sound pressure is taken to be 20 µPa (0.000,020 Pa). The definition of the decibel is given by; dB = 20 log10 (p/po)

decibel

The unit of sound pressure level usually abbreviated to the dB. Any noise quantity that is expressed as a “level” is measured and quoted in decibels.

Digital signal processing

A digital computation carried out on samples of the raw sound measured by certain sound level analysers that can be used to derive the common units of instantaneous, maximum, minimum and average level etc. Typical DSP calculations are carried out many times a second to derive small packets of noise that can be recombined to obtain the more popular values found in more conventional sound level meters. The adoption of proprietary algorithms can yield the frequency contributions contained within the short samples. Rates as fast as sampling at 76,800 times per second are common in many analysers generating small samples every 5 or 10 µseconds.

Directivity

Unless a noise source is completely omni-directional there will be some of the sound energy that is radiated more in certain directions than in others.

Directivity index

In a given direction from a sound source under consideration the directivity index is the difference in decibels between the sound pressure level produced by the source in that direction and the space averaged sound pressure level of that source measured at the same distance. This unit is often used in predicting noise levels away from a source of known output and directivity when performing noise control.

Doppler effect

The apparent upward, or downward, shift in frequency of a sound as the relative positions of the source and receiver change with respect to each other. This is most noticeable for a passenger standing on a railway platform as a speeding train approaches and recedes the station. The apparent frequency increases quickly as the source approaches the receiver and decreases as the source moves away. The faster the source is moving the more noticeable will be the change of frequency. The Doppler effect is also heard when the source is stationary and the receiver is moving such as a car passing by a steam exhaust venting to atmosphere.

Dose

A relative measurement of the noise in a workplace usually expressed as a percentage of some allowable total daily value. Noise dose is analogous to radiation dose as a hazard in the workplace.

Dose badge

A small lightweight personal noise dosimeter that has the microphone built in to the body of the unit so preventing problems with cables when worn by a worker in a noisy environment.

Dosimeter

A measurement instrument capable of being worn by a mobile worker or operator during the day to measure the total exposure of that operator to noise in the workplace. Traditionally, the dosimeter is supplied with a microphone on a cable that allows the measurements to be carried out in the hearing zone of the individual. The body of the dosimeter is worn on the belt or in a pocket or pouch. A noise dosimeter is essentially the same as a standard sound level meter except that it is normally designed to only measure the broadband noise levels without performing any sort of frequency analysis. Newer badge style dosimeters may have the microphone capsule built in to the body of the instrument and be worn on the shoulder directly and not on the belt.

Duration

The elapsed time from the start of a measurement run to the end of that run. Measurement durations can be from a few seconds up to several hours or even days depending upon the application. The duration of the measurement can be specified in a standard or may be calculated by knowing the process under investigation. If noise is cyclical in nature then at least one or two complete cycles should be measured to be sure of correctly classifying the noise climate.

Ear muffs

Personal hearing protectors that are worn over the whole of the outer ear to minimize hearing loss in high noise levels. These hearing protectors are usually connected by a strong metal band to maintain an adequate tight fit over the ears.

Ear plugs

Personal hearing protectors that are worn inside the ear canal of the outer ear to minimize hearing loss in high noise levels. These are usually made of foam that is first compressed and then inserted into the ear canal where they can expand and take up the right shape for each ear they are used in.

Echo

A wave that has been reflected or otherwise returned with sufficient magnitude and delay so as to be detected as being distinct from the direct wave at the point of interest. If the echo arrives too late after the direct wave then the intelligibility of the sound or speech will be adversely affected.

Equal loudness curves

Lines of equal sensation of loudness plotted on a chart of decibels versus frequency to show the subjective impression of different sounds. The human hearing mechanism is less sensitive to sound at low and high frequencies and more sensitive to the range of frequencies between 250 to 5,000 Hz. The equal loudness curves vary in gradient depending upon the overall level of noise becoming more linear as the noise level rises.

Equivalent continuous noise level

The notional constant single level, in decibels, that represents the same sound energy as the actual varying sound over a specified interval of time. The steady level Leq is equivalent in energy to the "real" actual varying noise level over the specified period of time. The Leq is usually expressed as an ‘A’ weighted value in dB unless the frequency response is specified otherwise, e.g. LCeq. The Leq can also be measured in individual octave or third octave bands during a frequency analysis of a noise source for noise control purposes.

Exceedance noise level

The calculated noise level based on sampling the varying noise climate and expressing the result as a percentage of time above the chosen statistical level. For example, the LN10% is the noise level exceeded for 10% of the measured time interval. The samples of the noise are sorted into a distribution table at fixed dB intervals and the statistics are calculated from the cumulative distribution curve that is produced. The LN90% is often used to describe the background noise level in noise measurements. The LN50% describes the median noise level with half the samples being above and half the samples being below this level. Because of the logarithmic nature of noise measurements with the decibel scale the LN50% is not the same as the average noise level.

Exchange rate

This is the number of decibels used in the calculation of the average noise level that is taken to represent the doubling (or halving) of the risk when used in personal noise dosimetry measurements. Possible values for the exchange rate are currently 3, 4 or 5 decibels. An exchange rate of 6 dB is very occasionally found in certain instruments but is not commonly used. See also, "Q" for more information.

Far field

The far field is a notional volume around a noise source such that the inverse square law applies to the dissipation of the energy. In this region the measured sound level reduces at a rate of 6 dB every time the distance from the source doubles. In the far field region the particle velocity of the molecules is in phase with the sound pressure.

Fast response

This is one of the standard responses in a sound level meter (or dosimeter).

Fast weighting

The fast weighting is the same as the fast response in a sound level meter and is part of the rms. circuit controlling the response of the meter to the variability of the instantaneous levels of the noise. It has a value of 125 milli seconds and is a continuous function that is calculated all the time by the instrument.

Filters

Can be made from glass fiber (GF/A) or mixed cellulose ester (MCE). Used to collect the particulates in the air when performing sampling conventions. Usually used in 25 or 37 mm diameter sizes.

Filter set

A device for separating the different components of a signal on the basis of their frequency. It allows components in one or more frequency bands to pass relatively un-attenuated while it attenuates components in other frequency bands.

Flanking noise

Noise that is transmitted from one room into another by indirect means such as through sidewalls or floors rather than through the common partition that separates the rooms.

Free field

Sound fields in which the effects of walls or other obstacles or boundaries on sound propagation are negligible. As a measurement point moves away from a source the noise level will drop according to the inverse square law.

Frequency

The number of times a second that a sine wave of sound repeats itself, or a vibrating object, repeats itself. The more repeats per second then the higher the frequency is said to be. The unit of frequency is Hertz, Hz, numerically equal to the earlier unit cycles per second, cps.

Frequency band

A range of frequency components in the audio bandwidth used to characterize different noise sources. Frequency bands can be expressed as whole octaves, third octaves, sixth octaves etc. For noise measurements to assess the affect on humans the step intervals for contiguous frequency bands are usually expressed on a logarithmic scale.

Harmonic

A sinusoidal component whose frequency is a whole number multiple of the fundamental frequency of the wave. If a component has a frequency that is twice that of the fundamental it is referred to as the second harmonic.

Hearing

The subjective response of human beings to acoustic energy or sound waves. The hearing capability of an individual must be protected against high noise levels to prevent it from deteriorating over time when working in noisy environments.

Hearing conservation program

A planned program to document the noise exposure of employees with the purpose of ensuring that all are adequately protected form the harmful effects of high noise levels in the workplace. Possible outcomes of such a program could include the prescription of suitable hearing protectors, the attenuation of noisy machinery or the rotation of job functions between different workers during the day.

Hearing level

A measured threshold of hearing at a specified frequency, expressed in decibels, relative to a specified standard of normal hearing. The deviation of an individual's threshold from the zero reference level in the audiometer.

Hearing loss

The general term for the impairment of hearing acuity. The amount of this hearing acuity, in decibels, measured as a set of hearing threshold levels at specified frequencies. Hearing loss can be caused by a number of factors such as loss in the conductive mechanisms in the ear, loss originating in the sensori-neural parts of the auditory nerves or by excessive exposure to high noise levels at work.

Hearing protectors

Devices worn by an individual to protect against excessive exposure to high noise levels. These can be of the internal or external types. Internal types include ear plugs that are inserted into the ear canal while external types are mainly ear muffs that fit completely around the ear lobes.

Hearing threshold level

The amount, in decibels, by which an individual's threshold of audibility differs from that of a normal standard audiometric threshold.

Hertz

The international unit of frequency of an oscillation, numerically the same as cycles per second. Abbreviated as Hz.

Impact sound

The sound produced by the collision of two or more solid objects. Typical sources are footsteps on a floor or on an interior surface. Other sources can include drop forges or other metalwork processes.

Impulsive noise

Either a single pressure peak with a rise time of less than about 200 milli seconds (or total duration of less than 200 milli seconds) spaced by at least 200 milli seconds or a sound pressure occurring in a short interval of time.

Impulse response

This is one of the standard responses in a sound level meter (or dosimeter).

Infrasonic

Sound frequencies that are below the normal limit of human audibility, typically less than about 20Hz.

Inner ear

The part of the hearing mechanism that transfers the mechanical vibrations into electrical impulses that are then sent to the brain to be interpreted as sounds. Also associated with the balance mechanism.

Insulation

The ability of a material to keep out sound from a given source on the other side of the material. The performance of the material depends on its composition and density, the higher the density the better the material is as a sound insulation product.

Integrated sound level

The average sound level over a period of time that represents the energy contained in the noise. The integrated level will be the same whether the fast or slow time weightings are used in the measuring instrument since these weightings are symmetrical for both rising and falling sound levels. Use of the impulse time weighting will produce a higher average level compared to the true energy level computed from fast or slow sampled levels.

Integrating sound level meter

A measuring instrument that can calculate the time average noise level over a specified period of time in addition to measuring and displaying the simple instantaneous level. Sometimes called Leq meters when the exchange rate is fixed at Q = 3 dB. It is also possible to obtain the integrating sound level with the exchange rates of 4, 5 or 6 dB.

Intensity

The sound energy flow through unit area ($1m^2$) in unit time (1 second).

Isolation

The physical separation of one item from another to prevent the flow of energy through a structure. This can be for both the control of sound or vibration energy.

KiloHertz

The unit of frequency measurement for signals over 1,000 Hz. 1 kHz = 1,000 Hz.

KiloPascal

The unit of pressure representing the force of 1 Newtons per square meter (M/m2). Standard atmospheric pressure of the air is 1.013 kiloPascals (kPa) also known as millibar (mb). 1 atmosphere is 1.013 kPa (mb) is also the same as 29.92 in of mercury.

Lavg

The logarithmic time average level with an exchange rate of 3, 4, 5 or 6 dB that represents the amount of noise as a single number compared to the actual varying sound level over a specified period of time. When Q = 3 the average level is called the Leq. When Q = 4 the average level is called the LDoD. When Q = 5 the average level is called the LOSHA. For a perfectly steady instantaneous noise level the values of the average levels with different Q factors will be the same.

LEP,d

LEP,d = Leq(t) + 10 log(10) t/8 hours The daily personal noise exposure level as specified in European noise at work regulations. It is a measurement of the total time of exposure to noise in the workplace expressed as a constant notional equivalent 8 hour value.

Leq

A descriptor applied to a unit of measurement of sound (or vibration) that denotes the physical quantity is a logarithmic representation of the underlying phenomenon. The decibel is normally used to denote that the value should be referred to as a level rather than the true physical quantity. The most used such value is the 'A' weighted sound pressure level expressed as a dB value.

Level

A descriptor applied to a unit of measurement of sound (or vibration) that denotes the physical quantity is a logarithmic representation of the underlying phenomenon. The decibel is normally used to denote that the value should be referred to as a level rather than the true physical quantity. The most used such value is the 'A' weighted sound pressure level expressed as a dB value.

Impulse weighting

The impulse weighting is the same as the impulse response in a sound level meter and is part of the rms. circuit controlling the response of the meter to the variability of the instantaneous levels of the noise. It has a rise time value of 35 milli seconds and a decay time of 1500 milli seconds. The asymmetric nature of the impulse weighting means that any average sound level calculated based on samples of the instantaneous will be biased towards the higher noise events than will the average calculated from either the fast or slow response. It is a continuous function that is calculated all the time by the instrument.

LN%

The notional steady level of noise exceeded for a specified percentage of the total measurement time. The value is usually found from the cumulative distribution table and so the number of sample bins used to collect the raw data in the instrument controls the resolution. For samples collected at 0.5 dB sample resolution the percentile level can only be displayed with a resolution of 0.5 dB. Typically an instrument will be able to calculate and display up to 5 LN% values but other values may be possible to obtain if the distribution table is available at download time using computer software.

Logarithm

The exponent that indicates the power to which a number must be raised to produce a given number. For the base 10 logarithms as used in acoustics and the study of sound the logarithm of100 is 2, while the logarithm of 1000 is 3, etc.

Loudness

The subjective judgment of the intensity of sound by the human hearing mechanism. Loudness depends on the sound pressure and frequency of the stimulus signal. Over the normal audio range it takes about a three fold increase in sound pressure (a ten fold increase of the energy level) to produce a doubling of the impression of loudness.

Loudness level

This is the measured level in phons and is numerically equivalent to the median sound pressure level of a free progressive 1,000 Hz wave presented to listeners facing the source, which in a number of trials is judged by the listeners to be equally loud.

Ltm3

The taktmaximal-3 level is a time average value calculated every 3 seconds based taking the highest level occurring during the preceding three seconds and assuming that it was present for the whole of the 3 second interval. This is repeated every 3 seconds to produce a long term average level that will be higher than the equivalent continuous noise level, or Leq, depending on the impulsiveness of the sound under investigation. Comparison of the Ltm3 and the Leq will therefore give an objective measure of the impulsive nature of the noise when assessing nuisance or risk to hearing from high noise levels.

Ltm5

The taktmaximal-5 level is a time average value calculated every 5 seconds based taking the highest level occurring during the preceding five seconds and assuming that it was present for the whole of the 5 second interval. This is repeated every 5 seconds to produce a long term average level that will be higher than the equivalent continuous noise level, or Leq, depending on the impulsiveness of the sound under investigation. Comparison of the Ltm5 and the Leq will therefore give an objective measure of the impulsive nature of the noise when assessing nuisance or risk to hearing from high noise levels.

Masking

The process by which the threshold of audibility for a sound is raised by the presence of another masking sound.

Masking noise

A noise that is intense enough to render inaudible or un-intelligible another sound that is also present. Typical uses of masking noise are between doctor's surgeries and waiting rooms to prevent those in the waiting room from hearing the intimate conversations of the patient currently talking to the doctor. Water fountains or background music are examples of masking noises for this purpose.

Mass law

The amount of sound insulation afforded by a wall is proportional to the mass of the material in the wall. Broadly speaking doubling the mass (per unit area) increases the sound attenuation by 6 dB and a doubling of the frequency increases the attenuation by 6 dB. These figures are theoretical limits and in practice a 5 dB reduction is more often found.

Maximum noise level (L_{AFmx}, L_{ASsmx}, L_{AImx} , L_{max})

This is the highest instantaneous sound pressure level in decibels with a specified frequency weighting and time weighting, expressed as L_{AFmx} and sometimes referred to as the L_{max}.

Medium

Any solid substance carrying a sound wave. Sound will not travel through a vacuum since there are no particles to transfer the energy from one point to another.

Microphone

A transducer that changes the physical motion of air molecules into an equivalent electrical signal that can be processed by a sound measurement system such as a sound level meter. Different devices have different frequency responses and sensitivities. All other things being equal a smaller diameter microphone diaphragm produces a lower electrical output signal for a given sound pressure. The sensitivity of a microphone is given as the number of Volts obtained for a reference sound pressure. Typical examples are 10 mV/Pa for a general-purpose microphone capsule.

Microprocessor

An electrical component that is able to rapidly process samples of an input signal obtained from an analog to digital converter and produce an output signal proportional to the time average level, the highest level or other computed values. Typically these calculations are performed many times a second in order that none of the input signal is missed. The microprocessor is the heart of the modern digital sound level meter and controls the main functions that are performed by the instrument.

Middle ear

Part of the hearing mechanism comprising the three smallest bones in the human body. The "hammer, anvil and stirrup" bones form a mechanical lever with a mechanical advantage of about 1.5 between the ear drum and the oval window of the cochlea.

Minimum noise level (L_{ASmn}, L_{AFmn}, L_{min})

This is the lowest instantaneous sound pressure level in decibels with a specified frequency weighting and time weighting expressed as L_{Asmn} sometimes referred to as the L_{min}.

MSHA

The Mine Safety and Health Administration in the USA.

Natural frequency

The frequency at which a system tends to vibrate with large amplitude for very small input energy. It falls at the point where a system changes from being stiffness controlled at low frequencies to being mass controlled at higher frequencies.

Near field

The sound field close to a noise source where the sound pressure does not obey the inverse square law and the particle velocity is not in phase with the sound pressure. Measurements made in the near field can vary greatly for small changes of microphone position. This can sometimes account for the differences found in noise measurements obtained with a personal noise dosimeter and those obtained from a hand-held sound level meter when an operator stands very close to a noisy machine.

Noise dose (dose%)

The amount of noise received by a worker during the workday expressed as a percentage of a certain reference level for a given duration. The usual allowable noise dose is typically set at 100% dose equivalent to an equivalent continuous noise level of 90 A weighted dB over a standard 8-hour working day. Other noise levels exist that are considered to represent the 100% noise dose but the time interval is almost always the 8 hour day.

Noise event

The increase in the current sound level that exceeds a selected threshold value and thereby identifies a significant change in the acoustic climate. Noise events are typically considered to be significant when the instantaneous level exceeds the underlying background level by more than about 15 dB. Events may be transient and last less than a second, such as a single blast or may last for 20 to 30 seconds such as a passing train or aircraft taking off at an airport.

Noise exposure

The absolute measure of the amount of noise experienced by an operator at work. It is proportional to the square of the sound pressure and the duration. It is different from noise dose in that it is an absolute measurement rather than a percentage of some chosen combination of noise level and time. Typically specified in European Noise at Work legislation and expressed in Pa^2h or Pa^2s. 1 Pa^2h = 3600 Pa^2s. a continuous noise level of 90 dB lasting for 8 hours is approximately equivalent to a sound exposure of 3.2 Pa^2h.

Noise exposure level (LEP,d LEX,8h)

The expression of noise exposure as a logarithmic term in dB. In European Noise at Work legislation it is expressed as the Daily Personal Noise Exposure level $L_{EP,d}$ or $L_{ex,8h}$

Noise floor

The lower limit of accurate measurement capability in a sound level meter where the effect of the inherent electrical noise is superimposed on the actual signal. It is normally quoted as the minimum level in dB that can be measured by the meter on the lowest dynamic range setting. Only results of

10 or more dB than the noise floor should be considered to be accurate in a typical sound level meter specification.

Noise isolation class

A single number rating derived in a prescribed manner from the measured values of noise reduction between two areas or rooms. It provides an evaluation of the sound isolation between two enclosed spaces that are acoustically connected by one or more paths.

Noise level

For sound transmitted primarily through the air it is usually taken to be the A weighted sound pressure level in dB.

Noise ordinance

A document that sets out how noise in a community is to be treated in terms of limits of level, duration, times of occurrence etc during the day. Different limits may apply to day times that to night times and between residential, industrial or commercial zones. Limits may be written in terms of absolute maximum levels not to be exceeded or in terms of the difference between the background level and the offending level. A person appointed to make such measurements makes measurements with an approved sound-measuring device usually on a property boundary line.

Noise reduction

The numerical difference in decibels of the average sound pressure in two areas or rooms. A complete measurement of the reduction in noise consists of the simple level difference between the two rooms due to the common partition and also takes into account the background level in the receiving room and the amount of sound absorption in the receiving room. The noise reduction is a function of frequency typically increasing with increasing frequency and is measured in third octave bands from at least 100 Hz to 3150 Hz.

Noise reduction coefficient

A measure of the acoustical absorption performance of a material calculated by averaging its sound absorption coefficients at 250, 500, 10000 and 2000 Hz and expressed to the nearest multiple of 0.05.

Noise reduction rating

A single number rating value based on the difference between the A and the C weighted overall noise levels. The difference in the readings obtained with a suitably equipped sound level meter will vary depending upon the frequency distribution of the subject noise and its spectrum particularly in the lower frequency bands. For a sound with a lot of low frequency components the C weighted level will be higher than the A weighted sound level. An increase in the A weighted level over the C weighted level indicates significant noise in the middle range of frequencies.

Nuisance

A legal definition of a noise that offends or upsets the receiver because it is occurring at the wrong time in the wrong place or is of a character that annoys due to excessive tonal components or impulses.

Occupational deafness

The reduction in hearing acuity caused by excessive exposure to high noise levels at work. This is in addition to recreational noise exposure caused by factors outside of the workplace which may be additive.

Octave

An interval between two sounds having a ratio of two to one in terms of their frequency span. There are 8 octaves on a piano and the audio range can be covered by 10 octaves in the range 20 Hz to 20 kHz.

Octave band

A single band of frequencies where the upper limit is twice the lower limit. Octave bands are classified according to their geometric center frequency based on the internationally standardized 1000 starting point. The 1000 Hz or 1 kHz band has limits of about 707 and 1414 Hz.

Octave band analysis

The analysis of a complex or simple sound into its constituent parts based on the interval of octave bands across the audio range. A full octave band analysis will contain 9 or 10 readings from 32 Hz to 8 kHz or 16 kHz.

Percentage noise dose

This is the noise exposure result compared to a notional allowable daily amount expressed as a percentage of that amount of noise for a standard 8 hours expressed as 100%, 200% etc for a 90 dB criterion level with 8 hr duration. 200% represents twice the allowable noise exposure.

Projected percentage noise dose

This is the result of an actual measurement being forward projected for exactly 8 hours and then recalculating the noise dose assuming the noise remains the same expressed as Pdose% or Proj % always referred to an 8-hour projection.

Peak noise level (L_{Cpk}, L_{Peak}, L_{Zpk}, L_{Apk})

This is the absolute highest sound pressure in Pascals or the absolute highest noise level in dB over a given period of time with no frequency weighting (or the C or A frequency weighting) and no time weighting expressed as L_{Cpk} and is sometimes written as Peak or Lpeak.

Periods

The concept of regular periods of data collection allows a long measurement to be broken down into shorter equal length intervals. Typical periods during a measurement are 5, 10 and 15 minutes, they allow the changing noise levels to be inspected more easily to see what happened during a run.

Profiles

These are short duration regular intervals that allow a more detailed analysis of the time history variation of the noise levels to be investigated. Typical profile intervals are 1, 10 or 60 sec. Profile data sets are very useful when working with a computer and permit graphical presentation of ‘how’ the noise level changed with time.

Permanent threshold shift

A permanent decrease of the hearing acuity of the ear at a specific frequency as compared to a previously established reference level. The amount of permanent threshold shift is commonly expressed in decibels and is unrecoverable by the individual who will not regain his or her hearing even by halting any exposure to excessive noise levels. It is an irreversible condition of the inner ear caused by damage to the individual hair cells in the cochlea.

Personal noise dosimeter

A small portable noise meter especially developed to be worn by an individual during the working day. Its purpose is to accumulate all the different noise exposure suffered by the individual whether it comes as steady noise exposure or whether it is in the form of sudden impulses of noise. The microphone is usually clipped to the collar close to the hearing zone and the body of the dosimeter is worn on the belt or in a pocket for safety. Some newer noise dosimeters have the microphones built-in to the body of the unit so there are no cable to get tangled or caught. Traditionally noise dosimeters readout the results in dose based on a percentage of the allowed daily maximum. More modern noise dosimeters also produce the results in dB form for the average level plus maximum and minimum levels.

Personal noise exposure

Noise exposure in the workplace that can affect a worker's hearing detrimentally over extended periods of exposure at high noise levels. Regulations exist in most industrialized countries to limit the danger to worker's hearing from such high levels of noise.

Pink noise

Noise with a constant energy per octave (or third octave) bandwidth. A spectrum analysis of a pink noise source with a real time octave (or third octave) band analyser would reveal a flat response across the frequencies of interest. Pink noise is often used as a stimulus signal in measurements of the characteristics of buildings and rooms since it produces equal energy across the whole audio bandwidth.

Pitch

The attribute of auditory sensation that orders sounds on a scale extending from low to high. Pitch depends primarily on the frequency of the sound stimulus, but it also depends on the sound pressure and waveform of the stimulus.

Plane wave

A sound wave whose wave fronts are parallel and perpendicular to the direction of propagation that the wave is traveling in.

Preamplifier

An electrical device that acts as the interface between the microphone (or accelerometer) on a sound level meter (or vibration meter) that is used to match the high impedance of the transducer to the following electrical circuits of the measuring instrument. The preamplifier comes before any extension cable, where the microphone is remotely mounted from the meter, to prevent any significant signal loss down the extension cable caused by capacitive effects. Some preamplifiers are

equipped with heater elements to minimize the harmful effects of moisture around the microphone capsule.

Precision

An indication of the uniformity or reproducibility of a result of a physical measurement. Precision relates to the quality of an operation by which a measurement result is obtained, and is distinguished from accuracy, which relates to the quality of the result itself. Thus a measurement can have good precision in that repeated results will all be close together but still be inaccurate if they differ from the "true" result by some offset value or bias.

Presbycusis

The reduction in human hearing acuity that is attributed simply to the normal aging process. This will occur irrespective of any exposure to high noise levels in the workplace.

Probability distribution level

The distribution of noise samples across the dynamic range of an instrument arranged at regular class widths such as every 0.5 dB. For an instrument with a 70 dB dynamic range there will be 143 class widths if the sampling is carried out at 0.5 dB steps. This will include an under and over range bin. The total number of samples to produce the percentage probability level divides the number of samples in each bin. For a random noise the distribution will have a Gaussian distribution.

Projected noise dose (Proj%)

This is the projection of the actual measured noise dose to what it would be if the measurement were to continue for a full 8 hours. This value is usually used to predict what the eventual outcome would be at the end of a standard working day when a representative period of time has been used to carry out the measurement. If the actual measurement lasted for 1 hour 30 minutes. And a measured noise dose was found to be 27% then the 8 hour projected value would be calculated as 27(8/1.5) = 144%.

Pure tone

A sound for which the sound pressure is a simple sinusoidal function of time, and characterized by a singleness of pitch (or frequency). Such examples are acoustic calibrators that generate a pure tone as the reference level.

Q factor (Exchange rate)

TWA Equal noise exposure risk combinations for different exchange rate "Q"

dB(A)	Q = 3	Q = 4	Q = 5
100	48 mn	1.41 hr	2 hr
99	1 hr	2.82 hr	
98		2 hr	
97			
96	2 hr		

95			4 hr
94		4 hr	
93	4 hr		
92			
91			
90	8 hr	8 hr	8 hr
89			
88			
87	16 hr		
86		16 hr	
85			16 hr

The number of decibels considered to double (or half) the risk of hearing damage in the workplace. A Q factor of 3 dB represents the equal energy principle and is based on the measured Leq value. A Q factor of 3 is recommended by certain US bodies such as NIOSH and the ACGIH and is mandated in European style noise regulations. A Q factor of 4 dB is mandated in certain US Department of Defense noise exposure regulations. The US OSHA regulations require a Q factor (or doubling rate) of 5 dB such that a noise is considered to be twice as risky (for the same exposure time) if it increases by 5 dB. The table above shows equal noise exposures for the main Q factor and noise level combinations.

Random noise

An oscillation whose instantaneous magnitude is not specified for any given instant of time. It can be described statistically by the probability distribution function giving the fraction of the total time that the magnitude of the noise lies within a specified range.

Real time analysis

The process of analysing the frequency components of a complex sound into octave or third octave bands when all of the band levels are obtained at the same time. This is sometimes referred to as simultaneous frequency analysis and is a feature usually found on the more sophisticated models in a manufacturer's range of instruments due to the complexity of the signal processing involved. This type of analysis is required for the correct determination of transient sounds such as aircraft flyovers or impulsive signals from blasts. Since all of the bands are calculated simultaneously no energy is lost or missed when performing this type of analysis.

Reflection

The return of a sound wave from a hard surface. Also the scattering of a light wave by a dust particle in the air from its original straight path through the medium.

Refraction

The bending of a sound wave or light wave from its original path, either because it is passing from one medium to another or by changes in the physical properties of the medium. Examples of this are temperature or wind gradients in the atmosphere.

Resonance

The relatively large amplitude of sound (or vibration) when the frequency of some source of sound matches the natural frequency of some object or component of the system.

Reverberant room

A specially designed room having a long reverberation time, usually used to make the sound field inside it as diffuse as possible. The walls are usually constructed from hard material such as smoothly plastered concrete blocks and the opposing walls are made non-parallel to prevent the build-up of standing waves with the space.

Reverberation Time (RT60)

The reverberation time of a room is the time taken for the sound to decay by 60 dB from its steady state value when the source of the sound energy is suddenly stopped. It is a measure of the persistence of an impulsive sound in a room as well as the amount of acoustical absorption present inside the room. Rooms with long reverberation times are said to be “live” rooms while rooms with short RT’s are said to be “dead” rooms. If a room has an RT that is too long, speech will be difficult to follow and absorption material may have to be placed in the room to reduce the RT value to acceptable limits.

RMS. Sound pressure

The root mean square (rms) value of a time varying signal is obtained by squaring the function at each instant, obtaining the average of the squared values over the interval of interest, and then taking the square root of the average value. The purpose of this is to convert an a.c. waveform into its equivalent d.c. value such that the variations can be read on a sound-measuring instrument. The rms value represents the effective energy value and is the best measure of steady continuous sounds. The period of interest, or averaging time, in sound measuring instruments is sometimes called the time weighting and is standardized in international regulations to specific values called the Slow, Fast and Impulse responses.

RMS. level

The rms level is the slowly varying sound level in decibels read from the display of a sound level meter (or other equivalent device) that shows the instantaneous sound pressure level with a selected time weighting applied to the signal. This is usually referred to as the Slow or Fast sound pressure level depending upon the selection of the time weighting in the instrument.

Run

The complete measurement process from the start time to the stop time encompassing all of the noise during that interval. A run can have just a single value attributed to the total noise level or it can be comprised of a number of regular shorter intervals that show how the noise level changed over time.

Sabin

A measure of the sound absorption of a surface. It is equivalent to a unit area of perfectly absorbing material.

Sociocusis

The loss of hearing caused by noise exposures that are part of everyday social life, exclusive of any occupational noise exposure, physiological changes with age or disease.

Sone

The loss of hearing caused by noise exposures that are part of everyday social life, exclusive of any occupational noise exposure, physiological changes with age or disease.

Sound

An oscillation in air pressure in an elastic medium. It is also an auditory sensation evoked by these oscillations. Not all sound waves will evoke an auditory response, for example, ultrasonic waves.

Sound exposure level (SEL, LAE)

The total noise energy in an event expressed as if it had only lasted for a single 1 second duration at the notional level in dB that contains the same amount of noise energy as the actual noise event. Measurement of the sound exposure levels of different noise sources allows their contribution to the overall noise climate to be easily compared since all results are referenced to the same time interval of 1 second.

Sound pressure level (e.g. L_{AF})

This is the instantaneous sound level with a specified frequency weighting and time weighting that shows the current level of the sound being measured it is written as L_{AF} sometimes referred to as the SPL.

Sound level meter

A measuring instrument comprising a transducer (the microphone), a frequency weighting circuit (the A, B or C responses), an rms circuit (the slow, fast or impulse weighting) some data processing (the microprocessor, if fitted) and an output device (the analogue needle display or digital LCD) for the accurate measurement of noise and sound. Sound level meters can be battery operated for field use or can be powered from external power sources depending upon their power consumption and the length of time required for autonomous operation.

Sound power

The inherent quantity of a sound source irrespective of its local position in the environment. It is the total sound energy radiated by a noise source in unit time. The unit of sound power is the watt.

Sound power level

Ten times the logarithm to the base 10 of the actual weighted sound power to the reference sound power. The reference sound power is taken to be 1 µW (or 0.000,001 Watt). This result is a logarithmic quantity called the decibel or dB.

Sound pressure

The instantaneous difference between the actual pressure produced by a sound wave and the current atmospheric barometric air pressure at a given point in space.

Sound pressure level

Twenty times the logarithm to the base 10 of the actual weighted sound pressure to the reference sound pressure. The reference sound pressure is taken to be 20 µPa (or 0.000,020 Pa). This result is a logarithmic quantity called the decibel or dB.

Sound quality

The objective measurement of sounds perceived by a listener that involve more than just the simple overall level of noise. Frequency content is very important and is often measured with a real time third octave band analyser.

Sound transmission

The study of the passage of sound through structures to determine the effectiveness of the insulation of different materials used for the construction of walls, floors ceilings etc.

Sound transmission class

The preferred single figure rating system designed to give an estimate of the sound insulation properties of a structure or a rank ordering of a series of structures.

Sound transmission loss

A measure of the sound insulation provided by a structure of specific design and construction. Expressed in dB, it is 10 times the logarithm to the base 10 of the reciprocal of the sound transmission coefficient of the configuration.

Span

The range of measurement capability in a monitoring instrument from the smallest to the largest value. Sometimes called the dynamic range.

Spectrum

The description of a sound wave's resolution into its components of frequency and amplitude.

Spectrum analysis

The measurement and determination of the contribution of the various frequencies that go to make up the overall sound level measured with a sound level meter.

Speech interference level

A calculated quantity providing a guide to the interference of a noise with the reception of speech. The speech interference level is the average of the octave band levels of the interfering noise in the most important part of the spectrum. The levels in the 500, 1000 and 2000 Hz bands are averaged together to give the speech interference level in dB.

Speed of sound

Sound waves travel through different media at different speeds depending upon the composition of the material. For sound waves traveling in air at normal temperature (21ºC, 70ºF) and pressure

(1013 mB) the speed of sound is 344 m/s (1128 f/s). sound waves traveling through steel have a faster speed of transmission.

Spherical wave

A sound wave in which the surfaces of constant phase are concentric spheres. A small point source radiating into an open space produces a free sound field of spherical waves.

Temporary threshold shift

A temporary impairment of hearing acuity as indicated by a change in the threshold of audibility.

Third octave band analysis

The process of performing a frequency analysis of a noise by breaking up the sound into a series of contiguous bands whose bandwidth is a third of an octave. 31 third octave frequency bands cover the typical audio range from 20 Hz to 20 kHz.

Threshold level

The sound level in dB below which an instrument will ignore any quieter noise levels for the purpose of measuring a noise dose in the workplace. Typical threshold levels are 80 and 90 dB used in personal noise dosimeters to comply with workplace noise measurement techniques specified by the OSHA regulations. Sometimes it is also called the cutoff level.

Threshold of audibility

The minimum sound pressure level at which a person can hear a specified frequency of sound over a specified number of tests carried out in acoustically controlled conditions.

Threshold of pain

The minimum sound pressure level of sound outside the ear that will produce a change from discomfort to definite pain. Typically taken to be at about a level of 130 A weighted dB.

Threshold shift

A change in the threshold of audibility at a specified frequency from a threshold previously established for that individual. The amount of the threshold shift is normally expressed as a dB value.

Timbre

An attribute of auditory sensation allowing a subject to judge that two sounds similarly presented and having the same loudness and pitch are dissimilar. Effectively, the ability of an individual to be able to tell the difference between the two sounds even though they both appear to be equally as loud and of the same pitch.

Time weightings (F,S and I)

These are the internationally standardised responses in a sound level meter to the time variation of the noise standard time weightings are Slow (1 second), Fast (125 msec), Impulse (35/1500 msec) and Peak (less than 100 microsec).

Time weighted average level

Occupational exposure limits for a material or hazard expressed as an 8 hour time weighted average value (TWA) that includes the whole of the shift exposure. For noise it is a single number equivalent value in decibels that represents the equivalent average level of the actual changing noise levels. When the exchange rate is chosen as 3 dB the average noise level is called the Leq. When the exchange rate is chosen as 4 dB the average noise level is called the LDoD. When the exchange rate is chosen as 5 dB the average noise level is called the LOSHA. In the example above the blue line shows the minute by minute changing noise levels from 65 to 92 dB while the horizontal black line shows the equivalent TWA value at 80.9 dB.

Tinnitus

A ringing in the ears or noise sensed in the head. The onset may be due to an acoustic trauma and still persist in the absence of the stimulus. A person suffering from tinnitus will complain of being able to hear noises even in very quiet surroundings. This condition is very difficult to prove or to treat.

Tone

A sound with a definite pitch. A pure tone from a device like an acoustic calibrator will produce a sinusoidal waveform when viewed on a suitable display. Frequency weightings (A,C and Z).

Transducer

A device capable of being stimulated by waves from one or more transmission systems or media and supplying related waves to one or more other transmission systems or media. Typical examples are microphones that convert (or transduce) sound waves into an equivalent electrical signal or accelerometers that convert vibrations into useful electrical signals.

Transmission loss (dB)

The decibel reduction in noise level across a partition as measured in third octave bands. Usually measured with a real time frequency analyser from 100 Hz to 3.15kHz.

Type 1 (Class 1)

A grade of overall accuracy taking into account the physical response of the complete measurement system that has tolerances in terms of frequency, direction, temperature, humidity, ambient air pressure etc. A sound measurement device having a claimed accuracy of type 1 according to ANSI (or other equivalent international standards) is sometimes called a precision instrument. Type 1 instruments are usually specified where the best accuracy is mandated.

Type 2 (Class 2)

A grade of overall accuracy taking into account the physical response of the complete measurement system that has tolerances in terms of frequency, direction, temperature, humidity, ambient air pressure etc. A sound measurement device having a claimed accuracy of type 2 according to ANSI (or other equivalent international standards) is sometimes called a general purpose instrument. Type 2 instruments are usually specified where the absolute accuracy is not critical or where cost is a compelling factor.

Ultrasonic sound

Sound waves with frequencies higher than 20 kHz beyond the audible range for a normal human being. Dog whistles operate at frequencies around the 30 kHz region. Bats are thought to be able to "hear" ultrasonic sounds up to about 100 kHz. These are the standardised frequency response shapes as defined by international noise standards. They are designed to replicate aspects of the human ears frequency response to different noise sources. Standard frequency weightings are ‘A’ (most generally specified), ‘C’ (used for higher noise levels), ‘Z’ or Lin scale (the un-weighted or "true" frequency content).

Vibration

An oscillatory motion of solid bodies described by displacement, velocity and acceleration with respect to a fixed reference position. The movement of a body can cause vibrations to be produced that can be transmitted as unwanted sound waves.

Vibration isolation

The process reducing the amount of motion passed through a system by the introduction of suitable materials.

White noise

Sound or noise whose energy is uniformly distributed over a wide range of frequencies such that there is constant energy per Hertz. When measured with an octave or third octave band filter set the spectrum of a white noise source will be seen to drop off at 3 dB per octave as the frequency increases.

Windscreen

A foam ball fitted over the microphone of a sound level meter to reduce the effects of wind induced noise on the readings being carried out. Windscreens are often manufactured from open cell design foams to allow free passage to the sounds of interest without unduly affecting the frequency response of the system beyond acceptable limits. Foam windscreens should always be used when performing outdoor measurements but will not be effective if allowed to become waterlogged or when used in high wind speeds in excess about 30 f/s (or 10 m/s, ~ 20 mph).