Health and Safety

All Ears: The Importance of Noise Protection

Webster's Dictionary defines noise as "electromagnetic radiation that is composed of several frequencies and that involves random changes in frequency or amplitude." This is just one definition and the definition that precedes it describes the negative connotations usually associated with the word: "a sound that lacks an agreeable musical quality or is noticeably unpleasant." Noise, it seems, is undesirable. It can, in fact, be dangerous since its effects are cumulative, and there are often no obvious signs that gradual damage is occurring apart from the temporary symptoms of overexposure: tinnitus—or ringing in the ears—and difficulty hearing for a period of time.

Both loud impulse noise (such as an explosion) and loud continuous noise (such as might be found in the workplace) can severely damage the sensitive structures of the inner ear, and cause noise-induced hearing loss. This condition is permanent and currently untreatable. Noise itself can also cause increased blood-pressure and exacerbate stress.

Just as there are Threshold Limit Values (TLVs) for chemicals and solvents, there are TLVs for noise. These vary according to the exposure duration and sound intensity. The size of the space in which the noise occurs affects intensity. The latter is measured in decibels (dB), a logarithmic measure of relative sound intensity on a scale from zero (the average least perceptible sound) to about 130 (the average pain level). Because dBs are nonlinear, a slight increase in the number of dBs actually indicates an enormous increase in sound intensity. Consequently, some people may be more sensitive than the regulation permitting maximum con-

Threshold Limit Values for Noise	
Sound Level (dBA)	**Duration (Hours / Day)**
80	16
85	8
90	4
95	2
100	1
105	_
110	_
115	_

SOME COMMONLY ENCOUNTERED NOISE LEVELS		
Noise Source	**Noise Level (dB)**	**Immediate Effect**
Carrier deck jet operation Air-raid siren Fire alarm	140	Painfully loud, harmful to hearing
Jet takeoff (at 200 feet) Thunderclap	130	
Hammering metal Discotheque Auto horn (from 3 feet)	120	
Rock-n-Roll bands	105-115	
Mechanized Textile loom	105	
Garbage truck (close range)	100	
Power lawn mower Some woodworking machinery	95	Very annoying, possibly causing hearing damage after 8 hours
City traffic	90	
Milling machine (at 4 feet) Diesel Truck (50 mph at 50 feet)	85	
Garbage disposal (at 3 feet) Alarm clock (at 3 feet)	80	Annoying, making telephone use difficult
Passenger car (50 mph at 50 feet) Noisy restaurant Man's voice (at 3 feet)	70	
Toilet	65	
Normal conversation (at 3 feet) Window A/C unit (at 25 feet)	60	Intrusive
Light auto traffic (at 100 feet)	50	Quiet
Quiet room	40	
Library interior Soft whisper (from 15 feet)	30	Very quiet
Broadcasting studio interior	20	
Rustle of leaves	10	Just Audible
Threshold of hearing	0	Hearing begins

Intensity of Noise	dB
10,000,000,000,000	130
1,000,000,000,000	120
100,000,000,000	110
10,000,000,000	100
1,000,000,000	90
100,000,000	80
10,000,000	70
1,000,000	60
100,000	50
10,000	40
1000	30
100	20
10	10
0	0

tinuous noise without ear protection would indicate. Yet, the average person can safely tolerate lengthy exposure to 80dB—equivalent to the sound of a loud hair dryer.

It is important to wear noise protection equipment in the workplace if there is loud equipment such as machinery or ventilation systems. A useful rule of thumb is that if you find you must raise your voice to be heard by someone just two feet away, then you probably need hearing protection. Measure sound levels (in dB) on a sound level meter which conforms at least to the requirements of the American National Standard Specification for Sound Level Meters, SI.4(1971) Type S2A, and set to use the A-weight network with slow meter response. (The "A-weighted scale" is used to weight the various frequency components of noise to approximate the response of the human ear.)

Good ear protection is affordable and easy to find. Do not improvise with cotton! Ear plugs are the cheapest form of protection; foam plugs may be quite effective. Check the package labels, which should list attenuation or noise reduction ratings (NRR) which correspond to the reduction in dB of noise levels. Ear plugs may provide as little as 5dB protection! Ear muffs are more expensive, and when chosen to attenuate specific frequencies, are better choices for reduction of heavy noise exposure. Safety protection product catalogs are a great source for ear protection as are sporting good stores or sporting good sections of major chain stores, since target practice dictates their use.

The best protection for your ears is to avoid exposure to loud noise. When purchasing new machinery, select quieter models with integral muffling devices and lower dB ratings. It is a good idea to visit an audiologist for a baseline hearing test and have annual evaluations as well. With minimal effort, we can all ensure that we will be able to listen to our favorite songs long after the songs have become oldies.

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For more information:

http://www.osha.gov/SLTC/noisehearingconservation/index.html.

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