SENSIDYNE®
Industrial Health & Safety Instrumentation

# Octave Band Analysis

## *More Accurate Selection of Hearing Protection Using Octave Band*

A Hearing Conservation Program (HCP) consists of ordered steps to ensure the program is correctly and effectively setup and administered. Steps begin with a simple assessment of the workplace for potentially dangerous noise levels for the work force. Then making the actual assessment in the form of noise measurements followed by an action plan based on measurement results.

The simplest initial course of events is to determine what the noise levels are and if they are likely to be dangerous. It is often taken to be a good indicator that further measurement is required if it takes raised voices to hold a simple conversation in the work place when standing about an arm's length apart. Having to raise one's voice to be heard over the background noise is a good indication that noise levels are at or above 85 dB and should be investigated.

The sound levels should be measured with a suitable instrument that complies with the accuracy requirements of ANSI/ IEC Type 2 (Class 2) or better for acceptable use in an OSHA survey.

Note: "Apps" or applications for smartphones and tablets claiming to offer a sound level meter for your phone are not a reasonable alternative to a quality sound level meter or noise dosimeter. Such applications lack sufficient accuracy, repeatability, and performance validation.

Two preferred instruments to use for noise survey work are the noise dosimeter and the integrating sound level meter. The noise dosimeter is a personal device and has the advantage of being a small portable unit that is fitted on the worker and goes wherever the worker goes during the day. Therefore, it receives representative noise exposure and integrates it into results that characterize the likely hazard or risk to the individual. Since the dosimeter is worn by a worker then it permits the supervisor to continue other tasks until the instrument is retrieved at the end of the shift.

A sound level meter is a hand held device and requires the presence of an operator to hold the instrument and decide where and how long to collect relevant information to make the assessments. This can be relatively easy if the worker has a fairly static location during the day but can become an issue if the worker moves around from area to area all of which need to be included into the overall result. Now it becomes important to know how long a worker is exposed at the different locations since the duration of exposure must be taken into account as well as the level of noise that occurs.

The other use for the sound level meter is to collect frequency information about the different noise sources in the form of octave band results that characterize the tonal aspects of the specific noise exposure for that individual worker. This is so that the appropriate hearing protectors can be supplied as a first recourse to protecting the worker until the noisy machinery or processes are attenuated by engineering means for the benefit of the entire workforce.

Results from a typical noise dosimeter are in terms of the A weighted noise dose or time weighted average noise levels and while this is satisfactory for the exposure assessment according to OSHA it does not provide much help when a problem is identified and some form of noise reduction, either on a personal level or by engineering means, must be undertaken. The A frequency characteristic completely removes any frequency information contained in the microphone signal and two or more different noise sources with completely different spectral content may end up with a similar overall A weighted noise level.

The next step beyond the simple overall A weighted level is to measure the C weighted overall level since the attenuation characteristics of the A and C curves are different then there will be different results based on the distribution of the main frequencies across the audio range. For noises with predominantly low frequency content the C weighted level will be greater than the A weighted level, whereas for mainly middle frequency noise sources the A and C weighted results will be very similar. It is possible for the A weighted noise level to be above the C weighted levels indicating a significant contributions in the 1 to 4 kHz range where the A curve adds emphasis to the sounds measured during the day.

The best means of defining what type of hearing protectors will provide the best results is to use the octave band frequency analysis measurement of the noise and to compare that with the published specifications of the protector that is planned to be used for the worker. The individual results for each possible protector that is being considered can be checked against the octave band spectrum and an attenuation characteristic can be determined using real data.

*Continues next page...*

# *Octave Band Analysis*

The traditional method, for simplicity in choosing hearing protectors, is to use the Noise Reduction Rating (NRR) number which is provided by law with all hearing protectors as part of the packaging. This number must be de-rated to allow for the variability of fit from subject to subject and is generally considered to be not as good as using the octave band results which give information over narrower ranges of frequencies and also use information contained on the protector packaging by law.

The main obstacle to using the octave band method has traditionally been the need to have a separate octave band meter and to have to make a second set of measurements for the worker after the results of the individual's noise dosimetry have been measured. While some organizations may have an octave band sound level meter many do not and this can involve the added expense of another piece of equipment that can cost in the same order of magnitude as the noise dosimeter used to collect the dose readings in the first place.

The Svantek SV 104 personal noise dosimeter offers a solution to the added expense of buying a second octave band noise meter by offering an option to measure the frequency content of the workplace noise at the same time as the overall noise dose measurements are being collected. Not only that, the octave band information is collected in real time for all frequencies of interest and can be synchronized to the regular collection of A weighted noise level samples during the measurement. These samples in the SV 104 can be collected as fast as every second to provide a clear and concise data set of the spectral characteristics of the noise that is being received by the worker under investigation and the supervisor has no additional measurements to make since it is all collected simultaneously.

The addition of the octave band analysis option in the Svantek SV 104 dosimeter saves both additional measurement time and additional expense since the low cost octave band feature is added to the standard dosimeter and does not require a separate instrument. Since the frequency analysis measurements are collected at the same time as the noise dose measurements there is a direct and real time link to the noise levels that are experienced by the worker leading to better accuracy and a full knowledge of what happened during the single noise measurement. Octave band data is collected at the selected data logging interval and includes the 9 octave band levels from 31.5 Hz to 8 kHz plus the overall A, C and unweighted noise levels during the work day.

The Svantek SV 104 opens up possibilities that until now have required multiple and expensive instruments to provide the industrial hygienist with better noise dosimetry results to identify the potential problem. It now provides the complete results to identify the best solution to that problem. This is all undertaken in a unit which is no larger than other similar shoulder worn dosimeters yet offers a complete solution for the correct assessment of selection of hearing protection devices in the fight against excessive workplace noise exposure and the risk to worker hearing. The Svantek SV 104 is an extremely cost effective solution to the problem of hearing loss in the workplace by offering the unique benefit of real time octave band frequency analysis.




Sensidyne, LP | 1000 112th Circle North, Suite 100 | St. Petersburg, Florida 33716
Tel: 800-451-9444 / +1 727-530-3602 | E-mail: info@Sensidyne.com | Web: www.Sensidyne.com