LOFTIN

Sound Attenuation of Generator Set Systems

Information Sheet # 4

Your Reliable Guide for Generator Maintenance

1.0 INTRODUCTION

OSHA allows 85 dBA for an 8 hour exposure. Higher levels mandate less time exposed. If employees are exposed to 85 dBA level an administrative program must be in place. This program may include hearing protection and periodic testing, process changes, shift changes, or whatever is required for hearing conservation.

One of the simplest methods of noise reduction to the receiver is simply for the designer/engineer to be aware of local regulations and place the new noise source as far as practically possible from the property line or any point at which noise may be measured.

This info sheet outlines how noise is measured, lists acceptable ranges, gives comparative scales, and details the sound attenuation technology being adopted to reduce generator noise emissions. (see Diagram Two)

DIAGRAM ONE

Typical sound attenuated rental generator

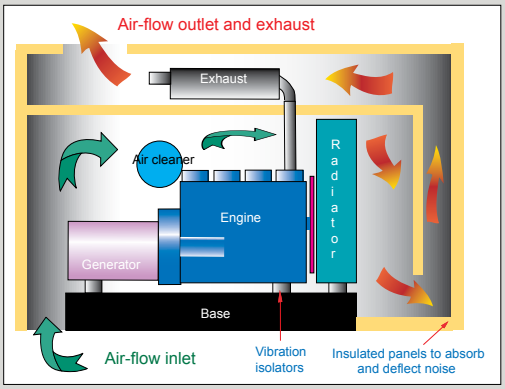
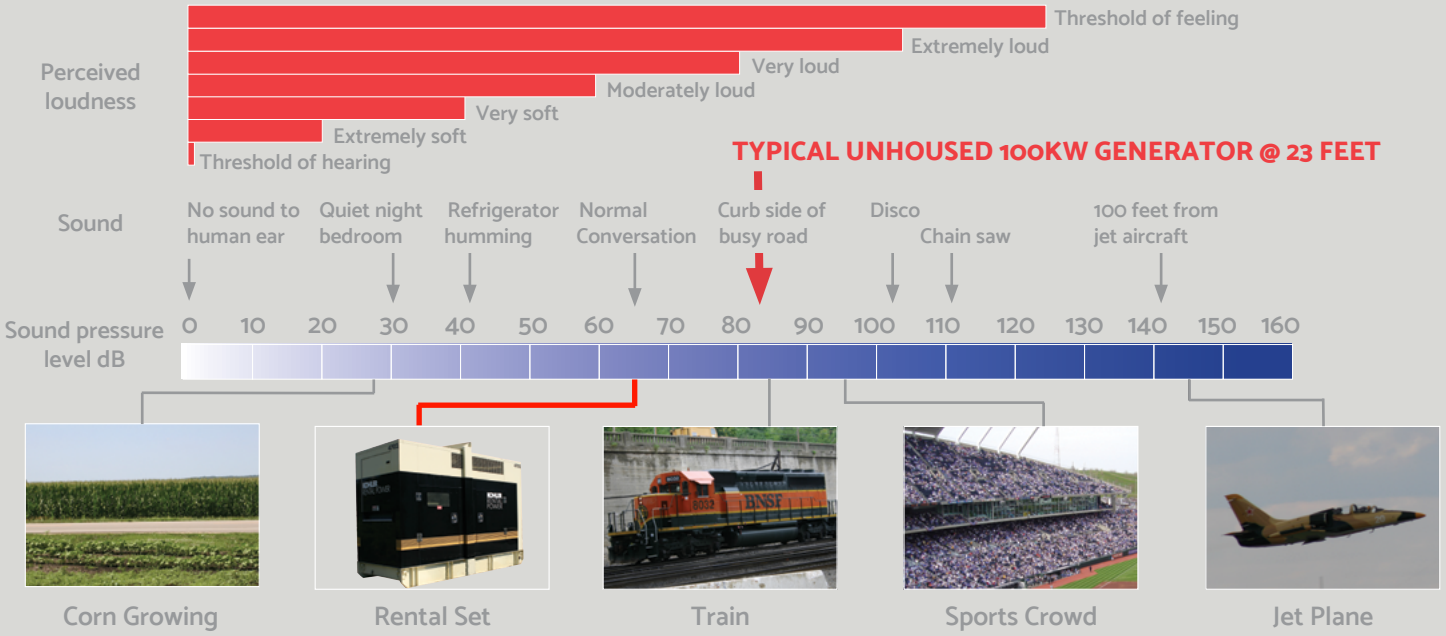


DIAGRAM TWO



To fulfill our commitment to be the leading supplier in the power generation industry, the Loftin Equipment team ensures they are always up-to-date with the current power industry standards as well as industry trends. As a service, our **Information Sheets** are circulated on a regular basis to existing and potential power customers to maintain their awareness of changes and developments in standards, codes and technology within the power industry.

2.0 MEASUREMENT OF SOUND

There are two distinct terms used in the measurement of sound, "Sound power" and "Sound pressure." Both use the decibel (dB) as their unit of measure. Decibels are logarithmic units. A logarithmic unit is adopted because sound goes from very small to very large values. If a logarithmic scale was not used with decibel measurements a scale would be needed that had divisions of up to 10^{13}. As such, a sound reading of 70dB is significantly higher than 65dB on a logarithmic scale.

Sound Power Ratings: Sound power is the acoustical energy emitted by the sound source, and is an absolute value not affected by the environment. Europe is using this measurement to define the actual noise generated by a given piece of equipment. All equipment has to be tested in an approved acoustics laboratory.

(Sound power value is higher than given for sound pressure, because they are not affected by the ambient. For example a 60kW generator set has a sound power of 94.4dBA and sound pressure 66.9dBA)

Sound Pressure Ratings: Sound pressure is measured in an existing space with a sound meter, and is the pressure disturbance in the atmosphere whose intensity is influenced by the strength of the source, the surroundings, and the distance from the source to the receiver. Sound pressure is what our ears hear and what sound meters read. Sound pressure can be measured in A, B, and C scale. The C scale measures pressure with little of no filtration. The A scale closely resembles how the human ear responds to or filters the actual sound pressure level. In the US, we use sound pressure, and, while it may not give a precise reading of the sound produced by any given piece of equipment, it does determine whether a design achieves the sound quality required.

Assigning a Decibel Value: There is no single entity that assigns a standard, but manufacturers in North America take an average of 8 sound meter readings around the equipment from a distance of 23 feet. The accepted value for sound attenuated generator sets is that the average of the reading should not exceed 70dBA. However, many rental applications are now asking for the reading not to exceed 65dBA.

3.0 GENERATOR SET SOURCES OF NOISE

Noise in the dictionary is referred to as unwanted sound. Noise sources from diesel, and gaseous-fueled generator sets are numerous, but can be summarized as:

Mechanical: Rotating/moving parts transmitting vibration acoustically to the surrounding ambient.

(Acoustic vibration to the surrounding atmosphere can be reduced by employing sound-absorbent materials, mechanical isolation of vibration, redirecting air-flow before it exits the equipment to dissipate sound, and designing enclosures that are well sealed and acoustically lagged).

Exhaust: Internal combustion noises from the engine transmitted through the exhaust and engine carcass.

(A by-product of cleaner burning, more efficient engines, has been smoother running and quieter engines. Exhaust muffler grade will have a significant effect on overall exhaust noise.)

Air flow: Air is required for combustion and cooling and noise is produced by cooling fan tips and combustion inlet draw. (More attention to aerodynamic flow can reduce noise from fans and aspiration).

4.0 METHODS OF MINIMIZING NOISE TO SURROUNDING ENVIRONMENTS

The following technologies have been employed to reduce mechanical and combustion sources of noise: (see Diagram One)

Absorption: This method primarily uses sound deadening material to lag the inside of enclosures and ductings that handle airflow inlet and outlet. If sound is not absorbed or transmitted when it strikes a surface, it will be reflected. There have been many advances in sound-absorbent material used in attenuated sets.

Redirection/Reflection: Sound that cannot be absorbed should be repeatedly reflected for good diffusion. Generator sets rely on air-flow for cooling and combustion. If the air flow that also carries the noise can be deflected frequently before it exits the enclosure, the noise energy will be reduced by good diffusion.

Noise Cancellation Technology: This technology works on the principal that one sound wave will be cancelled out by a similar sound wave from the opposite direction. Advances in electronics have enabled use of this technology. Types of noise cancellation have been used in the deadening of noise in small commercial aircraft.