Information Sheet # 04

GenPower© PRODUCTS • INC

Your Reliable Guide for Power Solutions

To fulfill our commitment to be the leading supplier in the Power Generation Industry, the Gen Power Products, Inc. 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.

Sound Attenuation of Generator Sets

When discussing pollution, exhaust particulates are the first to come to mind. However, frequently noise from operating equipment, such as generator sets, is also considered a serious pollutant. Sound, when heard as noise, is not acceptable in many environments. Approximately 30 million Americans are affected by hearing loss and 50 million have tinnitus: an early indication of hearing loss.

Many local governments have determined that noise is an environmental concern. Some municipalities have written legislation that specifically states limitations to noise producing equipment. During the design phase of a project, special attention should be given to any local noise requirements that may be in effect. Failure to do so may cause expensive field retrofits to get equipment noise levels within acceptable ranges.

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 2)

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 measured 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. 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.

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).

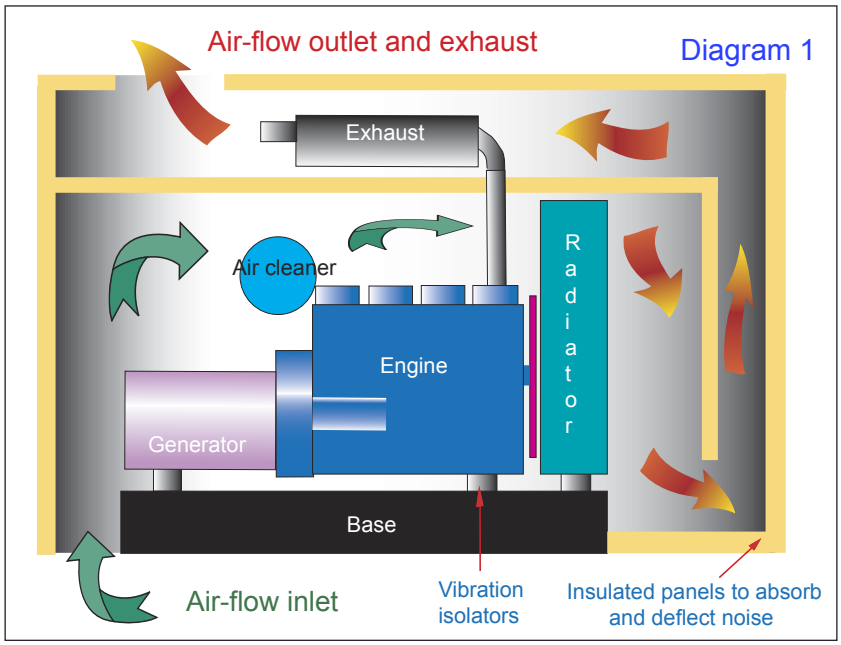
Methods of minimizing noise to surrounding environments: The following technologies have been employed to reduce mechanical and combustion sources of noise: *(See diagram 1)*

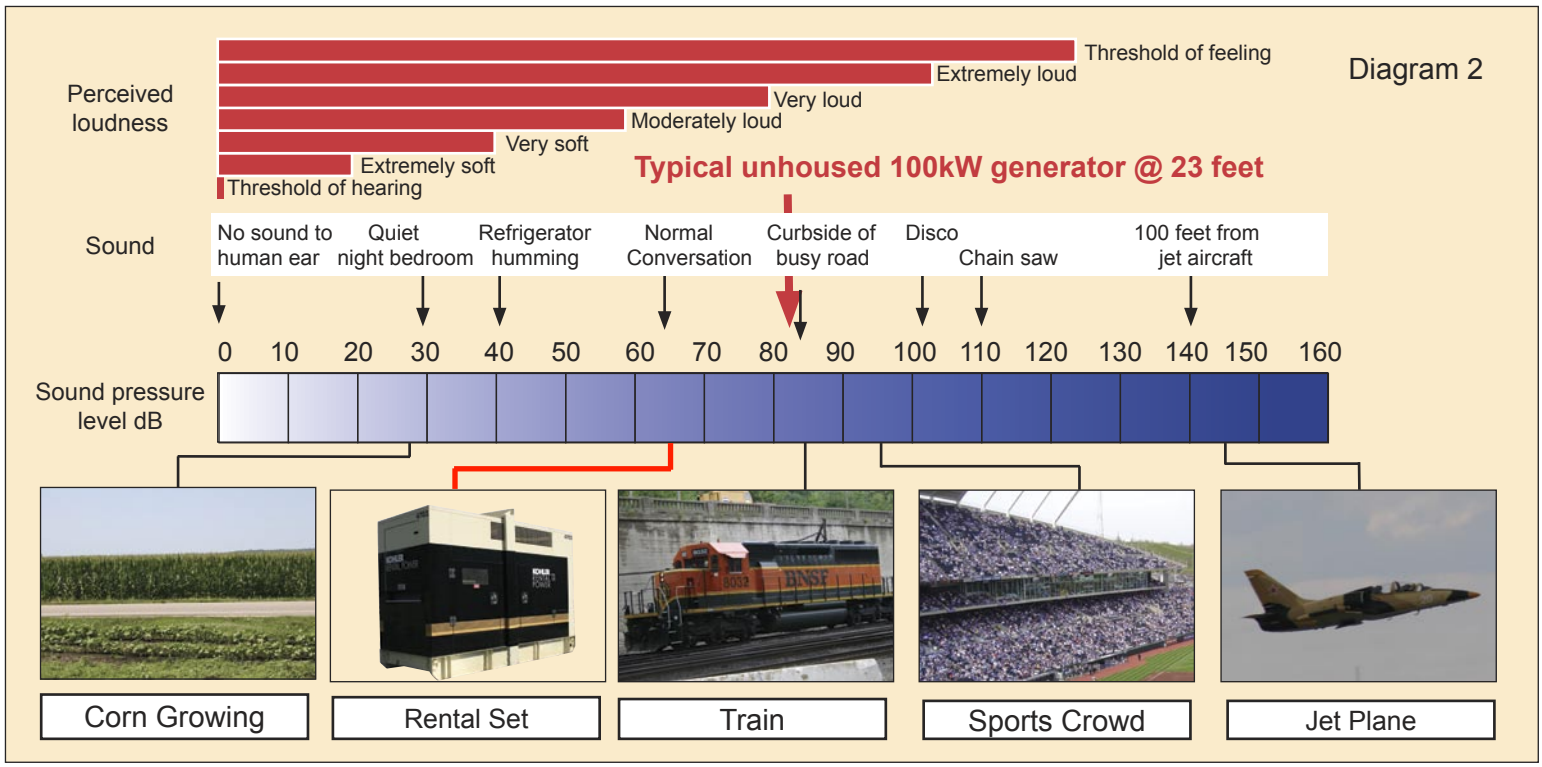
Absorption: This method primarily uses sound deadening material to lag the inside of enclosures and ductings that handle airflow inlet and outlet. If sound is not absorbed or transmitted when it strikes a surface, it will be reflected. There have been many advances in sound-absorbent material used in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

Typical sound attenuated rental generator





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