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Electrical Panels and Cables Noise Solutions

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ABSTRACT

Is there accurate and cost effective solution for reducing noises from electrical cables and electrical panels in present era ? Industrial panel noise can easily reduced by using some calculations and methods only. Cost effective way to reduce noise is shown below techniques. Let us understand by below mentioned examples and techniques.

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Noise:

Noise is unwanted sound considered unpleasant, loud or disruptive to hearing. From a physics standpoint, noise is indistinguishable from desired sound, as both are flickering motion through a medium, such as air or water. The difference arises when the brain receives and perceives a sound.

Acoustic noise is any sound in the acoustic domain, unintended like in industrial motorised control panel or instruments control panel or similar panels for switching or controlling purpose.

Flickering motion:

Flickering motion is a mechanical phenomenon whereby oscillations occur about an equilibrium point. The oscillations may be periodicor constant, for an example, as the motion of electrons passed through conductor of electrical cable.

Flickering motion can be desirable or undesirable.

In many cases, however, Flickering motion is undesirable, wasting energy and creating unwanted sound. For example, the Flickering motional motions of engines, electric motors, or any mechanical or electrical or instrumentation device in operation are typically unwanted. Such Flickering motions could be caused by imbalances in the rotating parts, uneven friction, or the meshing of gear teeth or Flickering motion of electrons in cables.

The studies of sound and Flickering motion are closely related. Sound, or pressure waves, are generated by vibrating structures (e.g. vocal cords); these pressure waves can also induce the Flickering motion of structures (e.g. ear drum). Hence, attempts to reduce noise are often related to issues of Flickering motion.

Careful designs needs to minimize unwanted Flickering motions. This lead to me to evaluate a solution for this problem.

By doing research in GOOGLE search engine many types of acoustic materials are available can reduce or nullify the unwanted sound upto desirable limits.

Some of them are,

Types of Soundproofing Materials

These are the most used soundproofing materials; each category has different best use scenarios. Each of these acoustic materials falls into one of these categories: Sound Absorbing, Sound Insulation, Sound Dampening, and Decoupling.

Acoustic Foam – This material, commonly called Studio Foam, has a distinctive wedge or pyramid

shape that is highly effective at absorbing sound. They attach to walls as panels, hang from ceilings as baffles, or sit in corners as bass traps.

Sound Insulation – Sound insulation are batts made of mineral wool, rock wool, and fiberglass, designed to fit in between the studs of walls. The batts fit snugly between studs to take up airspace that can transmit sound.

Acoustic Panels/Boards – These are decorative versions of sound insulation and sound absorbing foam. They can come in many appealing colors, patterns, and fabrics to serve a dual purpose in the home and workplace.

Acoustic Fabrics – Acoustical fabrics are thicker and heavier than other fabrics and used in theater curtains, blackout curtains, and studio blankets.

Acoustic Coatings – Materials like Mass Loaded Vinyl (MLV) is a dense rubber like material, used in many different situations such as car soundproofing, machinery, appliances, and as an underlayment. The mass of the material acts as a sound barrier.

Floor Underlayment – Soundproofing a hardwood or tile floor requires the decoupling of the flooring surface and the subfloor to reduce the noise transmission. Cork rolls, felt, and polymers are commonly used as underlayment materials.

Architectural Soundproofing – This group includes anything used in the structure of a building, such as soundproof windows, soundproof walls, doors, and decoupling products used to install them.

Novelty of application:

Workers can communicate easily without any doubts. No need to show sign languages.

No need to use ear plug or other ear safe devices or instruments.

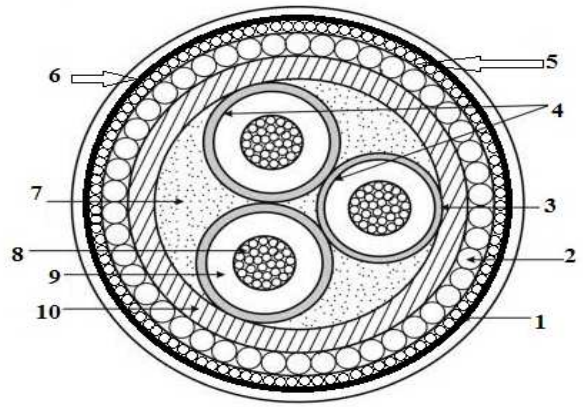
Improves work efficiency of employee compared with unprotected noisy area.

Creates stress free work environment while working inside main control area where panel are located, like substations, control area building by eliminating unwanted noise.

The most obvious is interrupted sleep, with its flow-on effects of tiredness, impaired memory and creativity, impaired judgement, Poor concentration and weakened psychomotor skills. But there is another, more serious outcome.

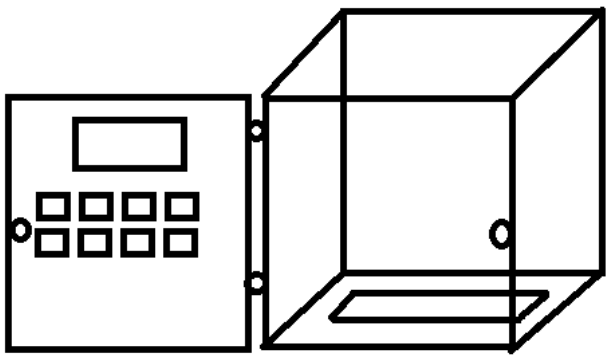
Even if you don't wake up, it appears that continual noise sets off the body's acute stress response, which raises blood pressure and heart rate, potentially mobilising a state of hyperarousal. It is this response that can lead to cardiovascular disease and other health issues. All these health issues occurrence can be prevented by applying such noise preventive materials.

Drawing of Application:

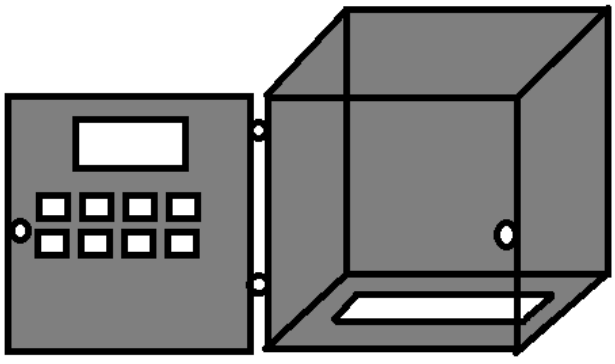


Example of electrical cable with noise insulating material

Numbers
1 outer servicing
2 steel armour
3 lead sheath
4 multilized paper
5 noise insulation material
6 noise insulating material barrier
7 filler insulation
8 conductor
9 paper insulation
10 belt insulation



Panel without noise insulating material



Panel with noise insulating material

Application:
Sound absorption can be a particularly important factor for spaces such as:
Sports halls.
Schools.
Recording studios.
Lecture theatres.
Concert venues, cinemas and theatres.

Generally, sound absorption is applied in the form of treatment to floors, walls, ceilings, partition surfaces and objects such as chairs or bookshelves. The use of sound absorbing screens is also becoming more common.

Industrial applications such as MCC panels, Instrumentation control panels, Switching control panels, etc... having inside and outside panel area can be used to protect unwanted sounds.

Results:
Creates stress free work environment while working inside main control area where panel are located, like substations, control area building by eliminating unwanted noise.

The most obvious is interrupted sleep, with its flow-on effects of tiredness, impaired memory and creativity, impaired judgement, Poor concentration and weakened psychomotor skills.

But there is another, more serious outcome. Even if you don't wake up, it appears that continual noise sets off the body's acute stress response, which raises blood pressure and heart rate, potentially mobilising a state of hyperarousal.

It is this response that can lead to cardiovascular disease and other health issues. All these health issues occurrence can be prevented by applying such noise preventive materials.

Conclusion:
500 amp electrical motor drive can cause 0.5 G to 1 G Flickering motion while running inside Panel. This leads to produce sound around 60 decibel to 120 decibel. Apart from electrical motor drive, electrical cables of 500 amp can cause 0.10 G to 0.20 G Flickering motion. This can produce 10 decibel to 20 decibel sound.Other components like relays, contactors, MCBs, etc... have different range of Flickering motion while running.

By calculating all this unwanted sound range 50 db to 130 db sound needs to be corrected. By applying noise insulating materials inside and outside of panel this problem can be resolved.

Apart from this, Cable tray carrying like 500/400/300 or more or less amp cables, where each cable can cause 0.10 G to 0.20 G Flickering motion or either on bundle of cables in cable tray.

An acoustic material, is a solution, is a material designed to control, direct, and manipulate sound waves or phonons in gases, liquids, and solids. They can be engineered to either transmit, or trap and remove sound waves at certain frequencies occurs from motorised electrical control panel or instruments control panel or similar panels for switching or controlling purpose.

References:
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