Sandia National Laboratories

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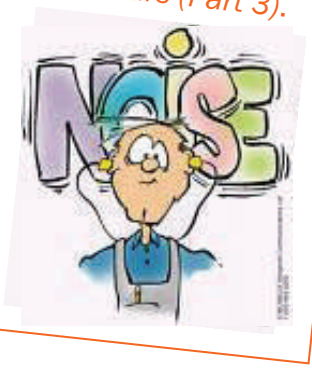
Construction News Sense

FACILITIES Management and Operations Center

Are Your Neutrals Crossed?

See page 2 for Noise Exposure: An Assault on the Ears (Part 3).



Recently an electrical issue came to light that was so non-typical, that it truly makes it a great lessons learned. A line employee received a 120volt shock while holding a standard 120volt, 20-amp plug. The plug feeds a portable clean room. The portable clean room has three separate 120volt standard electrical plugs that feed its internal circuitry. Two circuits feed two fans and one circuit feeds the lights. An Electrical Construction Contractor pre-wired the apparatus in December for the building occupants.

The impacted line employee plugged one cord into a wall receptacle and the employee heard "fan circuit 1" turn on. The worker then plugged in a second cord feeding "fan circuit 2" and did not hear any additional fans turning on. While walking the third cord to a third wall receptacle, the worker's finger simultaneously made contact with the neutral and ground pins of the cord end and received a shock.

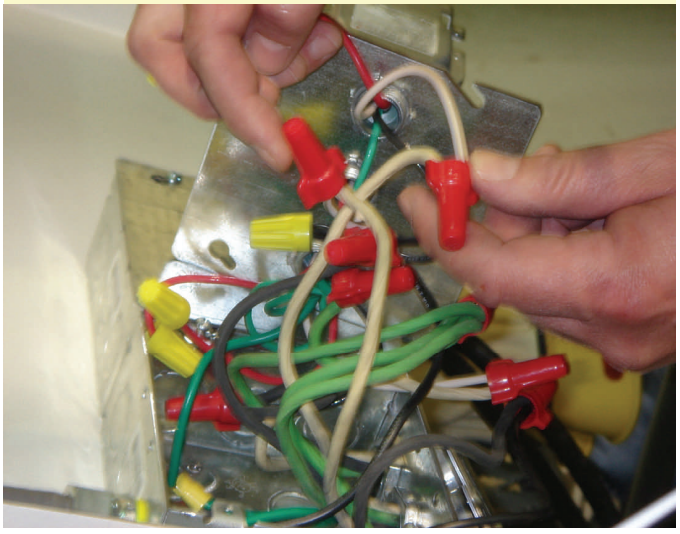
Investigation identified during the cord installation activity, the Electrical Construction Contract electrician crossed neutrals of the cords to fan 2 and the lights. Because of the crossed neutrals, the neutral connected to "fan circuit 2" was wired to the plug (lighting) the employee was holding. When the employee's finger touched the neutral and ground terminals on the plug, the circuit to "fan circuit 2" was completed and the employee was shocked.

This configuration was unusual due to the fact that the portable clean room utilized three separate 20 amp cords instead of a typical system that supplies power through an individual cord and configuration.

All of the portable clean room components (flex cables) were not available at the time of the cord installation. This contributed to the inability to test the installation.

The importance of the neutral connections was not apparent and separate controls such as labeling the conductors was not completed and a functional test was not performed.

This sequence of events and installation could have been completed by any electrician on any day. Lets make sure we share the lessons learned to prevent this hazard.



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Noise Exposure: An Assault on the Ears (Part 3 of 3)

In the March *Construction News Sense*, we took a look at noise at the construction site and how harmful many of the tools used in the construction industry are to our hearing. This month, we take a look at how we can protect our hearing.

What can be done to reduce the potential for noise induced hearing loss?

Workers exposed to loud noises without use of hearing protection risk losing their hearing. Properly selected hearing protection can help prevent hearing loss. The level of protection the hearing protection device provides shall be based on noise exposure levels. Overprotection should be avoided, as it can interfere with the user's ability to communicate and hear warning and other audible signals. To avoid overprotection, but still insure adequate protection from noise, attenuated exposure levels should be between 70 and 84 dBA. To obtain a better estimate of the amount of protection most workers will receive from a hearing protection device, consideration should be given to reducing, or derating, the NRR by some factor. The following is the OSHA hearing protector derating method.

OSHA's experience and the published scientific literature have shown that laboratory-obtained real ear attenuation for HPDs can seldom be achieved in the workplace. To adjust for actual attenuation achieved by workers, OSHA applies a 50 percent correction factor when estimating field attenuation during noise control inspections. This is especially important when considering whether engineering controls are to be implemented. The derating schemes below are modified to include the 50% correction factor:

- Single Protection: Estimated Exposure (dBA) = TWA (dBA) - [(NRR-7) x 50%]
- Dual Protection: Estimated Exposure (dBA) = TWA (dBA) - [(NRRh-7) x 50%] + 5

  Note: NRRh is the laboratory-based NRR for the higher rated protection device.

Training on the proper use of hearing protection is an important part of a hearing conservation program, and should take into account the need for construction workers to hear warning shouts and signals.

In addition to providing hearing protectors and training, construction companies should look into reducing noise exposure levels by purchasing quieter equipment or shielding workers from the noisiest equipment.

Engineering Control Examples

Examples of measures and changes to equipment to make equipment or work areas quieter:

Buy or lease quiet – substitute existing noisy equipment with quieter equipment

- Retro-fitting equipment – installing mufflers, dampers or vibration isolators on existing equipment
- Erecting noise-blocking acoustic barriers or enclosures around noisy equipment or work areas
- Acoustic treatment of walls and ceilings in noisy work areas
- Maintenance (well-maintained machines run more quietly)
- Reducing the feed pressure or drive speed of construction machinery
- Using electric or battery operated tools instead of pneumatic tools where possible

Administrative Control Examples

These are management decisions about work activities that are designed to reduce worker exposure to high noise levels:

- Moving workers away from the noisy equipment or work areas or moving noisy equipment away from workers.
- Restricting access into noisy areas
- Rotating workers performing noisy tasks so that no one individual worker is exposed to too much noise
- Shutting down noisy equipment when not needed
- Giving noise-exposed workers extended breaks in quiet areas

There is a great need for education and prevention of hearing loss in the construction industry. Compliance with existing standards and guidelines can reduce the potential that construction workers will suffer hearing loss at the magnitude that currently exists in the industry.

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