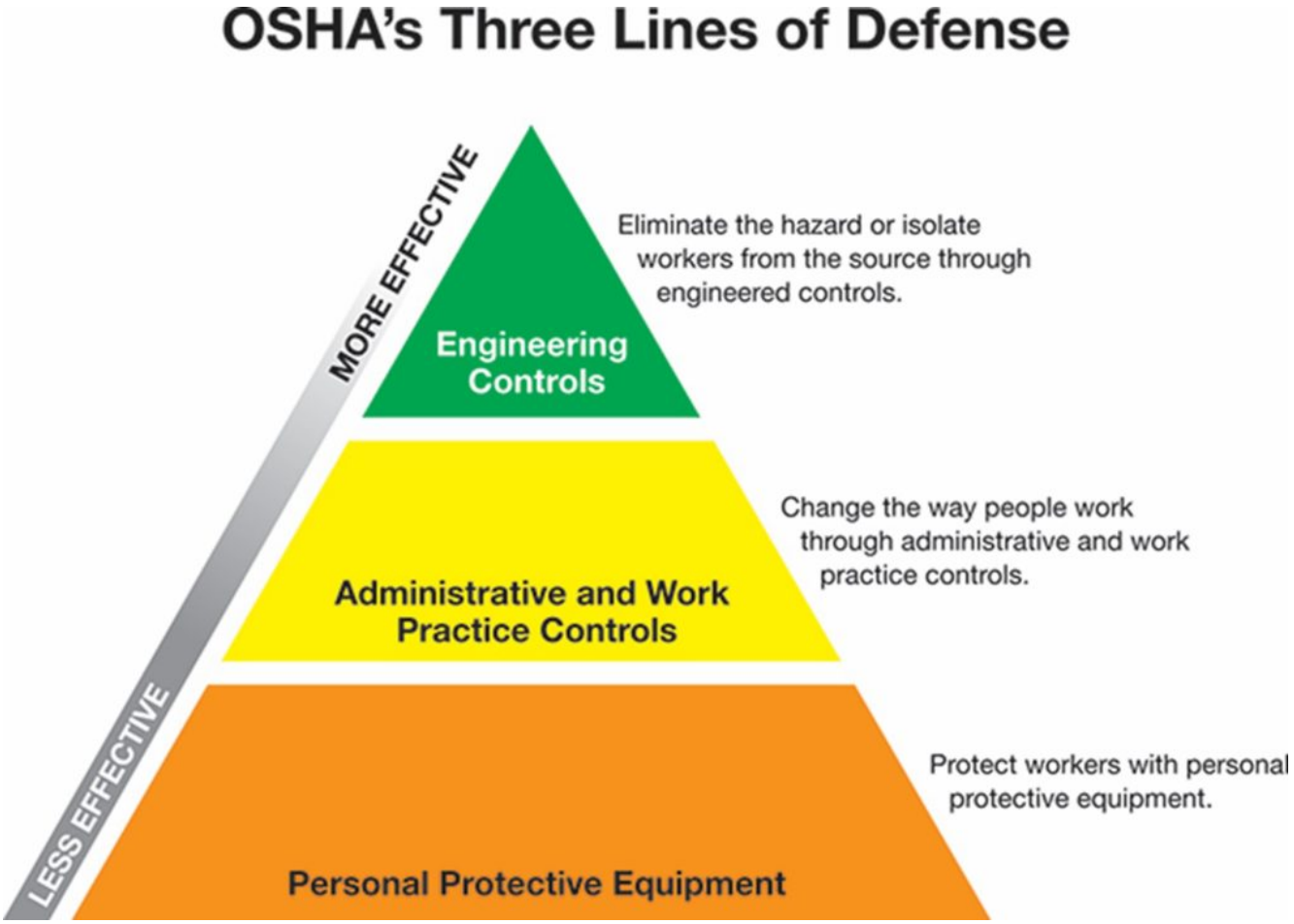
Work Site Communication – Quick Tips

When it comes to keeping your employees safe, work site communication of hazards is a vitally important action to take to prevent injuries and illness. Knowing when a hazard exists can alert an employee to take actions such as shutting off a machine or engaging a guard to isolate the hazard. Communications can be delivered orally by devices such as two-way radios, or be automated in the form of safety alarms and warning devices incorporated into equipment.

The Occupational Safety and Health Administration (OSHA) recognizes the “Three Lines of Defense” as a way of thinking about and applying specific actions to reduce or eliminate potential exposures to identified hazards. This is a commonly used and understood practice within the safety community. It is often depicted as a pyramid, where each level is considered progressively more effective.



Safety Alarms and Warnings

Safety alarms and other kinds of warning equipment are one of the first lines of

protection for workers in a building or on a job site. This protective equipment is designed to alert workers of potentially dangerous situations that could threaten their health and safety. Safety alarms and warning devices can be comprised of a variety of different styles, colors and shapes, and are used for many different purposes. The warnings typically consist of lights combined with a variety of sounds.

OSHA Alarm Requirements

OSHA requires employee alarms systems under 29 Code of Federal Regulations (CFR) 1910.165(b)(1):
“The employee alarm system shall provide warning for necessary emergency action as called for in the emergency action plan, or for reaction time for safe escape of employees from the workplace or the immediate work area, or both”

The employer must provide, when required*, an alarm system that will give all employees at the worksite adequate warning to the danger that the alarm signifies. This means all employees, including those with physical impairment, must be able to perceive and recognize an alarm signal for the purpose that it is sounded. Employees must have the proper training to identify alarm signals for what the alarm means and to know what their duties and responsibilities are when the alarm sounds.

*29 CFR 1910.165 only applies to those alarm systems that are required by other OSHA standards. It does not apply to all alarm systems in the industrial environment.

General categories of safety alarms and warning devices include:

- Audible signaling devices
- Carbon monoxide and smoke detectors
- Horn strobes
- Intersection warning devices and systems
- Outdoor warning systems
- Strobe and flashing lights
- Status indicator (tower) light assemblies

Typically, you will find most of these devices used as emergency/fire protection equipment to alert employees that an emergency action is necessary due to a fire, weather, or security threat. These devices are also used to increase visibility of emergency vehicles, school buses, snow plows, wreckers, slower moving construction vehicles, and are commonly used in conjunction with backup alarms on powered industrial trucks. Entrances and exits in loud environments use warning lights and sirens as a way to warn of hazardous environments and dangerous areas. The lights are designed for indoor/outdoor use.

Status indicator (tower) lights are used to signal the status of machinery, conveyors, and automated lines by using different colors to show the status from a distance.

Selection Criteria

Applications and other aspects of these safety alarm and warning devices that need to be considered before purchasing include:

- Light and bulb types
- Lens colors
- Voltage
- Mountings

Light and Bulb Type

There are several choices when choosing the type of light and bulb to be used. The most common choices are: strobe lights, which use a strobe tube or more commonly an LED lamp, rotating flash, which typically use incandescent or Halogen flash tubes and

stack type lights. Strobe lights have bright rapid flashes (typically 90 flashes per minute) and are highly visible at night as well as in fog. They are also low maintenance. A rotating or revolving light rotates approximately 60 times per minute. These are more visible in bright sunlight, have a greater visibility over distance and have longer “on time” to the human eye. LED’s are bright, stay cool to the touch and may last for thousands of hours versus. other type bulbs that last for hundreds of hours. Most lights can be set up as a flasher or light up in a variety of different patterns. Stack lights, which can be stacked in different color combinations, light up and can stay on or blink to show status, depending on the need.

Lens Color

Just as in traffic control signal lights, the signal device lens colors have meaning. The Society of Automotive Engineers’ standard, SAE J578-2016 specifies the colors used for any device employed in motor vehicle external lighting. Signal lights for use on vehicles or moving equipment meet certain ratings defined by the SAE. These lights are rated and defined by class. Each class is defined by specific photometric criteria for flash brightness and distribution:

- Class I: signal device for emergency use on emergency vehicles
- Class II: warning light for maintenance/service vehicles to warn of traffic hazards
- Class III: warning device for identification only

Voltage

Voltage is another determining factor for the type of safety alarm or warning device needed. If the device is going to be wired in, it would need to be 115-120 volt AC. Other voltages are available, such as 24 volt AC, which are used in facilities that use a transformer to reduce voltage from 120 to 24 volts. These offer different amperage options to meet a facility’s needs. Other options for safety alarm or warning devices are 12 to 48 volts DC. If the device is to be wired into a vehicle or other 12 volt battery system, the device would need to be 12 volt DC. Some devices for vehicles come with plug adaptors and magnets for ease of attachment and portability. All of the others need to be integrated into the vehicles wiring system or fuse box.

Audible Levels

Loudness decreases as the listener gets further from the source of the sound, mainly due to “divergence.” The intensity decreases because the energy is spread over a larger area. It decreases inversely with the square of the distance from the source at a rate of 6dB for each doubling of the distance. So the sound output from an alarm rated at 106 dB(A) will travel twice as far as a audio alarm rated at 100dB(A). If a sound is 100dB(A) at one meter, at two meters it will be 94dB(A), at 4 meters it will be 88dB(A) and so on.

Mounting

Depending on the light type, there can be different mounting options. The more common mount types available are surface mount and pipe mount. As for vehicles, magnetic or permanent mounts are common.

Two-Way Radios

Selecting the best two-way radio system for your business comes down to choosing the right solution for your specific business requirements, and there are several factors to consider:

- Signal Type (UHF, VHF, or Digital)

- Business versus Consumer two-way radios
- Wattage
- Number of Channels

Signal Type

VHF radios are best suited for exclusive outdoor use with open space with little obstructions, since the signal from a VHF radio travels farther with no obstructions. UHF two-way radios are best for indoor use, when signals need to penetrate wood, concrete and steel structures. They're also the best choice if you need a business radio for both indoor and outdoor use. An alternative to a VHF or UHF two-way radio for business is a digital radio that operates on the 900MHz band. Digital tworadios provide the same power and coverage of analog radios but on 25% of power. The digital signal is much clearer and does not have the static that often comes with analog radios. The digital signal can also transmit to an individual or switch to a group setting on the same radio. A big bonus for using digital signal radios is that they do not require a Federal Communications Commission (FCC) license.

Business versus Consumer Radios

Business radios are designed for use in the work environment versus a consumer radio. Business radios feature business-exclusive frequencies and many offer a feature of customizable codes that eliminate crosstalk from other radios that may be operating nearby. Other features offered by business radios that are desirable in the work environment include:

- More secure signal
- More durable
- Higher wattages
- Easy cloning of settings
- Programming software
- Compatibility with a repeater to extend range

Wattage

Typically a four to five-watt two-way radio with an integrated antenna would provide a range of up to 350,000 square feet or 30 floors. Certain businesses don't need that much power and in those instances more compact and discreet radios are an option. Business two-way radios are designed to be comfortably worn on belt holsters all day long without interfering with the employee's daily work. They also feature voice-activated operation and are compatible with low-profile headsets for maximum portability.

Number of Channels

If your company has several different departments or various groups of employees that need to communicate in the same space without one hearing, the other a multi-channel radio is the answer. This allows a channel for each department so that they can speak privately to others in their group or to the entire team.

Commonly Asked Questions

Q: Do all two-way radios work together regardless of brand?

A: All consumer two-way radios can communicate with each other if they operate on the same frequency, model and brand should not matter. Two-way radios targeted at consumers use a standard set of frequencies, either Family Radio Services (FRS) or General Mobile Radio Service (GMRS) or a combination of both. All radios that support FRS and/or GMRS use the same frequencies, so they are compatible with each other. The story is different for business two-way radios. They use different types of frequencies, for example VHF, UHF or the 800/900 MHz range. Additionally, they also

often support the programming of custom frequencies. So even in the case your radios use the same frequency type, it is still possible that you cannot communicate with these radios because they have different frequencies programmed into the radio.

Q: Is a license required to operate a two-way radio?

A: FCC regulations require all radios operating on business band frequencies one watt or more to require a license. Instructions for obtaining a license are typically included with the purchase of the radio. It is up to the end-user to obtain the license. A license is not required to purchase a business radio but can easily be done after purchase. A license is not required for consumer radios that operate on FRS or GMRS frequencies of one-half watt or less. FCC regulations can be found at https://www.fcc.gov/licensing-databases/licensing.

Sources for More Information

Society of Automotive Engineers (SAE) https://www.sae.org

Federal Signal https://www.federalsignal-indust.com

29 CFR 1910.165, Employee Alarm Systems

Federal Communications Commission (FCC) https://www.fcc.gov

Motorola
Radios: https://www.motorolasolutions.com/en_us/products/two-way-radios-story.html

Edwards Signaling: www.e2s.com/information

Source: Grainger Know How – https://www.grainger.com/know-how