

When Communicating Saves

Systems should have high intrinsic safety ratings to ensure safe and effective communications despite the type and / or level of the emergency.

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Good communication is one of the most important tools for ensuring workers' safety and work efficiency, especially when confronting the hazards of confined space entry. Benefits are also realized in productivity, costs, and workers' confidence. In some circumstances, communication makes an otherwise impossible task possible.

OSHA defines a confined space as any space that has limited or restricted means of entry or exit, is large enough for an employee to enter and perform assigned work, and is not designed for continuous occupancy by the employee. These areas include, but are not limited to, underground vaults, tanks, storage bins, vessels, pits or sumps, and silos. This definition is also consistent with that of the National Fire Protection Association's 1670, Standard on Operations and Training for Technical Rescue Incidents, 1999 Ed.

Choosing Communications

It's not always a simple task to choose a communication solution that will satisfy OSHA or other mandatory or discretionary requirements to provide effective communications in all situations and still be readily accepted by employees. Entrants are often encumbered with equipment, such as self-contained breathing apparatus (SCBA), personal alert and gas detection devices, and safety harness apparatus.

Firefighting is dangerous enough; poor communications in confined space entry can be fatal. Therefore, communication systems utilized should have high intrinsic safety ratings so as to ensure safe and effective communications despite the type and/or level of the emergency. This means greater worker safety and reduced employer liability.

In examining the conventional means of communications used, you'll find that many of these have limited application and usefulness. For example, direct voice transmission (talking or shouting), works only in low-noise environments and over relatively short distances. Loud hailers can extend the distance to some degree but may be cumbersome and limited when more than one entrant is involved. Hand signals work in line-of-sight applications and require constant visual contact between communicants. As soon as a back is turned, a vital hand signal will not be seen. Tugging rope will signal the recipient only if the rope is not snagged and conveys only the very basics of intelligence.

Electronic communications, which offer better solutions, fall into two main categories: "wireless" and "hard-line."

Wireless Communications

Wireless communication devices transmit signals through the air, usually via radio frequency waves (i.e., two-way radio), providing unhampered mobility to the user. For this reason, it becomes the system of choice for many applications. Radio equipment has its own shortcomings, however, making its use limited or even unacceptable in many confined space applications. New solutions may use infrared to link users, but these have other limitations without “line of sight.”

Without line of sight, communications may become erratic or, worse, entirely missing. Steel, concrete, or brick surrounding (or in proximity to) the radio can have a shielding effect. Additional antenna elements installed in strategic locations may alleviate these problems, but this becomes expensive and impractical in portable or emergency applications.

A duplex system has each radio operating on two frequencies simultaneously. In this case, transmit and receive frequencies are open all of the time in both directions. Keying the radio to transmit is not necessary because the transmitter is on all of the time. This method meets OSHA requirements for continuous communication but can use a lot of power and is limited. This is an important factor because most systems are battery operated and should be investigated before making a communication system choice.

If more than two radios are required, it becomes necessary to use an additional repeater to accommodate duplex operation. PTT (push-to-talk) or VOX (voice actuated) switches used to switch the radios to transmit are less acceptable because they prevent continuous communications.

Potentially volatile explosive atmospheres will require the use of intrinsically safe equipment. Assembling a multi-radio, intrinsically safe duplex system is an attractive solution only if cost is not a consideration.

In summary, although popular for other applications, wireless communications should not necessarily be the system of choice for confined space communications.

Hard-line Communications

In tethered or hard-wired systems, wires are used to interconnect headsets and components to form an intercom between the workers. Advantages of this system outweigh the disadvantages of a physical interconnection between components. Initial and operating cost is low, and non-line-of-sight communications are guaranteed. Full duplex lets everyone talk at once and ensures no messages are missed. PTT or VOX controls are not required, allowing hands-free operation.

Wired communications can typically be used by as many as 10 people. Most systems have immunity from RFI (radio frequency interference), which can be encountered from nearby equipment that generates RF, such as arc welders, computers, fluorescent lighting, etc. Wired communications typically do not generate their own RF and do not cause interference to nearby electronics and other sensitive equipment.

In the event that a confined space rescue becomes necessary, most wired intercom systems can provide the privacy needed to prevent monitoring or interference by those not involved with the operation.

Recently the American Society for Testing and Materials (ASTM) recommended, in summary, that systems: (1) be intrinsically safe; (2) have continuous, hands-free voice communications; (3) be dedicated and private; (4) not affect readings of other equipment (such as gas detectors); (5) if battery operated, have a low-battery warning or back-up power; (6) accommodate a minimum of three users; (7) allow for communications among all entrants, as well as the attendant; (8) must work in conjunction with any personal protective equipment used; and (9) must be impervious to the chemicals within the space.

Communication Ropes

Even though training and research into hard-line systems may not be new, communication ropes are quite unique. By incorporating communication wires directly into safety ropes, you reduce equipment, improving workers' efficiency and safety. When considering the benefits of communication rope, make sure it is high performance and meets OSHA's requirements, provides a means of rescuing entrants from a confined space, and eliminates the need for additional cable.

The Benefits of Intrinsically Safe Equipment

In confined space or rescue situations, poor communications and substandard systems can be fatal. It is highly recommended that you choose a product or system with the highest intrinsic safety rating so that workers, employees, and employers are guaranteed the correct communication components are being used, no matter what the emergency. This provides not only the greatest worker safety, but also liability protection for the employer.

References

1. Occupational Safety and Health Administration (OSHA) 29 CFR 1910.146.
2. American Society for Testing and Materials (ASTM) Designation: F 1764-97.

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