

PROTECTING PEOPLE, PROPERTY AND PRODUCTIVITY

By Josh Dyer

Have you ever wondered why telecommunication professionals who work up on power lines don't get shocked? Utility and telecom workers are trained to work with electricity. They wear special insulated boots, hard-hats, and gloves, and use special insulated tools that help prevent shock. It would be a bad idea to climb a power pole and imitate them — and possibly fatal! Welcome to the world of insulated tools: a world that has rapidly developed due to the ever-growing demand for more safety in the workplace. Driven by the need for more power to handle the latest technologies, insulated tools are no longer a preference but are becoming the standard requirement.

Old Benjamin Franklin could have died from many of his electricity experiments. One year he wanted to use electricity to kill a turkey for Christmas dinner. While checking his equipment, he touched two parts at the same time and got a big shock. His whole body vibrated, and his arms were numb until the next morning. He was lucky he wasn't burned or electrocuted!

Electricity causes physical damage and can even be fatal. Electric shock can cause muscle spasms, weakness, shallow breathing, rapid pulse, severe burns, unconsciousness, or death. In a shock incident, the path that electric current takes through the body gets



very hot. Burns occur all along that path, including the places on the skin where the current enters and leaves the body. It's not only giant power lines that can kill or injure you if you contact them. You can also be killed by a shock from an appliance or power cord in your home. Accidents and deaths have continually increased and now approximately 20% of job-related deaths in the construction industry are caused by electrocutions. This is the third leading cause of death in this industry. Even relatively low voltages can be fatal. For example, electrical shocks produced from common 60 Hz AC power passing from hand to foot for a duration of one second can cause shock, muscular contractions, respiratory paralysis, heart paralysis (can be fatal), ventricular fibrillation (usually fatal), and tissue burning. Moreover, electrical arcs can produce temperatures of up to 35,000 degrees F. Exposure to such temperatures can cause death at a distance of up to 10 feet, and burns at a distance of up to 40 feet.

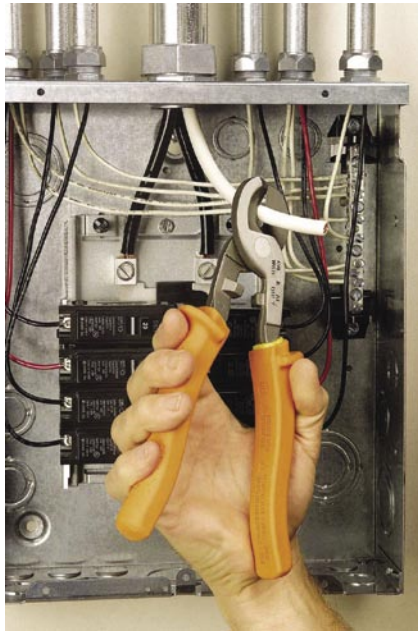
A SAD TESTIMONIAL

A telecommunication installer was working around power and reached behind a bay with his non-insulated tool, accidentally touching the electrical connection. He was electrocuted and died as a result. If he had been using insulated tools, there is a strong chance that he might be alive today.

Historically, electrocutions have been a leading cause of occupational fatalities, many times ranking among the top five. In addition to the thousands of fatalities annually, there is an average of 3,600 electrical-related disabling injuries. In an effort to reduce the number of fatalities and injuries, OSHA published the initial regulations for electrical safety in the workplace in 1990. Among the new regulations was the requiring of insulated tools when working near energized circuits. 29 CFR 1910.335(a)(2)(i) reads as follows, "When working near exposed energized conductors or circuit parts, each employee shall use insulated tools or handling equipment if the tools or handling equipment might make contact with such conductors or parts."

GENERAL REQUIREMENTS

Insulated tools are individually tested and certified by the manufacturer to be suitable for specific working conditions. Generally, the maximum



rated voltage for insulated tools is 1000 volts AC and 1500 volts DC. When purchasing an insulated tool, look for compliance with one or more of the following standards: The International Electrotechnical Commission (IEC), The American Society for Testing and Materials (ASTM) and The Deutsches Institute for Normung (DIN-German Standard). The ASTM, IEC, and DIN do not test the tools for compliance; they just set the performance requirements for the insulation. The manufacturers do their own testing. The Association of German Electro Technicians (VDE) is an independent agency that tests a sample of each tool to ensure compliance.

USE AND CARE OF INSULATED TOOLS

- **Keep tools clean and dry**
- **Inspect insulation prior to each use**
- **If you doubt the integrity of the insulation, destroy the tool or have it re-tested**
- **Follow the manufacturer's temperature recommendations for use**
- **Have a qualified person inspect and re-certify tools annually for safe use**

- **Use other personal protective equipment as necessary**

COMMONLY ASKED QUESTIONS

- Q.** Are there requirements for periodic re-testing of insulated hand tools?
- A.** Although there are not specific requirements for re-testing insulated hand tools, in compliance with 29 CFR 1910.355(a)(1)(ii), "Protective equipment shall be maintained in a safe, reliable condition and shall be periodically inspected or tested as required by 1910.137." Most manufacturers suggest inspecting the insulation before each use and having a qualified person perform an annual inspection and certification. To aid in the inspection process, some manufacturers offer two-layer insulation that will change color when the insulation has been breached.
- Q.** Can I use insulated tools on energized circuits?
- A.** Always follow the manufacturer's recommendations for use. Although insulated tools may be tested and certified to 1000 volts AC, the testing agencies do not recommend using them on energized circuits. Most insulating tools are designed only for protection from accidental contact with energized circuits.

TYPES OF INSULATED TOOLS

In order to work safely on or near energized parts these new products have recently been developed and are now available:

1. Class 00 insulating gloves are designed for work on or near energized circuits up to 500 volts AC. These gloves offer greater dexterity with less fatigue than bulkier gloves. The maximum thickness is .020" -- less than half the thickness of Class 0 gloves.
2. 7.5 kV PVC insulating material

is low in cost, transparent, tested to 10 kV, and available in 4' by 50' rolls. It can be cut to suit the application and then discarded.

3. Electrical insulating rubber shielding is engineered to protect personnel, equipment, and work areas from electrical hazards up to 17,000 volts. The shielding is flame, oil, ozone, and puncture resistant, remains flexible to -60 degrees F, and will not melt.

4. The Electrical Arc Hood incorporates a new UV- and IR-absorbing face shield providing heat protection up to 100 cal/cm². This is by far the highest level of protection available today. Previous generations of gold reflective face shields provide only 7.33 cal/cm² protection, while typical clear face shields provide only 1.2 cal/cm² protection.

5. Insulated hand tools for work on or near energized circuits up to 1000 volts are manufactured to ASTM 1505-01 standards. The latest development in this area is the introduction of screwdrivers and nut drivers manufactured from braided, military grade fiberglass composite over a tough polymer core.

These products can save lives and prevent damage to equipment and this is why OSHA requires employers to develop and implement electrical safety-related work practices for all employees exposed to 50 or more volts AC.

Electrocution is one of the top five causes of workplace deaths. Many workplace electrocutions involve touching a power line with long or tall equipment. Personal protective equipment is your first line of defense against shock and electrical burns. Keep boots, gloves and other gear in good condition - even a pinhole will let electricity through. Wear non-conductive protection on your head, face, hands, and feet. Use insulated tools or handling equipment, such as non-conductive ropes and protective shields. To be truly safe, make safe

INSTALLATION TOOLS

Protect yourself, your equipment, and your data

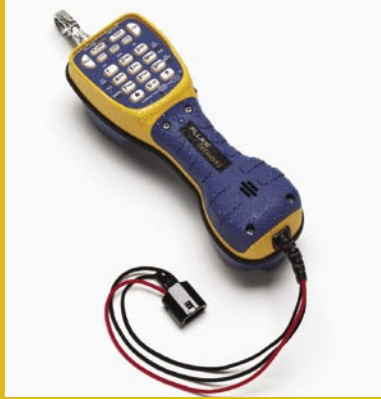
To borrow a phrase frequently seen in the cabling business, "safety is too important to ignore." And that applies not only to personal safety. Properly designed tools not only help protect the user, but add to their own longevity. And they can also help protect data that may be on the other end of the line. Data protection, or the lack of it, can be every bit as costly as lack of attention to personal safety.

How can something as simple as a set of hand tools have safety implications? Start by making sure the tools stay with the user. Locking belt clips and holsters that grip tools even when turned upside down help prevent accidental drops. Sounds trivial, but consider when it happens. If the user is in a lift bucket, it means stopping work, lowering the bucket and picking up the tools. More seriously, dropped tools can come in contact with live connections. And if the user reaches out to catch a dropped tool when it hits a live wire, the results can be far worse. A better solution; look for tools that stay with you.

For more complex and potentially more costly test equipment, such as butt sets, durability should be a



Well-designed hand tools will stay in their holster, even if turned upside down.



Telecom carriers demand butt sets with built-in data protection, as well as protection from the elements.

standard design feature. The most widely used butt sets have enhanced waterproof cases tested to withstand the combination of high wind and rain. Some are tested to wind speeds of 40 miles per hour, exceeding the American Military Spec MIL-STD-810E. And while the tool should always stay with the user, the best butt sets are designed to withstand a 20-foot drop to concrete.

Most major phone companies demand data protection built in to their test equipment. Accidentally clipping onto the wrong pair in a wiring closet or cross-box is one of the biggest threats to data lines and can interrupt critical data traffic, down a PBX, or down a server. Test sets should check for normal POTS voltage and the presence of data the moment you clip on the line. Data lockout and override protection will then alert the technician to the presence of data and only allow override if normal POTS voltage is detected. This level of protection is now considered best practice by most carriers.

Installation tools have a definite safety role for installers. Personal safety cannot be ignored.

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work habits second nature. Look out for everyone. Take responsibility for noticing, reporting and correcting electrical hazards. Talk with your supervisor about hazards, which have been reported but not corrected.

Many electrical injuries could be prevented if people were alert to hazards. Stay aware by keeping focused on your job and don't let emotions like anger and frustration get in the way. It might take longer to keep your area clean and dry, or inspect cords for wear, but it's worth a few minutes to prevent shock or fire. Before using unfamiliar equipment, study instructions and get questions answered.

One company that has geared up to meet the ever-increasing demand for safety in the workplace is OEL Worldwide Industries in Colorado. Because of the steady growth in recent years for efficient insulated tools, OEL continually

adds products to their portfolio. One of their primary jobs is to help keep fellow telecommunication workers in good health and assist their longevity in the workplace. Attitude is a key factor in maintaining a safe workplace. Safety is, and always will be, a team effort. Safety starts with each individual employee and concludes with everyone leaving at the end of the day to rejoin his or her families. Understanding the basic reasons for insulated tools will make you a much safer and efficient professional. Safety must be the choice of every worker as they are the ultimate benefactors. For many telecom companies changing from standard tools to insulated tools in the 21st century has already paid for itself many times over. ■

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