Overexposed AND Underrated:

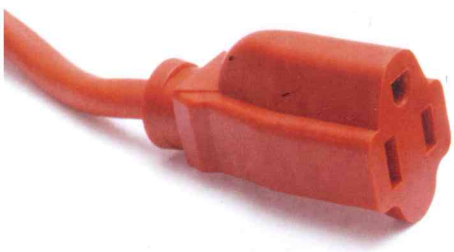
The Electrical Safety Paradox Facing Today's Workers and How to Succeed Using Service and Care Standards

BY RICHARD RIVKIN

PRESIDENT AND CEO, SAF-T-GARD INTERNATIONAL, INC.

It may seem obvious, but it is worth stating that nearly every single aspect of our lives relies on energy. Electricity is one of the most dominant forms of energy, and when properly harnessed, powers the modern industrial age and enables us to function efficiently both at work and home. However, when neglected or not respected, electricity can cause serious personal injury and death—especially when your job requires constant exposure to its many hazards. Additionally, and even more importantly, electricity can be largely harmful when you don't realize there is an actual threat on your job. Electrical safety is not only a concern for utility workers or contractors. In reality, nearly every single facility has a need for electrical safety, whether the company is a larger facility with building engineers overseeing distribution, or a smaller facility with maintenance staff working around floor or wall sockets. Nowadays, maintenance workers, janitorial staff, facilities staff and equipment operators (not just electricians) all risk exposure to electrical shock. There are quite a large number of possible end users. The truly shocking news is that many don't know that they need arc and/or voltage protection and/or that they can (and should) retest in-service rubber insulating gloves (electrical gloves) for continued use instead of needlessly spending more money on a new pair. As such, education and awareness is crucial. Not only about the requirements for use, but also about the requirements for in-service inspection and testing of rubber insulating equipment.

Numerous experts and training programs are available to provide guidance on how to keep workers safe and compliant in terms of conducting a proper hazard assessment and selecting the proper PPE.



The Burn

Anywhere from five to 10 arc explosions occur in electric equipment every day in the United States and as many as 10 workers in the U.S. are killed or injured, according to CapSchell Inc., a Chicago-based research and consulting firm. Additionally, the National Fire Protection Association (NFPA) reports that more than 2,000 people annually are treated in burn centers with severe arc flash injuries.

Arc flash can also lead to shocks and electrocutions, and oftentimes it does. In fact, OSHA estimates that 80 percent of electrically-related accidents and fatalities involving "qualified workers" are caused by arc flash/arc blast; and between 2007 and 2011, more than 2,800 fines were assessed for not meeting OSHA 1910.132(d) (1.5 fines a day on average). The Bureau of Labor Statistics (BLS) lists electrocution as the fifth leading cause of workplace fatalities in the U.S. with more than 2,000 fatal and more than 24,000 non-fatal electrical injuries reported in the last 10 years. Since the BLS counts arc flashes as burns rather than in its electrical shock statistics, the true rate of electrical shocks is even higher. That said, these statistics don't address business expenses. All in all, the National Safety Council estimates work-related injuries can cost businesses more than $30 million in fines, medical costs, litigation, lost business and equipment costs.

While the best way to prevent arc incidents from happening is to de-energize equipment before beginning work, there are instances where turning off the power could create an even greater hazard. As such, employers and facility owners must establish safe practices to protect their workers against arc flash incidents including the use of personal protective equipment (PPE). The NFPA along with the Occupational Safety and Health Administration (OSHA) mandates and enforces safer electrical work practices under the NFPA 70E standard. Numerous experts and training programs are available to provide guidance on how to keep workers safe and compliant in terms of conducting a proper hazard assessment and selecting the proper PPE. However, one topic that is often not discussed in detail is the need for rubber insulating gloves where a shock hazard exists from exposure to energized equipment.

Showing Your Hands Some Glove

Rubber insulating gloves are the only protective gear designed for constant contact with, and protection from, energized conductors and equipment. Arc-rated work gloves alone provide no protection from live voltage. OSHA rules and the NFPA 70E standard make the use of rubber insulating products mandatory when even the smallest possibility of contact with 50 volts AC or higher exists.

Rubber insulating gloves are an essential element in protecting workers that are exposed to high-voltage currents. Shock protection is the primary benefit. However, rubber insulating gloves also provide significant burn protection in the event of an arc flash. Electrical gloves are manufactured using proprietary materials and manufacturing processes with 100 percent testing to provide the highest possible level of protection. To be effective, electrical gloves must incorporate high dielectric and physical strength, along with comfort, flexibility and durability. To help ensure safety and performance, they should meet and/or exceed the requirements of the American Society of Testing Materials (ASTM) D120-14a—Standard Specification for Rubber Insulating Gloves.

According to the OSHA 29 CFR 1910.137 standard, rubber insulating gloves must be rated for the voltage to which a worker will be exposed (phase to ground or phase to phase) and marked to indicate their rating. For in-service use, the maximum use voltage must be above the actual exposure, but it is important to take note of the proof test voltage as well. All rubber insulating gloves are tested by the manufacturer at the specified proof test voltage. Manufacturers also perform a dielectric breakdown test at an even higher voltage to validate the dielectric strength of the rubber material. The result is a significant margin of safety between the test voltages and the maximum use voltage. Each specific hazard assessment will help in determining which class of gloves is appropriate for the application.

Take care to choose the correct rubber insulating glove for the task at hand and level of electrical exposure. Rubber insulating gloves are typically manufactured in sizes 8–12, often in half sizes, and some manufacturers also offer gloves as small as size 7 and as large as size 13. In addition, rubber insulating gloves are available in different cuff lengths of 11, 14, 16 and 18

inches depending on the glove class. Rubber insulating gloves are available in six specific voltage classes (Class 00–Class 4) categorized by the level of voltage protection they provide and whether or not they are resistant to ozone. Voltage protection is broken down into the following classes, and each class of gloves is clearly marked with the maximum use voltage on the permanent color-coded label:

CLASS COLOR	PROOF TEST VOLTAGE AC/DC	MAX. USE VOLTAGE AC/DC
00 Beige	2,500/10,000	500/750
0 Red	5,000/20,000	1,000/1,500
1 White	10,000/40,000	7,500/11,250
2 Yellow	20,000/50,000	17,000/25,500
3 Green	30,000/60,000	26,500/39,750
4 Orange	40,000/70,000	36,000/54,000

These are all AC voltages. The ASTM standards also include DC test and maximum use voltages.

For gloves, ozone resistance is covered by the "Type" designation. A Type I glove is not ozone-resistant, while a TYPE II is ozone-resistant and is manufactured from a synthetic polymer that is also more resistant to many chemicals.

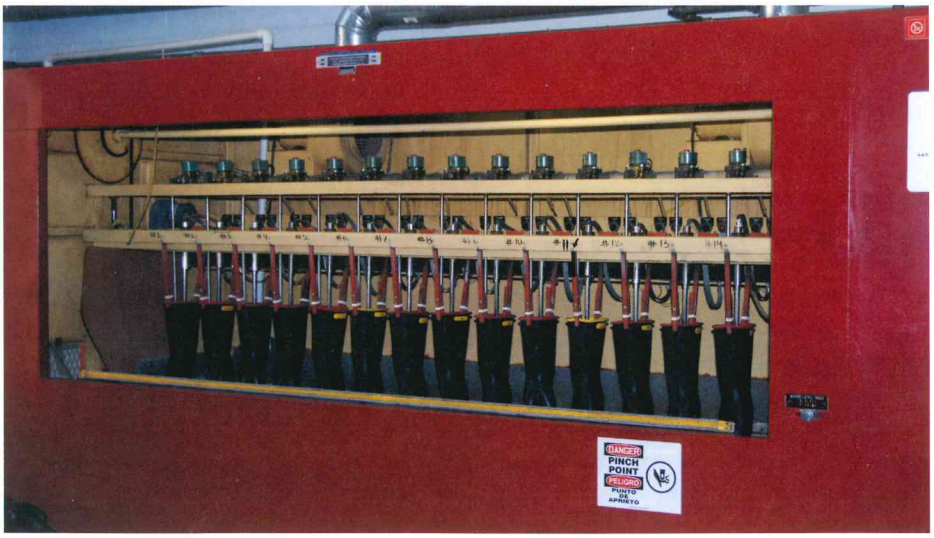
Inspect, Test and Retest for Continued Compliance, Cost Savings and Safety Success!

ASTM F496-08 In-Service standards require the regular inspection of in-service equipment. Visually inspecting rubber gloves identifies physical, chemical or ozone damage. Direct light is recommended because it enhances the ability to see surface imperfections on the rubber. Inflating the gloves with air or otherwise stretching the surface helps identify age and ozone damage as well as other physical damage such as snags, rope burns, deep cuts and punctures.

Expand gloves no more than 1.5 times their normal size for Type I rubber and 1.25 times normal for Type II rubber. Listen for escaping air to detect holes. If a portable inflator is not available, use a rubber glove inspection tool or roll the glove cuff tightly to trap air inside. Then, apply pressure to areas of the glove to inspect for escaping air. Repeat the procedure again with the rubber gloves turned inside out.

Testing is also a critical and required component to maintaining arc and electrical safety. ASTM Manufacturing and Acceptance standards mandate the testing of the rubber insulating products by the manufacturer or supplier prior to the first delivery to the end user. Users also have the option of performing or requiring an acceptance test upon receipt of the goods and prior to placing rubber insulating products into service. The interval between the date of issue and electrical testing should be based on work practices and test experience. For gloves, the interval shall not exceed six months except for industries such as telecommunications that utilize insulating gloves as precautionary protection, in which case the maximum interval may be increased to nine months. However, do not place rubber

Understanding the hazards first and then identifying the proper PPE is important, and understanding the difference between an arc-rated glove and a voltage-rated glove is critical.



With several workers required to wear rubber gloves and so many different testing intervals to consider, it is easy to see how compliance can fall through the cracks.

insulating products into service unless they have been tested electrically within the previous 12 months. These in-service retest intervals are the maximum permitted and in addition to the daily field care and inspection. It is quite common for users, including power utilities and contractors, to specify shorter intervals.

Periodic retesting of rubber insulating gloves should be performed at the proof test voltage to ensure that they are still safe using specialized equipment designed to gradually increase the voltage to the desired test level. The dielectric test is two-fold: pass/fail on the ability to withstand the rated test voltage and, for gloves, quantitative on the ability to prevent electric current from passing through the rubber goods above the maximum contained in the specifications. Products passing the inspection and test procedures can then be returned to service. If you do not have the equipment required to perform these electrical tests, there are independent testing facilities that can perform the acceptance and in-service testing on behalf of end users. At a minimum, ASTM standards require that the inspection and testing process include the following steps:

1. Check-in
2. Removing previous testing marking
3. Washing using cleaning agents that will not degrade the insulating properties
4. Visual inspection of all services (inside and out)
5. Electrical test
6. Final inspection
7. Recordkeeping
8. Marking
9. Packing in appropriate containers for storage or shipment (meaning boxes, or similar sturdy packaging materials to prevent folding, creasing or similar loose storage that can cause stress on the rubber)

When selecting a test lab for use, make sure that it is a NAIL-accredited test lab. NAIL stands for National Association of Independent Laboratories for Protective Equipment Testing (www.nail4pet.org). It incorporates the only Laboratory Accreditation for the electrical equipment test labs program in North America. NAIL4PET helps develop uniformity in testing and works in close association with the American Society of Testing Materials (ASTM International).

Conclusion

In summation, there are thousands of people, processes, policies and procedures that have resulted in today's electrical workers having the safest rubber insulating products and work practices available. However, they can only be effective if the worker realizes the need for electrical protective equipment and uses the safety industry standards for regular inspection and retesting. Understanding the hazards first and then identifying the proper PPE is important, and understanding the difference between an arc-rated glove and a voltage-rated glove is critical. With several workers required to wear rubber gloves and so many different testing intervals to consider, it is easy to see how compliance can fall through the cracks. Consider partnering with an electrical test lab that can test your rubber goods and manage the rubber goods change-out process for you. Keeping these services bundled together under one roof will minimize out-of-service time and save money by delivering a start-to-finish solution that includes cleaning, visual inspection, electrical testing, markings according to your safety protocols and shipment to your warehouse or jobsite so that you can focus on other work priorities while staying safe, productive and compliant!

Richard A. Rivkin is President and Chief Executive Officer of Saf-T-Gard International, Inc., a privately-held family-owned and operated global supplier of industrial safety products based in Northbrook, Illinois. Founded in 1936 as Latex Glove Company, Saf-T-Gard carries on the tradition that was started more than 80 years ago: bringing customers the products, training and service they need to keep employees safe in the workplace. Saf-T-Gard actively operates the Voltgard® Test Lab, one of the largest, independent, NAIL4PET-accredited test labs for rubber insulating products in the United States. To learn more, please visit www.saftgard.com or call 1 (800) 548-GARD (4273).