Electrical Safety Gloves Inspection and Classification – Quick Tips



Electrical safety rubber insulating gloves may be the most important article of personal protection worn by electrical workers. To be effective, electrical safety gloves must incorporate dielectric properties, physical strength, flexibility and durability. To help ensure safety and performance, they should meet and/or exceed the performance and testing requirements of the ASTM International ASTM D120-21 – Standard Specification for Rubber Insulating Gloves and the International Electrotechnical Commission (IEC) 60903:2014 Live Working – Electrical Insulating Gloves standard.

Glove System

A glove system consists of:

- Rubber insulating gloves– classified by the level of voltage protection they provide.
- Liner gloves– reduce the discomfort of wearing rubber insulating gloves. Liners provide warmth in cold weather and absorb perspiration in the warm months. They can have a straight cuff or knit wrist.
- Leather protector gloves– normally worn over rubber insulating gloves to help provide the mechanical protection needed against cuts, abrasions and punctures.

Classifications

The Occupational Safety and Health Administration (OSHA) states in 29 Code of Federal Regulations (CFR) 1910.335(a)(1)(i) “Employees working in areas where there are potential electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.” Design, in-service care, and use requirements for electrical protective equipment which includes gloves are outlined in 29 CFR 1910.137.

Electrical safety gloves are categorized by the level of voltage protection they provide and whether or not they’re resistant to ozone.

Class of Equipment	Maximum Use Voltage (AC)	Proof Tested (VAC)	Proof Tested (VDC)
00	500	2,500	10,000
0	1,000	5,000	20,000
1	7,500	10,000	40,000
2	17,000	20,000	50,000
3	26,500	30,000	60,000
4	36,000	40,000	70,000

Rubber is susceptible to the effects of ozone, which can cause cutting/cracking and compromise the integrity of the glove. If the gloves are used in an environment where the levels of ozone are high, ozone resistance is critical. Ozone resistance is covered by the “Type” designation. A Type I glove is not ozone-resistant; Type II is ozone-resistant.

Inspection

OSHA states in 29 CFR 1910.137(c)(2)(ii) all insulating equipment must be inspected for any damage before each day’s use and immediately following any incident that can reasonably be suspected of causing damage. OSHA references ASTM F1236-96 (2012), Standard Guide for Visual Inspection of Electrical Protective Rubber Products for performing the visual inspection. This standard was last updated in 2019.

Per 29 CFR 1910.137(c)(2)(iii) if any of the following defects exist the insulating equipment cannot be used:

- A hole, tear, puncture or cut
- Ozone cutting or ozone checking (a series of interlacing cracks produced by ozone on rubber under mechanical stress)
- Embedded foreign objects
- Texture changes such as: swelling, softening, hardening, or becoming sticky or inelastic
- Any other defect that damages the insulating properties

In addition to the inspection an air test must be performed. The air testing method is described in ASTM F496-20 Standard Specification for In-Service Care of Insulating Gloves and Sleeves. Gloves are filled with air, either manually or with a powered inflator, and then checked for leakage. The leakage is detected by listening for escaping air or by holding the gloves against the tester’s cheek to feel for air that is escaping. In accordance with ASTM F496-20, gloves should be expanded no more than

1.5 times their normal size for Type I, and 1.25 times normal for Type II during the air test. The procedure should then be repeated with the gloves turned inside out.

Since sleeves cannot be inflated, they should be inspected along the edge as they are rolled. Rolling will stretch the sleeve along the edge, making cuts, tears and ozone cutting more visible. After the outside of the sleeve is inspected, the procedure should also be repeated with the sleeve turned inside out.

Should any glove or sleeve be exposed to chemical contaminants or suspected of any other physical damage, they should be retested per ASTM D120-21 requirements.

Testing

In addition to the daily inspection, OSHA requires electrical safety equipment to be subjected to periodic electrical tests as specified in 29 CFR 1910.137(c)(2)(viii). Rubber insulating gloves must be tested before first issue and every six months thereafter; upon indication that the insulating value is suspect; after repair; and after use without protectors. If the insulating gloves have been electrically tested but not issued for service, they may not be placed into service unless they have been electrically tested within the previous 12 months.

An alternating glove color program is suggested to help ensure all gloves in use are in the proper test cycle. This program creates a visual reminder of the proper test cycle by using one color for the first six months and a different color for the following six months.

Storage

To help ensure the integrity of the electrical safety gloves they need to be stored properly when not in use. Proper storage means that they must not be folded and need to be kept out of excessive heat, sunlight, humidity, ozone and any chemical or substance that could damage the rubber.

Frequently Asked Questions

Q: Would retesting be needed if I don’t use the electrical safety gloves very often and visually see no damage?

A: Yes. Retesting is still needed to help verify the integrity of the material and to ensure electrical safety is maintained for the user.

Q: Can I just use the rubber glove only, and not buy the leather part?

A: A leather protective glove should always be worn over rubber insulating gloves to provide the needed mechanical protection against cuts, abrasions and punctures. However, there are some exceptions highlighted in OSHA’s electrical protective equipment standard 1910.137 (c) 2 (vii) (A) – (C). If the voltage is 250 volts AC, or 375 volts DC, protector gloves need not be used with Class 00 gloves, under limited-use conditions, when small equipment and parts manipulation necessitate unusually high finger dexterity. It also states that protectors need not be used with Class 0 gloves under the same limited-use conditions. Persons inspecting rubber insulating gloves used without protectors need to take extra care when visually examining them. Employees using rubber insulating gloves under these conditions need to take additional caution when handling sharp objects that could nick or cut the glove. Any other class of gloves may be used without protector gloves, under the same limited-use conditions if the class of gloves is one class higher than that required for the voltage involved. Rubber insulating gloves that have been used without protector gloves may not be reused until they have been retested.

Q: How do I size my leather protector that is worn over my rubber insulating glove?

A: It is suggested to select the same size leather protector as the rubber insulating glove. For length, the insulating glove cuff must be longer than the leather protector glove and the distance is specified by class. Use the following guidelines:

- Class 0, 00 Gloves – 1/2″
- Class 1 – 1″
- Class 2 – 2″
- Class 3 – 3″
- Class 4 – 4″

Q: Where can I get my gloves retested?

A: Grainger offers glove retesting and other environmental, health and safety services, or utilize a testing laboratory accredited by North American Independent Laboratories (NAIL) for Protective Equipment Testing.

Q: If I find a hole, can I just "patch it," like a tire inner tube?

A: Per 1910.137(c)(2)(x)(D), "Rubber insulating gloves and sleeves with minor physical defects, such as small cuts, tears, or punctures, may be repaired by the application of a compatible patch. Also, rubber insulating gloves and sleeves with minor surface blemishes may be repaired with a compatible liquid compound. The repaired area shall have electrical and physical properties equal to those of the surrounding material. Repairs to gloves are permitted only in the area between the wrist and the reinforced edge of the opening." Repaired insulating equipment must be retested before it can be used.

Sources

OSHA 29 CFR 1910.137: Electrical Protective Equipment
ASTM D120-21: Standard Specification for Rubber Gloves
ASTM F496-20: Standard Specification for In-Service Care of Insulating Gloves and Sleeves
ASTM F1236-19: Standard Guide for Visual Inspection of Electrical Protective Rubber Products
North American Independent Laboratories (NAIL) for Protective Equipment Testing
International Electrotechnical Commission (IEC) 60903:2014 Live Working – Electrical Insulating Gloves standard

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