American Polywater's
Technical Talk
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White Paper

CLEANING RUBBER GOODS FOR SAFETY

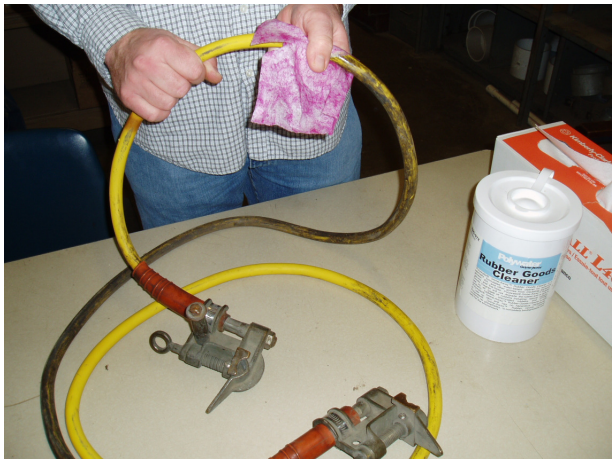

Dirty Grounding Jumper


Cleaned Grounding Jumper

How the Right Cleaner can Extend the Life of Tools and Workers by Uncovering Hidden Damage and Restoring High Visibility

A power utility got a big surprise recently when they tested a specially formulated rubber goods cleaner on a hot-line jumper. The new RBG Rubber Goods Cleaner from American Polywater revealed potentially hazardous burn and cut damage lurking beneath the grimy, blackened surface. The failed tool was removed from service, averting possible injury.

Remove Grime, Reveal Damage



Rubber goods take a beating in the field. Dirt and grime build-up turns tools black. Any change in appearance is a warning that the rubber may not retain its electrical insulating property. Protective rubber equipment should be inspected for anything that might compromise its integrity. But grimy discoloration can mask damage. Abrasions, burns, cuts, and minor nicks are particularly difficult to detect on dirty rubber goods. Regular cleaning before each inspection is the best way to stay safe.

Variety of Damage Possible

Protective rubber goods are not used in a pristine environment. Rubber is soft and susceptible to physical and chemical damage. Damage can be caused by cuts from sharp tools, punctures from wood splinters or barb wire, chemical degradation from hydraulic fluid or agricultural fertilizer, and much more.

When rubber comes in contact with a rough, abrasive surface, it can be scratched or scuffed. This looks like graining on leather. Pointed objects can cause nicks, snags, scratches or cuts. Such damage is easy to see, and becomes exacerbated when rubber is stretched. Punctures happen when sharp objects penetrate all the way through the rubber. Embedded foreign matter may appear as a small bump in the rubber. Tears at the rubber's edge can occur if the rubber is stretched and stressed too forcefully.

Other kinds of damage result from electrical leakage and tracking, as well as chemical degradation. Track marks and surface breakdown result from excessive electrical leakage over the surface of the rubber. Ozone cracks, a series of interlacing fractures that start at stress points, are caused by normal atmospheric exposure to ozone. Age cracks look like glazed ceramic crazing, and worsen with time. Age cracks are caused by exposure to sunlight. Both ozone and age cracks originate in stressed areas of the rubber. Hard and soft spots are usually created by contact with heat, oils or chemicals.

Roll the Rubber

ASTM F1236 Guide for Visual Inspection of Electrical Protective Rubber Products presents techniques for the visual inspection of electrical protective rubber goods. The preferred method of inspection before each use is to gently roll the entire surface. Lightly squeezing the outside and inside surface of the rubber highlights irregularities that can occur from the damages described above. For gloves and sleeves, carefully pinch and roll the rubber. Once the outside surface is thoroughly checked, continue the inspection by turning the glove inside-out and rolling the inside surface. Never leave a glove or sleeve in an inside-out condition. For blankets, lay on a clean, flat surface and roll tightly, starting at a corner. Line hose can be inspected by slowly bending two ends of the hose downward, forcing the slot open for better inspection. Work through the entire length of hose for a thorough check. Gloves can be manually inflated to test for punctures and small tears. It is important not to over inflate.

Why Clean?

ASTM F1236 further recommends good lighting and a thorough cleaning before each inspection and use. Protective rubber goods are often contaminated with a variety of grimes such as creosote, pine pitch, corrosion inhibitor, carbon, dirt, grease and oils. Contamination darkens the surface, masking its true color. In the worst cases, contamination hides cuts, burns, small nicks and holes. Cleaning the rubber surface can uncover damage that would otherwise stay hidden.

Regular cleaning is simply good practice. It preserves electrical integrity and adds to the life of the equipment. Some contaminants are less obvious and can't be seen on rubber goods. Dry fertilizer, herbicide and pesticide residues are invisible, but will degrade rubber's integrity. Most protective rubbers are designed to resist ultraviolet light, ozone, and oxidants, but tend to be susceptible to chemical damage. Degradation by various contaminants such as oil and grease can cause hard or soft spots and accelerated aging. Other surface contaminants are conductive, especially when combined with moisture from rain, snow, or high humidity.

Cleaning should restore the original color—usually brilliant yellow or orange—to tools. It is crucial that grounding jumpers be clean and highly visible for electrical and vegetation trimming crews. It is especially critical during storm restoration to visually differentiate tools from dangling branches.

Find the Proper Cleaner

Though they may effectively remove grime, strong industrial cleaners and solvents can also damage protective rubber. Petroleum distillates or hydrocarbons, kerosene, and terpenes such as d-limonene should be avoided. Other solvents commonly added to water-based degreasers, such as glycol ethers, can also degrade the protective rubber properties. Cleaner residue must not change the physical integrity and insulating properties of the rubber. Cleaners should be tested for compatibility with various types of rubber compounds per ASTM D471 and ASTM F496-99 to ensure compatibility and dielectric integrity.

Package Options with Polywater's RBG

An effective rubber goods cleaner is easy to use. It removes the heavy grimes and contamination typical of utility work without too much "elbow grease." RBG a mild, pH-neutral cleaner is more likely to be used regularly. Convenient package options such as the RBG-35LR spray bottle and the RBG-D72 pre-saturated wipe dispenser also encourage regular use.

Polywater® Rubber Goods Cleaner is compatible with plastics and elastomers. Testing is based on the soak test described in ASTM D471, Standard Test Method for Rubber Property-Effect of Liquids. Such full immersion is a good screening test and and will affect sensitive materials more than the short duration contact of a spray or wipe. See the teat results below.

ELASTOMERS	IMMERSED 72 HOURS AT 122°F (50°C)	
(Rubbers)	**Polywater® RBG**	
	% WEIGHT CHANGE	APPEARANCE
EPDM	NC	NC
EPDM (Type II) blanket	NC	NC
EPDM gloves	NC	NC
EPDM (Type II) line hose	NC	NC
Natural Rubber	NC	NC
Natural Rubber (Type I) blanket	NC	NC
Natural Rubber (Type I) gloves	NC	NC
SALCOR® (Type II) blanket	NC	NC
Silicone	NC	NC

ELASTOMERS	IMMERSED 28 DAYS AT 70°F (21°C)	
(Rubbers)	**Polywater® RBG**	
	% WEIGHT CHANGE	APPEARANCE
EPDM	NC	NC
EPDM (Type II) blanket	NC	NC
EPDM gloves	NC	NC
EPDM (Type II) line hose	NC	NC
Natural Rubber	NC	NC
Natural Rubber (Type I) blanket	NC	NC
Natural Rubber (Type I) gloves	NC	NC
SALCOR® (Type II) blanket	NC	NC
Silicone	NC	NC

KEY:

NC = NO CHANGE
C = CRAZING
SS = SLIGHT SWELLING
ES = EXTREME SOFTENING
S = SWELLING
D = DISSOLVED

SALCOR® is a trademark of W.H. Salisbury & Co.

There was no change in appearance and no weight gain for any of the samples tested.

Protective Equipment Testing

Polywater® Rubber Goods Cleaner was sent to an independent NAIL® for PET (North American Independent Laboratories for Protective Equipment Testing) accredited laboratory for testing in accordance with ASTM F496 Standard Specification for In-Service Care of Insulating Gloves and Sleeves. Gloves and sleeves are cleaned and dried at the testing laboratory. The items are then inflated and carefully inspected for cuts, tears, punctures, scratches, abrasions, or any other conditions that could adversely affect the dielectric integrity of the item. If any of these conditions are present,

the item fails the visual inspection and is rejected and immediately rendered unusable. Gloves, sleeves, and blankets then undergo an electrical test as specified by the "class rating" of the item and the ASTM and OSHA Standards (maximum 40kv A.C.). Again, any item that fails the electrical test is rejected.

The ASTM test was run on gloves soaked and cleaned with Polywater® RGB as described below.

ASTM F496-99 Test results for lineman's gloves

Class	Type	Exposure	Solvent	Visual Check	Electrical Test (max 40kv A.C.)
00	1	Wipe - no rinse	RBG	PASS	PASS
00	1	24-hour soak - no rinse	RBG	PASS	PASS
00	2	Wipe - no rinse	RBG	PASS	PASS
00	2	24-hour soak - no rinse	RBG	PASS	PASS
0	2	Wipe - no rinse	RBG	PASS	PASS
0	2	5-minute soak - no rinse	RBG	PASS	PASS
0	2	24-hour soak - no rinse	RBG	PASS	PASS
1	1	Wipe - no rinse	RBG	PASS	PASS
1	1	5-minute soak - no rinse	RBG	PASS	PASS
1	1	24-hour soak - no rinse	RBG	PASS	PASS
2	1	Wipe - no rinse	RBG	PASS	PASS
2	1	24-hour soak - no rinse	RBG	PASS	PASS

All of the RBG cleaned gloves passed the visual and electrical testing of the ASTM.

Clean is Safe

Clean and inspect your protective rubber goods before each job. Clean rubber is easier to inspect and provides increased tool visibility in the field. Regular cleaning with RBG Rubber Goods Cleaner prolongs the life and effectiveness of rubber protective goods, and is fundamental to electrical safety. To view a short video on proper techniques of rubber goods cleaning using Polywater® RBG go to *www.polywater.com/videos.asp*

Topic Related Links

Polywater RBG Flyer
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