

Guardian 1030 used for IR Test on Adhesive Heat-Shrink

Many companies that splice wire and cable need to verify the integrity of the spliced areas of wiring. Adhesive heat shrink is used for insulating the spliced sections of wire. Adhesive heat shrink is an elastomeric compound applied to the outer surface of the cable, heated and shrunk to tightly fit the joint or splice. The compound's rubber-like properties enable the joint to follow the thermally induced dimensional changes/contours of the cable insulation. Adhesive heat-shrink is not a cable jacket, sheath or armor, it is a post-production fix for insulating a wire splice or tear.

First, let's look at the physical properties of a cable and define some basic terminology of the cable and wire industry. Figure 1.0 illustrates a simple coaxial cable. There are myriads of cable types and applications but for this example we will stick with coaxial cable. A cable is made up a conductor at its core, a dielectric material for insulation over the center conductor, a shield of semi-conductive material for 'smoothing' surface irregularities of the conductor and a jacket as the outer most layer to provide mechanical, thermal, chemical and environmental protection.

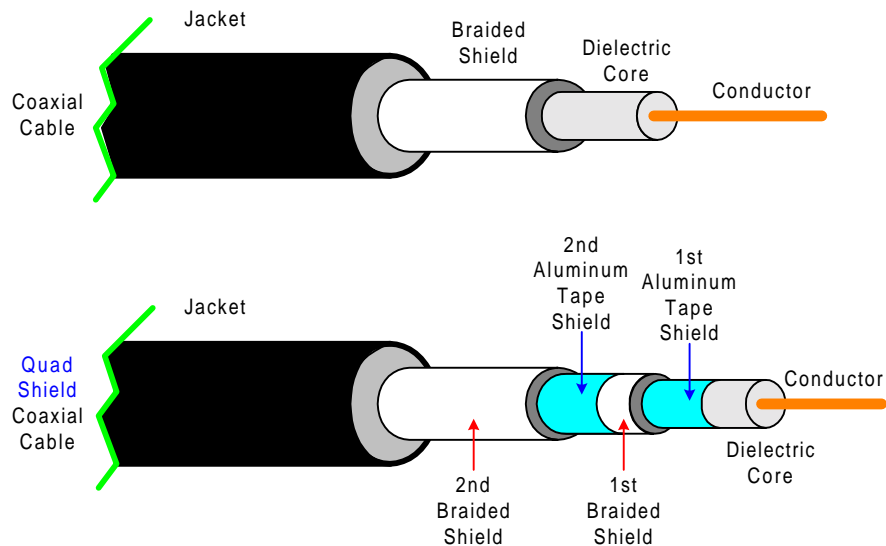


Figure 1: Coaxial Cable

The conductor can be aluminum, copper or copper covered steel and it can be solid or stranded. A stranded conductor is flexible but has a larger diameter than a solid one. The dielectric material used to electrically insulate the conductor is a thermoplastic material (polyvinyl chloride, PVC) or a thermoset material (polyethylene, PE, crosslinked polyethylene, XLPE, or a synthetic rubber compound). The shields control the electrical field in the cable. The conductor shield (semi-conductor material) makes the voltage on the inside of the conductor the same as the outside and the insulation shield regulates the voltage on the outside of the insulation. The jacket (plastic or PVC) covers and protects the inner layers. So what happens to this electrical system when the cable is spliced?

Heat Shrink IR Test

When a cable is spliced the layers of electrical insulation and conductivity may be only slightly altered (a tear) or entirely shorted (cut through). Cable is manufactured in great lengths, stored on reels, purchased and cut to fit on the job. Cables are spliced for many reasons including termination from outdoor to indoor applications. The outdoor cable performs in potentially harsh conditions and the indoor cable must conform to strict flammability (and other) requirements. So adhesive heat shrink is necessary and valuable tool in applications where cable and wire are cut and spliced together. The splice test helps determine the integrity of the cable's electrical insulation and verifies its performance under adverse conditions.

Back to the heat shrink insulation resistance test. First the wire is spliced, then the heat shrink is applied, and lastly, the insulation tubing around the splicing is checked for integrity. The spliced and insulated wire is placed in a 5% saltwater solution bath for 24 hours. Next an IR tester is used to measure between the water in the bath and the conductor in the wire. IEC 61242, "Cable Reels for Household and Similar Purposes", specifies an insulation resistance value to be $5M\Omega$ at 500V DC. This is just one specification for cable reel tests. There is no single governing test standard for the cable and wire industry. Figure 2 illustrates the IR test setup using the Guardian 1030S AC/DC/IR/SC Hipot Tester.

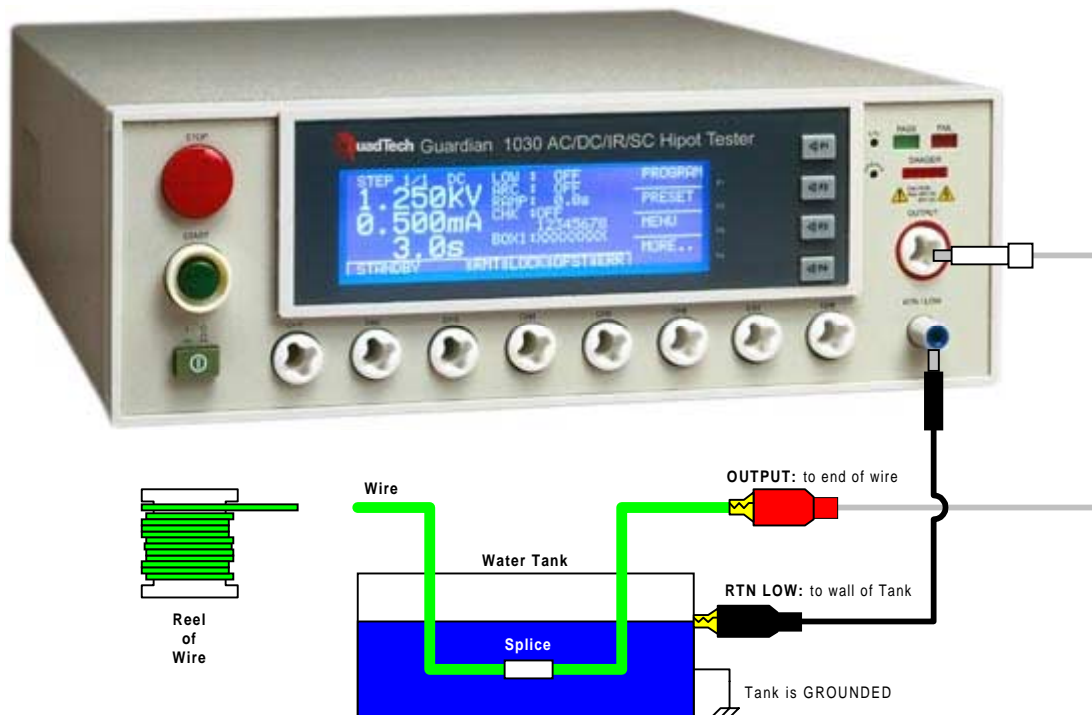


Figure 2: Adhesive Shrink IR Test

For complete product specifications on the Guardian 1030 AC/DC/IR Hipot Tester or any of QuadTech's products, visit us at <http://www.quadtech.com/products>. Do you have an application specific test? Call us at 1-800-253-1230 or email your questions to info@quadtech.com.

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