It is very important to periodically inspect the condition of the fuse tubes used in S&C Type XS Fuse Cutouts, especially cutouts that have experienced one or more fault-current interruptions. The fuse tube generally consists of an outer layer of filament-wound epoxy fiberglass that provides physical strength, wrapped around an inner liner having arc-extinguishing properties. To ensure proper fault-current interruption, it is essential that the physical size and integrity of the outer epoxy fiberglass tube and arc-extinguishing liner be maintained. This document explains the areas that should be inspected each time the cutout is re-fused.

Condition of the Fuse Tube

The exterior surface of the epoxy fiberglass fuse tube should be inspected for excessive weathering. If the gray polyurethane paint has completely faded so the underlying tube is visible, the condition of the fuse tube is still acceptable. However, the tube should be inspected more frequently. If, on the other hand, the paint has completely faded *and* the fiberglass fuse tube exhibits significant fraying or fuzzing, the strength of the tube may not be sufficient to withstand the internal pressures generated during fault-current interruptions. In this case, the fuse tube should be replaced. This is illustrated in Figures 1(a) through 1(c) for a typical 100-ampere fuse tube.

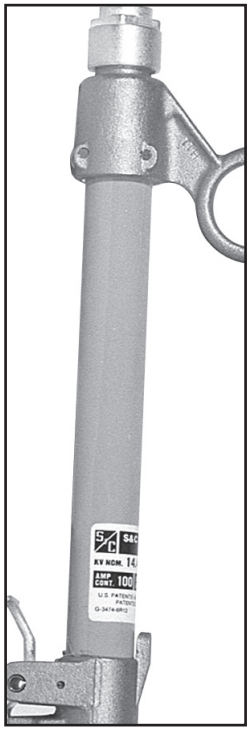

Figure 1(a). New.

Figure 1(b). Acceptable: Paint is completely faded.

Figure 1(c). Replace: Fuse tube exhibits significant fraying.

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Condition of the Arc-Extinguishing Bone-Fiber Liner

Identification: Visually inspect the arc-extinguishing liner at the end of the fuse tube. The bone-fiber liner is dark gray in color. If the color of the liner material is not visible caused by soot buildup from previous fault-current interruptions, check the date of manufacture of the fuse tube located on a label above the lower ferrule. 100-ampere fuse tubes manufactured before September 1998 and 200-ampere fuse tubes manufactured before January 1999 contain bone- fiber liners.

Erosion and Chipping: Each time the fuse cutout operates, arcing inside the fuse tube causes small amounts of the arc-extinguishing liner to erode, thereby increasing the inner diameter of the tube. After a number of operations—fewer in the case of high-magnitude faults—the liner may no longer be sufficient to properly extinguish the arc. Should the liner become too thin, the material may crack and chip away.

Wipe down the end of the fuse tube with a cloth to remove any excess dirt and debris. To account for small variations in the level of erosion, measure the diameter of the liner at two different points and record the larger of the two. If this diameter is greater than 11⁄16-inch (17.5 mm) for a 100-ampere fuse tube, or 1 inch (25.4 mm) for a 200-ampere fuse tube, *the fuse tube should be replaced with a new fuse tube.* If the liner is chipped significantly or there is no liner material at the end of the fuse tube—*the fuse tube should be replaced with a new fuse tube.* This is displayed in Figures 2(a)-2(c) below.

Swelling: Although the arc-extinguishing liner is designed to withstand normal atmospheric moisture, the significant accumulation of water that may occur if the fuse tube is inadvertently left hanging open can cause major swelling of, and damage to, the liner. Should such swelling occur, the fuse link may become trapped in the tube during operation, preventing the fuse tube from falling into the open position. If swelling of the liner is visible, *the fuse tube should be replaced with a new fuse tube.* If the diameter of a 100-ampere fuse tube is less than 15⁄32-inch (12 mm), or the diameter of a 200-ampere fuse tube is less than 3⁄4-inch (19 mm), at any point inside the bore of the fuse tube, *the fuse tube should be replaced with a new fuse tube.*

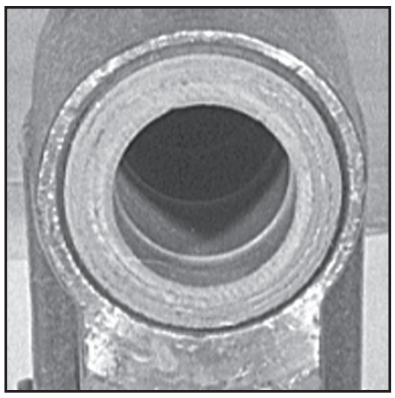

Figure 2(a). New.

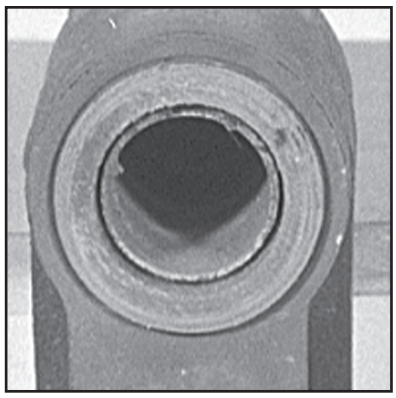

Figure 2(b). Acceptable: Diameter of liner is *less than* 11⁄16-inch (17.5 mm) for a 100-ampere fuse tube, or 1 inch (25.4 mm) for a 200-ampere fuse tube, and there is no significant chipping.

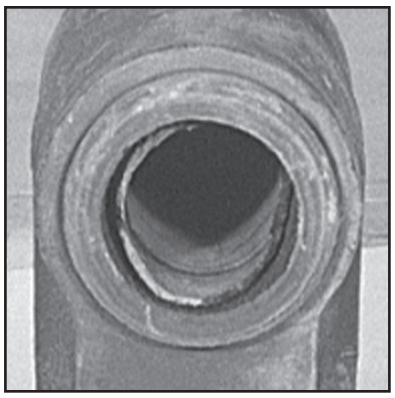

Figure 2(c). Replace: Diameter of liner is *greater than* 11⁄16-inch (17.5 mm) for a 100-ampere fuse tube, or 1 inch (25.4 mm) for a 200-ampere fuse tube, and/or there is chipping or significant loss of liner material.

Condition of the Arc-Extinguishing Multi-Wind™ Liner

Identification: Visually inspect the arc-extinguishing liner at the end of the fuse tube. The Multi-Wind™ Liner is yellow in color. If the color of the liner material is not visible caused by soot buildup from previous fault-current interruptions, check the date of manufacture of the fuse tube located on a label above the lower ferrule. 100-ampere fuse tubes manufactured in September 1998 or later and 200-ampere fuse tubes manufactured in January 1999 or later contain Multi-Wind Liners.

Erosion and Chipping: Each time the fuse cutout operates, arcing inside the fuse tube causes small amounts of the arc-extinguishing liner to erode, thereby increasing the inner diameter of the tube. After a number of operations—fewer in the case of high-magnitude faults—the liner may no longer be sufficient to properly extinguish the arc.

Wipe down the end of the fuse tube with a cloth to remove any excess dirt and debris. To account for small variations in the level of erosion, measure the diameter of the liner at two different points and record the larger of the two. If this diameter is greater than 23⁄32-inch (18.3 mm) for a 100-ampere fuse tube, or 1 inch (25.4 mm) for a 200-ampere fuse tube, *the fuse tube should be replaced with a new fuse tube.* This is displayed in Figures 3(a) and 3(b) below.

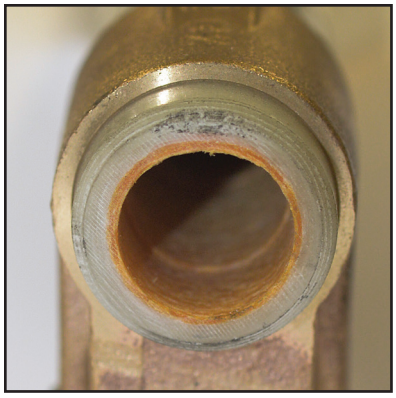

Figure 3(a). New.

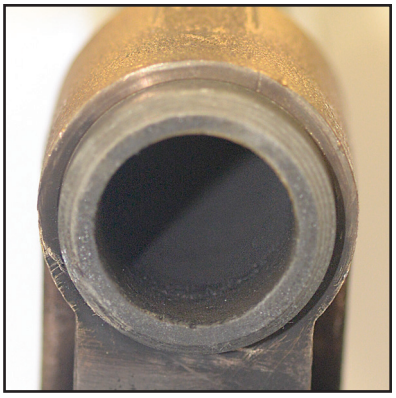

Figure 3(b). Replace: Diameter of liner is *greater than* 23⁄32–inch (18.3 mm) for a 100-ampere fuse tube, or 1 inch (25.4 mm) for a 200-ampere fuse tube.