Installation Instructions

multicomp PRO

Termination And Splicing of “SPC50xx” Tubing

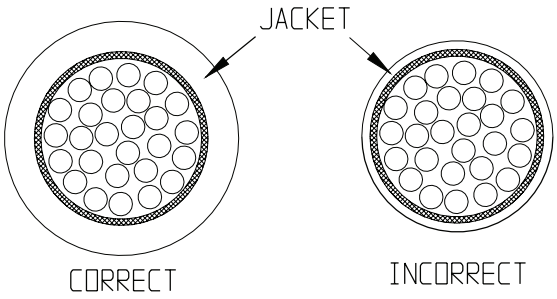
This procedure describes generic methods for shrinking, splicing and terminating of “SPC50xx” shielded shrink tubing. The methods described are of typical installations and may or may not apply to customer specific installation requirements. In-house engineering requirements should always be consulted prior to making any installation. All procedures described herein have been found to provide good mechanical and electrical performance. However the product does not endorse one method over another.

1. Sizing and Shrinking

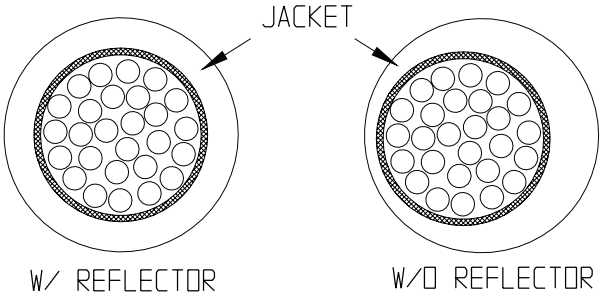
A) Standard “SPC50xx” tubing has a 2:1 shrink ratio. Always select the largest tubing size that when fully shrunk will yield an inside diameter equal to or slightly smaller than the cable outside diameter. An example would be to select “SPC50xx” (3/4” Expanded I.D.) tubing to cover a 7/16” outside diameter cable. This tubing will create a snug fit since the tubing would recover to 3/8” I.D. if not restricted. This method will yield the maximum tubing wall thickness.

B) When installing “SPC50xx” tubing always use a tubing reflector on the heat gun nozzle. If a reflector is not used, the tubing recovery will be non-uniform. The result is an insulation jacket with thin spots. See the sketches below for examples of conditions caused by incorrect sizing and installation.

C) “SPC50xx” has a shrink temperature of 90°C. Use of excessive heat can damage both the tubing and shield inside. Do not heat soak the tubing in an attempt to remove minor wrinkles. The EMI shielding material inside the tubing does not shrink. It will wrinkle up as the tube diameter decreases. Minor ridges and wrinkles in the jacket are normal on finished assemblies.



Tubing Sizing

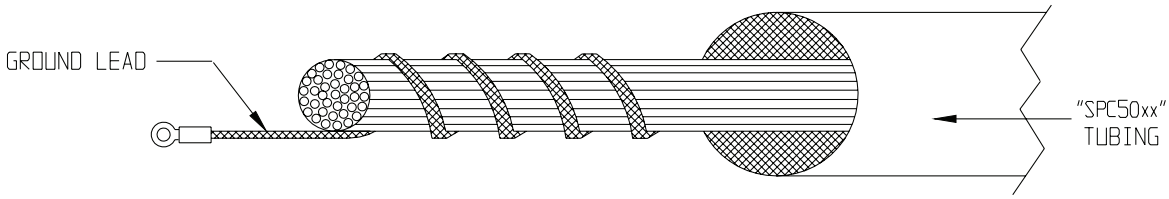


Heat Shrinking

2. Grounding and Termination

A) Wrapped Drain Wire

A ground lead can be added by simply wrapping a piece of bare conductor wire or a woven braid around the primary wire bundle prior to installing the “SPC50xx” tubing over the cable. The ground lead should be helically wound four or five revolutions around the outside of the primary wires. The helical winding insures that the bare lead will always be in contact with the shield due to the compressive contact of the shrink tubing. This winding will also create enough friction to keep the lead from pulling out if tugged on.

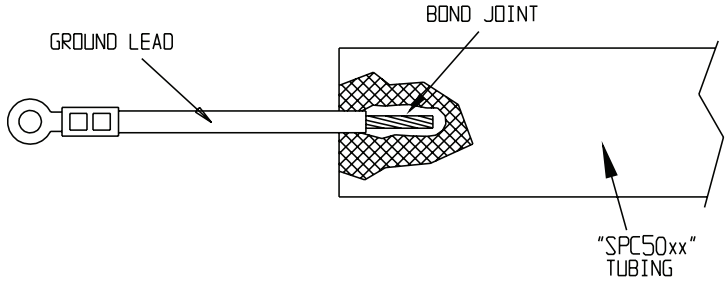


B) Bonded Ground Leads

This method involves attaching a piece of wire or a woven braid strap directly to the end of the shield cloth prior to installation, using solder or conductive epoxy bonding techniques.

1) A bared ground lead end can be bonded to the shield fabric using silver or nickel loaded epoxy. A minimal amount of epoxy should be used so as not to create a severe bump which would be visible once the tubing has been shrunk or create a possible abrasion point on the primary wires below. The addition of a tape wrapped insulation applied over the primary wires directly below the bond may be desirable to insure that no abrasion occurs which could lead to a short circuit condition. Follow the epoxy manufacture's instructions for mixing and applying.

2) A bared ground lead end can be soldered to the shield fabric using 63/37 Tin-Lead or 58/42 Bismuth-Tin solder. Because the shields nickel plating forms a tough oxide layer, a type "RA" flux must be used. A temperature controlled soldering iron set at 20-40°C above the melt temperature of the solder (183°C, 63/37 and 138°C 58/42) will provide the best results. A thin heat barrier must be placed between the shield cloth and the shrink tubing to insure that the tubing does not recover during the soldering process. Minimize the heat dwell time on the shield cloth to avoid damaging the plated fabric. Solvent clean the solder joint of flux residue. The addition of a tape wrapped insulation may be desirable to protect the primary wires from abrasion due to the solder joint.



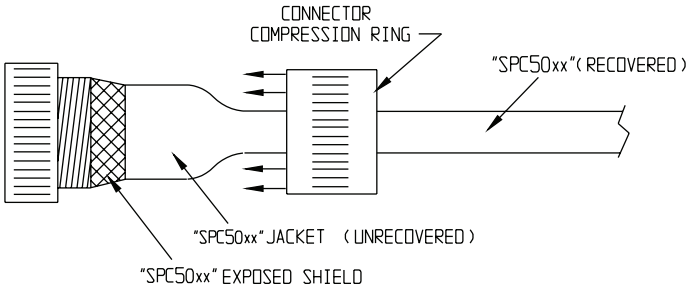
3. Connector Termination

There are too many connector and backshell hardware variations to give specific details as to exactly how the "SPC50xx" shield should be terminated. The following is a general description of how the shield might be terminated given the proper hardware size. Since "SPC50xx" has a shrink tubing outer jacket it allows the installer the option of selectively shrinking the material to create a boot area near the connector which is not heat shrunk. In example #1 the un-recovered tubing will not be subjected to heating so it is possible to trim the polyolefin shrink tubing away, exposing the conductive cloth. Once the cloth is exposed it can be placed into standard shielded connector compression hardware or folded back onto itself to make contact with saddle clamp hardware (example #2). In example #3, the connector is quite small. The "SPC50xx" tubing can be slide up and over the back of the connector and shrunk down to make direct contact with the connector shell.

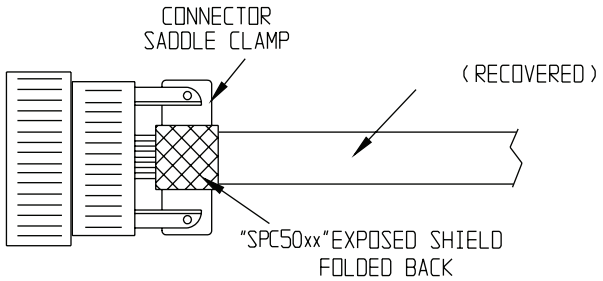
Caution

When cutting heat shrinkable tubing avoid nicks and jagged edges that may cause splitting the shield cloth should be cut using a 'hot knife' to minimize frayed ends.

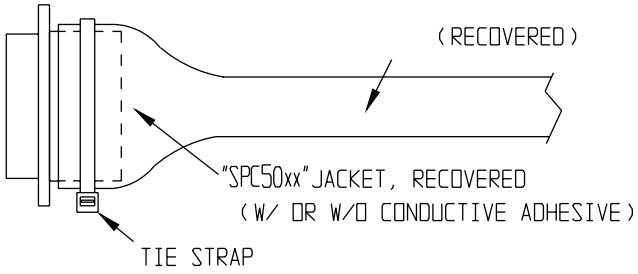
EXAMPLE #1
(SHIELDED CONNECTOR)



EXAMPLE #2
(SADDLE CLAMP BACKSHELL)



EXAMPLE #3
(SMALL CONNECTOR)



4. Shield Splicing

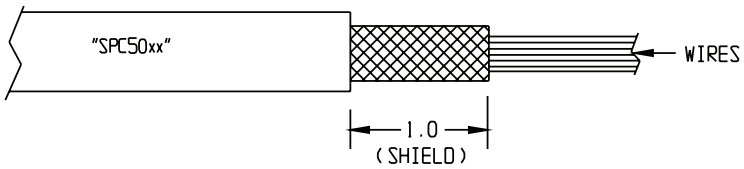
Although the splicing of any shield is undesirable, real world situations commonly force the installer to create one. The critical factors when creating a splice are to:

- Insure good electrical contact between the two shields.
- Provide a good mechanical joint so that the splice odes not shift in operation.
- Protect the joint from environmental degradation.

A) Commercial Splice

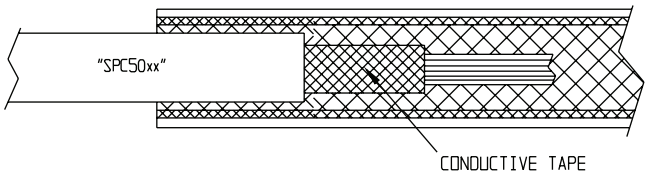
The following method is considered a “medium” performance splice that could be used where the environmental and mechanical requirements are not severe.

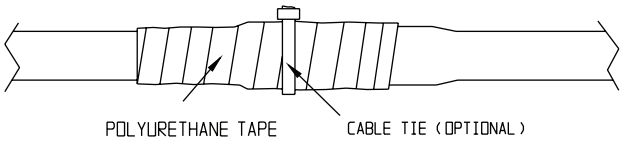
Step 1. Remove 1.0 Inches of the “SPC50xx” jacket, exposing the shield, insure that there are no nicks dr jagged edges on the trimmed end of the jacket that might cause splitting upon recovery. Shrink the tubing in place, beginning at the end opposite the splice area.



Step 2. Wrap the exposed shield using an electrically conductive double-backed tape such as 3M #9703 or equivalent.

Step 3. Slide the mating tubing approximately 1.0 Inch beyond the exposed shield and shrink in place. Wrap the splice area using polyurethane tape. (Note: Plastic cable ties can be added to provide additional mechanical strength if necessary)



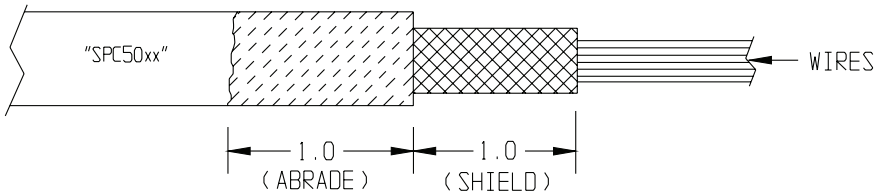


B. Military Splice

The following method is considered a 'Hi-performance' splice that should be used where the environmental and mechanical performance is critical. This type of splice is typical of those required to perform in a military environment.

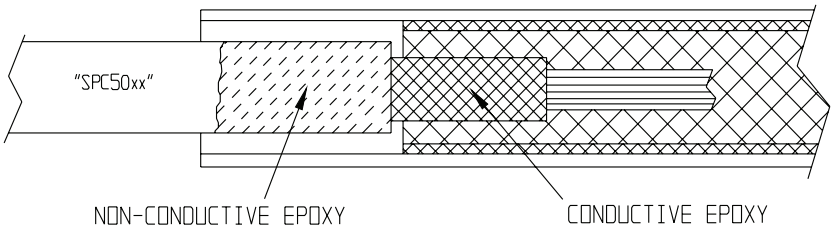
Step 1. Remove 1.0 Inch of the "SPC50xx" jacket, exposing the shield, insure that there are no nicks or jagged edges on the trimmed end of the jacket that might cause splitting upon recovery. Shrink the tubing in place, beginning at the end opposite the splice area.

Step 2. Lightly abrade and solvent clean approximately 1.0 Inch of the "SPC50xx" jacket adjacent to the exposed shield.



Step 3. Remove or fold in on itself approximately 1.0 Inch of shield from the mating piece of "SPC50xx" tubing. Abrade the inside jacket of the mating tube.

Step 4. Coat the shield area circumference of the pre-shrunk tubing with a silver or nickel loaded epoxy adhesive. Coat the abraded jacket area with a MIL-A-46864 or equivalent 2 part epoxy adhesive.



Step 5. Slide the mating tubing over the harness and align over the adhesive. Shrink the tubing in place making sure the pieces align over the splice area. Wipe any excess adhesive from the tubing before it cures. Allow splice to cure per the adhesive manufactures instructions.

Part Number
SPC5086
SPC5087
SPC5088
SPC5089
SPC5090
SPC5091