



# INSTALLATION INSTRUCTIONS

MS 0107-11 | 04.13.20

# iPRT<sup>®</sup> (S)

**⚠ WARNING:**  
Cancer and Reproductive Harm | [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

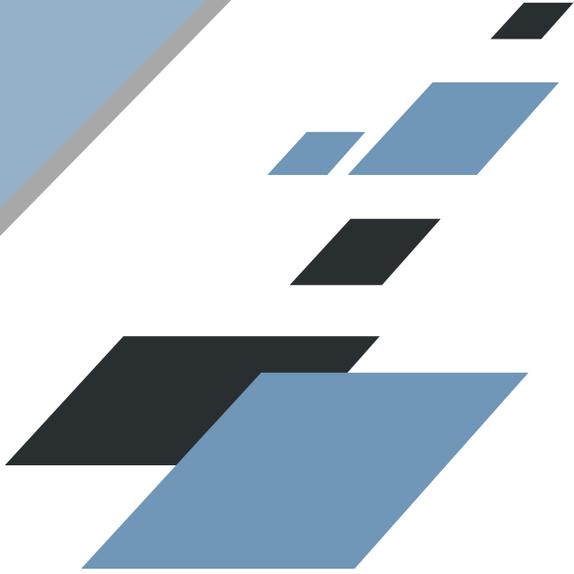
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**ABOUT ZIPPERTUBING®**

Since 1957, Zippertubing® has been solving every type of cable bundling, heat-shielding, EMI-shielding, specialized heat shrink and marine fairing component challenge. From under the sea to outer space, we have prototyped, manufactured, and shipped custom-engineered solutions for every type of industry. We specialize in creating unique custom solutions in-house from beginning to end, so you feel confident you will receive the perfect product every time.

No matter the size, shape, standards, or specifications, Zippertubing® will abide by any requirements to create a custom solution. If the project has material restrictions or weight limitations, we will create a solution to fit your unique application needs, rather than make your application fit the product. We will draw up, prototype, and refine to ensure the solution is exceeding your expectations.



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## INTRODUCTION

PRT® (S) is a wrap-around, heat-shrinkable, EMI-shielded tubing that provides performance similar to solid heat shrinkable tubing with the installation ease and time savings associated with an electrical tape wrap. PRT® (S) eliminates 99% of the electrical harness disassembly problems classically associated with a shrink tubing repair or modification by eliminating the need to slide the tubing over the end of the wire. A PRT® (S) jacket will provide additional chemical, mechanical, electrical or thermal protection to a wire or cable. It provides operational longevity comparable to standard shrink tubing while minimizing installation and down time.

## SIZING CHART



### CAUTION

Prior to beginning any work on production assemblies, it is suggested that installers read the instructions closely and practice using this material on mockup assemblies. Personnel familiar with installing heat-shrinkable tubing will be aware of some of the general do's and don'ts when installing these types of materials. However, working with a split heat-shrinkable material and a pressure-sensitive adhesive presents different handling requirements from standard tubing. Ideal results will be obtained by closely following the installation procedure.

### STEP 01

### SIZING

Measure the outside diameter of the wire or cable to be covered with the PRT® (S) tubing using a caliper or micrometer. Use [Table 1](#) and find the measured cable diameter. Select the corresponding PRT® (S) tubing size. If your cable OD is within 0.020 inches (0.5mm) of the high end of a cable size range, it is recommended that you select the next larger PRT® (S) size. A larger size will yield a jacket with the least residual stress and still be snug on the cable when fully shrunk.

**Note:** Selecting a PRT® (S) tubing size smaller than recommended may result in the material opening up during the heating process.

TABLE 1: PRT® (S) Sizing Chart<sup>1</sup>

PRT® (S) Size	Cable Diameter Inches (mm)	PRT® (S) Size	Cable Diameter Inches (mm)
0	0.090 - 0.124 (2.3 - 3.2)	8	0.88 - 0.99 (22 - 25)
1	0.125 - 0.187 (3.2 - 4.8)	9	1.0 - 1.12 (25 - 29)
2	0.188 - 0.249 (4.8 - 6.3)	10	1.13 - 1.24 (29 - 32)
3	0.25 - 0.37 (6.3 - 9.5)	11	1.25 - 1.37 (32 - 35)
4	0.38 - 0.49 (9.5 - 13)	12	1.38 - 1.49 (35 - 38)
5	0.50 - 0.62 (13 - 16)	13	1.50 - 1.62 (38 - 41)
6	0.63 - 0.74 (16 - 19)	14	1.63 - 1.74 (41 - 44)
7	0.75 - 0.87 (19 - 22)	15	1.75 - 1.87 (44 - 48)

<sup>1</sup> For cable diameters beyond Table 1, contact Zippertubing's Engineering department

## INSTALLATION

STEP

01

**Notes:**

- a) When PRT® (S) is removed from the original spool, it may have a flat profile with creased edges. Do not be alarmed by this shape; it will disappear when the product shrinks.
- b) If the material was pre-cut into pieces or not stored on the original spool, you may find that the material has curled up along its longitudinal axis. This is common for sizes of 0.375 inch or less. This material is usable and can still be unrolled and installed. All tension will be relieved once the material shrinks. To minimize curling store pre-cut pieces flat.

STEP

02

### PREPARATION & POSITIONING

1. Pre-determine the shield grounding method required by your in-house Engineering drawings or process specifications. Make any appropriate ground attachment installations necessary. If unsure, contact the Zippertubing® Engineering department for recommendations. (Photo 1)
2. Cut the PRT® (S) tubing from the spool as needed using standard scissors. Lay the tubing out so the metallic EMI shield material faces up. (Photo 2)
3. Place the electrical components on the metallic shield cloth so the cloth is sandwiched between the wires and the heat-shrinkable jacket material. Wrap the loose edge of the shield cloth around the wires and cover as much of the wire as possible. Peel off an inch or two of the adhesive's paper release liner on the shield material edge. Stick the adhesive edge to the wire bundle or cables. Wrap the entire assembly length in this manner. (Photo 3a & 3b)

**Note:**

Wrapping the shield around the cables as much as possible will ensure complete EMI shielding coverage when the tubing is fully shrunk.



Photo 1: PRT®(S) ordered with ground lead pre-attached



Photo 2: PRT®(S) prior to installation



Photo 3a: Remove paper release liner from shield

**STEP****02**  
(cont.)

- Remove a short section of the paper release liner that covers the adhesive on the shrink tubing. Position the non-adhesive edge of the tubing over the exposed adhesive section and align so all the adhesive is covered. Never over-wrap the tubing so much that you leave a loose flap of material at the overlap. Doing so can result in an undersized tubing condition and lead to the tubing tearing apart during the heating process. Begin bonding the tubing overlap edge to the adhesive. Avoid contacting the adhesive with your fingers as much as possible. Remove short sections of the release liner until the entire length of tubing is sealed closed. Rub the overlap seam area firmly using your thumb to work out any wrinkles. Minor wrinkles will disappear when the tubing shrinks. (Photo 4)



Photo 3b: Shield layer wrapped around cable bundle



Photo 4: Closing outside jacket

**Note:**

- Do not be concerned about the large size of the sealed tubing versus the wire size. It will always appear extremely large.
- You may shrink the tubing in place immediately after sealing. The closure adhesive system has no cure time.

**STEP****03****SHRINKING**

**Tools for installation (recommended):** Heat gun (500° to 750°F), reducer nozzle, and gloves.

PRT® (S) tubing requires the use of a heat gun with a temperature setting of 194°F minimum. For best results, use a heat gun with a 3/8" reducer nozzle that will localize the heat stream (Photo 5). Never use a tubing reflector designed to spread the heat evenly or an infrared type of heat gun.

- Begin shrinking the PRT® (S) tubing by directing the heat source at the overlap seam area near the center of the tubing. (Photo 5) Apply heat to the overlap area only. The overlap area will tend to curl up into a "U" shape as it is heated. (Photo 6) Continue applying heat in short bursts to this area until the surrounding tubing begins to pull the "U" shape back down flat. Do not be afraid to apply extra heat to the overlap area as it will take extra dwell time for the inside layer of the overlap to shrink. Do not be alarmed if the outer layer of the overlap flap tends to lift off the adhesive and curl back slightly during initial heat exposure. With continued heating this lifted area will generally lay back down on its own, if not, lightly tap the lifted edge as necessary with a wooden popsicle stick or gloved hand. Shrink the overlap seam along its entire length before attempting to shrink the remaining tubing.



Photo 5: Shrinking tubing using a reducer nozzle.



Photo 6: Overlap seams curled up prior to full shrinkage.

STEP  
**03**  
(cont.)

2. Begin applying heat to the remaining tubing after the overlap seam has fully shrunk. With small diameter tubing sizes you may find that most of the remaining tubing has already shrunk. Visually examine the entire circumference of the tubing and apply localized heat to any areas that show evidence of insufficient heating. While the tubing is hot, you may work or form the PRT® (S) tubing and cable as necessary. Once properly positioned, allow the finished assembly to cool to the point of being warm.
3. The finished assembly may display a shiny, sticky area parallel to the overlap seam. This is residual adhesive that was exposed as the overlap material pulled back during shrinking. The excess adhesive can be removed while the tubing is warm by rubbing your thumb along the overlap seam line. Rubbing the seam area will ensure good overlap contact and the excess adhesive will ball up ahead of your thumb. Remove excess adhesive as necessary and discard. (Photo 7 & 8)



Photo 7: Rubbing adhesive seam after shrinking.



Photo 8: Residual adhesive ball



**CAUTION: DO NOT attempt to remove excess closure adhesive using solvents. Tubing and adhesive will be hot. Use gloves to form tubing and remove adhesive or allow tubing to cool before handling.**



## TROUBLESHOOTING

1. The most common problem likely to occur when installing PRT® (S) tubing is a overlap seam rupture. This is a condition where the overlap seam pulls apart during installation. Seam ruptures are most likely to occur during the learning phase of PRT® (S) installations. Once the proper installation technique has been mastered this problem will disappear. Rushing to complete an installation is a big factor in creating a seam rupture.
2. Seam ruptures occur for two reasons and are controllable by the installer:
  - a) Incorrect size: The PRT® (S) tubing selected was too small for the cable diameter being repaired.
  - b) Excessive Heat: Too much heat was applied too quickly to the PRT® (S) tubing.
3. If a rupture does occur, the tubing must be replaced. Verify that the tubing size was correct. If correct, then adjust the heating technique by applying heat slowly and evenly. Minimize heat exposure to the tubing beyond the overlap flap. Use a “sneak up on it” approach where the heat is repeatedly removed from the tubing for a few seconds allowing it to cool and then re-applied. In awkward installations, a piece of aluminum foil can be useful as a heat block to blind the heat from the surrounding area.

### **Installer Note:**

Using the PRT® (S) tubing repair method will generally eliminate a large amount of cable harness disassembly and rework time. As a result, don't be in a rush to complete the installation. Take the few extra minutes to plan the installation, heat the sleeve slowly and work the materials as necessary to ensure a good first time repair. The extra time spent doing this will be small in comparison to the time required to perform a classic repair that involves connector disassembly.

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