1.0 Scope:

This standard covers the installation procedure and inspection requirements for terminating cable shields to ground leads using Tyco Electronics SolderSleeve shield terminators. The Tyco Electronics part numbers covered by this document includes: S01, S02, S03, SO63, SO96, SO175, ST18, ST63, D-108, and B-023.

2.0 References:

2.1 Tyco Electronics Instructions:

1. Operating instructions for the heating device used.

3.0 Application Equipment:

Tyco Electronics approved heat sources must be used to install these devices. The heater must be equipped with the recommended reflector to concentrate the heat and protect surrounding materials from damage.

4.0 Termination Procedure:

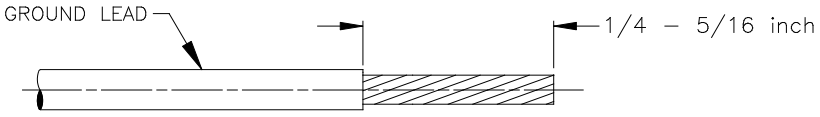
Unless otherwise noted on the Specification Control Drawing for the shield terminator being used, the following procedures shall be used for all SolderSleeve shield termination devices.

WARNING

Follow installation instructions carefully. Use adequate ventilation and avoid charring or burning during installation. Charring or burning the product will produce fumes that may cause eye, skin, nose and throat irritation. Consult Material Safety Data Sheets **RAY5103** or **RAY5104** for further information.

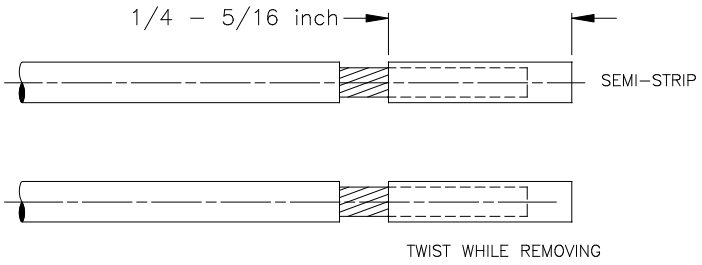
4.1 Ground Lead Preparation: (if using loose ground leads).

1. Remove 1/4 to 5/16 inch of the insulation from the end of the ground lead as shown.



Unless otherwise specified dimensions are in millimeters. [Inches dimensions are in between brackets]

2. Inspect wires to ensure that the strands lie flat in their normal lay, with no loose strands poking out. This can be achieved by semi-stripping and twisting the insulation slug off by hand as shown below:

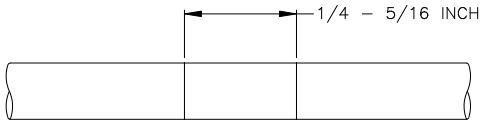


4.2 Cable Preparation:

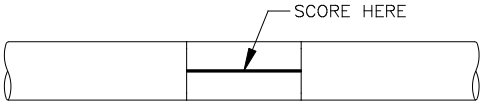
4.2.1 Center Strip

Remove 1/4 to 5/16 inch of cable jacket at the desired termination point as follows:

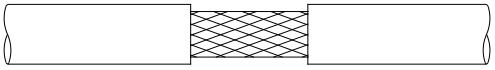
1. Score the jacket around the cable in two places, 1/4 to 5/16 inch apart.



2. Score the jacket between the cuts.



3. Remove the section of jacket.

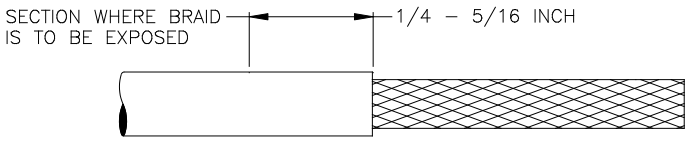


Unless otherwise specified dimensions are in millimeters. [Inches dimensions are in between brackets]

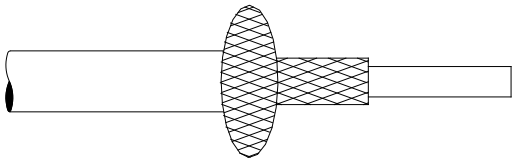
4.2.2 End Strip

The cable can be stripped according to the following procedure designed to leave the shield braid smooth and flat. The use of finger cots is recommended to prevent transfer of oils to the shield.

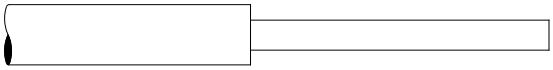
1. Score and remove the jacket as shown:



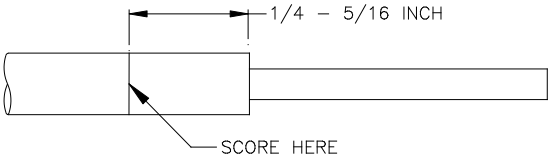
2. Bunch the braid.



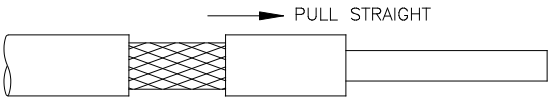
3. Trim the braid as close as possible to the jacket.



4. Score the jacket 1/4 to 5/16 from the end of the braid.



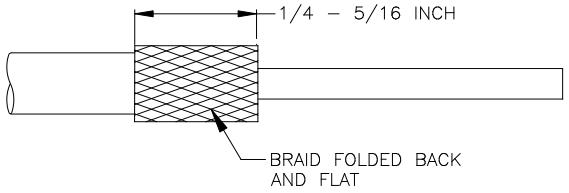
5. Remove section of jacket carefully by pulling straight. This will flatten the braid strand ends.



6. Inspect the cable to make sure that the braid strands are lying against the primary insulation.

4.2.3 End Strip with Braid Fold Back

This procedure is recommended for cables rated less than 125°C when installing SolderSleeve devices containing Sn63 solder. The cable is prepared as in Section 4.2.2 and then the braid is folded back over the cable jacket. This is done to prevent thermal damage to the primary insulation.



4.3 Shield Terminator Selection

4.3.1 Series selection

Select the correct series number based on the maximum temperature at which the assembly will operate and the degree of environmental protection required.
See table 1.

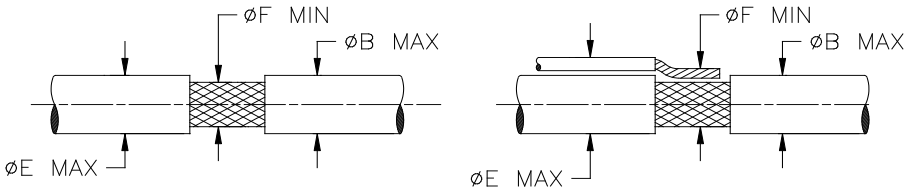
Table 1: Shield Terminator Series Selection

Cable Temperature Rating (°C)	Maximum Operating Temperature of System (°C)	**Shield Terminator Series**	
		Non-Sealed (1)	Sealed (2)
105	≤105	ST18	N/A
125	≤125	ST63	SO63
150	≤150	S03, ST63	S01, S02, SO63
200	≤150	S03, ST63	S01, S02, SO63
	≤175	N/A	SO96; SO175
	≤200	B-023	**N/A**
260	≤175	N/A	N/A
	≤200	B-023	N/A
	≤260	B-023	N/A

(1) Non-sealed terminators should not be used in areas where exposure to liquid water is possible.
(2) Degree of sealing is dependent on cable insulation. Consult Tyco Electronics for compatible jacket types.

4.3.2 Size Selection

Measure the diameters as shown below, and then select the correct size shield terminator. Use the smallest terminator that will fit the assembly.



For terminators with pre-installed leads. For terminators without pre-installed leads.

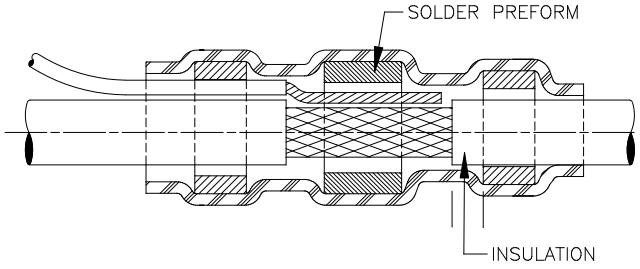
Table II: Shield Terminator Size Selection

Cable Dimensions			
B max	E max	F min	Use Size
1.91 [.075]	2.67 [.105]	0.89 [.035]	1
2.67 [.105]	3.68 [.145]	1.40 [.055]	2
4.32 [.170]	5.08 [.200]	2.16 [.085]	3
5.97 [.235]	6.48 [.255]	3.30 [.130]	4
6.99 [.275]	7.62 [.300]	4.32 [.170]	5
8.64 [.340]	9.65 [.380]	5.08 [.200]	6
11.18 [.440]	11.43 [.450]	5.72 [.225]	7
13.34 [.525]	13.59 [.535]	8.90 [.350]	8

4.4 Assembly Components

NOTE: Be sure that the strands of the shield braid and ground lead lie flat and smooth.

1. Position the stripped portion of ground lead(s) against the stripped portion of the shield braid.
2. Slip the selected shield terminator over the cable and ground lead assembly. Rotate the shield terminator as it slides over the ground lead to prevent it from catching on the strands.
3. Position the terminator so that the exposed shield is centered between the meltable inserts and some of the cable jacket is visible between the meltable inserts and the exposed shield.



Unless otherwise specified dimensions are in millimeters. [Inches dimensions are in between brackets]

4.5 Heating Tools and Ordering Information

WARNING

The heating tool and the assembly become hot during the installation of SolderSleeve devices. To prevent burns, allow tool and the assembly to cool off before handling.

Products	Heat Gun / Setting	Heating Tools & Accessories
S01, S02, S03, SO63,ST18, ST63	HL1920E = 6 on dial (1) HL2020E = 700°F (370°C) on LCD (1)	**HL1802E-074616**: SolderSleeve Terminators Reflector - Mini-Gun. **HL-ADPT-PR-REFLECTORS**: Adapter for PR Series Reflectors. **PR-25-REFLECTOR**: Small to Medium SolderSleeve Terminations 7 mm and under. **PR-25D-REFLECTOR**: Large SolderSleeve Terminations from 7 mm to 13 mm. **PR-13C-REFLECTOR**: Tubing up to 6 mm diameter.
SO96, SO175, D-180	HL1920E = 7 on dial (1) HL2020E = 800°F (425°C) on LCD (1)	
B-023	HL1920E = 9 on dial (1) HL2020E = 1000°F (540°C) on LCD (1)	

1. Use Tyco Electronics approved heat source and reflector (see above table).
   Note: CV-1981 Heating Tools are suitable alternatives. See product brochure for additional details.
2. Allow hot air heaters to warm up before using.
3. Position the assembly (cable, ground lead and terminator) in the reflector so that the solder perform is in the center of the hot air or at the focal point of the infrared heaters.
4. If the cable jacket or ground lead insulation is susceptible to heat damage for example, if the insulation is PVC, or if infrared heating is used with black insulation), move the assembly **toward** the heat source to minimize unwanted exposure of the jacket to the heat.
5. Heat until the solder perform melts, flows and wets the shield and ground lead.
6. Some terminators contain a thermal indicator to signal when the correct amount of heat has been applied to the solder. There are two types of indicators. One is a thermochromic material which signals correct heating by loss of color. Terminators with this type of indicator should be heated until all of the colored material in the joint area has turned colorless. (slight traces of the material may remain in the stranding of the shield). The other type of thermal indicator is a ring of fusible material around solder perform. Terminators with this BiAlloy indicator should be heated until the solder perform melts and the indicator ring completely disappears in the joint area.

The thermal indicator is only an aid for deciding when to stop heating. Its presence or absence in the installed part should not be the reason for rejection or acceptance of the installation. See Section 5 for inspection criteria.

5.0 Inspection:

See inspection photos in Section 7.

5.1 Assembly

1. The stripped portion of the ground-lead conductor should be located directly over the stripped portion of the braid. Rework termination per 6.2.
2. The sleeve should completely cover the stripped portions of the ground lead and the braid. Replace sleeve per 6.1.
3. The sleeve must be recovered tightly onto the ground lead and the cable. If the sleeve has not recovered onto the assembly, the terminator is too large for the application. Refer to 4.3.2 to select smaller size terminator and rework assembly per 6.1 or 6.2 as necessary.

5.2 Heating and Wetting

5.2.1 Insufficient Heat

The absence of the following criteria indicates that the heat applied to the assembly during installation was insufficient to produce an acceptable solder joint.

1. Meltable inserts should have melted and flowed along the cable joint under the insulation sleeve.
2. Solder preform must have melted and flowed along the ground lead/cable shield interface. There should be no evidence of the solder preform shape remaining and, if appropriate, the thermal indicator should have gone through the characteristic transition.

Reheat insufficiently heated terminations per 4.5.

5.2.2 Wetting

Poor wetting is characterized by the lack of a solder coating on the cable shield or ground lead may be caused by either insufficient heat or the poor solderability of the cable shield or ground lead. Reheat the termination per 4.5.1. If wetting is still poor after reheating, it may be necessary to replace the cable or ground lead with one that is more solderable. Other possible corrective actions are to place one drop of liquid flux on the ground lead or shield prior to installing the terminator or to change to a terminator with a more active flux. The corrective action for poor solderability is the responsibility of the installing facility.

5.2.3 Overheating

The absence of the following criteria indicates that the termination was heated longer than necessary to achieve a good solder joint on solderable wire.

a) The sleeve must remain sufficiently transparent to allow inspection of the solder joint.
b) There shall be solder fillet at least 1/8 inch long, visible along at least one side of the ground lead.

Rework overheated terminations per 6.1 or 6.2, depending on quality of the solder joint.

5.3 Damaged Assemblies

Examine the insulation sleeve and the wire and cable insulation for damage.

a) The insulation sleeve must be in tact with no shield or conductor strands poking through it.
b) The cable and ground lead insulations must show no signs of mechanical or thermal damage (cuts, melting, or charring) outside of the insulation sleeve. Surface discoloration is a natural occurrence on some insulating materials and does not indicate thermal damage. Rework damaged insulation sleeves per 6.1. Cut off damaged cable and terminate per section 4.

6.0 Rework:

WARNING
Eye damage is possible if safety glasses are not worn during sleeve removal or solder joint disassembly.

6.1 Insulation Sleeve Replacement

The insulation sleeve must be replaced if it is misaligned, overheated or otherwise damaged.

6.1.1 Removal of Sleeve

a) Score sleeve using a sharp blade. It is not necessary to cut through the sleeve. Use care not to cut cable jacket or ground insulation.
b) Reheat sleeve until it softens and then grasp it with a needle-nose pliers, on the side opposite of the scored line, and gently pull the sleeve off of the assembly.

6.1.2 Reinsulation

If the examination of the solder joint after the sleeve removal show that the solder joint is acceptable reinsulated the termination.

a) Use a terminator of the correct size.
b) Remove the solder preform by crushing the preform and allowing it to drop out of the sleeve.
c) Center the sleeve over the solder joint and heat until it recovers onto the assembly.

6.2 Solder Joint Replacement

The solder joint must be remade if it is misaligned or there is insufficient solder in the joint because of overheating.

6.2.1 Disassemble Joint

a) Remove sleeve as in 6.1.1.
b) Heat solder joint until the solder melts and then carefully separate the components.

6.2.2 Re-termination

Remove as much solder from cable shield as possible and then install a new terminator as desired in Section 4.

6.3 Inspection of Rework Assemblies

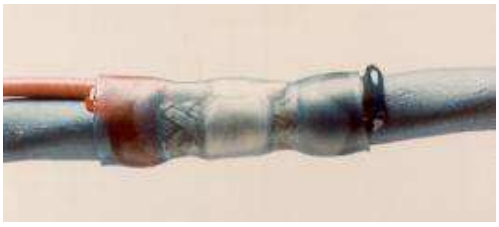
Inspect all reworked assemblies per Section 5. In addition, a Dielectric Withstand test between the cable primaries and ground lead should be performed to insure that the primary insulation has not been damaged.

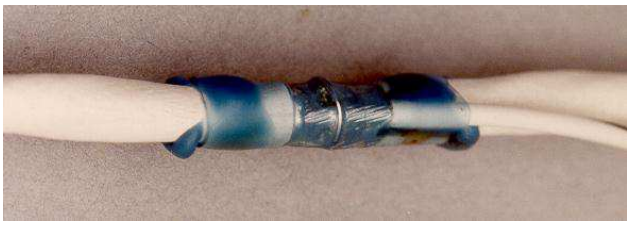
7.0 Inspection Photos:

1. Insufficient Heat

- Contour of solder perform is visible.
- Meltable inserts have not flowed.
- Contour of braid and/or lead is obscured by solder.

<u>Unacceptable</u>



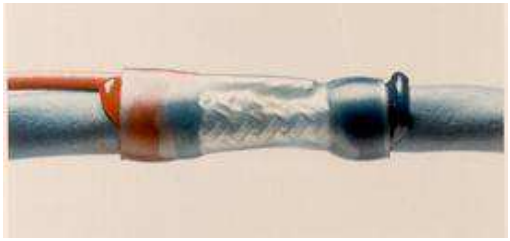


2. Minimum Solder Flow
- Solder has lost all appearance of ring shape.
- Inserts have melted and flowed along wires.
- Shield and lead contours are visible.
- There is a definite fillet visible along the lead and shield interface.

Acceptable

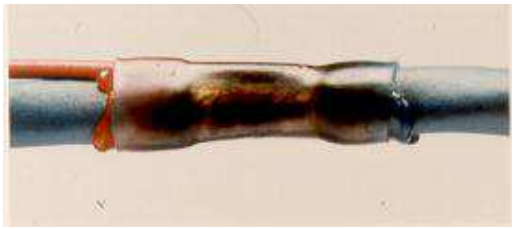
3. Maximum Solder Flow
- Fillet is clearly visible between the lead and shield.
- Joint area is visible despite browning of sleeve.

Acceptable



4. Overheated
- Joint area is not visible because of severe darkening of outer sleeve.
- Solder fillet is not visible along lead and shield interface.
- Wire insulation damaged outside of sleeve.

Unacceptable



[1] These values are for reference only and may change based on other variables (i.e. reflector type, sleeve's relative distance to the reflector, etc.)

DISCLAIMER

Unless otherwise specified dimensions are in millimeters. [Inches dimensions are in between brackets]