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SUMITOMO RECOMMENDED PROCEDURE

SRP SP-F04-030

FutureFLEX®

GROUNDING & BONDING METALLIC TUBE CABLE PROCEDURE

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1.0 General

1.1 This procedure describes the standard techniques for Grounding and Bonding FutureFLEX outdoor metallic tube cables.

1.2 Telecommunications network plants are often subject to electrical disturbances arising from lightning and commercial ac power line faults. To help safeguard personnel and property from the effects of these disturbances, primary telecommunications electrical protection is placed at the telecommunications entrance to a building or structure.

1.3 Grounding is defined as the intentional connection to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazard to connected equipment or to personnel.

1.3.1 Both ends of a FutureFLEX tube cable span containing a metallic element or elements must be grounded per the ANSI-J-STD-607-A Standard.

1.3.2 Typically, this work will be accomplished at a Tube Distribution Unit (TDU) located inside a building's Entrance Facility or at a last point run just before entering a building (e.g.: in an outdoor rated enclosure located in a manhole). In all cases, the grounding connection from the indoor TDU or outdoor enclosure shall be to earth ground.

1.4 Bonding is defined as the permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity and the capacity to safely conduct any current likely to be imposed.

1.4.1 The metallic element or elements of two (2) FutureFLEX tube cable segments coupled at an inline splice point must be bonded together.

1.4.2 Typically, this work will be accomplished inside a properly rated outdoor enclosure such as a NEMA-4, -4X, -6, or -6P enclosure (box) or inside a Splice Case.

1.5 The following FutureFLEX outdoor tube cable designs contain metallic elements that require Grounding and Bonding:

- Laminated Aluminum Polyethylene (LAP)
- Dielectric / Corrugated Steel Tape
- LAP / Corrugated Steel Tape
- Dielectric / Interlocked Galvanized Steel
- LAP / Interlocked Galvanized Steel

2.0 Safety Precautions

CAUTION: *When working with the different metallic tube cables, always exercise extreme caution. Sharp edges will be present whenever the laminated aluminum, interlocked galvanized steel, and corrugated steel tape are exposed.*

2.1 The use of personnel safety equipment is strongly recommended while cutting and stripping tube cable ends and working around the metallic tube cable elements. This includes the use of cut-resistant Kevlar gloves and eye wear.

3.0 Reference Documents

3.1 Sumitomo Recommended Procedure, *FutureFLEX Indoor, Wall-Mount TDU Installation Procedures,* SRP SP-F04-005.

3.2 Sumitomo Recommended Procedure, *FutureFLEX LAP Cable Tube Distribution Unit – PLP Closure,* SRP SP-F04-015.

3.3 Sumitomo Recommended Procedure, *FutureFLEX Tube Cable Splicing Procedures,* SRP SP-F04-031.

3.4 ANSI-J-STD-607-A (latest revision) Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

3.5 ANSI / NFPA-70 (latest revision) National Electrical Code (NEC)

3.6 Local Codes as mandated

4.0 Equipment / Tools Required

The following equipment, tools, and materials, are required to complete this procedure:

4.1 Grounding and Bonding hardware. Type and style to suit installation and local code requirements. **See Fig. 1.**

4.2 Felt Tip Pen / Marker

4.3 Tape Measure

4.4 Tube Cable Cutter (BETL01)

4.5 Hacksaw or equal

4.6 Utility Knife with Hook Blade

4.7 Scissors

4.8 Vinyl Electricians Tape

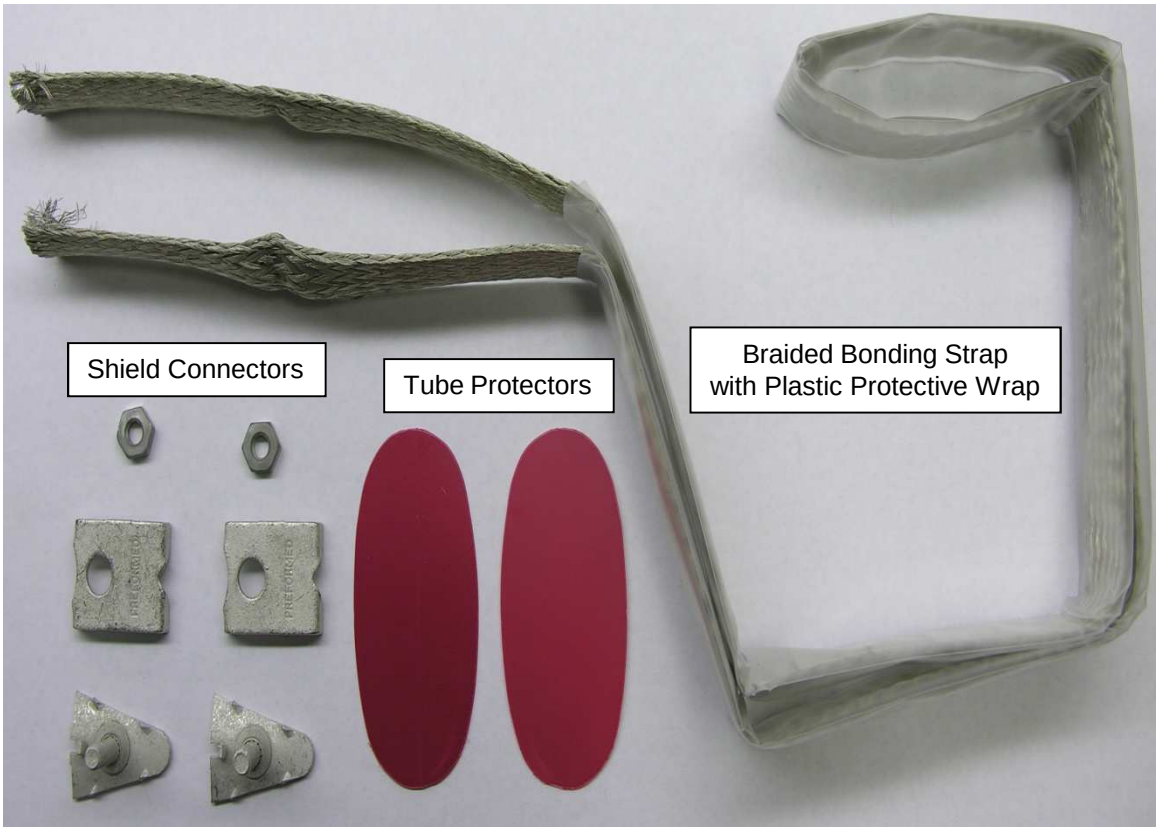

Figure 1
Typical Shield Connector Assembly
(DE09SBK Bonding Kit shown)

Shield Connector describes the hardware that attaches to or under a tube cable's metallic element. A typical Shield Connector Assembly consists of a bottom plate with a threaded stud, a top plate, and a nut. Other examples include clamps, lugs, and so forth.

Bonding Strap describes the hardware that connects a Shield Connector to either a grounding point or to another Shield Connector in a bonding application. Examples include bare or insulated wires, harnesses, braided straps with or without eyelets, and so forth.

Tube Protector describes the hardware (plastic piece) used as a protective barrier between the bottom plate of a Shield Connector and the exposed tubes.

Note: *DE09SBK and DE12SBK Bonding Kits include insulated Bonding Braid (short and long length difference), Shield Connectors (top & bottom halves) with nuts, and Plastic Tube Protectors.*

5.0 LAP Tube Cables

5.1. Route tube cable end into Tube Distribution Unit (TDU) and mark where outer jacket and excess tube cable length are to be cut. **See Fig. 2.**

5.2 Provide a minimum 1”-2” of outer jacket length inside TDU entry point. Mark jacket.

5.3 Provide a minimum 1”-2” of outer jacket length for grounding and bonding hardware attachment to LAP jacket. Mark jacket.

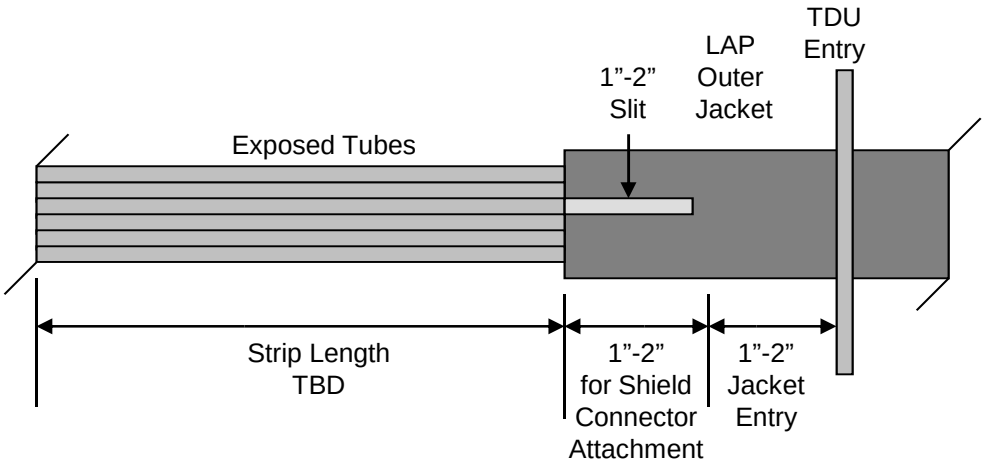

Figure 2
Grounding & Bonding
Laminated Aluminum Polyethylene Tube Cable

5.4 Remove tube cable from TDU and use Tube Cable Cutter (BETL01) to cut tube cable to desired length.

5.5 Use Hook Blade Knife to lightly score tube cable jacket, Pull ripcord and strip jacket away to expose individual tubes.

5.6 Use Hook Blade Knife or Scissors to cut an approximate 1”-2” long slit in outer jacket and laminated aluminum. Be careful. Do not cut or damage tubes during this step.

5.7 Reinstall tube cable into TDU.

5.8 Slide a Tube Protector under laminated aluminum to protect the tubes.

5.9 Carefully slide bottom plate of Shield Connector between Tube Protector and laminated aluminum so that threaded stud sticks through jacket slit ensuring a good metal-to-metal contact.

5.10 Install Bonding Strap on threaded stud and secure top plate of Shield Connector with nut provided. **See Fig. 3.**

5.11 Wrap all exposed metal with Vinyl Electricians Tape.

5.12 Fasten other end of Bonding Strap to ground connection or Shield Connector installed on mating tube cable.

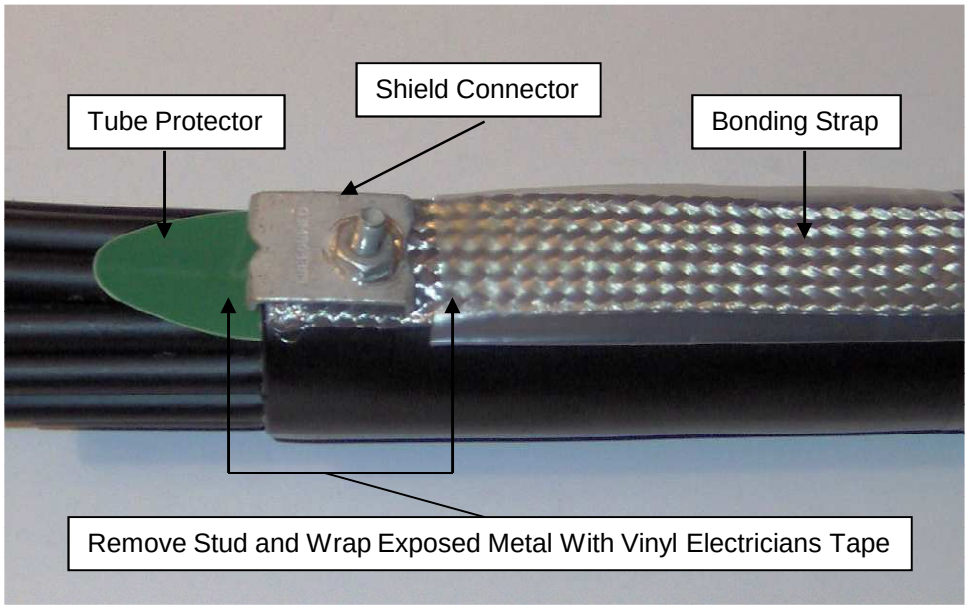

Figure 3
LAP Tube Cable With Shield Connector Assembly Installed

6.0 Dielectric Core / Corrugated Steel Tape Tube Cables

6.1 Route tube cable end into Tube Distribution Unit (TDU) and mark where outer jacket and excess tube cable length are to be cut. **See Fig. 4.**

6.2 Provide a minimum 1”-2” of outer jacket length inside TDU entry point. Mark jacket.

6.3 Provide a minimum 1”-2” of outer jacket length for grounding and bonding hardware attachment to corrugated steel tape outer jacket. Mark jacket.

6.4 Provide a minimum 1”-2” of dielectric core inner jacket length. Mark jacket.

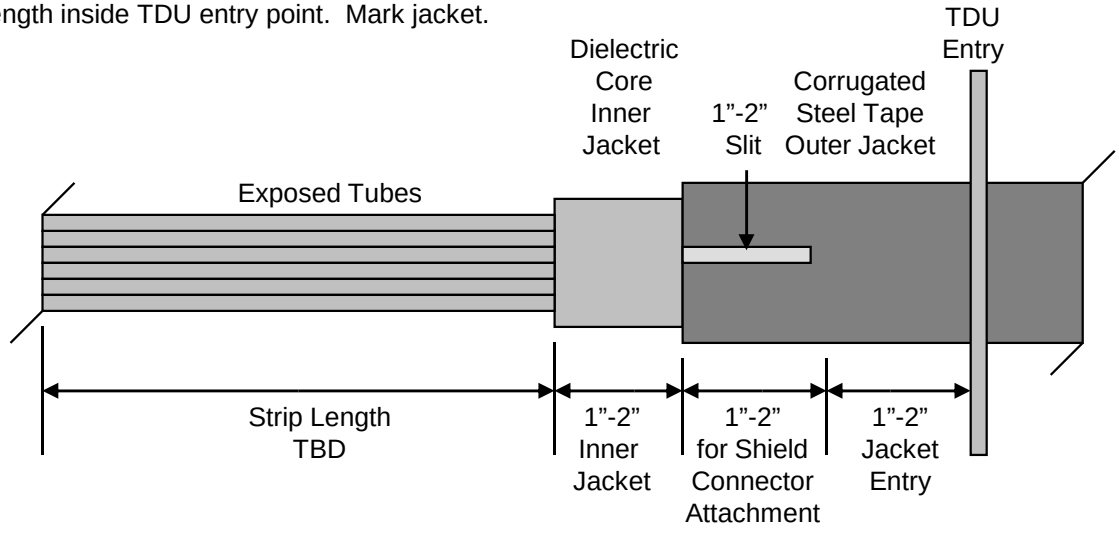

Figure 4
Grounding & Bonding
Dielectric Core / Corrugated Steel Tape Tube Cable

6.5 Remove tube cable from TDU and use Tube Cable Cutter (BETL01) to cut tube cable to desired length.

6.6 Use Hook Blade Knife to lightly score outer tube cable jacket and strip away.

6.7 Use Hook Blade Knife to lightly score inner tube cable jacket. Pull ripcord and strip jacket away to expose individual tubes.

6.8 Use Hook Blade Knife or Scissors to cut an approximate 1”-2” long slit in outer jacket and corrugated steel tape.

6.9 Reinstall tube cable into TDU.

6.10 Carefully slide bottom plate of Shield Connector between inner jacket and corrugated steel tape so that threaded stud sticks through outer jacket slit ensuring a good metal-to-metal contact.

6.11 Install Bonding Strap on threaded stud and secure top plate of Shield Connector with nut provided.

6.12 Wrap all exposed metal with Vinyl Electricians Tape. **See Fig. 5.**

6.13 Fasten other end of Bonding Strap to ground connection or Shield Connector installed on mating tube cable.

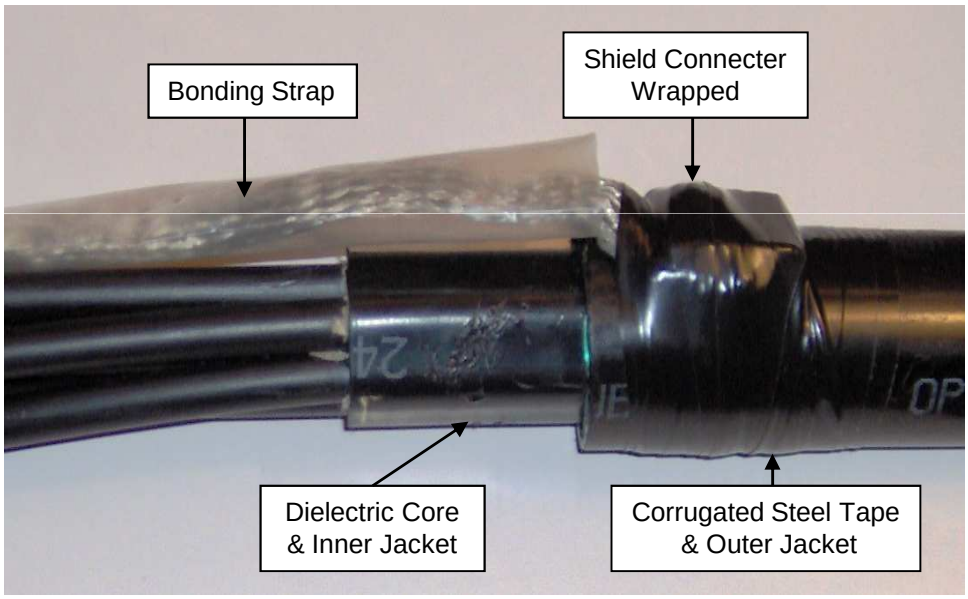

Figure 5
Dielectric Core / Corrugated Steel Tape Tube Cable
With Shield Connector Assembly Installed

7.0 LAP Core / Corrugated Steel Tape Tube Cables

7.1 Route tube cable end into Tube Distribution Unit (TDU) and mark where outer jacket and excess tube cable length are to be cut. **See Fig. 6.**

7.2 Provide a minimum 1”-2” of outer jacket length inside TDU entry point. Mark jacket.

7.3 Provide a minimum 1”-2” of outer jacket length for grounding and bonding hardware attachment to corrugated steel tape outer jacket. Mark jacket.

7.4 Provide a minimum 1”-2” of inner jacket length for grounding and bonding hardware attachment to laminated aluminum polyethylene inner jacket. Mark jacket.

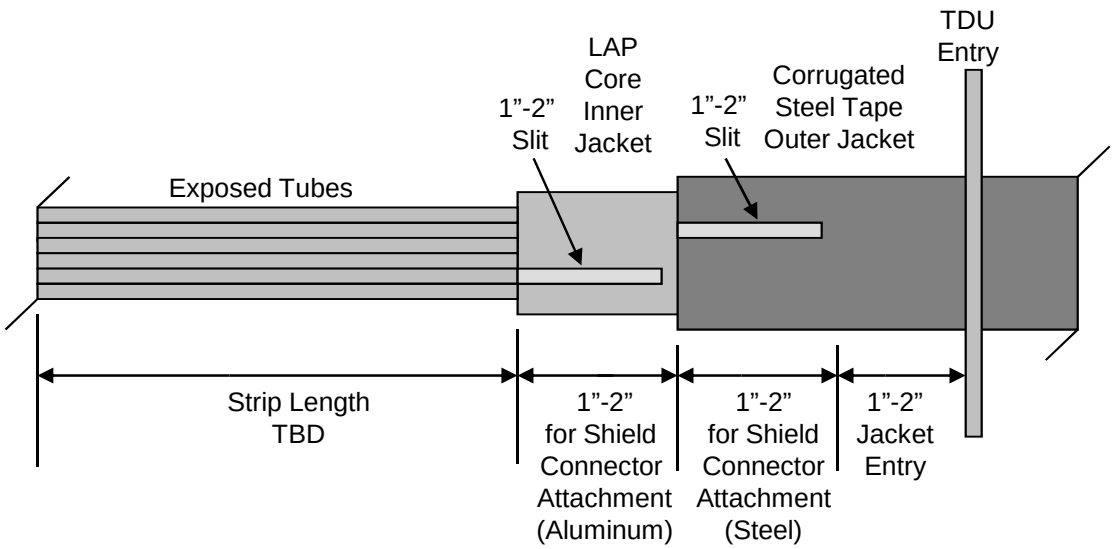

Figure 6
Grounding & Bonding
LAP Core / Corrugated Steel Tape Tube Cable

7.5 Remove tube cable from TDU and use Tube Cable Cutter (BETL01) to cut tube cable to desired length.

7.6 Use Hook Blade Knife to lightly score outer tube cable jacket and strip away.

7.7 Use Hook Blade Knife to lightly score inner tube cable jacket. Pull ripcord and strip jacket away to expose individual tubes.

7.8 Use Hook Blade Knife or Scissors to cut an approximate 1”-2” long slit in outer jacket and corrugated steel tape.

7.9 Use Hook Blade Knife or Scissors to cut an approximate 1”-2” long slit in inner jacket and laminated aluminum. Be careful. Do not cut or damage tubes during this step.

7.10 Reinstall tube cable into TDU.

CAUTION: *Do not join (bond) dissimilar metals (aluminum and steel) together. This can result in galvanic action that will corrode and eventually destroy the metallic elements of the Shield Connector Assembly.*

7.11. Slide a Tube Protector under the laminated aluminum to protect the tubes.

7.12 Carefully slide bottom plate of Shield Connector between Tube Protector and laminated aluminum so that threaded stud sticks through inner jacket slit ensuring a good metal-to-metal contact.

7.13 Carefully slide bottom plate of Shield Connector between inner jacket and corrugated steel tape so that threaded stud sticks through outer jacket slit ensuring a good metal-to-metal contact.

7.14 Install Bonding Straps on threaded studs and secure top plates of Shield Connectors with nuts provided.

7.15 Wrap all exposed metal with Vinyl Electricians Tape.

7.16 Fasten other end of Bonding Straps to ground connection or Shield Connectors installed on mating tube cable.

8.0 Dielectric Core / Interlocked Galvanized Steel Tube Cables

8.1 Route tube cable end into Tube Distribution Unit (TDU) and mark where outer jacket and excess tube cable length are to be cut. **See Fig. 7.**

8.2 Provide a minimum 1”-2” of outer jacket length inside TDU entry. Mark jacket.

8.3 Provide a minimum 1”-2” of outer jacket length for grounding and bonding hardware attachment. Mark jacket.

8.4 Provide a minimum 1”-2” of dielectric core inner jacket length. Mark jacket.

8.5 Remove tube cable from TDU and use hacksaw or equal to cut and remove interlock galvanized steel and outer jacket. Be careful. Do not cut or damage inner core tube cable during this step.

8.7 Use Hook Blade Knife to lightly score inner jacket at mark. Pull ripcord and strip jacket away to expose individual tubes.

8.8 Reinstall tube cable into TDU.

8.9 Slide the bottom plate of the Shield Connector between inner tube cable jacket and interlocked galvanized steel. Push in until threaded stud contacts exposed interlocked galvanized steel to ensure a good metal-to-metal contact.

8.10 Install Bonding Strap on threaded stud and secure top plate of Shield Connector with nut provided.

8.11 Wrap all exposed metal with Vinyl Electricians Tape.

8.12 Fasten other end of Bonding Strap to ground connection or Shield Connector installed on mating tube cable.

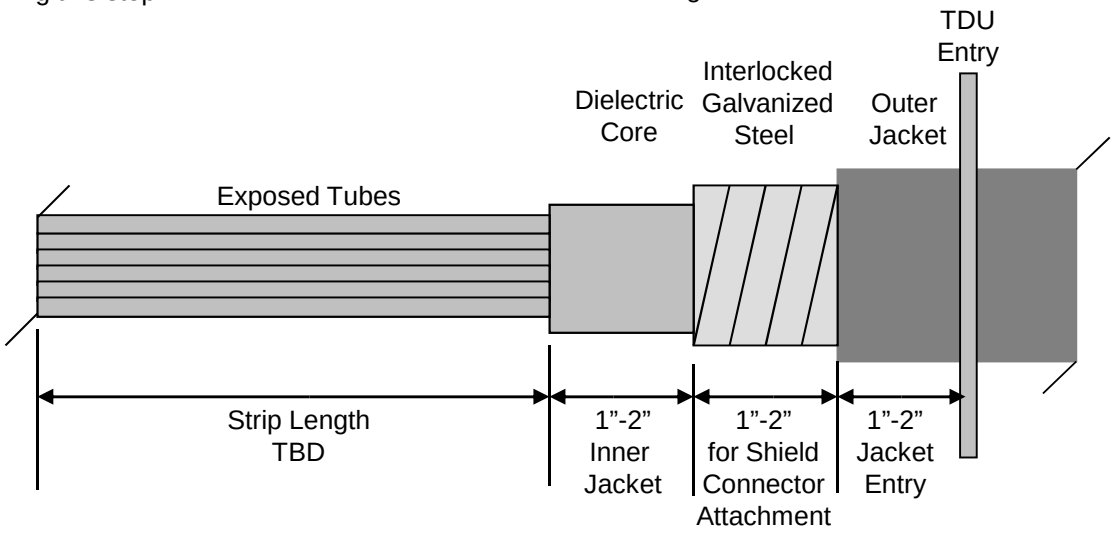

Figure 7
Grounding & Bonding
Dielectric Core / Interlocked Galvanized Steel Tube Cable

9.0 LAP Core / Interlocked Galvanized Steel Tube Cables

9.1 Route tube cable end into Tube Distribution Unit (TDU) and mark where outer jacket and excess tube cable length are to be cut. **See Fig. 8.**

9.2 Provide a minimum 1”-2” of outer jacket length inside TDU entry. Mark jacket.

9.3 Provide a minimum 1”-2” of outer jacket length for grounding and bonding hardware attachment. Mark jacket.

9.4 Provide a minimum 1”-2” of LAP core inner jacket length for grounding and bonding hardware attachment. Mark jacket.

9.5 Remove tube cable from TDU and use hacksaw or equal to cut and remove interlock galvanized steel and outer jacket. Be careful. Do not cut or damage inner core tube cable during this step.

9.6 Use Hook Blade Knife to lightly score inner jacket at mark. Pull ripcord and strip jacket away to expose individuals.

9.7 Use Hook Blade Knife or Scissors to cut an approximate 1”-2” long slit in inner jacket and laminated aluminum. Be careful. Do not cut or damage tubes during this step.

9.8 Reinstall tube cable into TDU.

CAUTION: *Do not join (bond) dissimilar metals (aluminum and steel) together. This will result in galvanic action that can corrode and eventually destroy the metallic elements of the Shield Connector Assembly.*

9.9 Slide a Tube Protector under the laminated aluminum to protect the tubes.

9.10 Carefully slide bottom plate of Shield Connector between Tube Protector and laminated aluminum so that threaded stud sticks through inner jacket slit ensuring a good metal-to-metal contact.

9.11 Slide the bottom plate of the Shield Connector between inner tube cable jacket and interlocked galvanized steel. Push in until threaded stud contacts exposed interlocked galvanized steel to ensure a good metal-to-metal contact.

9.12 Install Bonding Straps on threaded studs and secure top plates of Shield Connectors with nuts provided. **See Fig. 9.**

9.13 Wrap all exposed metal with Vinyl Electricians Tape.

9.14 Fasten other end of Bonding Straps to ground connection or Shield Connectors installed on mating tube cable.

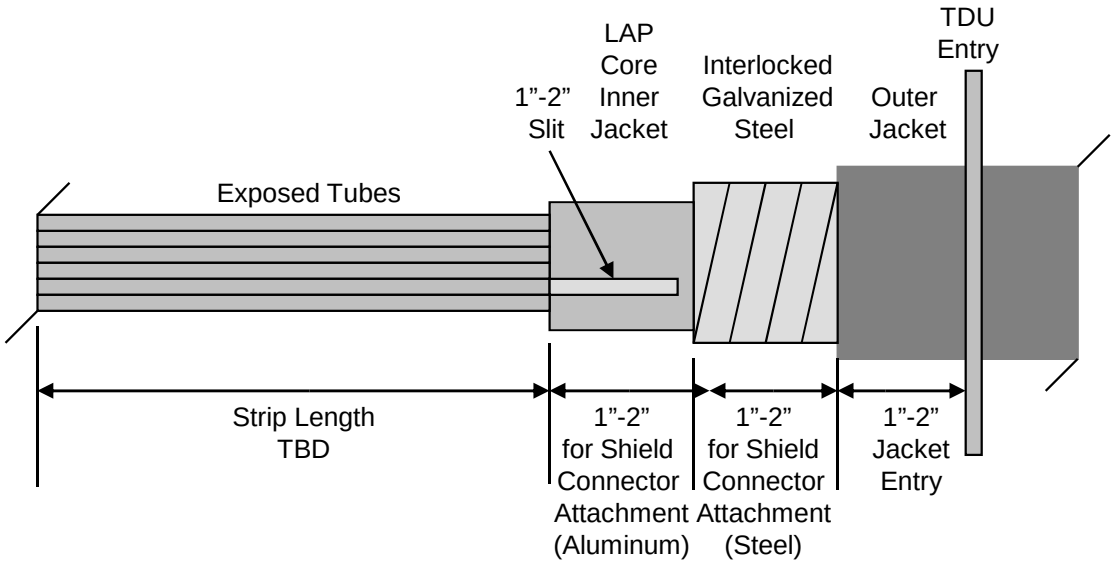

Figure 8
Grounding & Bonding
LAP Core / Interlocked Galvanized Steel Tube Cable

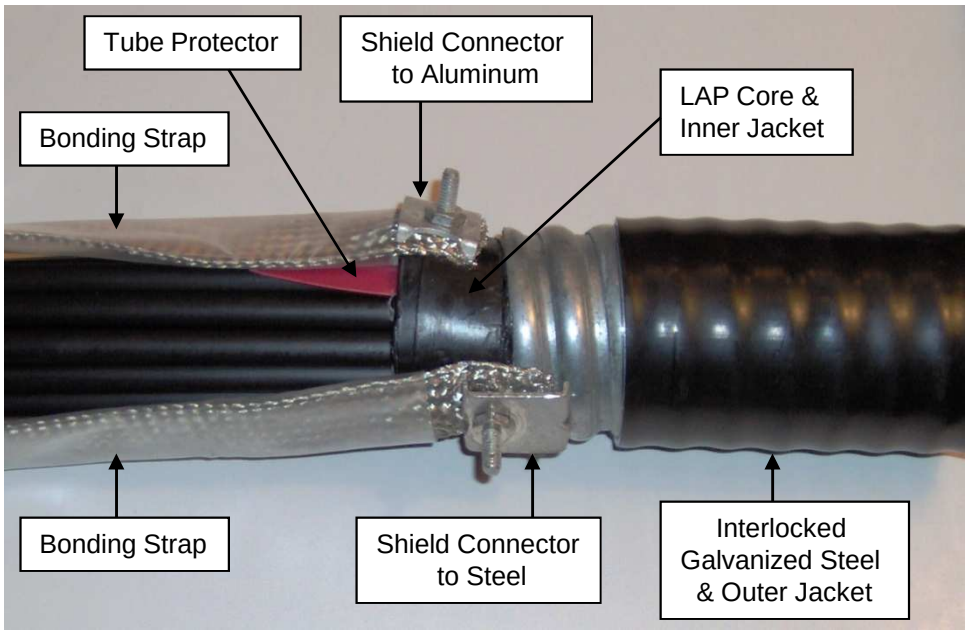

Figure 9
LAP Core / Interlocked Galvanized Steel Tube Cable
With Separate Shield Connector Assemblies Installed