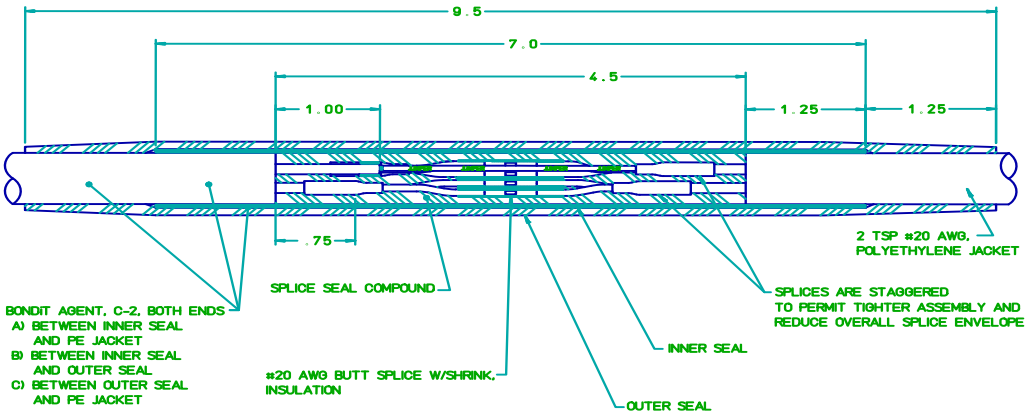
RELTEK

Adhesives and Coatings for Harsh Environments

Polyethylene Cable Splice Kit



The **Sealing Compound** encapsulates the electrical splices, provides a strain relief for the conductors, acts as a water block, eliminates air voids which tend to act as pumps to draw in water during pressure cycles, and prevents damage from hydro-pressure.

The **Inner** and **Outer Sealing Tubes** are of different compounds which, provides greater environmental resistance from chemicals, thermal shock, and stress cracking.

The **Outer Seal** is highly abrasion resistant and provides mechanical stiffness to the splice in order to better match the cable stiffness.

Simplicity of assembly: all components are precut and prepped. The **Sealing Tubes** are pre-shaped and the inner walls are pre-treated. The technician need only wash the tubes and prime them with **BONDiT™ C-2**. Sealing is accomplished with the simple technology *of a hot air* Gun (or torch in an emergency.)

Fast assembly time measured in minutes. No long hours of waiting for curing cycles. Ease of transport and storage; one year shelf life. Simple skill, low cost, *permanent field or production splicing*.

The **Inner** and **Outer Sealing Tubes** form chemical (cohesive) bonds to the cable jacket, as well as to each other and to the **Sealing Compound**, providing redundancy in sealing, and mechanical integrity to the splice. *The bonds are stronger than the substrates.*

Reliability of completed splice: triple redundancy is built into sealing design; the two **Seal Tubes** and the **Sealing Compound**. All seals have been tested independently in Accelerated Life Tests for *long term life in the deep-sea*.

The chemically bonded **Seals** are attained by use of the **BONDiT™ C-2** that activates the reaction between materials when heat is applied by a hot air gun.

Tolerance to error in assembly: under test, abrading instructions were not followed, and sealing surfaces were not cleaned, but rather, deliberately contaminated. Testing demonstrated acceptable water proof seals were still obtained. Cleanliness is emphasized as a normal good operating procedure for best results.

Wide range of sizes and applications. Custom designs available on request, for all underwater and down hole oil well applications. Both hot splice and cold splice technology available.

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Polyethylene Cable Splice Kit Assembly Instructions

Purpose

The purpose of this document is to aid the user in making a permanent, pressure and water proof splice in polyethylene jacketed cable, using the supplied splice kit.

Safety

Refer to the Material Safety Data Sheet for safety precautions of BONDiT™ C-2. Nylon or rubber gloves and safety glasses are recommended.

Storage

BONDiT™ C-2:	1 year minimum, when stored at 70°F, sealed in original container.
Splice Seal Compound:	2 year minimum, when stored at 70°F, sealed in original container.
All other kit components:	5 years when stored at 70°F.

Tooling and Materials List

Following is a list of required tools and materials, not included in the kit:

Electrical butt crimps and insulators/shrink tubing
Wire insulation strippers
Long, thin flathead screwdriver or probe, 8+ inches
Razor knife
Needle nose pliers, 6 inch
MethylEthylKetone, 5 Ounce (MEK)
Box Kimwipes or equivalent
Disposal container (Kimwipes)
6" steel scale
Nylon or rubber gloves
Safety glasses

Included in the splice kit:

2 Splice Seal Compound, strips (red)
1 Inner Seal Tube, 7" X 3/4" O.D. (green)
1 Outer Seal Tube, 9.5" X 3/4" O.D. (black)
1 BONDiT™ C-2 in dispenser
1 Abrasive Pad, 1 1/2" x 9"

Cable Preparation

The cable must be inspected for damage, stripped and the outer jacket evenly abraded.

Inspect the cable jackets for significant damage in splice area. Small nicks can quickly be removed with the provided **Abrasive Pad** by abrading the damaged area. If light abrading does not smooth out the damage, an Exacto knife (or razor blade) can be used to scrape the area with the blade, back and forth, along the length of the cable until all nicks, cuts etc. are removed.

CAUTION: Using excessive pressure with the blade, could result in further damage to the cable. Cable with significant damage should be cut back to good jacket material.

Strip the ends of both cables to be spliced, to expose 2 1/4" of the insulated shield/conductors. When stripping the jacket from the conductors, avoid damaging the conductors and their shields.

Cut the conductor lengths so that the wire butt crimps will be staggered in the completed assembly. This will minimize the finished splice diameter.

Strip insulation from conductors using wire strippers to match butt crimps. Be careful not to nick conductors or remaining insulation.

To achieve a best bond between the cable jacket and the **Splice Seal Tubing**, it is necessary to abrade the surface of the jacket with the **Abrasive Pad** provided.

Wrap the pad around the jacket and abrade with a twisting motion a 3" minimum length, starting from the end of the jacket. The jacket will have a dull, matt finish when properly abraded. If the jacket is glossy and/or smooth in appearance, it is not properly abraded and may produce a poorer bond.

Scrub the cable jacket with TCE or MEK for two foot on either side of the splice to ensure cleanliness when the **Inner** and **Outer Seal Tubes** are assembled on the cable.

Before completing the conductor splices, the **Inner** and **Outer Seal Tubes** must be placed over the cables and moved out of the way (1-2 feet). The inside of the **Sealing Tubes** must be cleaned, and coated with **BONDiT™ C-2** before assembly on the cable.

Inner and Outer Seal Preparation

With both the **Inner Seal Tube**, (green) and **Outer Seal Tube**, (black), wad one or two Kimwipes into a ball and grip with needle nose pliers. Dip ball into TCE or MEK, (w/ clean pliers), insert into the Sealing Tubes and scrub the length of the interior walls. Use a long screw driver to reach deeper into the tubing for scrubbing.

Repeat this step 2 times for both **Sealing Tubes**. Use fresh Kimwipes each time. *NEVER* immerse the same wipe in the MEK twice, or the cleaning agent may become contaminated.

BONDiT™ C-2 is shipped pre-mixed and ready for application. Vigorously shake the dispenser for several seconds before applying it to the prepared cable jackets. When not in use, keep the dispenser closed. Avoid continuous heat exposure, such as, from direct sunlight.

CAUTION: Wear protective rubber gloves.

Partially saturate a **Kimwipe** with **BONDiT™ C-2** and swab the entire inside surfaces of both of **Seal Tubes**.

Slide the **Outer Seal Tube** onto the cable, followed by the **Inner Seal Tube**, far enough to be out of the way (about 1-2 feet.)

Splicing the Conductors

Electrical splicing requires butt splice crimping of the conductors, and heat shrinking the crimp insulation.

*CAUTION: The **Inner and Outer Seal Tubes** must be placed over either cable and moved out of the way before the splice between any of the conductors or shields is completed.*

Make sure all conductors are properly stripped. Use butt crimps (user supplied) to verify strip length. Adjust if necessary. Ensure the butt crimps will be staggered as much as possible in the final assembly.

Crimp butt crimps to all conductors on one cable end before completing any electrical splices to the mating cable. Install the butt crimp insulators over the conductors before completing splice to mating cable. When all crimps are complete heat shrink the butt crimp insulators as required.

Splice Seal Compound

The **Sealing Compound**, (red) is used to encapsulate the entire splice volume. This makes the splice area diameter match the cable and reduces the possibility of a break in the **Seals** at cable edges by acting as a strain relief. It also provides additional water blocking as a moisture resistant adhesive, eliminates air voids, and prevents damage to the splice due to hydro-pressure.

Peel the protective plastic from one side of the **Sealing Compound** strips and press the conductors into one strip. Lay the second strip over the splice and press together.

Remove the remaining protective plastic and shape the **Sealing Compound** to fill around conductors to match cable diameter as closely as possible. All conductors, including shields, must be completely encapsulated. Remove excess compound, and wipe **Sealing Compound** clean with TCE or MEK.

Coating the Cable

CAUTION: Wear protective nylon, or rubber gloves.

Before applying **BONDiT™ C-2**, the cable jacket should be free of contaminants. Scrub cable with TCE or MEK saturated Kimwipes. Use fresh Kimwipes for every scrub. Continue to clean abraded area until Kimwipes appear clean after scrubbing. It is important that all abraded areas of the cable jacket are cleaned properly to insure a quality seal.

Do not contaminate cleaned areas with bare hands. Handle with clean gloves.
Partially saturate a Kimwipe with **BONDiT™ C-2** and swab onto abraded area of cable. Liquid should readily permeate and saturate (wet) the entire abraded surface of the cable.

CAUTION: If the BONDiT™ C-2 does not readily spread (wet) the surface, and tends to significantly pool/puddle/bead, the cable is not adequately cleaned and/or abraded. In such a case, clean the jacket again and apply BONDiT™ C-2. Adequate BONDiT™ C-2 is supplied for repeating the entire procedure several times.

Coat **Sealing Compound** surface with the ***BONDiT™ C-2***.

Once the jacket is coated, no drying time is required agent. Up to four hours exposure at ambient is acceptable.

Final Assembly

The **Inner and Outer Seals** will now be positioned over the splice and heat shrunk to form water tight seals.

Center the **Inner Seal Tubing** over splice area so that approximately 1 1/4", on either side, covers the coated jacket.

Shrink the **Inner Seal Tubing** onto splice with heat gun. Heat must be applied evenly, s*tarting in the center*, until the entire length has shrunk down around the cable and splice.

After tubing has shrunk, apply heat evenly to the 1 1/4" long cable seal areas, approximately 1½ minutes. **BONDiT™ Agent C-2** and **Inner Seal Tube** should reach a high enough temperature (approximately 500°F to react and form a water-proof bond. The strength of bond will be somewhat dependent on the type of jacket material: polyethylene forming highly cohesive bonds, and rubbers forming weaker adhesive bonds.

CAUTION: *Excessive heat may damage cable jacket.*

Allow the splice assembly to cool for ease of handling, and thoroughly wash the assembly with TCE or MEK.

Saturate a Kimwipe with **BONDiT™ C-2** and swap the entire assembly and remaining abraded cable. Liquid should readily permeate and wet the surface of the cable. Center the **Outer Seal Tubing** over the **Inner Seal Tube** so 1 1/4" extends past the **Inner Seal Tube** beneath it on either side. Shrink the **Outer Seal Tube** using the same heating procedure as for the **Inner Seal Tube**. This seal will provide an additional water tight seal and mechanical abrasion protection.

Re-inspect cable for any damage. Splice is complete.

Technical Support

For technical support call *RELTEK* at 707-284-8808, or email reltek@reltekllc.com.

Reference RELTEK Document No. A400-0001 Rev C