

STACKPAK[®] INSTRUCTIONS for ZONE HEATERS

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Installation instructions are provided to give the field engineer and installers the necessary information to install STACKPAK in an efficient and effective manner. These recommendations are suggestions and do not imply that only these methods can be used.

CAUTION:

ALL INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH ALL APPLICABLE CODES. IF THERE IS A CONFLICT BETWEEN THESE INSTRUCTIONS AND THE REQUIREMENT OF APPLICABLE CODES THE REQUIREMENTS OF THE CODES MUST BE FOLLOWED. TO SATISFY CODE AND APPROVAL AGENCY REQUIREMENTS O'BRIEN POWER CONNECTION AND END TERMINATION KITS MUST BE USED. APPROVALS AND PRODUCT WARRANTY MAY BE VOID IF ALTERNATE CONNECTION KITS ARE USED OR INSTALLATION INSTRUCTIONS AND PROPER END SEALING ARE NOT FOLLOWED.

THE ENDS OF THE BUNDLE AND TRACER MUST BE PROTECTED FROM MOISTURE AND WEATHER AT ALL TIMES. THIS INCLUDES TEMPORARILY SEALING AND PROTECTING ALL ENDS DURING INSTALLATION AND HOOKUP.

NEVER INSTALL A BUNDLE DURING INCLIMATE WEATHER IF THE ENDS ARE NOT SEALED.

NEVER LEAVE A BUNDLE END UNSEALED OVERNIGHT.

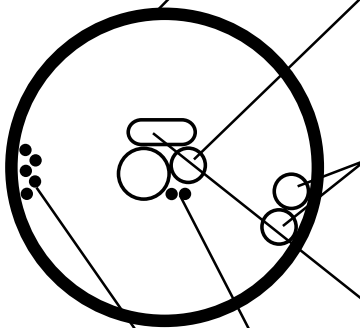
MODEL NUMBER / PRODUCT IDENTIFICATION

Stackpak Model Number Example

Model SS-A3A2/H22-TN18/200/J50/5M
S STACKPAK
S SV47 Jacket
A3A2 2 heated tubes
 one 3/8" x 0.035 316L SS Wld
 one 1/4" x 0.035 316L SS Wld
H22 2 unheated tubes
 both 1/4" x 0.062 PFA
TN18 240V 18W/ft zone heater for non-hazardous areas
200 200' overall length
J50 Type J thermocouple w/ sensor located 50' from
 power end
5M 5 Messenger wires
 Size and configuration is defined during
 quotation and purchase order.

If You Have a 'Z' in the Model Number

Some designs may contain tubes, tracers and other components not listed. These components will be designated by a "Z" in the model number and are defined in the packing list accompanying the shipment.



| STACKPAK MODEL NO. | DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------|---------------|-------------|-------------|---------------|-------------|------------|---------------|-------------|-------------|---------------|-------------|-------------|---------------|-------------|------------|---------------|-------------|-------------|---------------|-------------|-------------|---------------|-------------|
| X = Alpha # = Numeric | | | | | | | | | | | | | | | | | | | | | | | | | |
| X | Unit of measure – only used for bundle sold and marked in Meters No prefix designates product is sold and marked in feet M = meters | | | | | | | | | | | | | | | | | | | | | | | | |
| / | Separator | | | | | | | | | | | | | | | | | | | | | | | | |
| S | Stackpak Product Designation | | | | | | | | | | | | | | | | | | | | | | | | |
| X | Jacket Material S = SV47- Proprietary Blend O'Brien PVC U = TPU P = Polyethylene braid | | | | | | | | | | | | | | | | | | | | | | | | |
| - | Separator | | | | | | | | | | | | | | | | | | | | | | | | |
| X# | For tube core codes see: Tube List For hose core codes see: Hose Core List Tube will be called out in 1/8" and Hose cores will be called out in 1/16". Multiple, like tubes/cores designated by multiple number codes.(ie H33G2 to designate (2) heated H3 tubes and (1) heated G2 tube). Different tube types designated by including additional tube codes. Hose cores will be called out with the prefix H. (ie HC06). | | | | | | | | | | | | | | | | | | | | | | | | |
| / | Separator only if unheated tubes are present. | | | | | | | | | | | | | | | | | | | | | | | | |
| X# | Unheated tube(s) using same method as heated tubes. | | | | | | | | | | | | | | | | | | | | | | | | |
| - | Separator | | | | | | | | | | | | | | | | | | | | | | | | |
| X# | Tracer – electric tracer family and wattage. <table border="0"> <tr><td>JN20</td><td>20w/ft</td><td>240v</td></tr> <tr><td>JV20</td><td>20w/ft</td><td>120v</td></tr> <tr><td>K12</td><td>12w/ft</td><td>120v</td></tr> <tr><td>KN12</td><td>12w/ft</td><td>240v</td></tr> <tr><td>KY12</td><td>12w/ft</td><td>208v</td></tr> <tr><td>T18</td><td>18w/ft</td><td>120v</td></tr> <tr><td>TN18</td><td>18w/ft</td><td>240v</td></tr> <tr><td>TY18</td><td>18w/ft</td><td>208v</td></tr> </table> | JN20 | 20w/ft | 240v | JV20 | 20w/ft | 120v | K12 | 12w/ft | 120v | KN12 | 12w/ft | 240v | KY12 | 12w/ft | 208v | T18 | 18w/ft | 120v | TN18 | 18w/ft | 240v | TY18 | 18w/ft | 208v |
| JN20 | 20w/ft | 240v | | | | | | | | | | | | | | | | | | | | | | | |
| JV20 | 20w/ft | 120v | | | | | | | | | | | | | | | | | | | | | | | |
| K12 | 12w/ft | 120v | | | | | | | | | | | | | | | | | | | | | | | |
| KN12 | 12w/ft | 240v | | | | | | | | | | | | | | | | | | | | | | | |
| KY12 | 12w/ft | 208v | | | | | | | | | | | | | | | | | | | | | | | |
| T18 | 18w/ft | 120v | | | | | | | | | | | | | | | | | | | | | | | |
| TN18 | 18w/ft | 240v | | | | | | | | | | | | | | | | | | | | | | | |
| TY18 | 18w/ft | 208v | | | | | | | | | | | | | | | | | | | | | | | |
| Options Listing (Repeat as necessary) | | | | | | | | | | | | | | | | | | | | | | | | | |
| / | Separator between each option – repeat as necessary | | | | | | | | | | | | | | | | | | | | | | | | |
| # | Length, exact and continuous | | | | | | | | | | | | | | | | | | | | | | | | |
| X## | Temperature sensor (if applicable) J = J- thermocouple K = K- thermocouple T = T- thermocouple R = 100Ω / 100PT 3 wire RTD XX = distance from power end in units of measure | | | | | | | | | | | | | | | | | | | | | | | | |
| #X | XM will call out the quantity of messenger wires. (ie /3M will call out 3 messenger wires) | | | | | | | | | | | | | | | | | | | | | | | | |
| - | Separator | | | | | | | | | | | | | | | | | | | | | | | | |
| ## | Specials identifier | | | | | | | | | | | | | | | | | | | | | | | | |

MODEL NUMBER / PRODUCT IDENTIFICATION

Tube List

| DESIGNATION | DESCRIPTION | CONSTRUCTION | OD | WALL |
|-------------|-------------|-----------------|------|--------|
| F1 | 316/316L SS | Seamless | 1/8" | 0.035" |
| F2 | 316/316L SS | Seamless | 1/4" | 0.035" |
| F3 | 316/316L SS | Seamless | 3/8" | 0.035" |
| F4 | 316/316L SS | Seamless | 1/2" | 0.035" |
| B3 | 316/316L SS | Seamless | 3/8" | 0.049" |
| B4 | 316/316L SS | Seamless | 1/2" | 0.049" |
| K4 | 316/316L SS | Seamless | 1/2" | 0.065" |
| A2 | 316/316L SS | Welded | 1/4" | 0.035" |
| A3 | 316/316L SS | Welded | 3/8" | 0.035" |
| A4 | 316/316L SS | Welded | 1/2" | 0.035" |
| J2 | Copper | Seamless | 1/4" | 0.030" |
| C3 | Copper | Seamless | 3/8" | 0.032" |
| D4 | Copper | Seamless | 1/2" | 0.035" |
| M4 | Copper | Seamless | 1/2" | 0.049" |
| G2 | PFA | Teflon Extruded | 1/4" | 0.030" |
| S2 | PFA | Teflon Extruded | 1/4" | 0.040" |
| H2 | PFA | Teflon Extruded | 1/4" | 0.062" |
| G3 | PFA | Teflon Extruded | 3/8" | 0.030" |
| H3 | PFA | Teflon Extruded | 3/8" | 0.062" |
| G4 | PFA | Teflon Extruded | 1/2" | 0.030" |
| H4 | PFA | Teflon Extruded | 1/2" | 0.062" |
| N2 | Monel | Seamless | 1/4" | 0.035" |
| N3 | Monel | Seamless | 3/8" | 0.035" |
| P4 | Monel | Seamless | 1/2" | 0.049" |
| MF6 | 316/316L SS | Seamless | 6mm | 1mm |
| MF8 | 316/316L SS | Seamless | 8mm | 1mm |
| MF10 | 316/316L SS | Seamless | 10mm | 1mm |
| MF12 | 316/316L SS | Seamless | 12mm | 1mm |
| MB10 | 316/316L SS | Seamless | 10mm | 1.5mm |
| MB12 | 316/316L SS | Seamless | 12mm | 1.5mm |
| MD6 | Copper | Seamless | 6mm | 1mm |
| MD8 | Copper | Seamless | 8mm | 1mm |
| MD12 | Copper | Seamless | 12mm | 1mm |
| MG6 | PFA | Teflon Extruded | 6mm | 1mm |
| MG8 | PFA | Teflon Extruded | 8mm | 1mm |
| MA12 | 316/316L SS | Welded | 12mm | 1mm |
| MG10 | PFA | Teflon Extruded | 10mm | 1mm |
| MG12 | PFA | Teflon Extruded | 12mm | 1mm |

Hose Core List (hydraulically and mechanically complete with specialized end connections)

| MODEL # | DESCRIPTION | OD | WALL | JIC | 1" SS Tube |
|--|------------------------------|------|--------|-----|------------|
| Standard Pressure – Smooth Bore TFE fluoropolymer with SS over-braid | | | | | |
| HC04 | TFE w/SS braid | 1/4" | 0.030" | J | S |
| HC06 | TFE w/SS braid | 3/8" | 0.030" | J | S |
| HC08 | TFE w/SS braid | 1/2" | 0.030" | J | S |
| Standard Pressure – Heavy Wall Smooth Bore TFE fluoropolymer with SS over-braid | | | | | |
| HCH04 | Heavy Wall TFE w/SS braid | 1/4" | 0.040" | J | S |
| HCH06 | Heavy Wall TFE w/SS braid | 3/8" | 0.040" | J | S |
| HCH08 | Heavy Wall TFE w/SS braid | 1/2" | 0.040" | J | S |
| High Pressure – Smooth Bore TFE fluoropolymer with SS over-braid | | | | | |
| HD04 | High Pressure TFE w/SS braid | 1/4" | 0.040" | J | |
| HD06 | High Pressure TFE w/SS braid | 3/8" | 0.040" | J | |
| HD08 | High Pressure TFE w/SS braid | 1/2" | 0.040" | J | |

Receiving and Storage

- Ensure that the protective caps placed over the ends of the bundle are firmly in place.



- All bundle ends must be sealed at all times.
- Cover from weather.
- Protect from mechanical damage.
- Temperature Range - Storage
 - 60°F to 140°F (-50°C to 60°C) TPU Jacket
 - 30°F to 140°F (-35°C to 60°C) SV47 Jacket

Minimum Installation Temperatures

| Identifier | Description | Minimum Installation Temperature | Minimum Service Temperature |
|------------|-------------|----------------------------------|-----------------------------|
| S | SV47 | -10°F (-23°C) | -30°F (-35°C) |
| U | TPU | -40°F (-40°C) | -60°F (-50°C) |

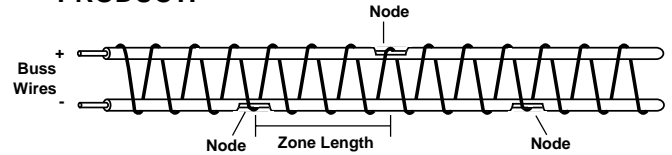
Planning Installation and Determining Length with Zone Heaters

- Route along existing structures such as beams and columns to provide support.
- Avoid areas where the ambient temperature may exceed 110°F (45°C).
- Maintain 1/2" (12mm) space between bundles.
- Measure square into corners. (The length required to make a 90 degree bend is about 13" (330mm). Measuring square into the corner will give you 16" (410mm). The extra 3" (80mm) is part of your safety factor to ensure you have enough length.)
- Allow 12" - 18" (300mm to 450mm) of straight tubing bundle before connecting to fittings.
- Allow enough heater cable to reach the junction box and make connections inside considering the minimum length requirements of applicable national and local electrical codes.

Installation of STACKPAK with zone heaters:

Zone heater cables have a series of heater zones. The junction between zones are called NODES.

YOU MUST LOCATE THE FIRST AND LAST NODES TO CORRECTLY INSTALL THIS PRODUCT.

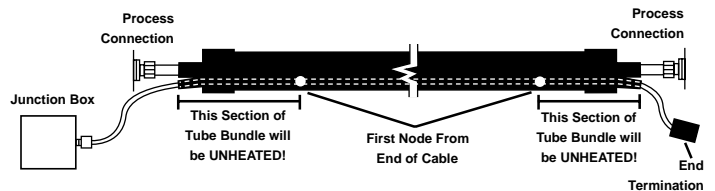


When installed, the first node must be a minimum of 6" (150mm) away from the junction box entry gland or the end termination fitting. The heater cable from the cut end to the first node will be unheated.

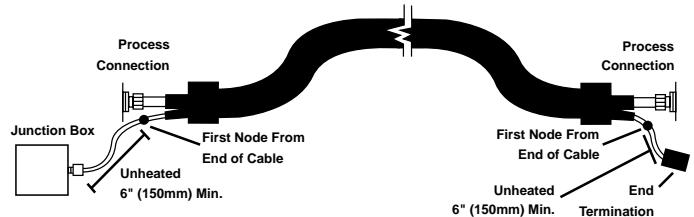


- Allow enough tubing to reach process connections at each end.
- Bundle length may need to be adjusted to insure that the ends of the tubing are in contact with a heated zone.

WRONG WAY:

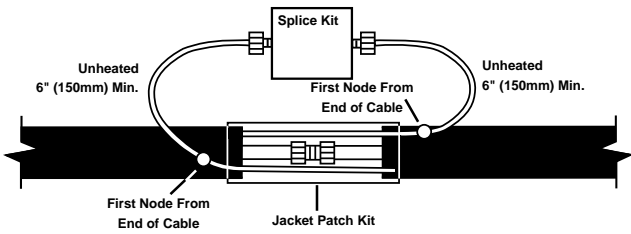


CORRECT WAY: Adjust length of installation so entire bundle length is heated.

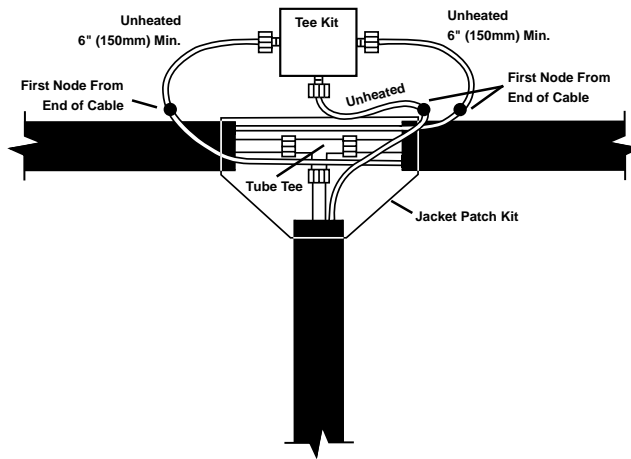


- Zone nodes must also be located when installing splice and tee connections.

Splice



Tee



Uncoiling and Straightening

Method 1 - Roll it out on the floor or other flat surface.

This will leave a slight bow that can be taken out by hand.



Method 2 - Use a second smaller spool to straighten the product as it is taken off of the larger shipping spool.



Minimum Bend Radius

- Minimum bend radius for all products with 5/8" (16mm) and smaller diameter tubes is 8" (200mm).
- Minimum bend radius for all products with 3/4" (19mm) and larger diameter tubes is 12" (300mm).

Bending

- The jacket will wrinkle when the bundle is bent. This is a normal condition and does not affect the performance or life of the bundle.
- Do not exceed the minimum bending radius.
- Use the O'Brien Bundle Bending Tool or a mandrel with the minimum bending radius such as a small spool.
- Bend on the small dimension. The bundle will tend to twist and then bend on this dimension naturally.



- To bend on the other (larger) dimension:
Method 1 - Make two back to back bends on small dimension and twist the bundle in the direction you want it to go.



- Method 2 - Grasp the bundle firmly and twist it 90°. Then make the bend. This technique may also be used to position the tubing for process connection.

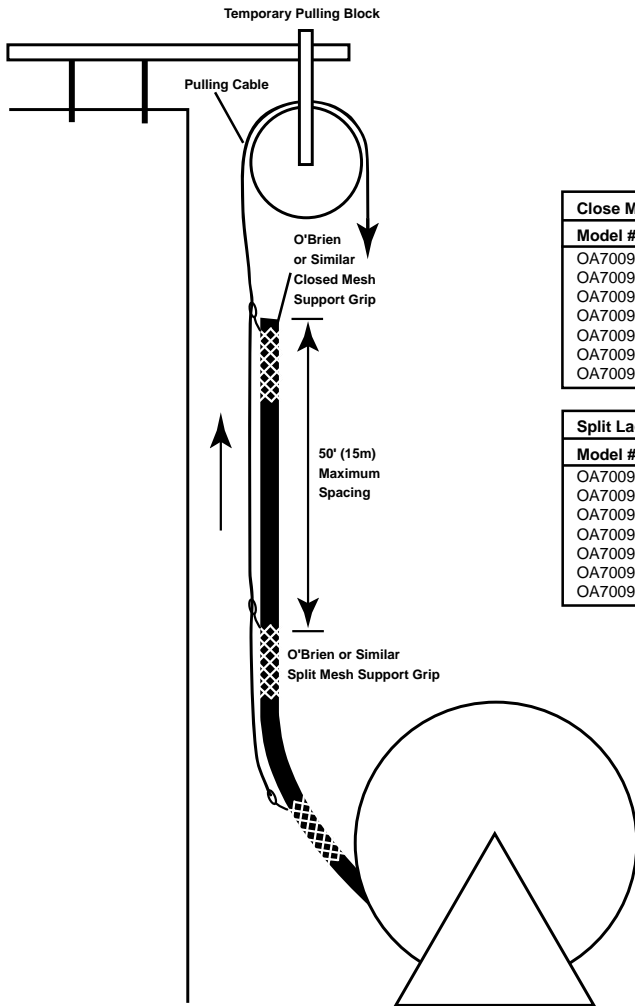


Vertical Runs

- Two methods are used, one pulls the probe or process end of the bundle into place and the other lifts the product spool to the highest point and lowers the instrument or analyzer end.

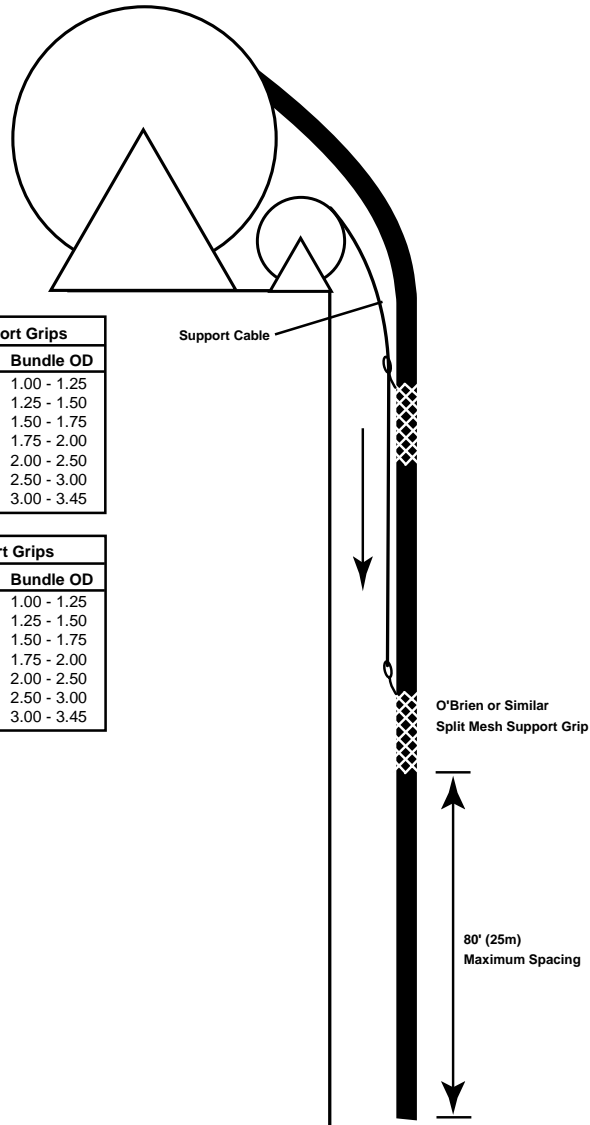
Lowering Bundle from Top Down

Pulling Bundle Into Place



| Close Mesh Support Grips | |
|--------------------------|-------------|
| Model # | Bundle OD |
| OA70095K15 | 1.00 - 1.25 |
| OA70095K16 | 1.25 - 1.50 |
| OA70095K17 | 1.50 - 1.75 |
| OA70095K18 | 1.75 - 2.00 |
| OA70095K19 | 2.00 - 2.50 |
| OA70095K21 | 2.50 - 3.00 |
| OA70095K21 | 3.00 - 3.45 |

| Split Lace Support Grips | |
|--------------------------|-------------|
| Model # | Bundle OD |
| OA70095K44 | 1.00 - 1.25 |
| OA70095K45 | 1.25 - 1.50 |
| OA70095K46 | 1.50 - 1.75 |
| OA70095K47 | 1.75 - 2.00 |
| OA70095K48 | 2.00 - 2.50 |
| OA70095K49 | 2.50 - 3.00 |
| OA70095K51 | 3.00 - 3.45 |



DO NOT PULL BUNDLE USING TRACER OR NON METALIC PROCESS TUBES.

DO NOT ALLOW UNSUPPORTED DROPS GREATER THAN 80' (25m)

- When pulling bundle into place the bundle must be attached to pulling cable at intervals not exceeding 50' (15m).
- Once in place the bundle must be permanently supported following recommended methods at specified support centers.
- When lowering bundle into place the bundle must be attached to pulling cable at intervals not exceeding 80' (25m).
- Once in place the bundle must be permanently supported following recommended methods at specified support centers.

Supporting

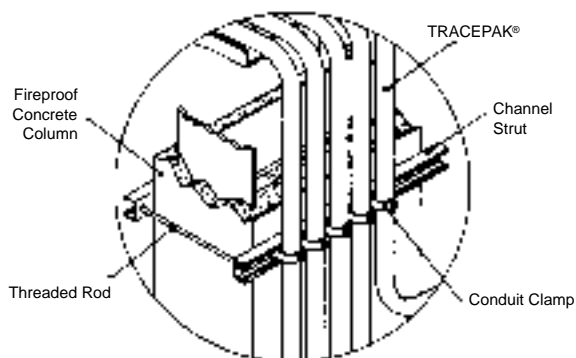
- Supports and hangers must have a large surface area and be designed so they can not be overtightened to crush the tubing bundle.

Do not use U-bolts as supports.

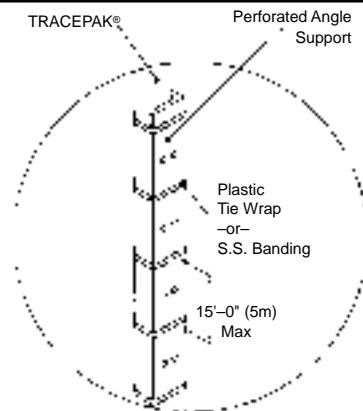
- Angle iron may be used as a support. Place the bundle in an angle sized $\frac{1}{2}$ " (12mm) larger than the largest dimension of the bundle and secure it with metal or plastic straps. Do not use wire ties.
- Cable tray may be used as a support. Maintain a minimum of $\frac{1}{2}$ " (12mm) space between bundles.

Maximum Support Centers

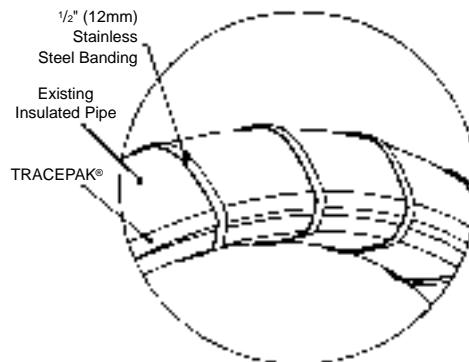
Vertical Runs - 15 feet (5 meters)
 Horizontal Runs - 6 feet (2 meters)
 Unsupported Horizontal Runs - 6 feet (2 meters) max*
 Support centers should be placed so bundle does not sag between supports. This distance will vary by bundle configuration.



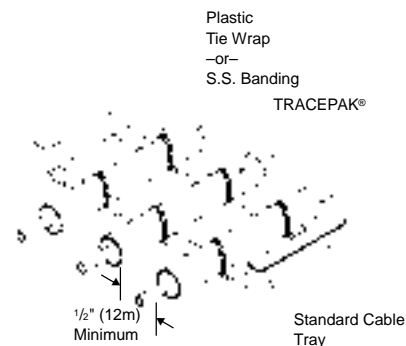
Detail 1



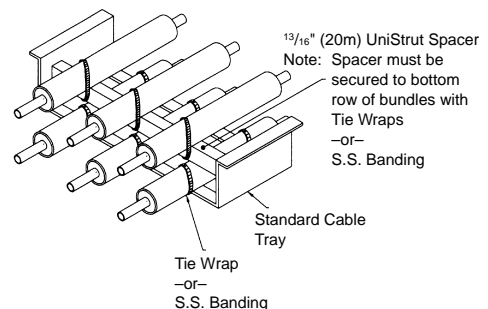
Detail 2



Existing Insulated Pipe



Standard Cable Tray



Sealing the Ends

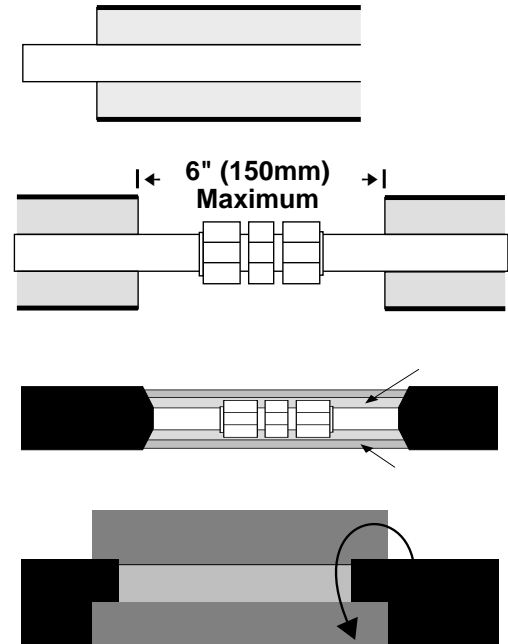
- All ends of the bundle must be sealed temporarily during installation. Use a heavy weight plastic bag and tape it in place to temporarily seal the end of the bundle.
- TPKJP Jacket Patch – see page 9
- TPKES Entry Seal – see page 10
- TPKHS Heat Shrink Boots – see page 11
- TPKSK Silicone Sealant – see page 12

TPKJP-1, TPKJP-2 Jacket Patch

O'Brien's Jacket Patch Kit is made up of thermal insulation, fiberglass tape to hold the insulation in place, and a black self-sealing rubber patch for weatherproofing the bundle. It is to be used to insulate an area where two bundles have been spliced together and the tubes connected with a tube fitting.

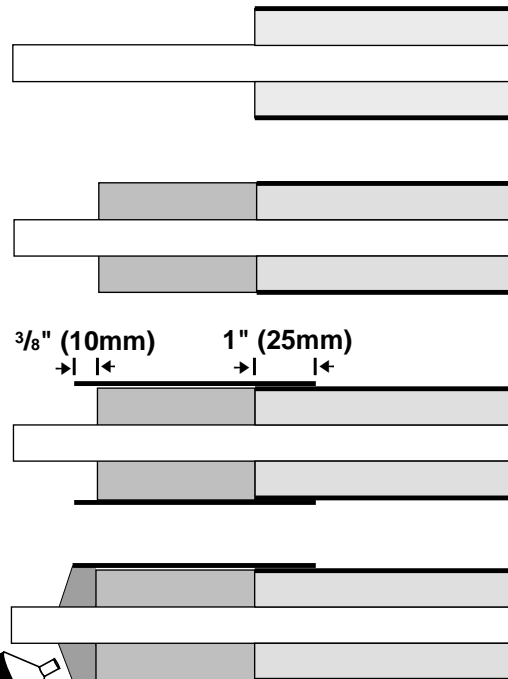
To install the jacket patch kit at a splice.

- Cut the ends of both bundles off square, exposing only the needed length of tubing*.
- Splice the tubes together using a standard compression type fitting. Wrap the area with the insulation until the diameter is built up to equal the diameter of the jacket on the bundle. Use the fiberglass adhesive tape to hold the insulation in place.
- Cut the black rubber patch so that it extends over the existing jackets 1" (25mm). Remove the protective wax paper backing and wrap it around the patch area. Leave the clear protective layer in place and facing out. Overlap the ends by at least 1/2" (12mm) and press it into place. Use the fiberglass tape to hold it in place and prevent separation of the seams until it cures.



To install the jacket patch kit at a bundle end.

- Cut the end of the bundle off square, exposing only the needed length of tubing*.
- Wrap insulation around the tubes and fittings. At the end where the patch material will end, wrap insulation around the individual tubes to build the diameter to equal the bundle.
- Cut the patch material to extend over the bundle jacket 1" (25mm) and past the insulation on the individual tubes 3/8" (10mm).
- Remove the protective wax paper backing and wrap it around the patch area. Leave the clear protective layer in place and facing out. Overlap the ends by at least 1/2" (12mm) and press it into place. Use the fiberglass tape to hold it in place and prevent separation of the seams.
- Fill the end with RTV sealant, such as O'Brien TPKSK, making sure that all exposed insulation is protected.

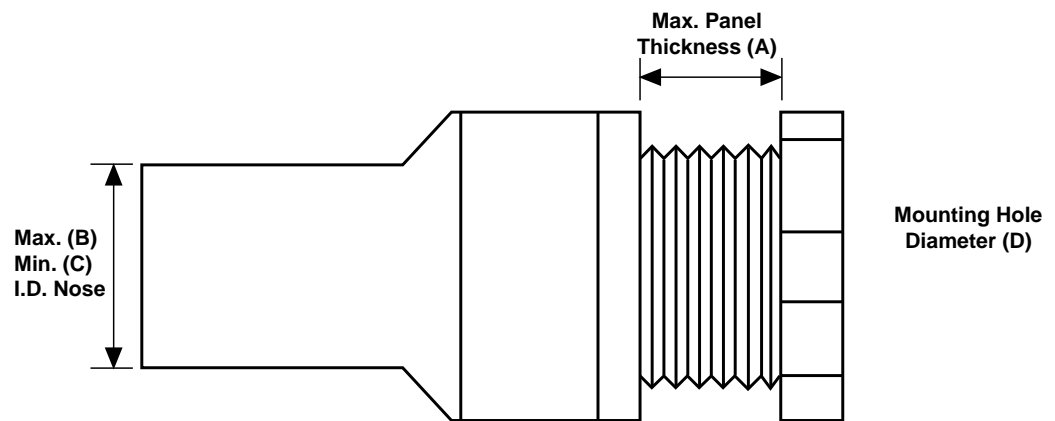


TPKES - Entry Seal

TPKES The heat-shrinkable entry seal provides a waterproof fitting where STACKPAK enters an enclosure. They can be added to parting line or surface mounted plates on VIPAK enclosures or any enclosure. The thermally stabilized, modified polyolefin entry seal consists of a threaded assembly that seals at the enclosure and a heat-shrinkable nose that seals to the bundle.

TPKES Selection

| Model Number | Max. Panel Thickness (A) | Maximum I.D. Nose (B) | Minimum I.D. Nose (C) | Mounting Hole Diameter (D) |
|-----------------|--------------------------|-----------------------|-----------------------|----------------------------|
| TPKES-4 | 0.50" (12mm) | 1.60" (40mm) | 0.75" (19mm) | 2.00" (50mm) |
| TPKES-4S | 1.00" (25mm) | 2.10" (51mm) | 0.75" (19mm) | 2.38" (60mm) |
| TPKES-5 | 1.00" (25mm) | 2.75" (70mm) | 1.43" (36mm) | 3.50" (88mm) |
| TPKES-6X | 1.40" (36mm) | 3.50" (89mm) | 0.73" (19mm) | 4.75" (120mm) |



Installation

- Place rigid, externally threaded nut through hole, so flanged end is on the inside of enclosure.
- If the enclosure is purged or kept at a positive pressure, place O-ring over threaded end and position against outside of enclosure. Otherwise the O-ring may be omitted to provide additional thread engagement.
- Screw shrinkable, internally threaded nose on to rigid nut and tighten using appropriate spanner wrenches.
- Insert bundle through expanded opening and make necessary connections.
- Shrink expanded nose by applying heat with a heat gun. Move the heat gun back and forth over the nose applying heat evenly. Once the nose has assumed the shape of the bundle, discontinue heat. Further heating will not make the nose shrink tighter.

TPKHS - Heat shrink boots

TPKHS is a series of heat-shrinkable end seal boots made of a thermally stabilized, modified polyolefin. They are designed to provide a weatherproof seal at the end of tubing bundles. These boots may be used for process temperatures up to 400°F (204°C).


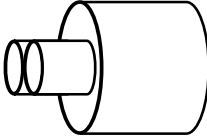
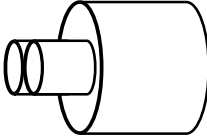
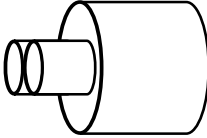
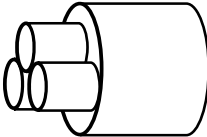
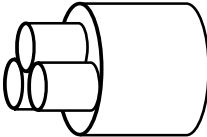
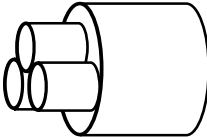
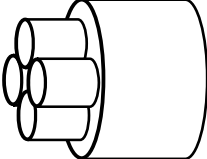
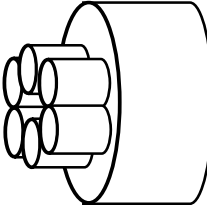
Installation

- Cut back the bundle leaving the desired length of tubing exposed. This can be as short as 13" (160mm).
- Spread the tubes apart enough to fit into the legs on the end of the boot. We suggest that you bend the process tubes to the correct instrument connection centers before installing the boot. This will result in a more compact installation.
- Slip the boot over the end of the bundle with one tube, tracer or wire bundle in each leg until the bundle seats at the bottom of the boot. Be careful not to nick or cut the boot. Nicks and cuts will cause the boot to split during heat shrinking.
- Use a heat gun to shrink the boot over the bundle, tubes and tracer. Move the heat source back and forth over the boot applying heat evenly. Once the boot has assumed the shape of the bundle and the tubes, stop applying heat. Further heating will not make the boot shrink more tightly. If required, the boot leg should be pinched with pliers while hot and held till cool to reduce the leg diameter. Cut tubing and tracer to length required for instrument and tracer connections.



CAUTION

When applying a heatshrink boot to a product with Teflon or plastic tubing, take care not to overheat the tubing.

| | Body dia. Min/Max | Leg dia. Min/Max |
|---|----------------------------|----------------------------|
|  TPKHS-E1 | 0.375"/1.30" (9mm/33mm) | — |
|  TPKHS-C2 | 0.95"/1.90" (24mm/48mm) | 0.30"/0.75" (8mm/19mm) |
|  TPKHS-D2 | 0.45"/1.60" (11mm/40mm) | 0.15"/0.55" (4mm/14mm) |
|  TPKHS-L2 | 1.50"/3.00" (38mm/75mm) | 0.50"/1.5" (12mm/38mm) |
|  TPKHS-A3 | 1.40"/2.40" (36mm/60mm) | 0.50"/1.13" (12mm/28mm) |
|  TPKHS-B3 | 0.90"/1.70" (22mm/43mm) | 0.30"/0.80" (8mm/20mm) |
|  TPKHS-H3 | 2.00"/3.20" (50mm/80mm) | 0.75"/1.40" (19mm/35mm) |
|  TPKHS-J4 | 1.40"/2.65" (36mm/67mm) | 0.43"/1.20" (11mm/30mm) |
|  TPKHS-K6 | 1.45"/2.40" (37mm/61mm) | 0.35"/0.80" (9mm/20mm) |

Combining Tubes & Messenger Wires in a Common Leg

- At times it may be necessary to route multiple tubes or messenger wires through a common leg in a heat shrink boot. This can be done if you seal any voids left in the leg after it has been heat shrunk to its minimum size. Use silicone RTV sealant to fill voids left between multiple tubes or messenger wires. Force the sealant into the voids by inserting the tapered end of the tube into the void and squeezing in silicone until it fills the void and starts to overflow.
- Do not combine heater cable with any other component. Each heater cable must be routed through its own leg in a heat shrink boot.

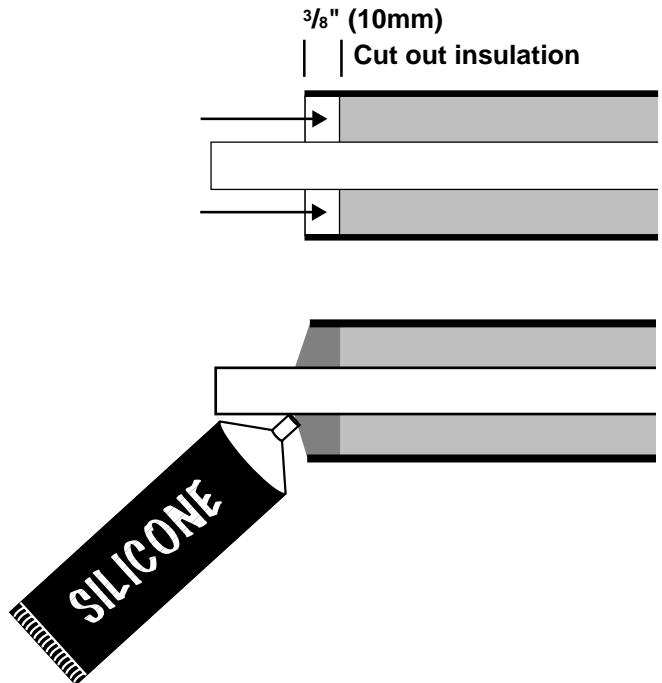
TPKSK - Silicone Sealant

O'Brien's RTV end sealant is a black adhesive/sealant which cures to a tough rubbery solid upon exposure to moisture in the air. The cure time is 24 hours at 77°F (25°C) and a relative humidity of 50%. Its maximum service temperature extremes are -60°F to 450°F (-60°C to 210°C). It has excellent resistance to weather, oil, and many chemicals.

TPKSK-10 will seal approximately 10 bundle ends.

To install the end sealant, follow these instructions:

- Cut the bundle square on the end leaving the desired length of tubing exposed.
- Bend the process tubes to the correct instrument connection centers.
- Cut the insulation back under the jacket about $\frac{3}{8}$ " (10mm). **Caution:** It is important to cut the insulation out rather than pushing it back.
- Fill the end with end sealant making sure that all exposed insulation is protected.



Electric Connections and Terminations

- Electric tracers must be connected and terminated using approved power connection and termination kits. See instructions provided with the power connection kit.

Select Correct Power Connection and End Termination Kits Depending Upon Electric Tracer Supplied

| Tracer | W / Ft | Voltage | Unclassified Areas | FM/CSA CL I, Div 2 | ATEX EEx es |
|---------------|---------------|----------------|----------------------------------|----------------------------------|----------------------------------|
| JV20 | 20 | 120 | T850-PC (power) T850-ET (end) | T850-PC (power) T850-ET (end) | T850-PC (power) T850-ET (end) |
| JN20 | 20 | 240 | T850-PC (power) T850-ET (end) | T850-PC (power) T850-ET (end) | T850-PC (power) T850-ET (end) |
| K12 | 120 | KCAB-4C | KCAB-4C | KCAB-4C | — |
| KN12 | 240 | KCAB-4C | KCAB-4C | KCAB-4C | — |
| KY12 | 208 | KCAB-4C | KCAB-4C | KCAB-4C | — |
| T18 | 120 | T9G90-UC | T9G90-UC | — | — |
| TN18 | 240 | T9G90-UC | T9G90-UC | — | — |
| TY18 | 208 | T9G90-UC | T9G90-UC | — | — |

Temperature Sensors

The temperature sensing bulb, RTD or thermocouple should be placed in direct contact with the process tube or tubes and not in contact with the electric tracer. Each temperature sensor is different and specific installation procedures may vary.

Field Installed Temperature Sensors

- Route the capillary or lead wires along the bundle away from heat sources other than the tracer in the bundle. (Do not place near process connection or the heater in an enclosure.)

Insure that the location you select for the temperature sensor is in a heated section of the bundle. Check that the electric tracer is properly connected and terminated and that it is safe to temporarily energize the heater cable.

Energize the heater. Using your hand feel along the area of the bundle where you will install the temperature sensor to see if it gets warmer. You should be able to feel the bundle warm up. Disconnect the tracer and proceed with the installation.

- Locate the tracer in the bundle. The tracer can usually be felt through the bundle and insulation. Make a slit lengthwise along the bundle, opposite the tracer, where the sensor will be placed. The slit should be about 2" (50mm) longer than the length of the sensor and it must go through the insulation and mylar.
- Insert the bulb in the bundle in direct contact with the process tube or tubes. Cut three pieces of the 2" (50mm) wide fiberglass insulating tape about 1" (25mm) less than the length of the slit. For each piece, fold the tape along the cut length making a double layer tape of 1" (25mm) wide. Work each of the three tapes into the slit covering the capillary bulb and under the jacket material.
- Use the fiberglass tape supplied with the jacket patch kit to wrap the bundle over the slit every 1 1/2" (40mm). Secure the capillary to the bundle with the tape for a distance of at least 2" (50mm) from the end of the slit. Apply a liberal bead of sealant, similar to TPKSK, along each side of the capillary.
- Use the black rubber patch supplied with the jacket patch kit and wrap the bundle to seal the slit. Cut the black rubber patch so that it extends 2" (50mm) past the slit in both directions. Remove the protective backing and wrap it around the patch area, overlapping it, and press into place. Wire the switch to the power supply and the tracer per local and applicable codes.



Connecting Factory Installed Temperature Sensors to a Controller

- Identify if your bundle was supplied with factory installed temperature sensors. See "Model Number and Product Identification"
- Locate the leads as they exit the bundle.

RTD leads may be supplied with an armor flex cable which will contain:

- Red lead
- White leads

Thermocouple leads may be supplied with a common overjacket.

| Type | Overjacket | +Lead | -Lead |
|------|------------|--------|-------|
| J | Brown | White | Red |
| K | Brown | Yellow | Red |
| T | Brown | Blue | Red |

Connect the leads according to the instruction provided with the controller.



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