

# OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

## Cast Resin Transducer

with Temperature Sensor

Model: R99

10/03

17-335-01 rev. 02

**IMPORTANT:** Please read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

### CAUTION: NEVER USE SOLVENTS

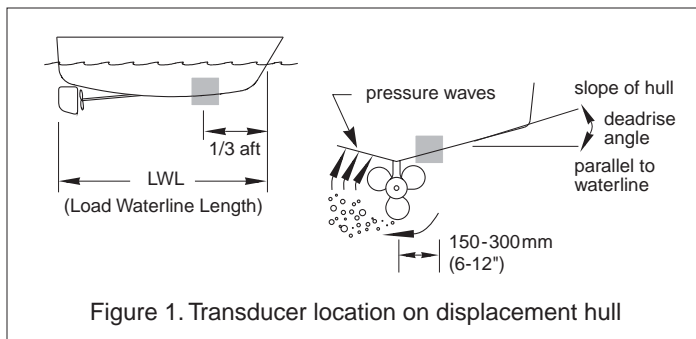
Cleaners, fuel, paint, sealants, and other products may contain strong solvents, such as acetone, which attack many plastics greatly reducing their strength.

## Applications

- Recommended for fiberglass, wood, or steel hulls
- *Steel hull*—Follow generally accepted installation practices
- *Aluminum hull*—Use a stainless steel stuffing tube. Never mount a bronze stuffing tube in an aluminum hull because electrolytic corrosion will occur.
- Not recommended for hulls less than 9m (30') long
- Maximum deadrise angle 25°

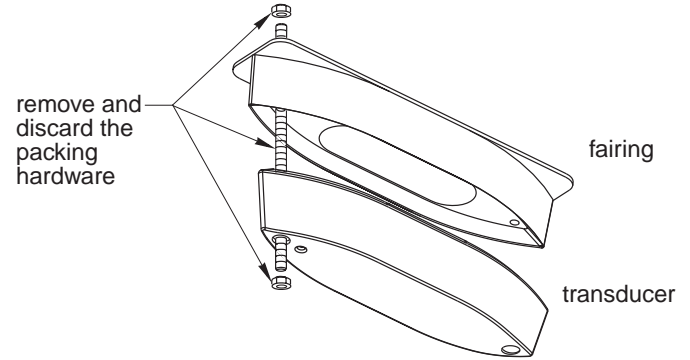
## Tools and Materials

- Safety goggles
- Dust mask
- Electric drill with 10mm (3/8") or larger chuck capacity
- Drill bits and hole saw:
  - Pilot hole 3mm or 1/8"
  - Stuffing tube 44mm or 1-3/4"
  - Threaded rods 14mm or 9/16"
- Sandpaper
- Mild household detergent or weak solvent (such as alcohol)
- File (installation in a metal hull)
- Marine sealant
- Slip-joint pliers
- Digital level or bubble level & protractor
- Band saw or hand saw (blade must be very sharp)
- Rasp or power tool
- Permanent marker
- Torque wrench
- Zip-ties
- Water-based antifouling paint (**mandatory in salt water**)



Record the information found on the cable tag for future reference.

Part No. \_\_\_\_\_ Date \_\_\_\_\_ Frequency \_\_\_\_\_ kHz



## Pretest

Remove and discard the packing hardware (rod and 2 nuts) (see figure above). Connect the temperature function to the instrument. Check for the approximate air temperature. If there is no reading or it is inaccurate, return the product to your place of purchase.

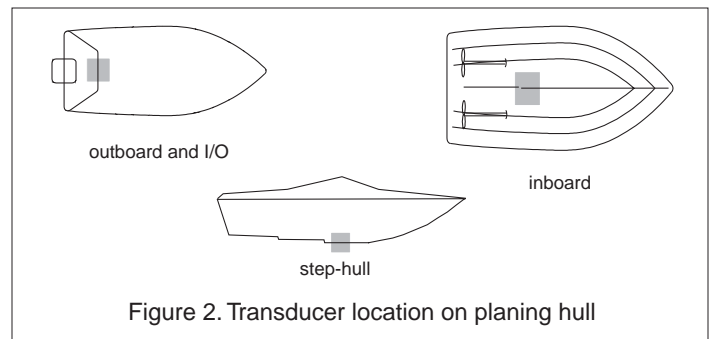
## Mounting Location

### Acoustic Noise

Acoustic noise is always present and these sound waves can interfere with the operation of the transducer. Ambient (background) noise from sources such as: waves, fish, and other vessels cannot be controlled. However, carefully selecting the transducer's mounting location can minimize the effect of vessel generated noise from the propeller(s) and shaft(s), other machinery, and other echosounders. The lower the noise level, the higher the echosounder gain setting that can be used.

### Boat Types

- **Displacement hull powerboat**—Locate 1/3 aft LWL and 150–300mm (6–12") off the centerline on the side of the hull where the propeller is moving downward (see Figure 1).
  - **Planing hull powerboat**—Mount well aft, on or near the centerline, and *well inboard of the first set of lifting strakes* to insure that the transducer is in contact with the water at high speeds (see Figure 2). Mount on the side of the hull where the propeller blades are moving downward.
    - Outboard and I/O**—Mount just forward of the engine(s).
    - Inboard**—Mount well ahead of the propeller(s) and shaft(s).
    - Step-hull**—Mount just ahead of the first step.
- Boat capable of speeds above 25kn (29MPH)**—Review transducer location and operating results of similar boats before proceeding.



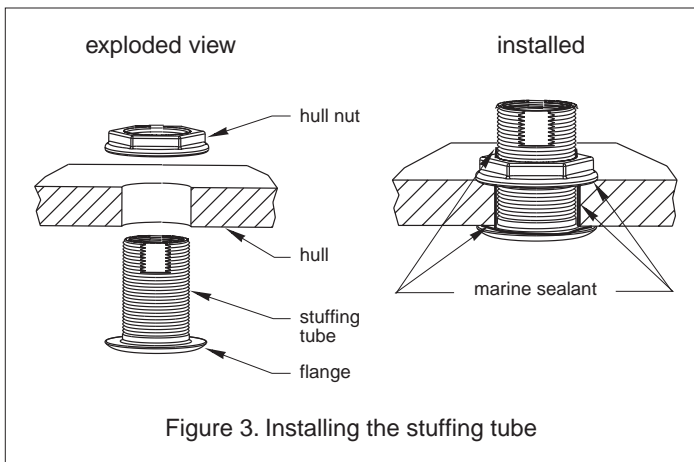


Figure 3. Installing the stuffing tube

## Placement

Choose a location where:

- The water flowing across the hull is smoothest with a minimum of bubbles and turbulence (especially at high speeds).
- The transducer will be continuously immersed in water.
- The transducer beam is unobstructed by the keel or propeller shaft(s).
- There is a minimum deadrise angle not to exceed 25°
- There is adequate headroom inside the vessel for the height of the stuffing tube and tightening the nuts.

**Caution:** Do not mount the transducer:

- Near water intake or discharge openings*
- Behind strakes, fittings, or hull irregularities*
- Behind eroding paint (an indication of turbulence)*

## Installing the Stuffing Tube

Installation requires a stuffing tube. The stuffing tube seals the hull forming a water-tight conduit for the cable.

**Warning:** Always wear safety goggles and a dust mask.

1. At the selected mounting location inside the hull, drill a 3mm or 1/8" diameter pilot hole perpendicular to the *hull*. If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside.
2. Using a 44mm or 1-3/4" diameter hole saw, cut a hole from outside the hull. *Be sure* to hold the drill perpendicular to the hull.
3. Sand and clean the area around the hole, inside and outside, to ensure that the marine sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either a mild household detergent or a weak solvent (alcohol) before sanding (see Figure 3).

**Metal hull**—Remove all burrs with a file and sandpaper.

4. Bed the stuffing tube by applying a 2mm (1/16") thick layer of marine sealant around the flange that makes contact with the outside of the hull. Apply a 2mm (1/16") thick layer of marine sealant up the sidewall of the tube, 6mm (1/4") higher than the combined thickness of the hull and the hull nut. Apply a 3mm (1/8") thick layer of marine sealant to the flange of the hull nut. This will ensure there is marine sealant in the threads to seal the hull and hold the hull nut securely in place.
5. From outside the hull, push the stem of the stuffing tube through the mounting hole using a twisting motion to squeeze out excess sealant. From inside the hull, screw the hull nut in place. Tighten it with slip-joint pliers.

**Wood hull**—Allow the wood to swell. *After the hull has expanded, tighten the hull nut securely.*

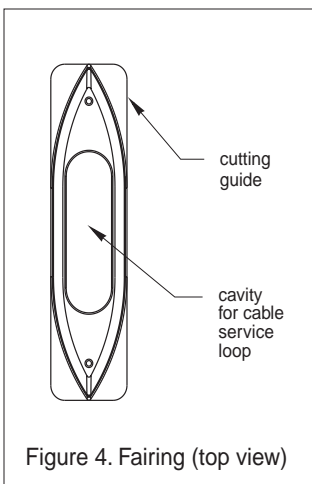


Figure 4. Fairing (top view)

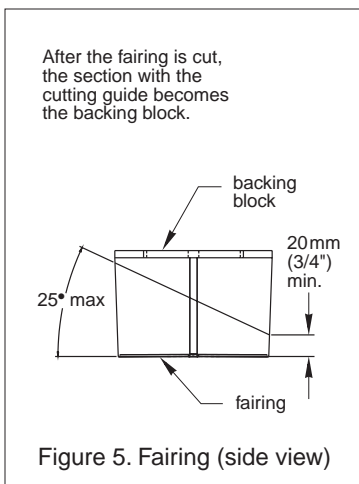


Figure 5. Fairing (side view)

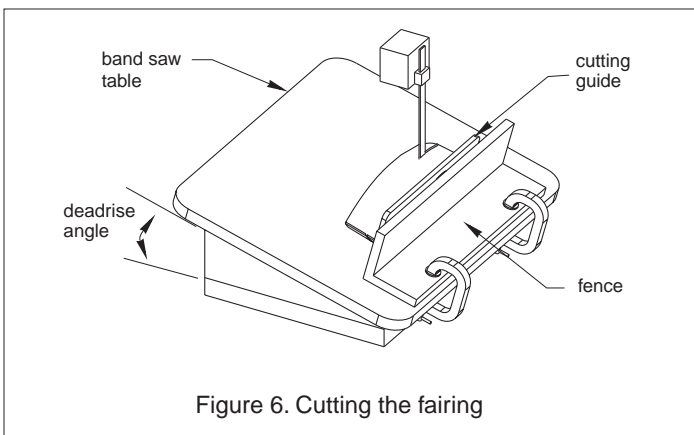


Figure 6. Cutting the fairing

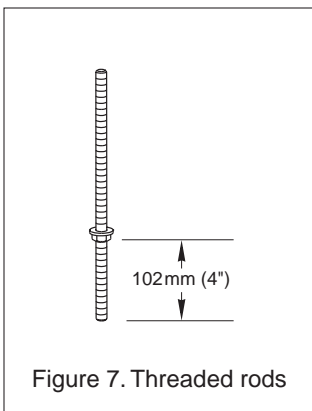


Figure 7. Threaded rods

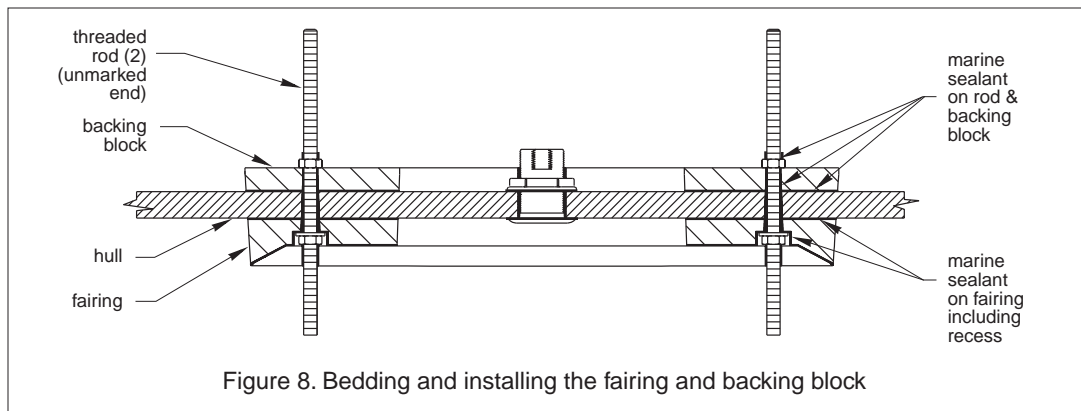


Figure 8. Bedding and installing the fairing and backing block

## Fairing

- Orients the sound beam straight down by mounting the transducer parallel to the water surface
- Minimizes aerated water flowing over the transducer's face by mounting it deeper in the water

## Cutting the Fairing

**Caution:** *The deadrise angle of the hull cannot exceed 25°.*

1. From outside the hull, position the fairing at the selected location. The stuffing tube will be located in about the center of the oval cavity (see Figure 4).
2. Measure the deadrise angle of the hull at the selected location using a digital level, or bubble level and protractor (see Figure 5).
3. Tilt the band saw table to the measured angle and secure the cutting fence (see Figure 6).
4. Place the fairing on the table so the cutting guide rests against the fence. Note the fairing is symmetrical (see Figures 4 and 6).
5. Adjust the fence so the fairing will be cut in about two equal parts. The fairing *must* be a minimum of 20mm (3/4") at its thinnest dimension (see Figure 5).

**Warning:** *Always wear safety goggles and a dust mask.*

6. Recheck steps 2 through 5; then cut the fairing.
7. Shape the fairing to the hull as precisely as possible with a rasp or power tool.
8. The remaining section of the fairing (with the cutting guide) will be used as the backing block inside the boat. This will provide a level surface for the nuts to seat against.

## Dry Fitting the Fairing

**Warning:** *The fairing must be installed parallel to the keel to ensure proper boat handling and water flow over the transducer.*

1. Hold the fairing against the outside of the hull with the stuffing tube in the center of the cavity (see Figure 4). The fairing *must* be parallel to the centerline of the boat (keel). Using the *forward* hole in the fairing (nearest the bow) as your guide, drill a 14mm or 9/16" diameter hole through the hull for one threaded rod.
- Do not drill the second hole at this time.**

2. Prepare the threaded rods. Using a permanent marker, draw a line on each threaded rod 102mm (4") from the end. Add identifying markings along this length of each rod. (The marked

length of the rod will be used to fasten the transducer to the fairing at a later time.) Screw a nut onto the marked length of each threaded rod *above* the 102mm (4") line drawn (see Figure 7).

3. Place the fairing against the hull. Push the *unmarked* end of the threaded rod through the fairing and the hull until the nut rests inside the recess in the fairing (see Figure 8). With a person stationed inside the vessel, slide the backing block onto the rod. Secure the rod with a washer and nut. *Hand tighten only.*
4. Align the fairing parallel to the centerline of the boat (keel). Using the aft hole in the fairing as a guide, drill a 14mm or 9/16" diameter hole through the hull for the second threaded rod.
5. When dry fitting is complete, remove the fairing from the hull.

## Bedding and Installing the Fairing

1. Apply a 2mm (1/16") thick layer of marine sealant to the surface of the backing block that will contact the hull, to the fairing that will contact the hull, and to each threaded rod. Slide a washer along the unmarked length of each threaded rod until it rests against the nut (see Figure 8).

**Note:** *Be sure* to apply marine sealant to the threads under the nuts. Back each nut off 13mm (1/2"). Apply sealant to the threaded rods and return each nut to the marked location on the rod (see Figure 7).

2. Push the *unmarked* length of each threaded rod through the fairing, the hull, and the backing block until the washer rests inside the recess in the fairing. With a person stationed inside the vessel, secure the rod with a washer and a nut (see Figure 8). Tighten the nuts on both rods with a wrench.

**Wood hull**—Allow for the wood to swell. *After the hull has expanded, tighten the nuts securely.*

## Bedding and Installing the Transducer

**Caution:** *Never pull, carry, or hold the transducer by its cable as this may sever internal connections.*

1. Apply a 2mm (1/16") thick layer of marine sealant to the surface of the transducer that will contact the fairing. Apply a 2mm (1/16") thick layer of marine sealant in the recess for the washer and nut *Be sure* there is sealant on the threaded rods (see Figure 9).
2. Thread the transducer cable through the stuffing tube. Allow a service loop of 25cm (10") of cable within the cavity of the fairing (see Figures 9 and 10).

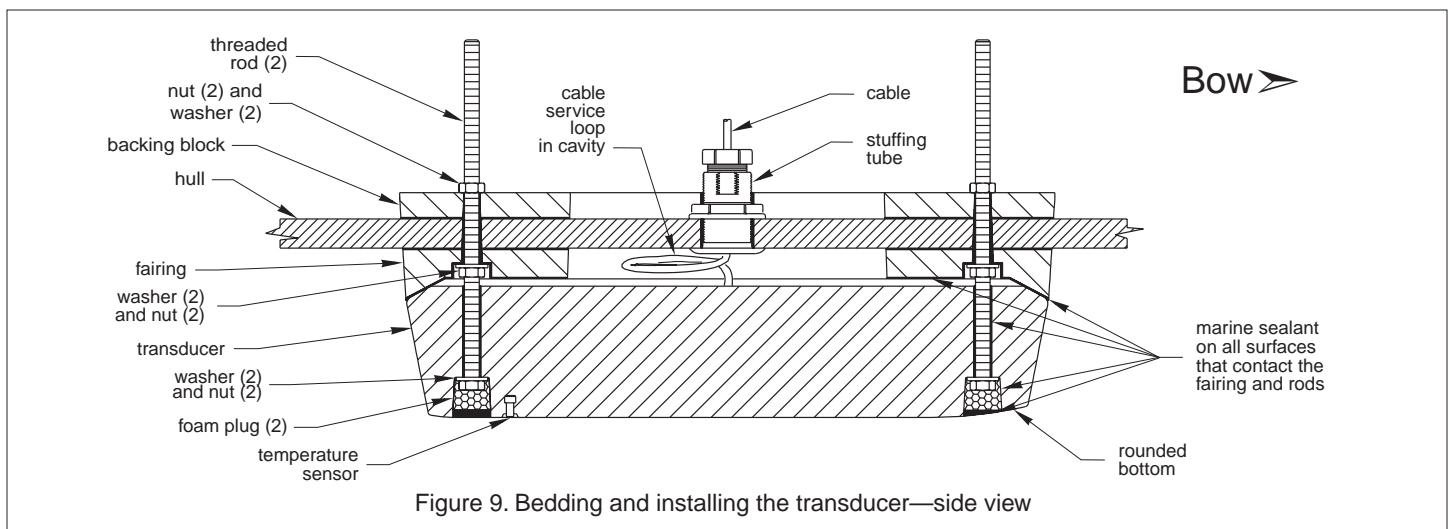


Figure 9. Bedding and installing the transducer—side view

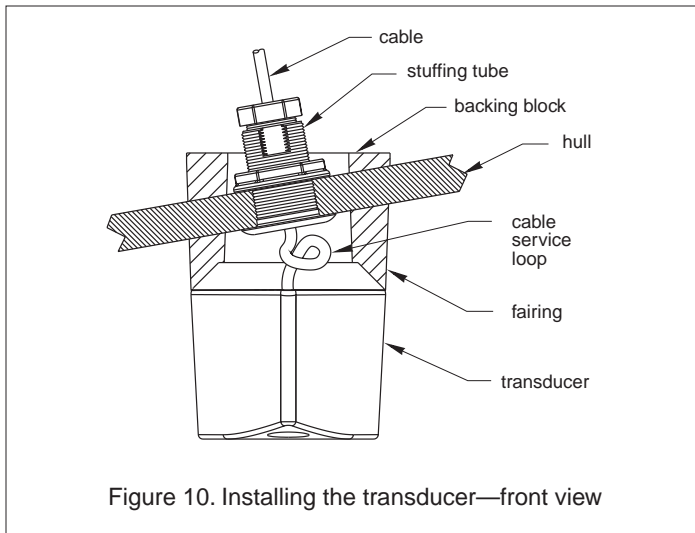


Figure 10. Installing the transducer—front view

- Slide the transducer onto the threaded rods *being sure* the rounded bottom is facing forward toward the bow and the temperature sensor is aft. Seat the transducer firmly within the recess in the fairing. Secure the transducer in place by applying a washer and a nut to each threaded rod (see Figure 9). Tighten both nuts with a torque wrench using a force not exceeding 12N-m (10ft.-lb.). *Be sure the rods extend a minimum of 3 threads beyond the nut after being tightened.*
- Plug the mounting holes to minimize turbulence on the surface of the transducer. *Be sure* there is marine sealant on the exposed threads of the rods. Cut the white foam plugs to length so that when installed, each plug is recessed 5mm (3/16") below the surface of the transducer. Push the foam plugs into the holes. Use marine sealant to fill the remaining recess flush with the transducer's surface.
- Remove excess marine sealant on the outside of the hull to ensure smooth water flow.

## Cable

**Warning:** To form a watertight seal in the stuffing tube, stagger the splits in all the washers.

- To seal the cable inside the stuffing tube, slide the four compliant split washers around the cable. Place one brass split washer above the compliant washers and one below them. *Be sure* to stagger all the splits. Seat the stack securely against the machined lip inside the stuffing tube (see Figure 11).
- Screw the compression nut into the stuffing tube until it is snug. Using slip joint pliers, tighten the compression nut one half turn. This will compress the compliant washers slightly for a watertight seal.
- Route the cable to the echosounder being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. To reduce electrical interference separate the transducer cable from other electrical wiring and the engine. Coil any excess cable and secure it in place with zip-ties to prevent damage.
- Refer to your echosounder owners manual to connect the transducer to the instrument.

## Checking for Leaks

**Warning:** Never install a transducer and leave the boat in the water unchecked for several days.

When the boat is placed in the water, **immediately** check around the bolts that fasten the transducer to the hull and the stuffing tube for leaks. Note that very small leaks may not be readily observed. It is best not to leave the boat in the water unattended for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat the bedding and installing procedures beginning on page 3 **immediately**.

## Maintenance, Repair, and Replacement

### Antifouling Paint

Surfaces exposed to salt water *must* be coated with antifouling paint. Use **water-based** antifouling paint only. *Never* use ketone-based paint since ketones can attack many types of plastic possibly damaging the transducer. Reapply antifouling paint every 6 months or at the beginning of each boating season.

### Cleaning

Aquatic growth can accumulate rapidly on the transducer's surface reducing its performance within weeks. Clean the surface with a soft cloth and mild household detergent. If necessary, use a stiff brush or putty knife to remove the growth taking care to avoid making scratches. If fouling is severe, wet sand with #220 or finer grade wet/dry paper.

### Parts

Fairing & Stuffing Tube 33-439-01

### Transducer Replacement

The information needed to order a replacement Airmar transducer is printed on the cable tag. *Do not* abrade the marking or remove this tag. When ordering, specify the part number, date, and frequency in kHz. For convenient reference, record this information on the top of page one where indicated.

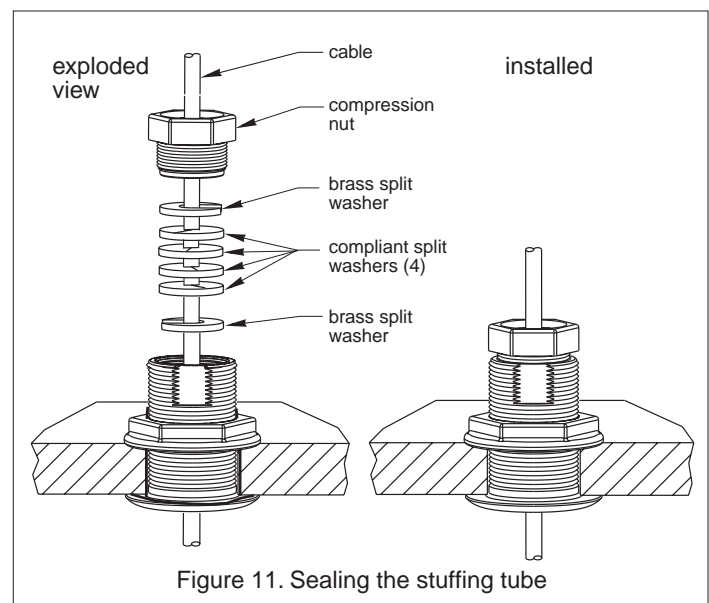


Figure 11. Sealing the stuffing tube

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