

Recommended Construction and Installation Instructions for the Composite Panel Bycatch Reduction Device with a Cone Fish Deflector

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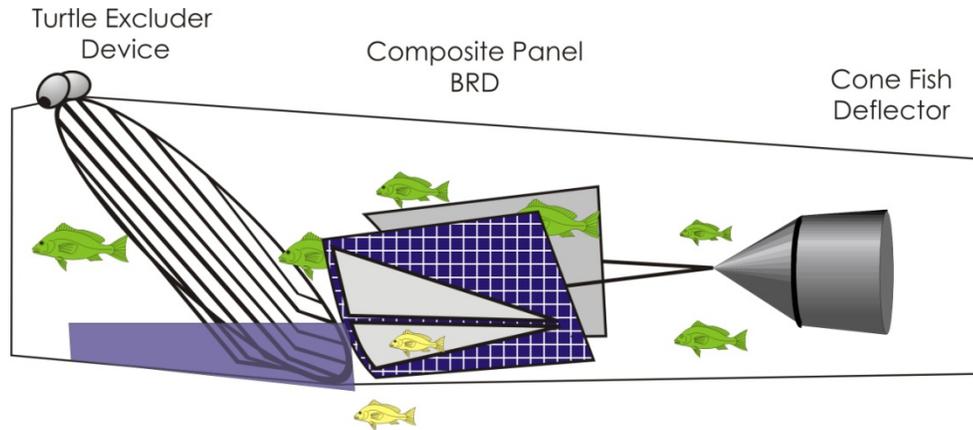


Figure 1: Composite Panel Shrimp Trawl Bycatch Reduction Device with a Cone Fish Deflector.

The Composite Panel Bycatch Reduction Device (BRD) (figure 1) is a funnel type BRD that is installed in the Turtle Excluder Device (TED) extension immediately behind the TED. The “funnel” consists of two panels installed in the lower part of the extension. The panels taper inward creating a slow flow area that allows escapement of fish through two triangular escape openings cut into the extension on each side of the trawl. Each composite panel is comprised of two overlapping panels, a diamond mesh panel (interior) and a square mesh exterior panel (figure 2). The inner panel reduces the water flow creating the slow flow necessary for fish escapement. The outer square mesh panel provides support, preventing the panels from billowing outward and closing off the escape openings.

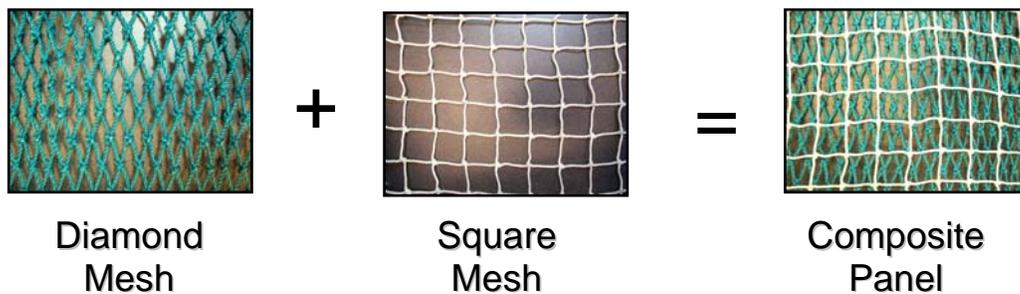


Figure 2: Components of the Composite Panel

Figure three demonstrates the purpose of the outer square mesh panels. The images were taken in a trawl behind the TED and BRD looking forward. The image on the left (a) shows diamond mesh panel unsupported by a square mesh panel. The water pressure causes the diamond meshes to expand which allows the panel to collapse against the sides of the extension closing off the escape opening holes. The image on the right (b) shows the diamond mesh panel supported by the square mesh panel. The square mesh panel allows for clearance between the panel and extension. Fish respond to the slow water flow created by the composite panel and take up position in the trawl near the escape openings.

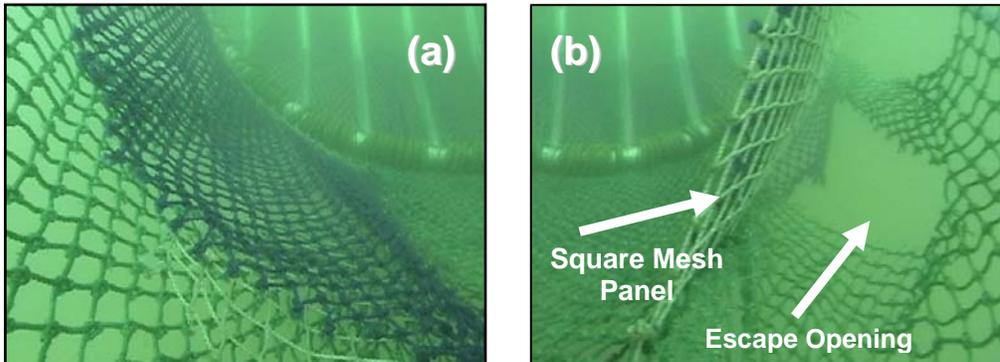


Figure 3: Composite panel on the port side with the square mesh component detached, causing the diamond mesh to collapse (a). Square mesh on the starboard side (b) supporting the diamond mesh maintaining space between the composite panel and trawl extension.

Instructions for construction of the Composite Panel BRD

Abbreviations and definitions of terms used in the instructions

SM	Square Mesh Panel
DM	Diamond Mesh Panel
M	Mesh (Squares along the run of twine)
P	Point (Squares transverse to the run of twine)
B	Bar (one of four sides of a mesh)
Leading Edge	The side of a webbing panel that will be facing forward, toward the mouth of the trawl.
Trailing Edge	The side of a webbing panel that faces aft, toward the codend or trawl bag.

When counting, each square is referred to as a mesh.

Note: These instructions assume at least a minimal knowledge of trawl construction techniques and terminology.

Construction of the webbing extension

The webbing extension is constructed from a single piece of 1-5/8 inch (41 mm) stretch mesh 24-1/2 meshes by 149.5 meshes. At the completion of the construction process, the 24-1/2 mesh sides will be joined to form a tube of webbing. The Composite panel can be constructed using the existing TED extension as long as the portion of the TED extension behind the grid meets the BRD extension requirements.

Cutting the extension escape openings

There are two sets of escape openings in the extension. Each set is comprised of two openings making a total of four openings in the extension. A diagram of the escape opening placement and dimensions can be seen in Figure 4. Orient the extension webbing so that the left corner of the leading edge starts on a whole mesh. Count 39.5 meshes along the leading edge of the webbing. Start the first escape opening of the set by making a 9 mesh cut on an even row of meshes 1-1/2 meshes inward of the leading edge of the extension webbing. Next, turn 90 degrees and cut 15 points on an even row toward the trailing edge of the extension webbing. At this point turn and cut 18 bars forward and to the left. Finish the escape opening by cutting 6 points toward the original starting point. The second opening of the set is a mirror image of the first opening with 5 meshes of space between the openings. The 5 mesh strip of webbing between the escape openings is a webbing brace that allows the extension to maintain its' shape during towing.

From the top right corner of the second opening, count 25 whole meshes to the right parallel the leading edge of the extension webbing and repeat the previous steps to create the second set of escape openings. Selvage the perimeter of the escape opening cuts to prevent the knot from separating.

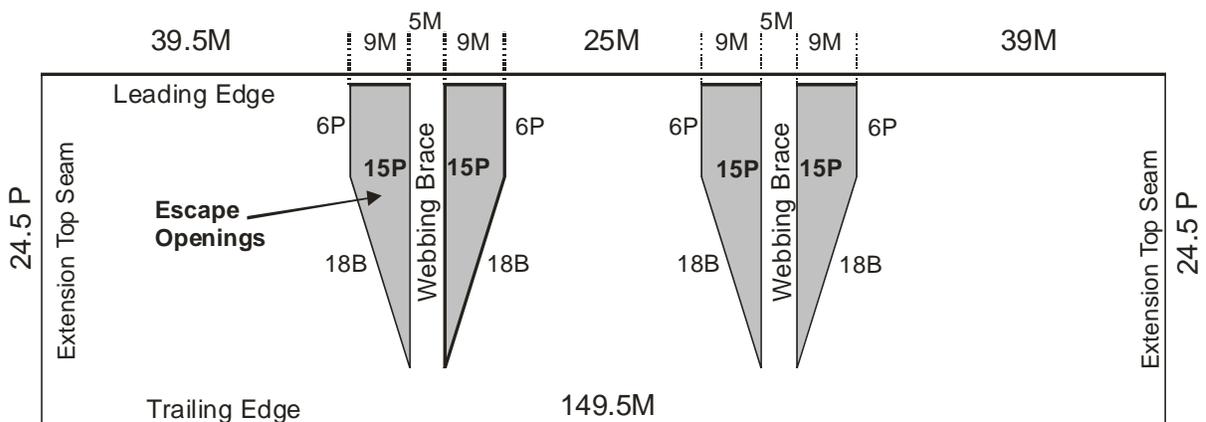


Figure 4: Schematic of BRD extension showing escape opening placement and configuration.

Constructing the composite panels

Each composite panel is two ply in design. The first layer is constructed from a rectangular piece of 1-5/8 inch (41 mm) heat-set and depth-stretched polyethylene diamond mesh (DM) webbing 36 meshes on the leading edge by 20 meshes deep (figure 5-a) The second layer is a piece of 2 inch (51 mm) square mesh (SM) webbing (1 inch bar) 18 squares on the leading edge and 32 squares down each side (figure 5-b). The requirements for the square mesh panel do not specify a particular webbing material. In the illustrations, 2 inch (51 mm), #18 nylon is used.

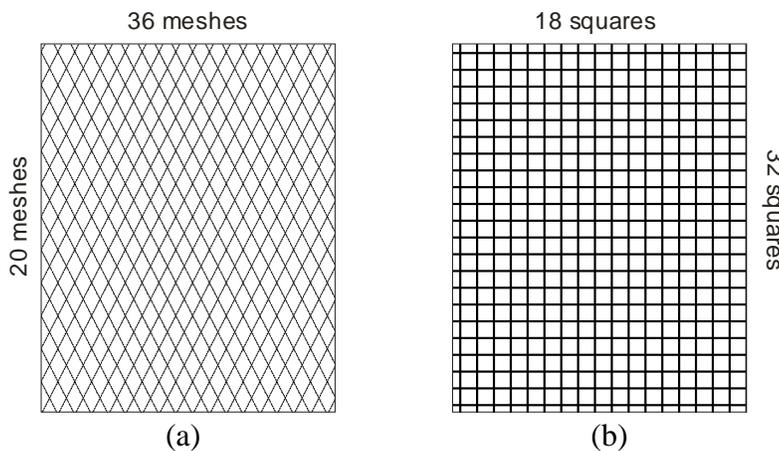
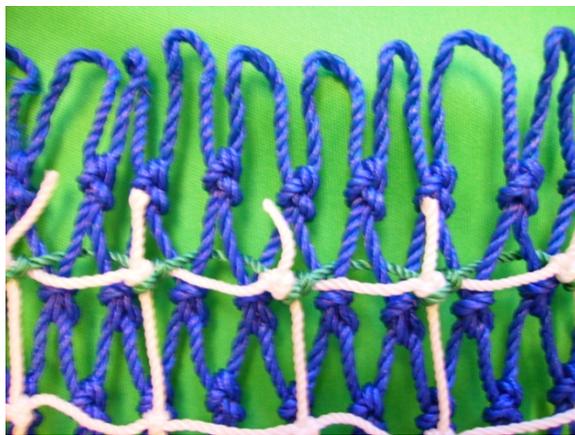


Figure 5: Components of the Composite Panel; (a) diamond mesh panel (DM), (b) Square mesh panel (SM).

The SM panel is attached to the diamond mesh webbing on all four sides. Begin by using twine to attach the 18 square side of the SM along the first row of meshes along the 36 mesh side of the DM. The sewing sequence for the leading edge of the composite panel will be two meshes of the DM material for each square (figure 6-A). Next, attach sides of the panels together. Attach the SM evenly along the first row of meshes on the 20 mesh sides of the DM. When this attachment is made, both panels should be stretched taut (figure 6-B). The trailing edge of the SM should align with the last row of meshes of the DM. Depending on the webbing manufacturer(s), there is a possibility that the SM may be too long. If so, excess square meshes can be cut from the square mesh panel trailing edge (figure 7). Next, attach the trailing edge of the two panels together in the same manner as with the leading edge. Construct a second composite panel using the same procedure.



(a)



(b)

Figure 6: Attachment of the square mesh panel along the leading edge (a) and the sides (b) of the diamond mesh panel.

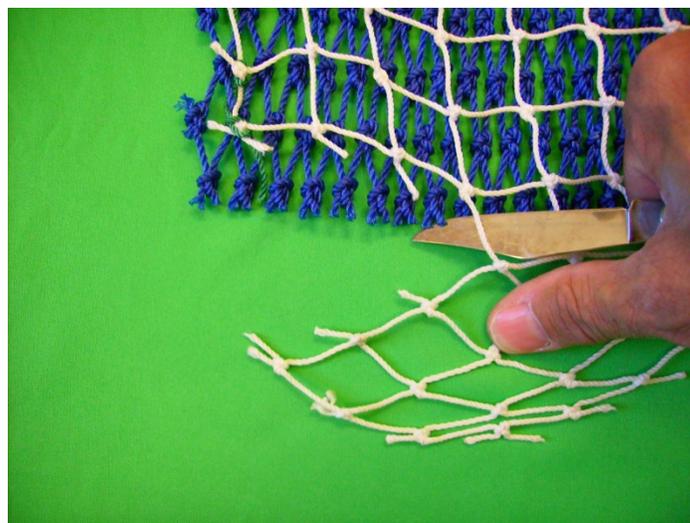


Figure 7: The end of the square mesh panel should be even with the last row of meshes on the diamond mesh. If the square mesh is too long, excess webbing should be cut off.

Attachment of the composite panels

The two composite panels are attached to the extension to cover the extension escape openings. A diagram of the panel attachment is shown in figure 8. One composite panel is used to cover each set of extension openings. The composite panel will be oriented so that the square mesh layer is against the extension webbing and escape openings. For each set of escape openings, the 36 mesh leading edge of a DM should be sewn evenly across the leading edge of the escape openings including the webbing brace (24 meshes) (figure 8-A). Alternately sew 2 meshes of the DM to 1 mesh of the extension webbing then 1 mesh of the DM to 1 mesh of the extension webbing (figure 9).

From the inside corners of the escape openings, the 20 mesh sides of the DMs are then attached to the extension webbing on a 2 bar 1 point angling toward the back center of the extension forming a v-shape in the center of the extension webbing (figure 8-B). The opposite sides of the DMs are then attached to the extension on the bars angling back and away from the escape openings (figure 8-C).

The 24.5 P sides of the extension are joined to form a tube of extension webbing. The seam will be located at the top of the extension. If nylon is used in the construction of the BRD, a net treatment (dip) should be applied before use.

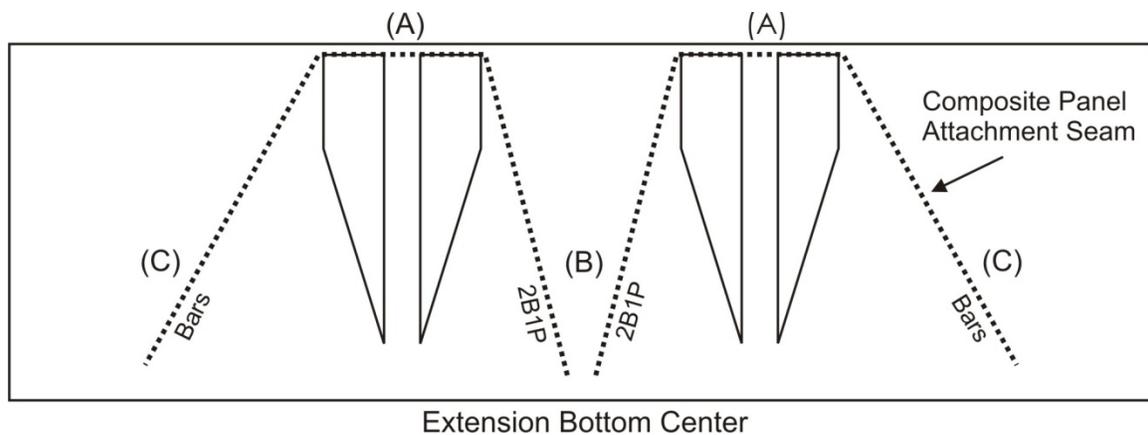


Figure 8: A schematic for the attachment of the composite panels to the BRD extension. (A) leading edge attachment, (B) inner seams, (C) outer seams



Figure 9: Attachment of the leading edge of the diamond mesh of the composite panel (blue) to the BRD extension (white).

Installation of the Composite Panel BRD

The Composite Panel BRD is designed to be installed immediately behind the Turtle Excluder Device (TED). The Composite panel can be constructed using the existing TED extension as long as the portion of the TED extension behind the grid meets the BRD extension requirements.

To install the completed Composite Panel BRD, cut the TED extension on an even row of meshes 4 meshes behind the posterior edge of the TED grid (figure 10). Next, join the leading edge of the BRD extension to the TED extension directly behind the TED. To complete the installation attach the codend (bag) to the trailing edge of the BRD extension.

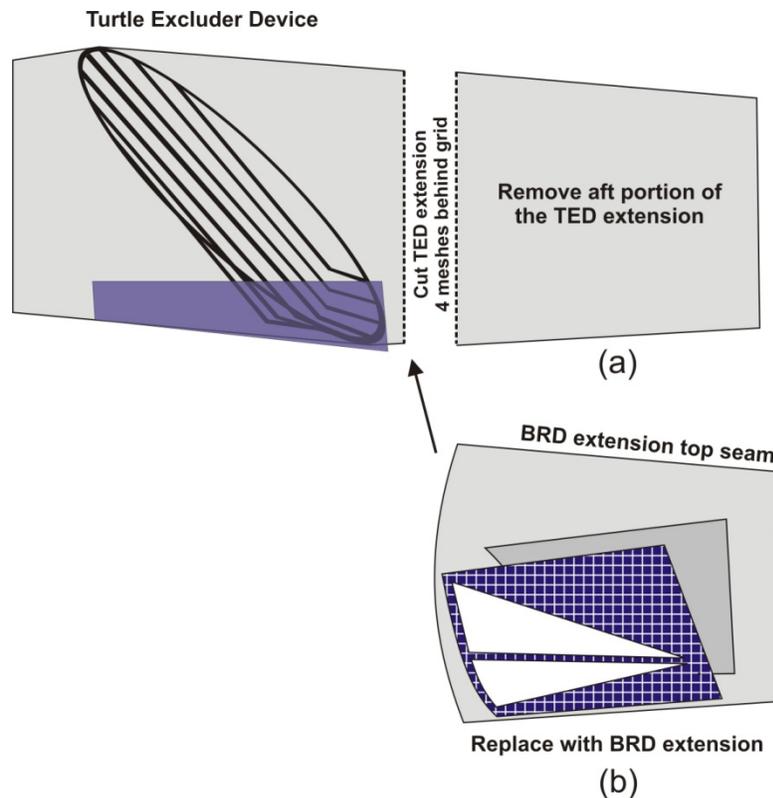
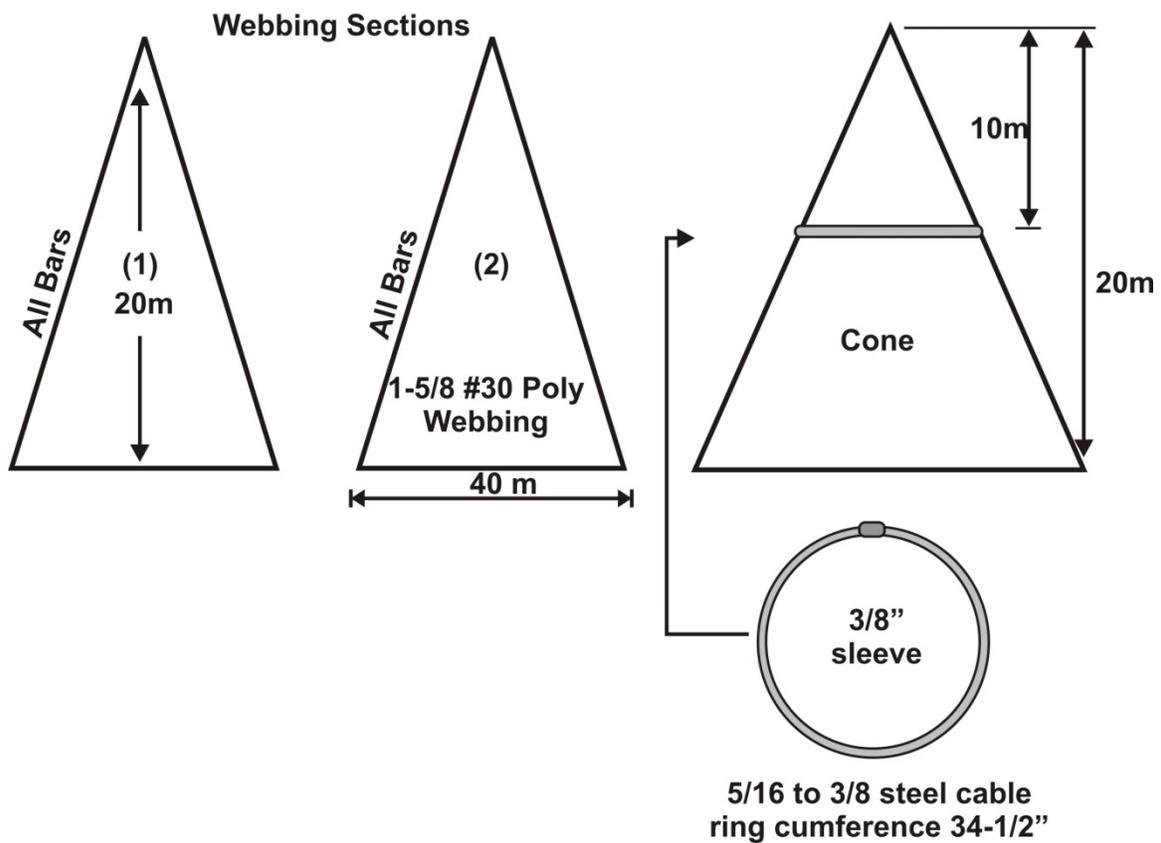


Figure 10: The Composite Panel BRD is installed in the trawl by removing a portion of the TED extension starting four (4) meshes behind the TED grid (a) and replacing it with the BRD extension. The codend is then attached to the trailing edge of the BRD extension (b).

Construction of the cone fish deflector

The cone fish deflector is constructed of 2 pieces of 1-5/8 inch (41 mm) polypropylene or polyethylene webbing, 40 meshes wide by 20 meshes in length and cut on the bar on each side forming a triangle (figure 11). Starting at the apex of the two triangles, the two pieces must be sewn together to form a cone of webbing. A single hoop must be constructed of 5/16 inch (8 mm) or 3/8 inch (9.5 mm) cable 34-1/2 inches (88 cm) in length. The ends must be joined by a 3 inch piece of 3/8 inch (9.5 mm) aluminum pipe pressed together with a 1/4 inch (6.4 mm) die. The hoop must be inserted in the webbing cone, attached 10 meshes from the apex and laced all the way around with heavy twine.

Figure 11. Construction of the cone fish deflector



Installation of the Fish Deflector Cone in the extension

The apex of the cone must be installed in the extension within 12 inches behind the back edge of the funnel and attached in four places (figure 12). The midpoint of a piece of number 60 twine (or at least 4 mesh wide strip of #21 or heavier webbing), 3 ft in length must be attached to the apex of the cone. This piece of twine or webbing must be attached within 5 meshes of the aft edge of the funnel at the center of each of its sides. Two 12 inch (30.5 cm) pieces of number 60 (or heavier) twine must be attached to the top and bottom of the cable ring of the cone. The opposite ends of these two pieces of twine must be attached to the top and bottom center of the extension webbing to keep the cone from inverting into the funnel.

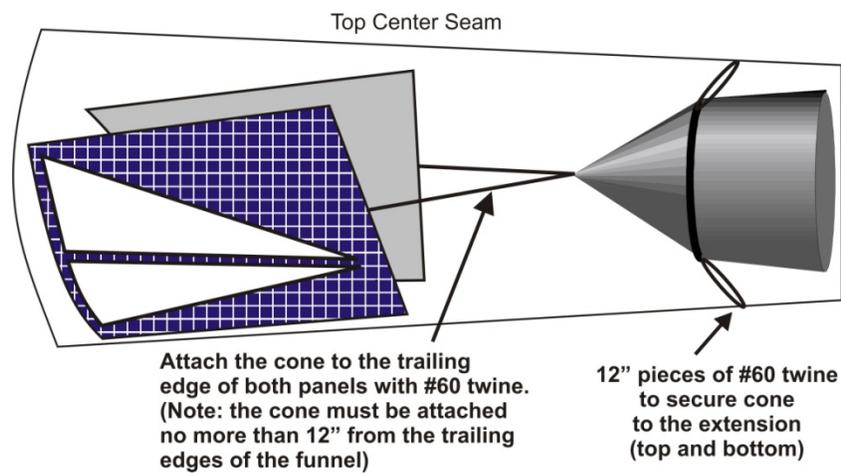


Figure 12: Installation of the Cone Fish Deflector

This document was prepared for general informational purposes in March 2012 and has no legal force or effect. Please refer to the federal BRD regulations, 50 CFR part 622 and 622 Appendix D and the Federal Register for specific and controlling BRD requirements.

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