



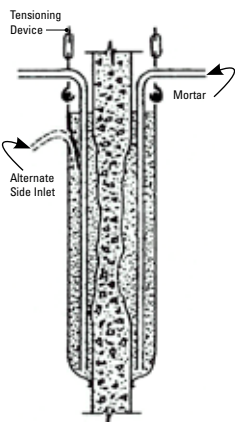
## Fabriform® Ballistic Pile Jacket Technical Data

DESIGNS BASED ON OVER 40 YEARS OF EXPERIENCE

Fabriform® ballistic pile jackets structurally restore and protect piles of timber, concrete, and steel. Pump placement of mortar in a water permeable fabric form precludes the possibility of accidental entrapment of air or water regardless of the length of jacket, complexity of reinforcing steel, or restricted space between pile and form.

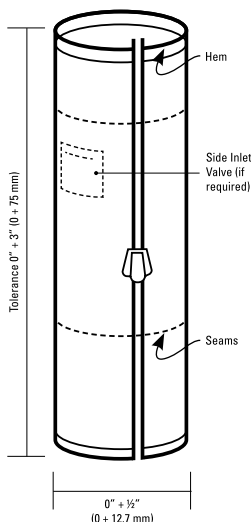
1. Jacket diameter should provide a minimum of 3" (75 mm) cover over the pile and at least 1 ½" (38 mm) cover over reinforcing steel. An excessively thick jacket subjects the pile to unnecessary dead load and to the possibility of additional lateral load as a result of wave action on the pile.
2. In specifying jacket length, allowance should be made for shifting bottom and possible future dredging. Length should be specified from a known elevation on the deck and should provide for at least one foot of cover at both top and bottom over sound undamaged pile.
3. Specifications should prohibit free fall of concrete (grout) through water and should require that the lower end of the injection hoses be maintained under the concrete (grout) surface at all times.

**INSTALLATION** — Fabriform® ballistic pile jackets offer exceptional economy of installation by reason of the light and low bulk of the forming material and the ease with which positive mortar tight closure can be made by means of a zipper.



1. After cleaning the piles and placing reinforcing steel as required, fabric forms are suspended from the structure by means of turnbuckles or changes to a steel hanger ring passed through the upper hem of the jacket.
2. The zipper is closed by sliding from the top down and the bottom of the jacket closed with the aid of a rope in the bottom hem of the jacket.
3. The jacket is then tensioned by means of the turnbuckles, or pulling the chains, and mortar injected through hoses at opposite ends of a diameter to insure even filling.
4. Because of restricted access to the work, a very fluid, cement-rich mortar is recommended to minimize possible pumping problems. In estimating small jobs, it is conservative to use a mix containing 750 lbs of cement, 2,000 lbs of concrete sand, 500 lbs of 3/8" pea gravel and 60 gallons of water per cubic yard (445 kg of cement, 1,190 kg of sand, 295 kg of 94 mm pea gravel and 295 liters of water per cubic meter). Leaner mixes with good pumping characteristics are also satisfactory.
5. After mortar hardens, the suspender assembly is removed. The fabric jacket remains in place.

**ORDERING** — All ballistic pile jackets are assembled to order. Shipment can usually start within 5 days of receipt of order.



1. Seams are folded, double needle stitched. Zipper is constructed of brass teeth on nylon and mildew-proofed cotton tape.
2. Specify length required allowing for any extra material which may be required as for indeterminate depth required below mudline. Length is measured at the zipper under a tension of 2 lbs/ft (3 kg/m) of length. Manufacturing tolerance is -0" +3" (-0 + 75 mm).
3. Specify diameter required. Manufacturing tolerance is -0" + ½" (-0 + 13 mm)
4. Specify size and location of side inlet valves if required.
5. Hems are normally 3" (75 mm). Specify other dimensions if required.
6. Identify each jacket by pile and bent number.
7. In estimating freight costs per 100 ft² of fabric used: 25 lbs and ½ ft³ (12.3 kg and .016 m³ per 10 m²).

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# Guide Specifications: Fabriform® Ballistic Pile Jackets

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## I. GENERAL

Following specified cleaning and preparation of the surface of the damaged pile and placement of reinforcing steel around the pile, each pile shall be encased in a fabric sleeve and the annulus between the pile and the sleeve shall be filled with structural mortar. The Contractor shall furnish records of past successful experience in performing this type of work. The Contractor shall save the owner harmless from liability of any kind arising from the use of any patented or unpatented invention used in the performance of this work.

## II. MATERIALS

- a. Mortar shall consist of a mixture of portland cement, fine aggregate, and water so proportioned and mixed as to provide a pumpable slurry. Pozzolan and grout fluidifier may be used at the option of the Contractor. The mixture shall exhibit a compressive strength of 3000 psi (21 MPa) at 28 days when made and tested in accordance with ASTM C-31 and C-39.
- b. Fabric forming materials shall be uncoated 100% nylon of which at least 50% by weight shall be textured multifilament nylon. Zipper teeth shall be brass on nylon or mildew proof tape.
- c. Fiber and fabric materials shall meet the minimum requirements, as listed and reported by an independent testing agency, shown below:

PROPERTY	TEST METHOD	UNIT	VALUE	
<b>PHYSICAL</b>				
Composition			NYLON	
Weight	ASTM D-3776	oz/yd	12	
Thickness	ASTM D-1777	in	.025	
<b>MECHANICAL</b>				
Tensile Strength	ASTM D-5034	lbs	WARP	850
			FILL	850
Tensile Elongation	ASTM D-5034	%	WARP	35
			FILL	35
Tongue Tear	ASTM D-2261	lbs	WARP	100
			FILL	100

## III. INSTALLATION OF FABRIC JACKET AND REINFORCING

The pile to be jacketed shall be first cleaned of loosely adhering surface contamination such as rust scales, deteriorated and spalled concrete, and marine organisms. Removal of tight rust, unspalled concrete and tightly adhering marine organisms at the surface of piles will not be required. Reinforcing steel, as required, shall be assembled and installed. If spacers are required to maintain adequate mortar coverage over reinforcing, these spacers shall be non-metallic. All wires and ends of reinforcing steel rods shall be turned toward the pile to avoid damage to the fabric jacket during installation.

The fabric jacket shall then be installed. The bottom and top of the jacket shall be secured tightly to the pile or to suitable supporting and/or spacing members. The jacket shall be so designed and installed as to assure minimum 3" (75 mm) mortar cover over the pile and minimum 1½" (38 mm) cover over reinforcing steel.

## IV. PLACEMENT OF MORTAR IN FABRIC JACKETS

The mortar shall be introduced through suitable pipes or hoses extending down to the lowest point of the jacket. Mortar shall not be allowed to fall freely through water or air and shall be injected in such a manner as to assure uniformly sound and undiluted mortar in the pile jacket. Any special treatment, such as coating of exposed fabric after mortar injection, jetting below mud line, or sealing of riprap, shall be so specified.

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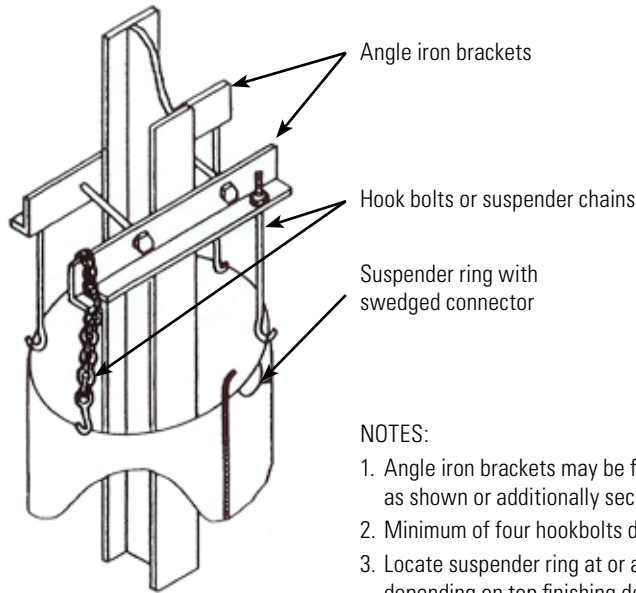
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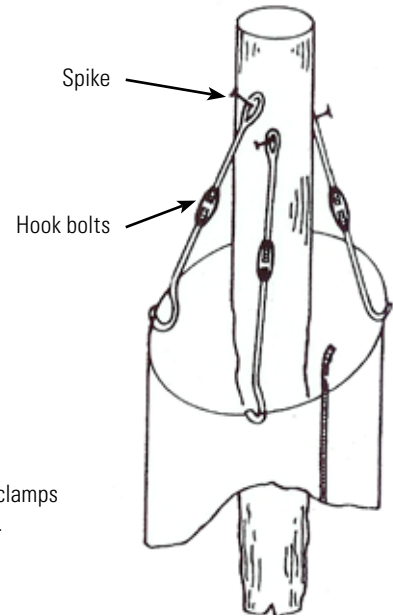
## SUSPENDER DETAIL AND FABRIC HANGING PROCEDURE



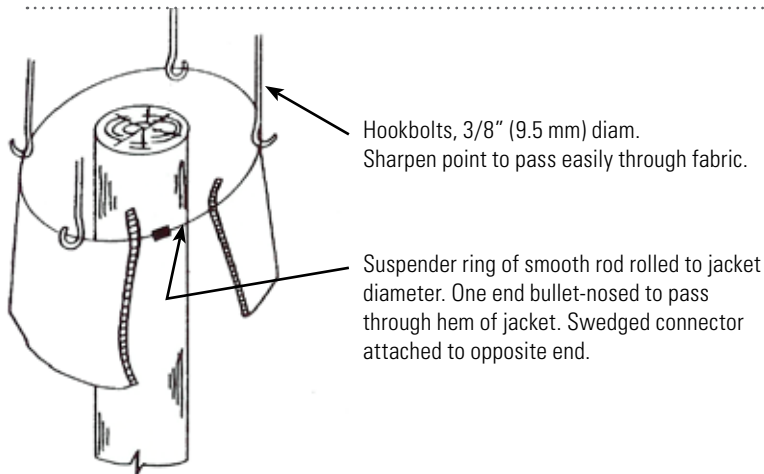
TYPICAL FOR STEEL OR CONCRETE PILES

### NOTES:

1. Angle iron brackets may be fastened to pile with friction clamps as shown or additionally secured with stud bolts into pile.
2. Minimum of four hookbolts depending on pile diameter.
3. Locate suspender ring at or above desired top of mortar depending on top finishing detail selected.
4. Level top of jacket and pull taut with bolts. Do no attempt to adjust tension after starting to inject mortar.



TYPICAL FOR TIMBER PILES



### Suggested Maximum Hookbolt Spacing

Suspender Ring Diameter		Maximum Spacing	
INCHES	MM	INCHES	MM
1/2"	13	13"	330
5/8"	16	16"	400
3/4"	19	20"	500



**To start slider,** remove top three teeth from one side of zipper tape. Zip from top down and secure with tie.

### PROCEDURE:

1. While still on the beach, insert ring in jacket through holes provided in hem behind the zipper tapes.
2. Spring suspender ring, with jacket attached, apart by hand to pass over pile.
3. Secure ends of ring together with swedging tool.
4. Start zipper closure and wire zipper together above suspender ring.
5. If jacket is not going to be filled promptly, gather fabric and piece in burlap bag wired to hangers where it will not be damaged by floats, workmen, or water action.

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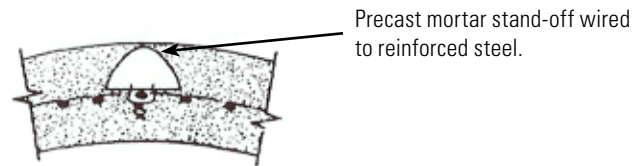
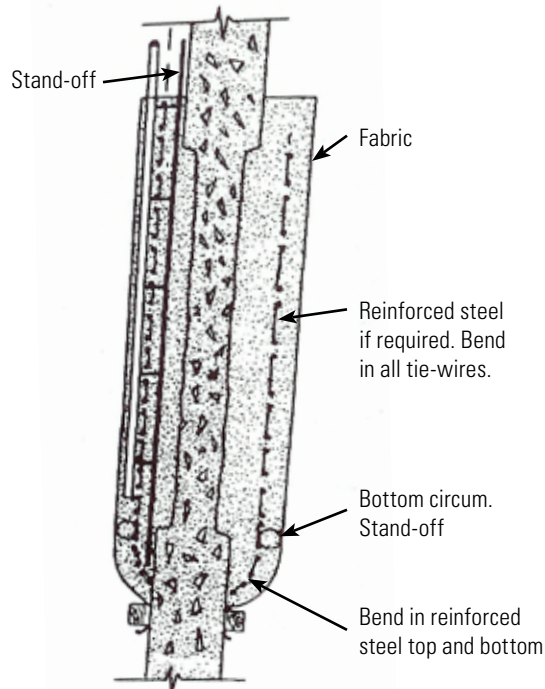
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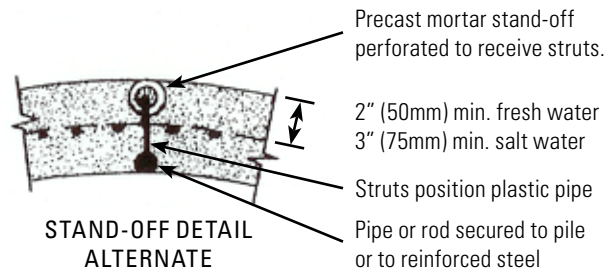
# Installation Suggestions: Fabriform® Ballistic Pile Jackets

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## STAND-OFF DETAILS



STAND-OFF DETAIL

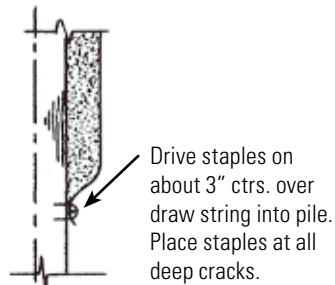


STAND-OFF DETAIL  
ALTERNATE

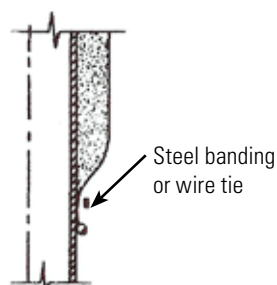
### NOTES:

1. Stand-offs not required for vertical timber piles in calm water.
2. Position a minimum of 4 stand-offs equally spaced around vertical pile subjected to current or wave action.
3. Position stand-offs on high side of battered pile.

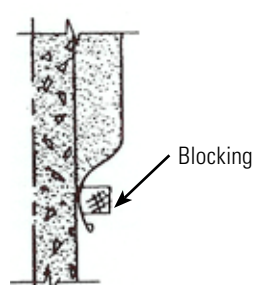
## BOTTOM TIES



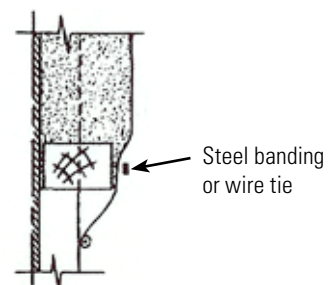
TIMBER



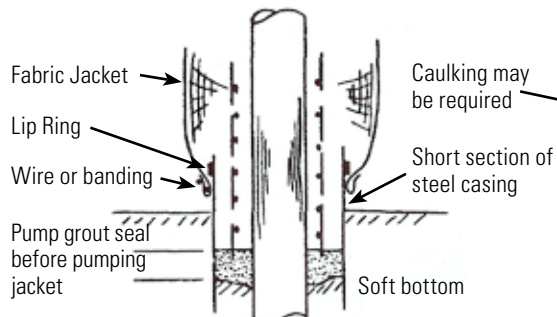
STEEL PIPE



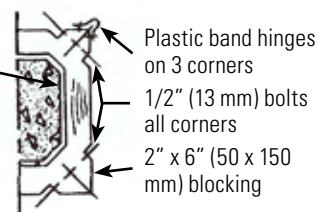
PRECAST CONCRETE



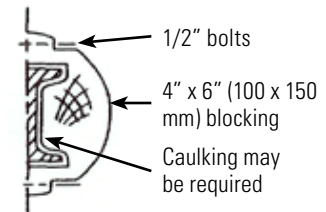
STEEL BEARING



USE OF CASING TO SUPPORT  
BOTTOM EXCAVATION



HALF SECTION THROUGH  
PRECAST CONCRETE PILE



HALF SECTION THROUGH  
STEEL BEARING PILE

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