

## INTEGRAL PILE AND COLUMN JACKETS.

(REV 11-22-19) (FA 1-27-20) (7-21)

The following new Section is added after Section 455:

### SECTION 457 INTEGRAL PILE AND COLUMN JACKETS

#### 457-1 Description.

Furnish, fabricate and install an integral pile and column jacket in accordance with the Contract Documents.

#### 457-2 Materials.

**457-2.1 Stay-In-Place Forms:** Use forms composed of a durable, inert, corrosion resistant material with an interlocking joint along one or two sides that permits the form to be assembled and sealed in place around the pile or column. Fabricate the forms from glass or carbon fibers and polyester or vinylester resins. Provide jackets with a minimum thickness of 1/8 inch with a minimum thickness at the corners of 3/16 inch and dimensions as shown in the Contract Documents. Ensure the form is capable of maintaining its original shape without additional support or damage when placed around a pile. Ensure the inside face of the form has no bond inhibiting agents in contact with the filler material. Provide the forms with bonded or bolted-on, non-metallic, adjustable standoffs to maintain the forms in the required positions. Sandblast or score the inside surface of the forms with an abrasive material to provide a rough surface texture and ensure bond with the filler material. Equip the forms with a compressible sealing strip at the bottom which will effectively seal the annular space between the pile or column and the form. Use non-metallic hardware for pumping ports when these are provided. Fabricate the jacket form in a workmanlike manner and have it inspected and approved by the Engineer prior to placement. Remove from the project any jacket form that has been rejected.

The forms shall meet the following physical property requirements of Table 1:

Water Absorption (ASTM D 570)	1% maximum
Ultimate Tensile Strength (ASTM D 638)*	9,000 psi minimum
Flexural Strength (ASTM D 790)*	16,000 psi minimum
Modulus of Elasticity (ASTM D 790)	700,000 psi minimum
IZOD Impact (ASTM D 256)	15 lb/inch minimum (unnotched specimen)
Barcol Hardness (ASTM D 2583)	45 minimum number

Color: Similar to Federal Color Standard No. 595, Table VII, Shade No. 36622. The color must be integral in the form gel coat.  
\* On original specimens whose flat surfaces are not machined to disturb the fiberglass.

**457-2.2 Anode Material:** Use expanded mesh anodes pre-installed inside the form by the manufacturer when cathodic protection integral pile or column jackets are specified. Use anode type and configuration shown in the Contract Documents. If galvanic anodes are used, place the anodes in direct contact with the inside face of the form.

**457-2.3 Fillers:** Use portland cement grout fillers for non-structural jackets and portland cement concrete fillers for structural jackets. Use special fillers when required by Contract Documents. Submit the filler mix design to the Department for approval.

Hardened portland cement grout, portland cement concrete, and special fillers will be accepted based on strength test results as defined in this Section. Test the compressive strength of the laboratory cured samples at 28 days in a laboratory meeting the qualification requirements listed in 105-6.

Total amount of chlorides for jacket fillers shall not exceed 0.4 pounds per cubic yard of filler after placement. When directed by the Engineer, randomly select samples to determine the total amount of chlorides meeting the requirements of Section 346.

**457-2.3.1 Portland Cement Grout Fillers:** Use a mix design of portland cement, fine aggregate, water, and an admixture(s) along with a minimum of 940 pounds of cementitious material per cubic yard. Up to 30%, by weight of cement may be replaced by fly ash for standard pile jackets. Do not use fly ash, slag, or silica fume for cathodic protection jackets, unless specified in the Contract Documents.

**457-2.3.1.1 Materials:** Meet the following requirements:

Silica Sand Fine Aggregate\*.....Section 902  
Portland Cement and Blended Cement.....Section 921  
Water.....Section 923  
Admixtures Types A, D, and air entraining\*\*.....Section 924  
Supplementary Cementitious Materials\*\*\*.....Section 929

\*Use only silica sand, except as provided in 902-5.2.3.

\*\*Use products listed on the Department's Approved Product List (APL) and containing no chlorides or other salts corrosive to metals. Do not use materials containing hard lumps, crusts or frozen matter, or that is contaminated with materials exceeding the specified limits in the above listed Sections.

\*\*\*Use fly ash meeting the requirements of Section 929, ASTM C618, Type F, except that loss on ignition shall not exceed 4%.

**457-2.3.2 Portland Cement Concrete Fillers:** Use Class IV Concrete meeting the requirements of Section 346 with an adjusted slump of 7 inches to 9 inches. Reduced size coarse aggregate may be used as approved by the Engineer. Do not use fly ash, slag, or silica fume for cathodic protection jackets.

**457-2.3.3 Special Fillers:** Use prebagged special fillers meeting the requirements of Section 930. Provide material data sheet and certification that the fillers meet the APL requirements of Section 6.

**457-2.4 Water:** Use water that meets the requirements of Section 923 for all filler mixing. Use potable water for cleaning, rinsing, or any other application that requires direct contact with the piles.

**457-2.5 Reinforcing Steel:** Use reinforcing steel meeting the requirements of Section 415 for all structural jackets.

**457-2.6 Materials Certification and Testing.**

**457-2.6.1 Certification:** For materials other than those for portland cement grout and portland cement concrete, submit a certificate to the Engineer certifying that the materials furnished meet all the requirements of this Section and conform to the materials tested. Attach current test reports to the certificate.

When cathodic protection jackets are specified, submit certified test results of the chemical composition of the anode and submit a manufacturer certification stating that the dimensions and physical characteristics of the anode meet the requirements of the Contract Documents.

No test report for tests made more than two years prior to shipment will be accepted for the form and anode material.

**457-2.6.2 Sampling and Testing of Portland Cement Grout Fillers:** Sample and test the portland cement grout fillers at a frequency of one sample per LOT in accordance with Section 346 using Quality Control technicians meeting the requirements of Section 105. The maximum LOT size is 50 cy or one day's production, whichever is less.

**457-2.6.3 Sampling and Testing of Portland Cement Concrete Fillers:** Sample and test materials for Portland cement grout and Class IV concrete as required in Section 346. Perform sampling and testing using Quality Control technicians meeting the requirements of Section 105. Conduct test at a frequency of one set of tests per LOT. The maximum LOT size is 50 cy or one day's production, whichever is less.

**457-2.6.4 Sampling and Testing of Special Fillers:** Test properties of special filler materials meeting the requirement of Section 346 at a frequency of one set of tests per LOT. The maximum LOT size for special filler is 25 cy or one day's production whichever is less.

For each set of tests, cast three 4 inch by 8 inch cylinders for compressive strength testing at the required test date. Conduct a field demonstration of the mixing operations prior to commencing the jacket installation. Cure samples of special filler materials in accordance with ASTM C31.

### **457-3 Construction.**

**457-3.1 Shop Drawings:** Submit shop drawings and obtain approval prior to field installation. Submit shop drawings showing locations of standoff spacers, method of fastening jacket form to piling, method of sealing the form after assembly, and method for bracing during placement of filler. Include details of access holes, fiberglass caps, method of securing anode from movement, and methods for placing the filler and sealing the pumping ports.

**457-3.2 Surface Preparation:** Remove all cracked or delaminated concrete and excavate to a depth of 3/4 inch to 1 inch behind the exposed reinforcement. Limit the size of chipping hammers to 20 pounds unless otherwise approved by the Engineer. Thoroughly clean all pile/column surfaces that the jackets will cover. Remove all oil, grease, dirt, broken concrete, marine growth and any other deleterious material that could prevent proper bonding. Mediablast all exposed reinforcing steel to SSPC-SP10, near white, per the Society of Protective Coatings, to remove all rust and scale before installing the pile jacket. Water blast or mechanically clean reinforcing steel exposed under water by methods and with equipment approved by the Engineer. Clean existing concrete surfaces by mediablasting, wet blasting, wire brushing, water laser, or other methods approved by the Engineer, which will yield an equivalent result. Do not place the form until the surface preparation has been approved by the Engineer.

**457-3.3 Cathodic Protection:** Provide connection to the reinforcement for cathodic protection integral pile jackets inside the jacket limits unless otherwise specified in the Contract Documents. Use connection methods and materials in accordance with the Contract Documents.

**457-3.4 Form Placement:** Place the fiberglass form in position around the pile; secure and seal the interlocking joints seal the bottom of the form against the pile surface with the compressible seal, and coat the compressible seal with an APL listed epoxy mastic suitable for

underwater application. Adjust stand-offs as necessary to prevent misalignment and install temporary hard backing to prevent deformation of the jacket. Place a temporary plastic wrap around the form prior to placement of the hardbacking to protect the gel coat.

**457-3.5 Filler Placement:** Wet to saturation the surface of the existing concrete immediately prior to placing the filler. Place the filler in one continuous pour at no more than 72 hours after final surface preparation. Fill the annulus between the pile or column and jacket form following the jacket manufacturer's instructions and the Contract Documents. Do not drop filler material into forms higher than five feet or into forms containing water. Prevent contamination of the filler during placement and provide internal or external vibration to ensure proper consolidation.

Cure filler for a minimum of 72 hours before removing any external bracing. Remove any filler or other extraneous material from the exterior surface of the form and clean the form without damaging the fiberglass or gel coat resin.

**457-4 Method of Measurement.**

The quantities to be paid for under this Section will be the total feet of integral pile or column jacket furnished, installed, completed and accepted. Measure length from bottom of the form to top of the form.

**457-5 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section. No separate payment will be made for reinforcing steel or filler material. Include payment for anode material, anode connection accessories, testing, and activation in the price per foot for cathodic protection integral pile jackets. Remove and replace jackets with misalignment exceeding 3/4 inch or CP jackets with the anode electrically shorted to the reinforcement at no additional cost to the Department.

Payment will be made under:

- Item No. 457- 1- Standard Integral Pile Jacket - per foot.
- Item No. 457- 2- Cathodic Protection Integral Pile Jacket - per foot.