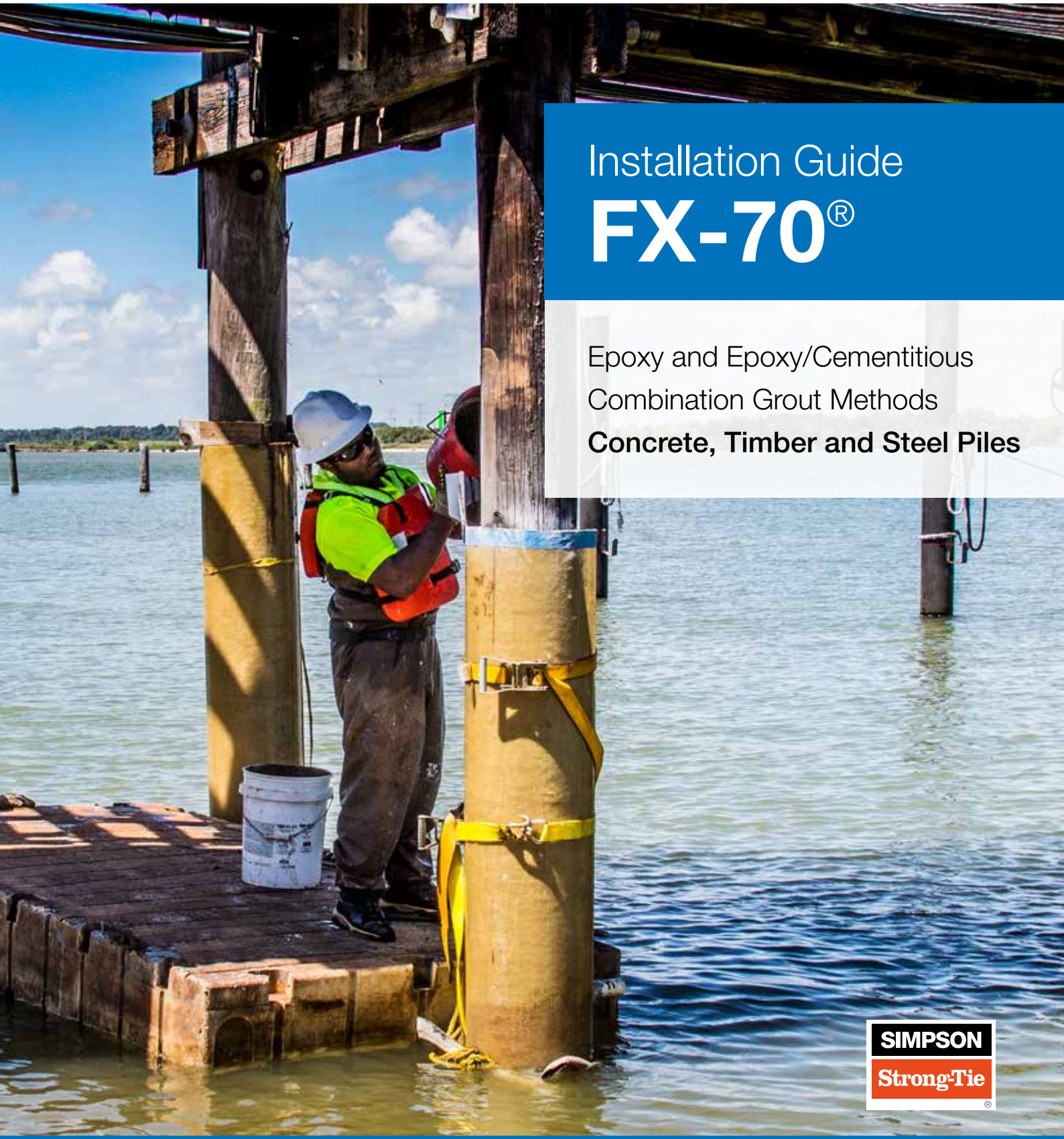
A Simpson Strong-Tie® Company



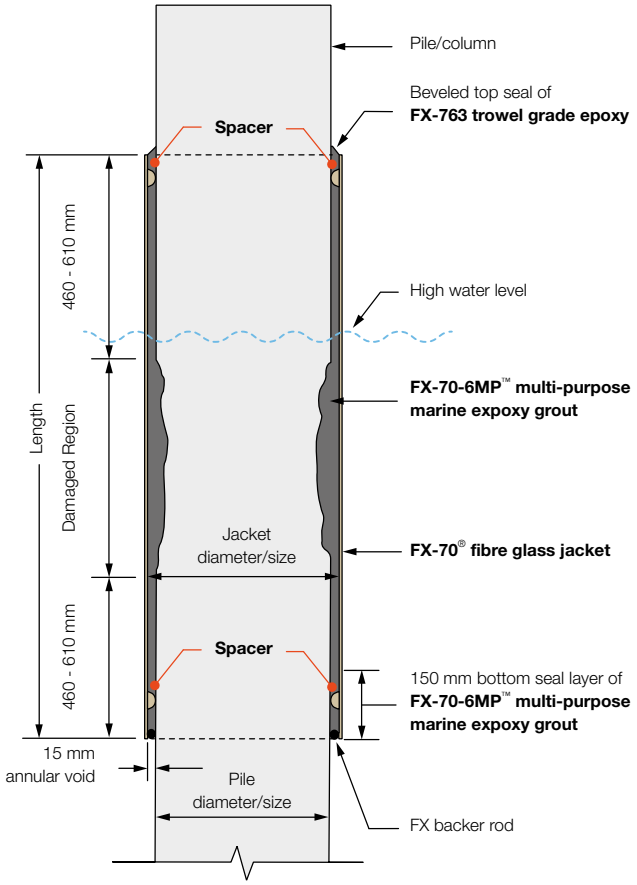
Installation Guide
FX-70®

Epoxy and Epoxy/Cementitious
Combination Grout Methods
Concrete, Timber and Steel Piles

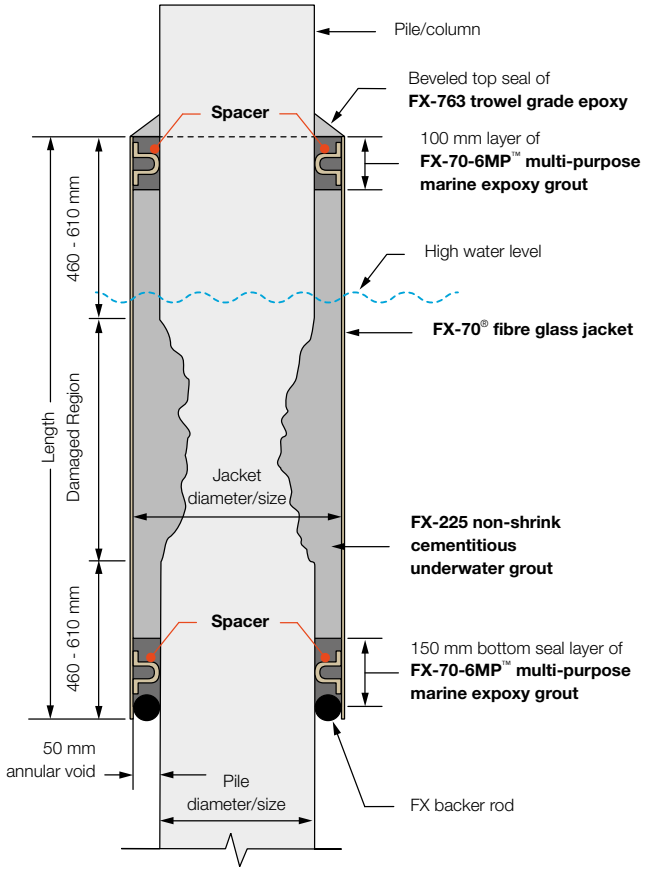
SIMPSON
Strong-Tie®

Ref: FX70INST19

Epoxy Grout Method



Cementitious Grout Combination Method



SCOPE

1. This guide covers the installation procedures for using the FX-70® system to repair and protect timber, concrete, and steel piles with two different application methods:

- **FX-70-6MP**™ epoxy grout method: consisting of a fiberglass jacket that is placed around the existing pile with a 15 min annular space between the pile and the jacket. The annular space is then filled with a marine epoxy grout and a bevel of epoxy mortar is placed at the top of the jacket.

- **FX-225** cementitious grout combination method: consisting of a fiberglass jacket that is placed around the existing pile with a 50 mm min. annular space between the pile and the jacket. The annularspace is initially filled with 150 mm of FX-70-6MP™ marine epoxy grout at the bottom of the jacket, and then filled with FX-225 marine cementitious grout to within 100 mm from the top of the jacket. Finally, the remaining space is filled with FX-70-6MP™ marine epoxy grout, and a bevel of FX-763 trowel-grade epoxy is placed at the top of the jacket.

2. All submerged jackets should be installed by certified professional divers.

SURFACE PREPARATION

1. The surface of the substrate must be at least 8°C prior to application.

2. Consult with the Engineer of Record before making structural repairs, to confirm the stability of the structure during the restoration process.

3. All pile surfaces to be covered with jackets should be thoroughly cleaned of marine growth, laitance debris, oil, grease, dirt, and any other deleterious material that could prevent proper bonding.

4. Prepare the surface:

- **Timber:** All wood surfaces to be covered with pile jackets shall be thoroughly cleaned of oil, grease, dirt, and any other deleterious material which would prevent proper bonding.

- **Concrete:** All concrete surfaces to be covered with pile jackets shall be thoroughly cleaned of oil, grease, dirt, and any other deleterious material which would prevent proper bonding.

  Prepare surface by high-pressure water blasting or other mechanical means. Repair or replace any reinforcing steel as determined by a qualified professional engineer.

- **Steel:** All concrete surfaces to be covered with pile jackets shall be thoroughly cleaned of oil, grease, dirt, and any other deleterious material which would prevent proper bonding.

  Prepare surface by sandblasting, wet blasting, wire brushing, water laser, or other approved method(s).

- **Fiberglass Jacket:** Fiberglass surfaces must be sound, clean, and free of all contaminants that could impair product adhesion or performance. Important: Please ensure that the peel ply is removed from the inside of the jacket before installation.

5. FX-70® jacket placement should not proceed until pile cleaning has been approved by the Engineer of Record or the Owner's Representative.

JACKET PREPARATION

Installation and positioning of FX spacers are unique to each application.

1. FX Spacers — See S&P drawings for specific pile shapes and for the location of the jacket spacers, or contact S&P at:

   +41 41 825 00 70

- **FX Spacers** epoxy grout method: consisting of a fiberglass jacket that is placed around the existing pile with a 15 min annular space between the pile and the jacket. The annular space is then filled with a marine epoxy grout and a bevel of epoxy mortar is placed at the top of the jacket.

- **FX-225** cementitious grout combination method: consisting of a fiberglass jacket that is placedaround the existing pile with a 50 mm min. annular space between the pile and the jacket. The annularspace is initially filled with 150 mm of FX-70-6MP™ marine epoxy grout at the bottom of the jacket, and then filled with FX-225 marine cementitious grout to within 100 mm from the top of the jacket. Finally, the remaining space is filled with FX-70-6MP™ marine epoxy grout, and a bevel of FX-763 trowel-grade epoxy is placed at the top of the jacket.

2. FX spacers and standoffs are shipped unattached and are to be field-installed.

3. FX spacers to be adhered to the inside of the jacket using FX-SpacerTape.

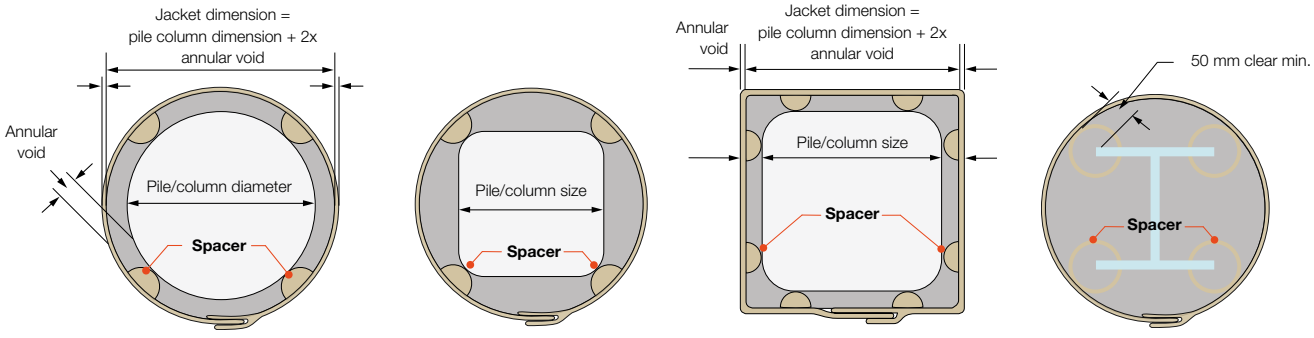
a. Typical Spacer Placement

- **Round jackets:** spacers are installed equal distances apart around the interior circumference of the jacket in two rows. Each row is installed 50-75 mm from the top and bottom of the jacket.

- **Square jackets:** spacers are installed using two per side around the interior perimeter of the jacket in two rows. Each row is installed 50-75 mm from the top and bottom of the jacket

b. Spacer installation

- Apply a suitably sized strip of FX-SpacerTape to the spacer. Install the spacers to the inside face of the jacket and allow to cure before setting jacket.



JACKET PREPARATION

Important: Please ensure that the peel ply is removed from the inside of the jacket before installation.

Two or more jackets per pile

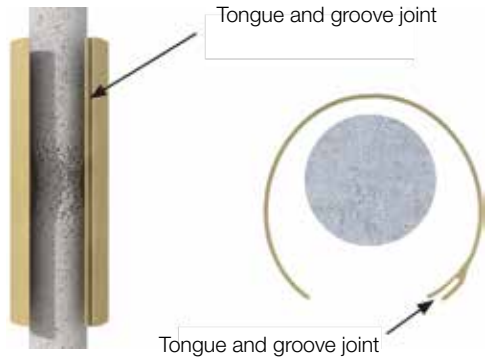
1. Follow the instructions provided in the previous page.
2. Trim the bottom 75 mm of the tongue-and-groove joint of the top jacket so that it can sit in the 75 mm bell of the bottom jacket.

Cut out this section (75 mm) for insertion into the bell of the lower jacket

JACKET INSTALLATION

One jacket per pile

1. Prepare a cartridge of FX-763CTG gel paste epoxy cartridge per current S&P technical data sheet found at sp-reinforcement.eu, and place a bead of epoxy into the female (groove) portion of what forms the jacket's tongue-and-groove joint, and then wrap the FX-70® jacket around the pile to be repaired. One 600 ml. cartridge should fill 6.5linear metres of jacket joint.

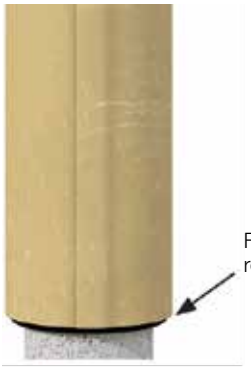


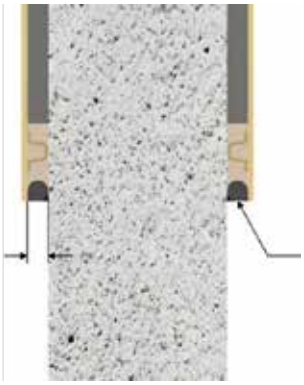
2. "Close" the jacket by inserting the tongue into the groove of the jacket. Temporarily suspend/hold the jacket in position so there is 460-610 mm of undamaged pile inside the jacket above and below the damaged area. Note: Use of ratchet straps may be required to pull jacket together.

JACKET INSTALLATION (CONTINUED)

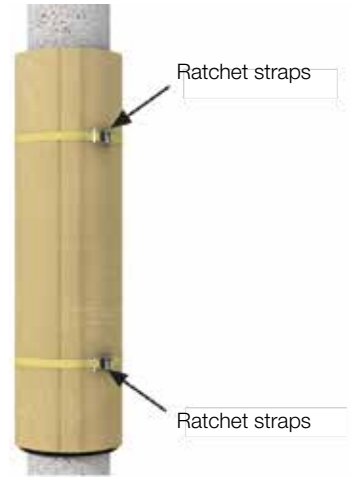
One jacket per pile

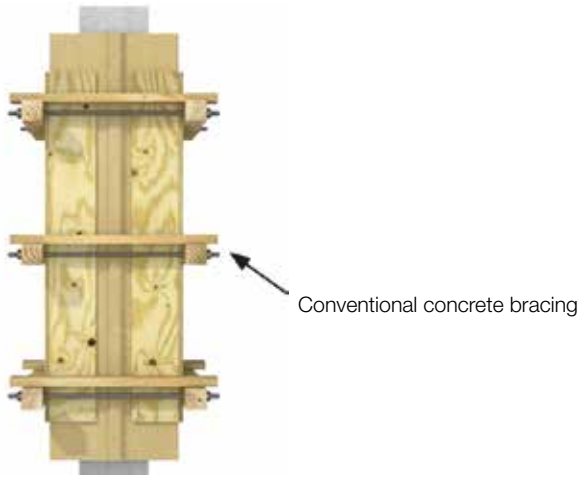
3. Install temporary bottom seal, FX backer rod at base of jacket. Seal may be installed prior to placing jacket.



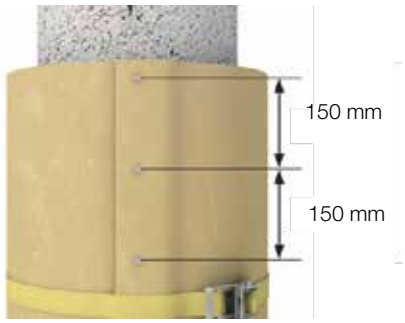


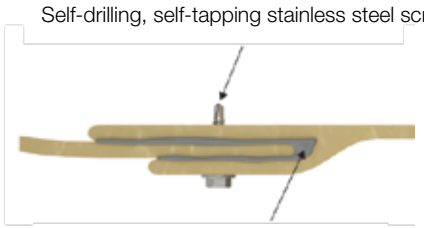
4. Install external bracing as needed to secure jacket and prevent excessive deflection and rupture. Ratchet straps shown for bracing round piles. Other shapes will require conventional concrete bracing methods.





5. Install a self-drilling, self-tapping stainless-steel screw every 150 mm on centre to secure the tongue and-groove joint. Start the screw spacing approximately 25 mm from the top and bottom of the jacket.





FX-763CTG Gel Paste Epoxy Cartridge

JACKET INSTALLATION

Two or more jackets per pile

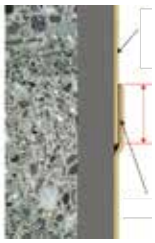
1. Place bottom jacket according to the instructions on page 5 of this installation guide, taking into account the following exceptions and additional instructions:

- The bottom of the jacket shall be placed 460-610 mm below the bottom of the damaged area.
- The lower jacket should typically have the bell positioned facing upward so the upper jacket slides into the bell of the jacket below (see detail below).

2. Place top jacket following the instruction of page 5 of this installation guide, taking into account the following exception and additional instructions:

- Prepare a cartridge of FX-763CTG gel paste epoxy cartridge and place a bead of epoxy into the female(groove) portion of upper jacket tongue-and-groove joint of the jacket. One 600 ml cartridge should fill 6.5 linear metres of jacket joint.
- Place FX-70® jacket around the pile to be repaired.
- Place a bead of FX-763CTG gel paste epoxy cartridge around the bell of the lower jacket.
- Slide the upper jacket into the bell of the lower jacket (see detail below).
- Secure bell to the upper jacket by installing self-drilling, self-tapping stainless-steel screws through the bellinto the upper jacket, spacing the screws every 150 mm on centre.
- Install a self-drilling, self-tapping stainless-steel screw every 150 mm on centre to secure the tongue and-groove joint.

3. Repeat steps 1 and 2 if additional sections of jackets are to be joined together.



BOTTOM SEAL APPLICATION

1. Mix FX-70-6MP™ multi-purpose marine epoxy grout per current S&P technical data sheet found at sp-reinforcement.eu

2. Place FX-70-6MP™ into the bottom 150 mm of the annular void by tremie, pouring, or pumping.

3. Allow bottom seal to cure overnight before proceeding with repair.

FILLER GROUT APPLICATION

1. Prepare product per current S&P technical data sheet found at sp-reinforcement.eu. FX-70-6MP™ multi purpose marine epoxy grout may be poured, pumped, or placed by tremie method. FX-225 cementitious grout may only be pumped, or placed by tremie.

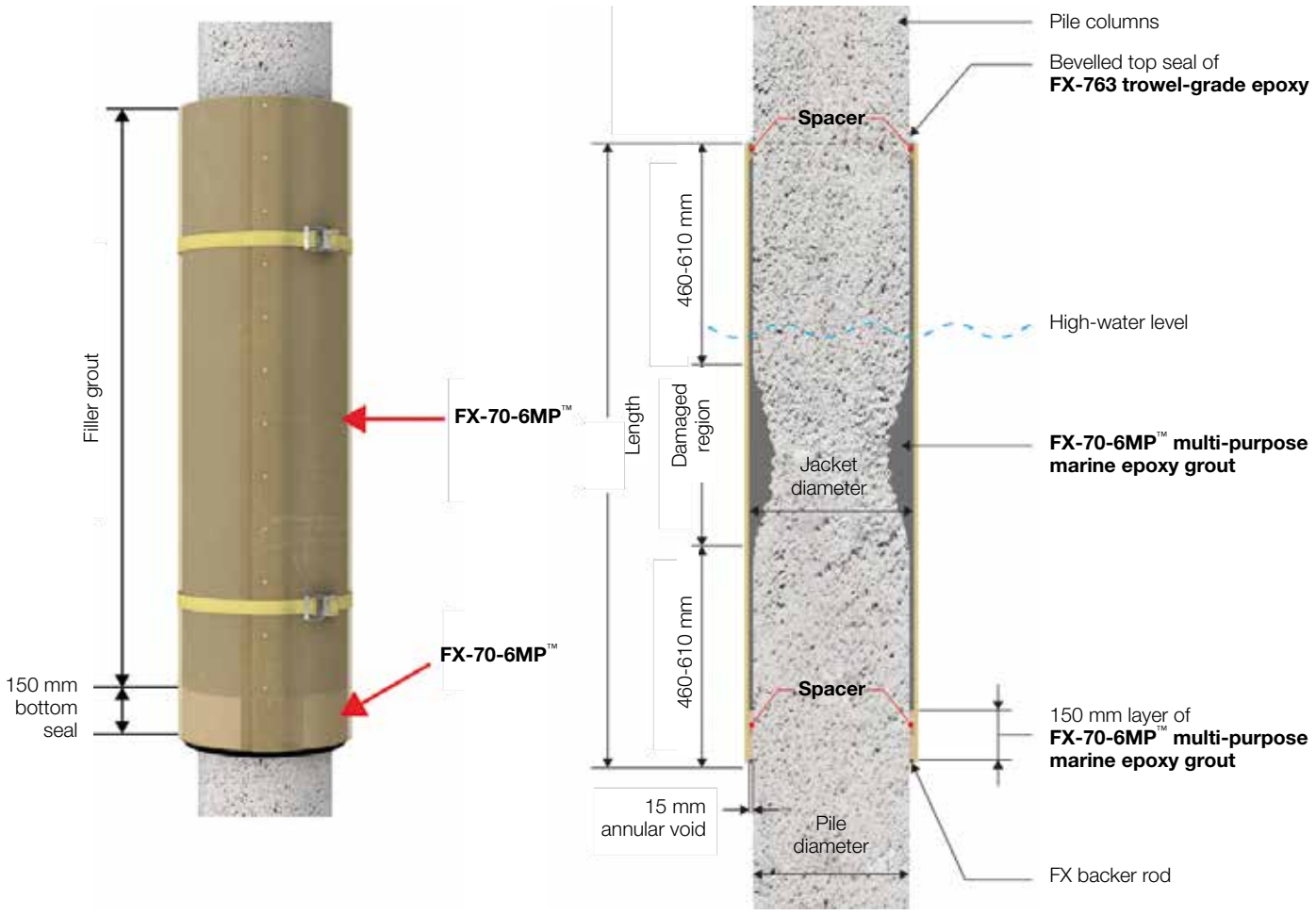
2. Place filler grout per one of the following methods:

For FX70-6MP™ epoxy grout method:

To pour:
- Filler grout can be poured into the top of the jacket through standing water.
- Fill jacket until grout reaches the top of the jacket.

To pump:
- Begin by pumping filler grout into the lowest port and move up from port to port.
- Grout should be continuously injected until the grout level reaches the top of the jacket.
- At the contractor's discretion, multiple grout ports can be installed to minimise the pumping pressure. For this method, injection should begin at the lowest port and continue until the grout appears at the port above. When this occurs, close off the port and move up to the next injection location. The injection process must be continuous, except for brief interruptions when the hose is being moved from port to port. Continue this process until the grout reaches the intended level.

Epoxy Grout Method



FILLER GROUT APPLICATION (CONTINUED)

For FX225 cementitious grout combination method:

For tremie applications:

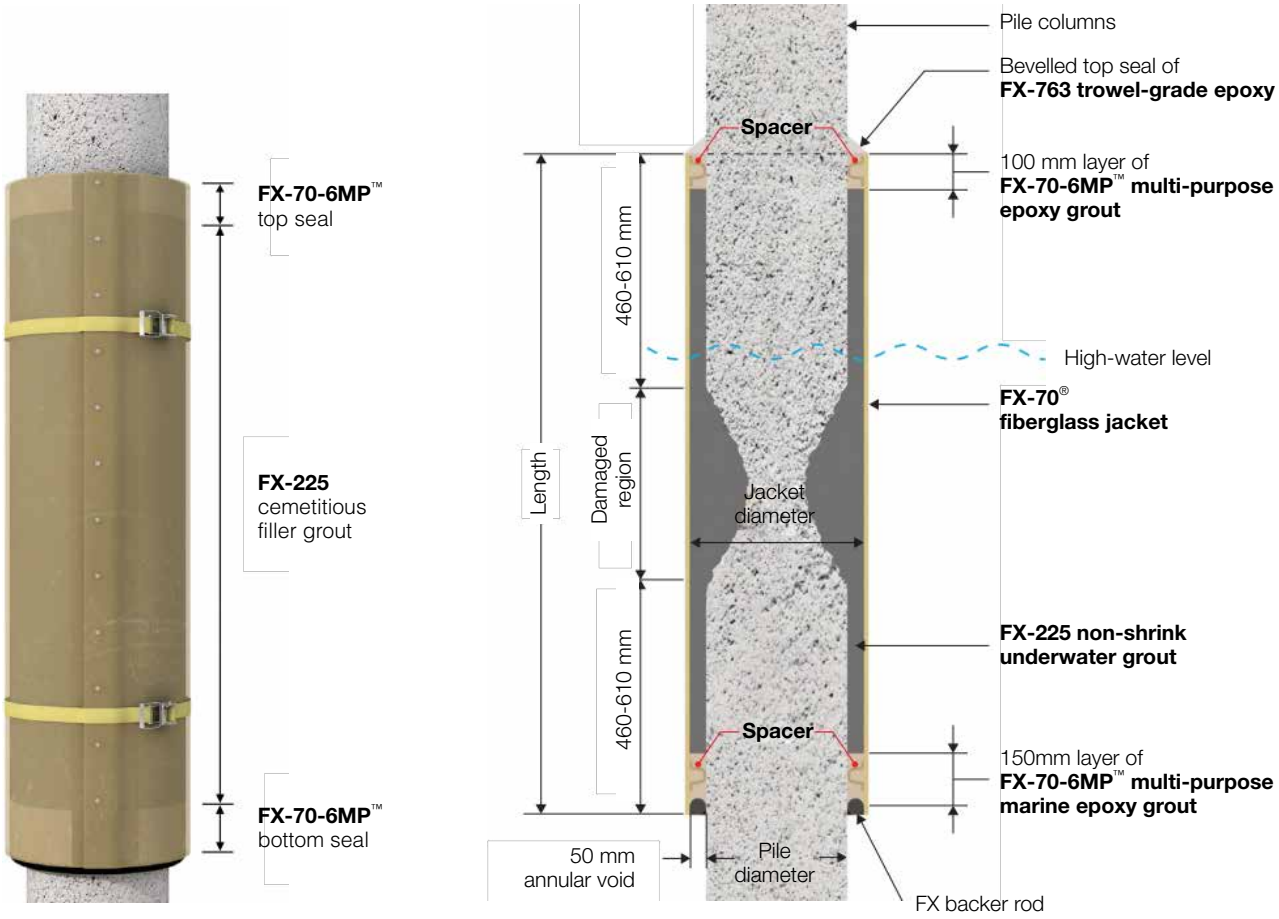
- Ensure the pipe/hose extends to the bottom of the jacket.
- Fill the jacket with grout, allowing water to be displaced from the top of the jacket. To maintain flow, the tremie hose may need to be retracted as the jacket fills, depending on the depth of the pour and the size of the jacket.
- Fill the jacket until the grout level is 100 mm below the top of the jacket.

To pump:

- Begin by pumping filler grout into the lowest port and move up from port to port.
- Grout should be continuously injected until the grout level is 100 mm below the top of the jacket.
- At the contractor's discretion, multiple grout ports can be installed to minimise the pumping pressure. For this method, injection should begin at the lowest port and continue until the grout appears at the port above. When this occurs, close off the port and move up to the next injection location. The injection process must be continuous, except for brief interruptions when the hose is being moved from port to port. Continue this process until the grout reaches the intended level.

3. Allow filler grout to cure overnight before proceeding with repair.

Cementitious Grout Combination Method



TOP SEAL APPLICATION

For FX225 cementitious grout combination method only:

1. Mix FX-70-6MP™ per current S&P technical data sheet found at sp-reinforcement.eu.
2. Pour FX-70-6MP™ into the remaining 100 mm at the top of the jacket.
3. Allow the seal to cure overnight before proceeding with the epoxy bevel.

EXPOXY BEVEL CONSTRUCTION

1. Prepare FX-763 trowel-grade epoxy mortar per current S&P technical data sheet found at sp-reinforcement.eu.

   After mixing the FX-763 trowel-grade epoxy, slowly add one part FX-702 oven dried rounded silica filler by volume per one part of mixed epoxy. Continue to mix for approximately 2–3 minutes or until FX-702 is thoroughly wetted.

2. Using a steel trowel, immediately construct the bevel using the mixed FX-763 trowel-grade epoxy mortar, taking care to construct a slope which will shed water.

COMPLETION OF WORK

Remove external bracing and clean any filler or other extraneous material from exterior surfaces of the jacket.

SUGGESTED TOOL LIST

1. Equipment to properly prepare the pile surface: chosen by the contractor and Engineer of Record
2. PPE: gloves, safety glasses, respirators, etc.
3. Generator
4. Manual epoxy dispensing tool, S&P EDT22S
5. Ratchet straps
6. Small drill and adapter, to set self-tapping stainless-steel screws in interlocking joint
7. Slow-speed mixing drill and mixing paddle
8. Clean measuring vessels
9. Large clean buckets for mixing
10. Mortar mixer (stationary drum with moving blades)
11. Suitable grout pump
12. Various hand tools: shovel, hammer, trowels, etc.
13. Hand-held grinder for jacket trimming
14. Drill and hole-saw for cutting holes for pumping ports

CE-MARKING

CE

This product conforms to EN 1504-3.

Head Office
S&P Clever Reinforcement Company AG
Seewernstrasse 127
CH-6423 Seewen
Phone: +41 41 825 00 70
Fax: +41 41 825 00 75
Web: www.sp-reinforcement.ch
E-Mail: info@sp-reinforcement.ch

SIMPSON Strong-Tie®