

## WATERPROOFING CONCRETE TIE HOLES USING XYPEX

2019-11

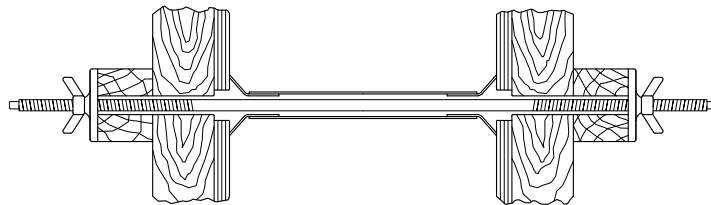
There are several ways of holding forms together during placement of concrete. Most of these methods involve the use of some type of steel tie that connects the forms together and holds them from spreading. These ties inevitably leave a leak path for water and need to be detailed in order to achieve a waterproof structure.

The following provides one recommended procedure for waterproofing each of the four most common types of concrete ties: spacer tube assembly ties, gang form taper ties, cone snap ties and flat bar snap ties. If coil ties, other ties whereby part of their assembly remains in the concrete, or some other type of tie not covered in this document is used, a modification of these procedures to fit that situation would be recommended. Contact Xypex's Technical Services Department for assistance.

These procedures are meant for use with tie holes that are not actively leaking. If tie holes are leaking see the Xypex "Repair of Leaking Tie Holes" Method Statement or contact Xypex's Technical Services Department for assistance.

### Waterproofing Spacer Tube Assembly Tie Holes

As illustrated below, spacer tube assembly ties include an appropriate length and diameter plastic tube that has cone shaped inserts in the ends. These act as a spacer assembly between the forms. A threaded rod runs through the forms and tube and is bolted tight to hold the forms together. The following procedure is for the waterproofing of the through element holes left after removal of the steel rods, cone inserts and other forming hardware.

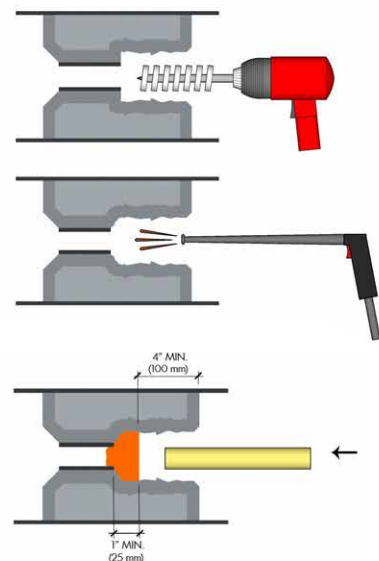


The following installation is best performed from the positive or wet side of the concrete element although it can also be done from the negative or dry side.

**STEP 1:** Using a hammer drill bit that is slightly larger than the outside diameter of the plastic tube, drill out to a depth of at least 5" (125 mm) the plastic spacer tube leaving the inner wall of the hole rough and free of any plastic debris.

**STEP 2:** Remove all loose material within the void and to a 12" (300 mm) diameter area around the void. Clean, profile (ICRI CSP-3) and saturate this area with water. Allow water to soak into the concrete and then remove all surface water. All surfaces should be left saturated surface dry (SSD – wet but with no glistening water).

**STEP 3:** Compact a quantity of Xypex Patch'n Plug into the bottom of the prepared section of the hole to form a plug. The plug is to be at least a 1" (25 mm) thick. There must remain at least a 4" (100 mm) of space between the top of the Patch'n Plug and the surface of the concrete element. Alternately insert an appropriately sized rubber stopper or commercially available rubber stopper device (such as a Flupp 22 ST) into hole and seat the stopper soundly into the top of the remaining plastic tube. (See the Taper Tie Assembly illustrations for rubber stopper example).



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**STEP 4:** Apply one slurry coat of Xypex Concentrate at a coverage of 1.5 lb./sq. yd. (0.8 kg/m<sup>2</sup>) to inside of the void and to a 12" (300 mm) diameter area around the hole. Application may be performed by brush or gloved hand.

**STEP 5:** While slurry coat is still tacky, fill the void to the surface with Xypex Concentrate mixed in the following proportions: one part clean water to six parts Concentrate by volume to create a Dry-Pac. Blend Dry-Pac by trowel for 10 to 15 seconds only (lumps should be present in the mixture). Fill the hole fully compacting Xypex Concentrate Dry-Pac using a pneumatic packing device or a hammer and dowel.

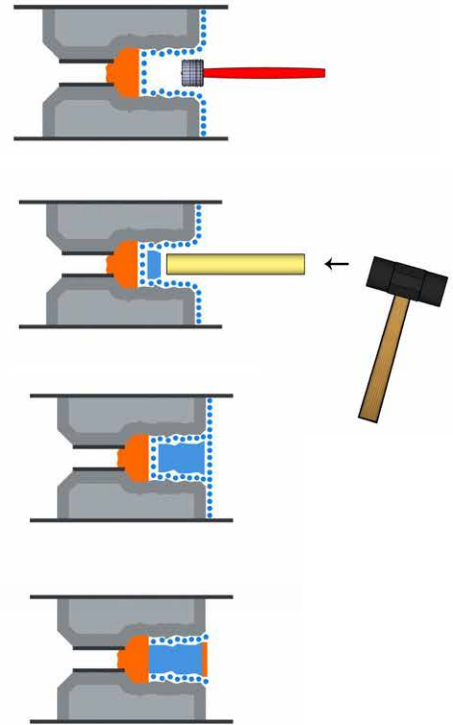
**STEP 6:** Wet the Dry-Pac surface lightly with water, then apply a slurry coat of Xypex Concentrate at a coverage of 1.5 lb./sq.yd. (0.8 kg/m<sup>2</sup>) over the repaired area to a 12" (300 mm) diameter area around the filled void.

**STEP 7:** Cure by keeping moist by fog spraying periodically with water for two to three days. Open to water contact per Xypex Coatings guidelines.

**Note:**

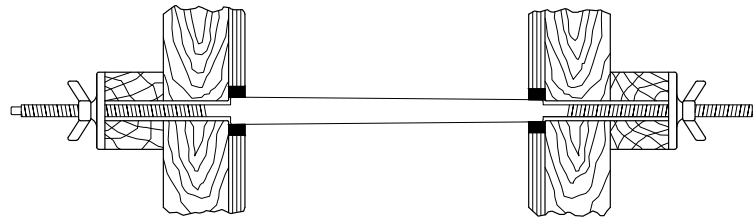
When early exposure to water is required:

1. In Step 5 – replace the top 1/4" - 1/2" (6 - 12 mm) of Xypex Concentrate Dry-Pac with Xypex Patch'n Plug.
2. Step 6 and Step 7 – eliminate.
3. Allow materials to gain sufficient strength for exposure to liquids.



## Waterproofing Gang Form Taper Tie Holes

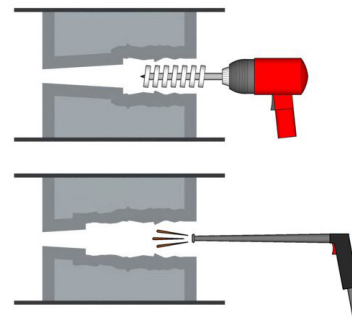
As illustrated below, taper ties are long steel bars that are threaded at each end and have a slight taper through the full length of the bar between the threaded areas. They are usually used in thick section walls of 20" (500 mm) or more.



The following procedure is meant for use when waterproofing a thick section wall. If the concrete section is thinner than 10" (250 mm) contact Xypex Technical Services for assistance. The following installation is meant to be installed from the positive or wet side of the concrete element although it can also be done from the negative or dry side.

**STEP 1:** Using a hammer drill bit that is slightly larger than the outside diameter of the taper tie hole, drill out the hole to a depth of at least 5" (125 mm) leaving the inner wall of the hole rough.

**STEP 2:** Remove all loose material within the void and to a 12" (300 mm) diameter area around the void. Clean, profile (ICRI CSP-3) and saturate this area with water. Allow water to soak into concrete and then remove all surface water. All surfaces should be left saturated surface dry (SSD – wet but with no glistening water).



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**STEP 3:** Insert into the smooth sided tie hole (at the bottom of the drilled out area) an appropriately sized rubber stopper or commercially available rubber stopper device. Alternatively, compact a quantity of Xypex Patch'n Plug into the bottom of the prepared section of the hole to form a plug. The plug is to be at least a 1" (25 mm) thick. There must remain at least a 4" (100 mm) of space between the top of the Patch'n Plug and surface of the concrete element (See the Spacer Tube Assembly illustrations for Patch'n Plug example).

**STEP 4:** Apply one slurry coat of Xypex Concentrate at a coverage of 1.5 lb./sq.yd. (0.8 kg/m<sup>2</sup>) to inside of the void to a 12" (300 mm) diameter area around the hole. Application may be performed by brush or gloved hand.

**STEP 5:** While slurry coat is still tacky, fill the void to the surface with Xypex Concentrate mixed in the following proportions: one part clean water to six parts Concentrate by volume to create a Dry-Pac. Blend Dry-Pac by trowel for 10 to 15 seconds only (lumps should be present in the mixture). Fill the hole fully compacting Xypex Concentrate Dry-Pac using a pneumatic packing device or a hammer and dowel.

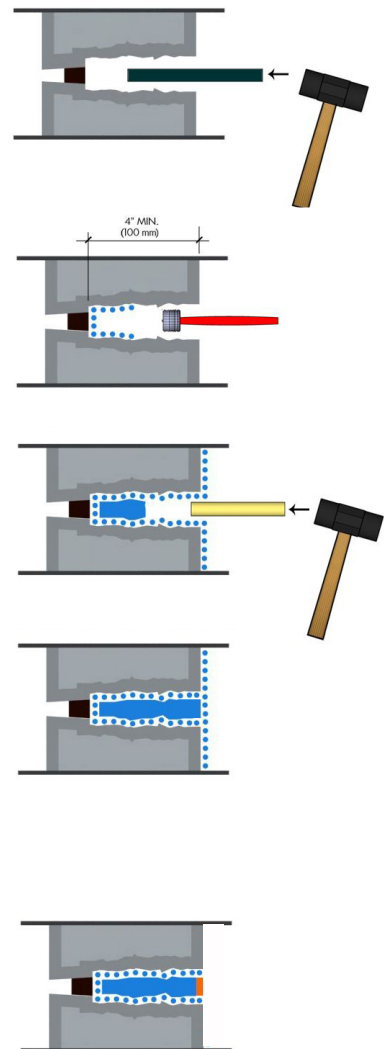
**STEP 6:** Wet the Dry-Pac surface lightly with water, then apply a slurry coat of Xypex Concentrate at a coverage of 1.5 lb./sq.yd. (0.8 kg/m<sup>2</sup>) over the repaired area to a 12" (300 mm) diameter area around the filled void.

**STEP 7:** Cure by keeping moist by fog spraying periodically with water for two to three days. Open to water contact per Xypex Coatings guidelines.

**Note:**

When early exposure to water is required:

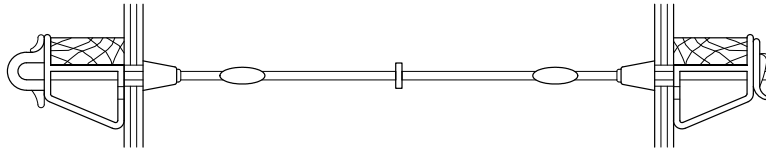
1. In Step 5 – replace the top 1/4" - 1/2" (6 - 12 mm) of Xypex Concentrate Dry-Pac with Xypex Patch'n Plug.
2. Step 6 and Step 7 – eliminate.
3. Allow materials to gain sufficient strength for exposure to liquids.



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### Snap Ties with Cone Spreaders

The following procedure is meant for snap cone ties that leave a solid steel rod through the concrete and a cone-shaped impression approximately 1" x 1.5" (25 mm x 37 mm) deep, at the surface of the concrete. When specifying form ties for a project, Xypex recommends a cone depth of greater than 1.5" (37 mm) and that ties have a built in waterstop included.



**STEP 1:** Using a hammer drill, or chisel bit that is slightly larger than the outside diameter to the cone, drill out or chip out the cone shape to the full depth of the indentation leaving a rough surfaced, straight sided void.

**STEP 2:** Remove all loose material within the void and to a 12" (300 mm) diameter area around the void. Clean, profile (ICRI CSP-3) and saturate this area with water. Allow water to soak into concrete and then remove all surface water. All surfaces should be left saturated surface dry (SSD – wet but with no glistening water).

**STEP 3:** Apply one slurry coat of Xypex Concentrate at a coverage of 1.5 lb./sq.yd. (0.8 kg/m<sup>2</sup>) to inside of the void to a 12" (300 mm) diameter area around chipped void. Application may be performed by brush or gloved hand.

**STEP 4:** While slurry coat is still tacky, fill the void to the surface with Xypex Concentrate mixed in the following proportions: one part clean water to six parts Concentrate by volume to create a Dry-Pac. Blend Dry-Pac by trowel for 10 to 15 seconds only (lumps should be present in the mixture). Apply Dry-Pac by gloved hand, then compress it tightly using a pneumatic packing device or a hammer and dowel.

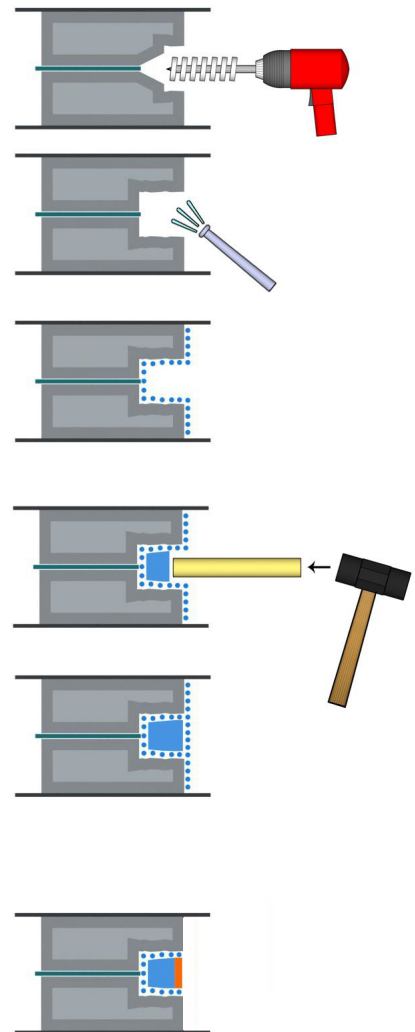
**STEP 5:** Wet Dry-Pac surface lightly with water, then apply a slurry coat of Xypex Concentrate at a coverage of 1.5 lb./sq.yd. (0.8 kg/m<sup>2</sup>) over the repaired area to a 12" (300 mm) diameter area around the filled void.

**STEP 6:** Cure by keeping moist by fog spraying periodically with water for two to three days. Open to water contact per Xypex Coatings guidelines.

**Note:**

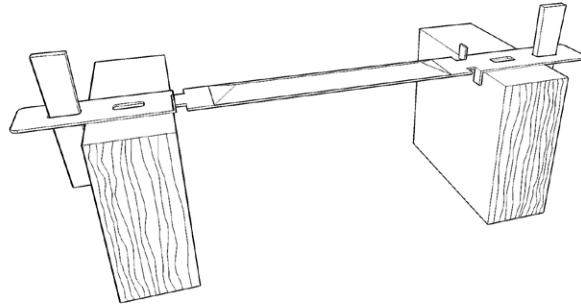
When early exposure to water is required:

1. In Step 4 – replace the top 1/4" - 1/2" (6 - 12 mm) of Xypex Concentrate Dry-Pac with Xypex Patch'n Plug.
2. Step 5 and Step 6 – eliminate.
3. Allow materials to gain sufficient strength for exposure to liquids.



**WATERPROOFING CONCRETE TIE HOLES USING XYPEX****Flat Bar Snap Ties**

Flat bar snap ties are typically not used for water retaining structures or significant foundations works but are used for below grade foundations that may require waterproofing.



Most flat bar snap ties are designed to break back approximately ¼" (6 mm) below the surface of the concrete.

**STEP 1:** Remove all loose material to a 12" (300 mm) diameter area around the tie. Clean, profile (ICRI CSP-3) and saturate this area with water. Allow water to soak into concrete and then remove all surface water. All surfaces should be left saturated surface dry (SSD – wet but with no glistening water).

**STEP 2:** Apply one slurry coat of Xypex Concentrate at coverage of 1.5 lb./sq.yd. (0.8 kg/m<sup>2</sup>) to a 12" (300 mm) diameter circle around the tie. Application may be performed by brush or gloved hand.

**STEP 3:** Mix Xypex Patch'n Plug to a mortar consistency and while slurry coat is still tacky, fill any depression around tie hole as well as mounding the Patch'n Plug over the area to a depth of approximately ½" (12 mm). The Patch'n Plug mound should be approximately 6" (150 mm) in diameter centered over the tie.

**STEP 4:** For added protection cover entire repair area with one coat of Xypex FCM 80 at 1/16" (1.5 mm) thickness.

**Note:**

The above procedure recommends Xypex Concentrate in Dry-Pac and Xypex Patch'n Plug as the materials to use to fill tie holes. Xypex is aware that blends of Xypex Concentrate and Xypex Patch'n Plug powders are also utilized in place of the Xypex Concentrate Dry-Pac. The blends normally consist of between 20% Concentrate and 80% Patch'n Plug to 80% Concentrate and 20% Patch'n Plug. These blends are typically used in a mortar consistency and have the advantage of ease of placement as well as rapid set while being able to be reworked in the hand, for several minutes, back to a mortar consistency. While Xypex recommends 100% Concentrate in Dry-Pac as the primary filling material for tie holes, Xypex allows the use of the blends described above for these and other applications.

