

January 29, 2015

PQ-200 Crystalline Procedural Installation Guideline

Project: Specified for CIP concrete water holding tanks, sewage treatment plants, pools, elevator pits, containment tanks and general waterproofing for interior concrete walls and floors.

Below are common installation methods utilizing Tremco's PQ-200 chemical crystalline.

- 1) Inspect all water holding facilities or elevator pits to be chemically waterproofed with PQ-200 crystalline.
- 2) Chip out or saw cut all cracks >0.1mm. Rout and clean all tie-rod holes. Chip the floor wall junction as per detail C-010-1B assuming the floor wall junction has been cast in separately such as water or sewage tanks or pools. Chip out or saw cut cold/construction joints as per detail C-010-1B. Details are approximate when chipping to size/depth. Repair as per 6, 7 & 8 below.
Note: Saw cutting into cracks and cold joints with multiple concrete saw blades placed onto a single concrete saw has shown to be extremely affective. We have seen up to 4 concrete blades installed to a single gas powered saw. A minimum of 2 blades required depending on blade thickness. Saw cuts 1/4" to 3/8" + wide x 3/4" deep are best. Adjust depth for steel reinforcement. Call Tremco for specific instructions. Chipping floor wall reglets normally done where water infiltrates from the exterior or problematic jobs where exterior water has not been halted. In some cases, chipping to 1/8" depth is all that's required in the floor wall junction that show consistently dry. CRD-48 test method would require 3/4" reglet depth for floor wall junctions. Finish all floor wall junctions with a cant/cove.
- 3) Floors (preferred method): Dry seed with PQ-200 (200/sf/pail) at time of initial cast. PQ-200 may be dry broadcast to CIP concrete just prior to bull floating or, cast 10 to 30/ft in front of the steel spin trowel.
"Bull floating preferred then steel spin trowel"
3.1) Floors previously cast without PQ-200 dry broadcast; Waterblast 1000/psi above the compressive strength of the concrete floor using an oscillating tip. (Sand/Shot blast accepted). The floor must be damp (SSD) prior to the application of PQ-200 crystalline. Make sure there's no ponding water prior to application. Brush PQ-200 to floor at 400/SF per 5-gallon pail. Wait 30 minutes to 1-hour and brush a second coat same as first. If you can walk on the first coat without removing the material, you're ready for the second coat.
- 4) Walls: Water blast or sandblast tank walls in order to open the concrete capillary tracks. Water blasting will be 4000/psi+ c/w an **oscillating tip**. The water pressure should be able to etch the walls. Walls should be fully cured prior to sand/shot or water blasting or water pressure adjusted for new concrete.
- 5) (Option) - Fill and Drain water holding tanks and mark all interior cracks which show leakage, and repair as per Tremco detail C-010-1B. Details are approximate when chipping to size/depth. Cracks may be saw cut.
- 6) Chipped or saw cut cracks are cleaned, dampened then detailed with PQ-200 crystalline installed as a dry pack mortar. Never use a mixing paddle for dry pack mortars. Trowel to dampened (SSD) surface. Chip out or saw cut cracks and reglets as per Tremco detail C-010-1B. Details are approximate when chipping to size/depth. Dry containment tanks need only 1/16" to 1/8" concrete chipped for cant/cove installation to the floor wall junctions. Install PQ-200 as dry pack mortar to (SSD) dampened surface. Interior baffle walls

generally do not need coves or reglets unless there are cracks developing under the wall protruding across the floor.

- 7) Reglets: Where moisture is entering from the exterior, detail as point #6 above. Floor wall junctions are chipped 3/4" to 1" depth. Reglets are dampened then detailed with PQ-200 crystalline installed as a dry pack mortar. Chip out cracks and reglets as per Tremco detail C-010-1B. Details are approximate when chipping to size/depth. Interior baffle walls generally do not need coves or reglets unless there are cracks developing under the wall protruding across the floor. Note: Coves may be installed as part of the reglet repair (recommended). Never use a mixing paddle for dry pack mortars. Trowel to (SSD) dampened surface. All reglets will be filled with PQ-200 dry pack to for a cant/cove when finished.
- 8) Fill the tie-holes utilizing the same methodology as chipped out crack repairs. PQ-200 crystalline installed as a dry pack mortar to SSD dampened well prepared tie-holes. Never use a mixing paddle for dry pack mortars.
- 9) (Bug Holes). Provide a test patch 1 meter x 1 meter minimum and cover with 2-coats of crystalline. Take pictures of before and after the application. This will give you a good idea of the size of bug hole to repair. Make sure to use a large crystalline brush or similar. In many cases, smaller bug holes will disappear under 2-coats of PQ-200 without concern. See detail C-142-3A. Note: on rare occasions, 3 coats of PQ-200 have been applied to cover bug holes.
- 10) Fill large bug holes (clusters) as determined by the test patch above. 2-ways to repair bug holes in mass
1.) mix sand/cement/PQ-200 mixed by volume, 3 gallons sand, 1-gallon cement, 1-litre (1.1 quarts) PQ-200. You may adjust the sand cement ratio as needed. Trowel or bag rub to dampened (SSD) surface.
- 11) The application of PQ-200 crystalline to the walls will be 400/SF per pail 1st coat. 2 coats are required to meet our specifications. Make sure to grid the area for each pail. The first coat must reach initial set before the second application. Usually 30 minutes to 1.5 hours later for elevator pits and up to 1-hour for large covered holding tanks. The first coat should not be affected by the brushing application of the second coat. The wall should be dry damp (SSD) before initial PQ-200 application and any subsequent applications. If required, spray walls with water and let stand until the wall shows no glistening water. Wall should be damp but semi dry to the touch. All repairs will be covered by 2 coats of PQ-200.

Pools: Special Applications and precautions.

The following procedure may be used for pool applications. This procedure may be altered with Tremco approval to suit specific site conditions or specifications.

1.1 Dry broadcast PQ-200 to floors same point #3 above. An alternate, dry broadcast PQ-200 to 1st lift of CIP concrete just above the rebar on the first pour. Vibrate concrete immediately. Cast 2nd lift of CIP concrete to first. This ensures PQ-200 is reactive "center of concrete".

1.2 Reglets: Floor wall junction reglets may be formed during concrete floor being cast. Taped wood strapping or similar may be used. Depress into wet concrete floor during 2nd lift being cast. Make sure wood is tight to wall.

1.3 Remove wood strapping once specifications for concrete dry times have been met. Waterblast, shot/sand blast the entire wall at 1000/psi above the compressive strength of the concrete. Utilize an oscillating turbo nozzle for waterblasting. Make sure the waterblaster/power washer is rated 4/gallons of water per minute or higher.

Concrete will show a sanded etched surface. Make sure all sand/shot or waterblasting is done prior to dry pack applications to cracks, reglets or tie holes. Example: wood removed from reglet will produce a smooth surface which must be roughened.

1.4 The procedure may be altered at this point. Fill all tie holes utilizing point #8. Reglets are also filled using point #7 above. Fill pool over a 3 to 7 day period or as specified to prevent cracking. Mark leaks to be repaired.

1.5 Drain pool and repair leaks as above. Apply PQ-200 chemical crystalline in a 2-coat application to (SSD) pool walls covering any and all repairs previously done. Carry the PQ-200 onto the floor approximately 6" to 12"

1.6 Allow the PQ-200 chemical crystalline parge coat to remain for 14 days minimum and up to 28 days. Follow specification for refilling pool to determine if more repairs are necessary.

1.7 Tiles: Where specifications call for the installation of tiles over chemical crystalline waterproofing, in most cases the chemical crystalline is sand/shot blasted from the walls. 85% or more of the reactive chemical is now incorporated into the matrix of the concrete after 14 to 28 days so removal of the visual parge coat does not affect the waterproofing. The depth of penetration is dependent on humidity, concrete mix design and other factors. The visual parge coat is no longer necessary once 15mm penetration has been achieved. Chemical crystalline imparts what appears to be efflorescence to the surface and sub-surface of the concrete. Once the parge coat is 85%+ removed, spray or brush the surface with muriatic acid to neutralize. Muriatic is applied over pre-dampened surfaces. **Note:** See below "Painting" If excessive damage has occurred during the removal process to the tie holes, crack repair areas and reglets, repack with 200 dry pack mortar and neutralize surface after 3 full days.

Call Tremco for guidance once the removal process has been specified.

Painting PQ-200:

PQ-200 can be painted over with special precautions. First, PQ-200 may impart what appears to be efflorescence on the wall surface. This is a normal reaction with particular types of concrete mix designs. All flaking or loose parge material must be removed. For exterior surfaces, muriatic acid wash is best to neutralize the reactive surface after pre-dampening the PQ-200 with fresh water. Muriatic mixed with water can be sprayed from a curing compound sprayer. Surfaces to be painted may have to be neutralized twice. In order to determine the correct water to muriatic mix ratio, test a small area first. **Note:** Proper ventilation must be addressed for muriatic wash. Always heavily dampen the concrete surface with clean potable water before muriatic acid wash is used.

Water to Muriatic

| | | | | |
|---|---|---|-----|--|
| " | " | " | 3:1 | Surface should be hosed down after 25 minutes. |
| " | " | " | 4:1 | " " " 35 minutes. |
| " | " | " | 5:1 | " " " 45 minutes. |

Under normal circumstances Tremco requires 28 days to refill pools or tanks once the crystalline application is complete. Due to the excessive atmospheric moisture crystalline may impart on the pool/tank walls; accelerated reaction times have been noted. It may be possible to fill pools/ holding tanks well under the 28 day mark. Elevator pits take considerably less time to press into service.

CMU Walls:

1. CMU walls require special attention. CMU walls require a “minimum” of 3 to 5 coats of PQ-200 instead of the normal 2 coats over the dampened surface. Placing a crystalline admix in the concrete fill for CMU is the best practice before starting any below grade CMU project.
2. When filling hollow CMU walls to eliminate the potential of water occupying the hollow cavities, utilize PQ-100 or IC admix at 1 gallon per cubic yard of concrete or mortar fill. Hollow CMU block may fill with water and be near impossible to waterproof if the hollow cavities are not properly cemented.

Elevator pits: It is imperative that **floor wall junctions** are chipped or saw cut to create a keyway in CIP concrete. Always check for tie-wire including tiewire clusters, rebar chairs and other contaminants. Chipping may be the only way to find pathways in the floor wall junction. You must pack the keyway/reglet with PQ-200 mixed as a dry pack mortar then create a cant/cove when finished. All repairs are done same as mentioned above. All repairs are covered with 2 coats of PQ-200 mixed as a slurry coat.

Slurry coat (typical): PQ-200 mixed as slurry, 2.5 parts powder to 1 part water.

Dry Pack: PQ-200 mixed as a dry pack mortar must be adjusted for water hardness. This means, your area may have hard or soft water which can slow or accelerate the cure. A normal PQ-200 dry pack is 7 parts powder to 1 part water adjusted for temperature, humidity and water hardness. Mix small batches first and adjust the water to make a non-slumping mortar. Do not mix same as the PQ-200 slurry. Adjust dry pack mixture depending on temperature and humidity

Curing: PQ-200 may be water cured over a 3 day period assuming the humidity level drops below 65%. Spraying the new crystalline installation once a day for 3 days will enhance the cure and penetration. Should a curing compound be considered, only sodium silicate curing compounds may be utilized.

Understanding application rates.

PQ-200 crystalline comes in 5-gallon pails. For brush applied applications, 1-pail will coat up to 400/SF. Tremco requires 2 coats for every 400/SF. That's 2-pails of PQ-200 for every 400/SF of walls. For dry broadcasting into new CIP concrete floors, calculate 1 pail only for every 200/SF of floor.

Another way to look at this, when calculating how much material to use per job, simply take the entire concrete area (floors and walls) and divide by 200/SF.

Example:

20,000/SF of walls would be $20,000 \div 200 = 100$ -pails of PQ-200 (not including waste)

Or

$20,000/SF \text{ of walls} \div 400/SF \text{ per pail} = 50\text{-pails}$, but remember you need 2 pails for every 400/SF so that's $50 \times 2\text{-pails} = 100\text{/pails}$

10,000/SF of floors would be $10,000 \div 200 = 50$ -pails of PQ-200 (not including waste)

Note-1: Bug holes and other imperfections to concrete walls can reduce application rates by a considerable amount. That coupled with waterblasting or sandblasting can leave walls rough forcing the spread rates to drop.

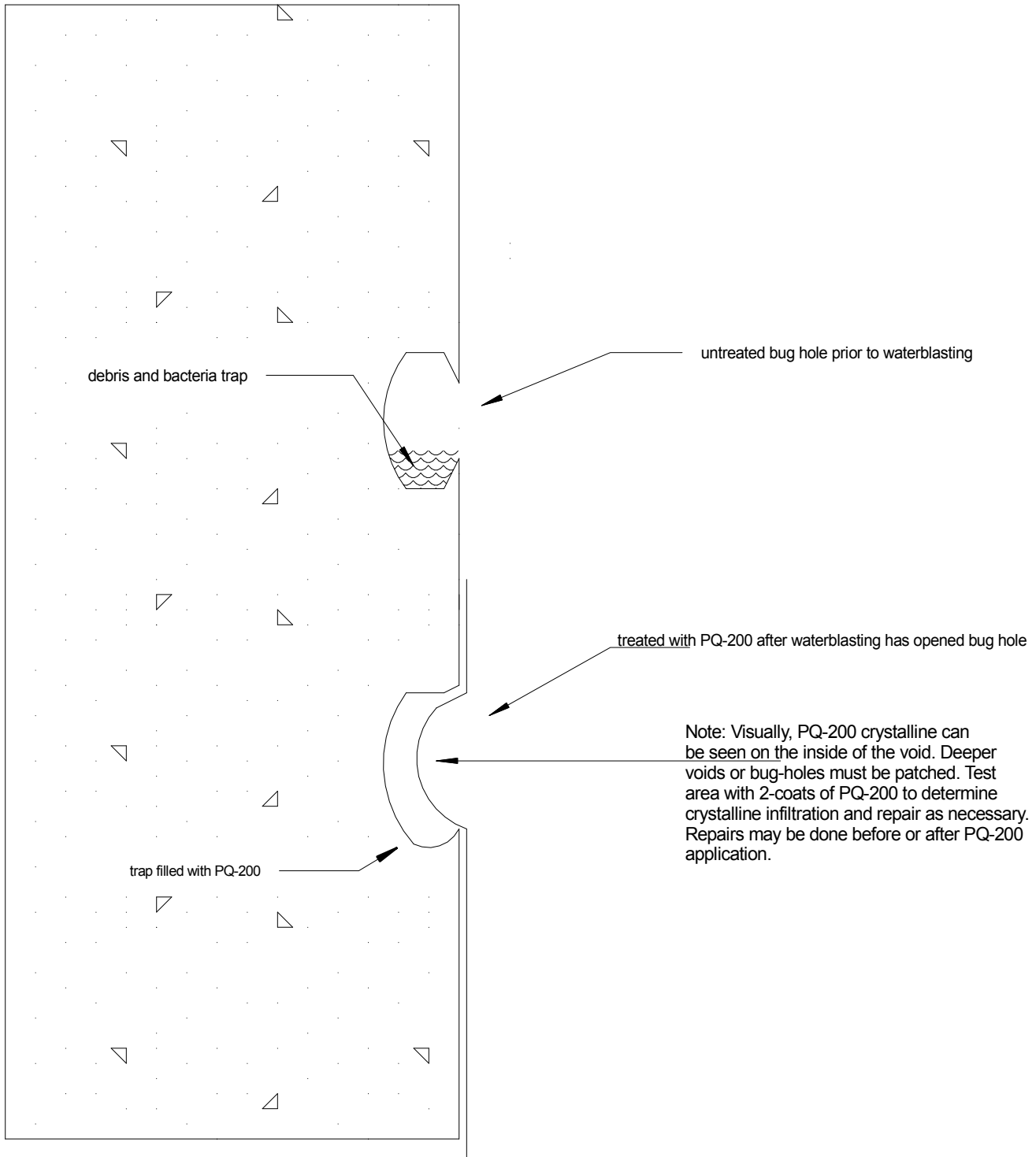
Note-2: It's very important to keep all latex, acrylic or any other 2-component modified cement grout out of the specifications if crystalline is formally specified. Chemical reactive crystalline needs to contact the calcium hydroxides or lime as the 3rd reactive in the concrete. 99% of 2-component polymer modified repair mortars blocks the reaction through the capillary tracks of the concrete.

Note-3: It's important to make sure the waterblast or sand/shot blast is done before any of the repairs are carried out. You certainly do not want to water/sand/shot over your new repair.

Structural Design Considerations: For new structures, always try to inform the steel workers to cut back or bend tie wire to the interior of the rebar cage. Try not to allow steel tie wire pathways to cause entry points for water infiltration. That goes for both the exterior and interior. Stop any repairs to walls which are specified to receive chemical crystalline until such time, the contractor/applicator and manufacturer format a game plan for these repairs. It's been noted that using latex acrylic modified grouts to repair tie holes for example, slow or stop the chemical reaction of the crystalline. Never inject cracks with hydroscopic/hydrophilic/hydrophobic materials prior to the application of chemical crystalline. We have no objection to their use after the chemical crystalline has had a chance to react with the concrete substrate. Keep all specified hydroscopic waterstop materials away from the interior wall to wall, floor to wall junctions and cold joints should chemical crystalline be specified for installation. Hydroscopic/hydrophobic water stop materials must never contact chemical crystalline.



Containment structure.
minimum requirement for bug-holes or voids.



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Feb-12-2013

Drawing No.
C-142-3A

Drawn by:
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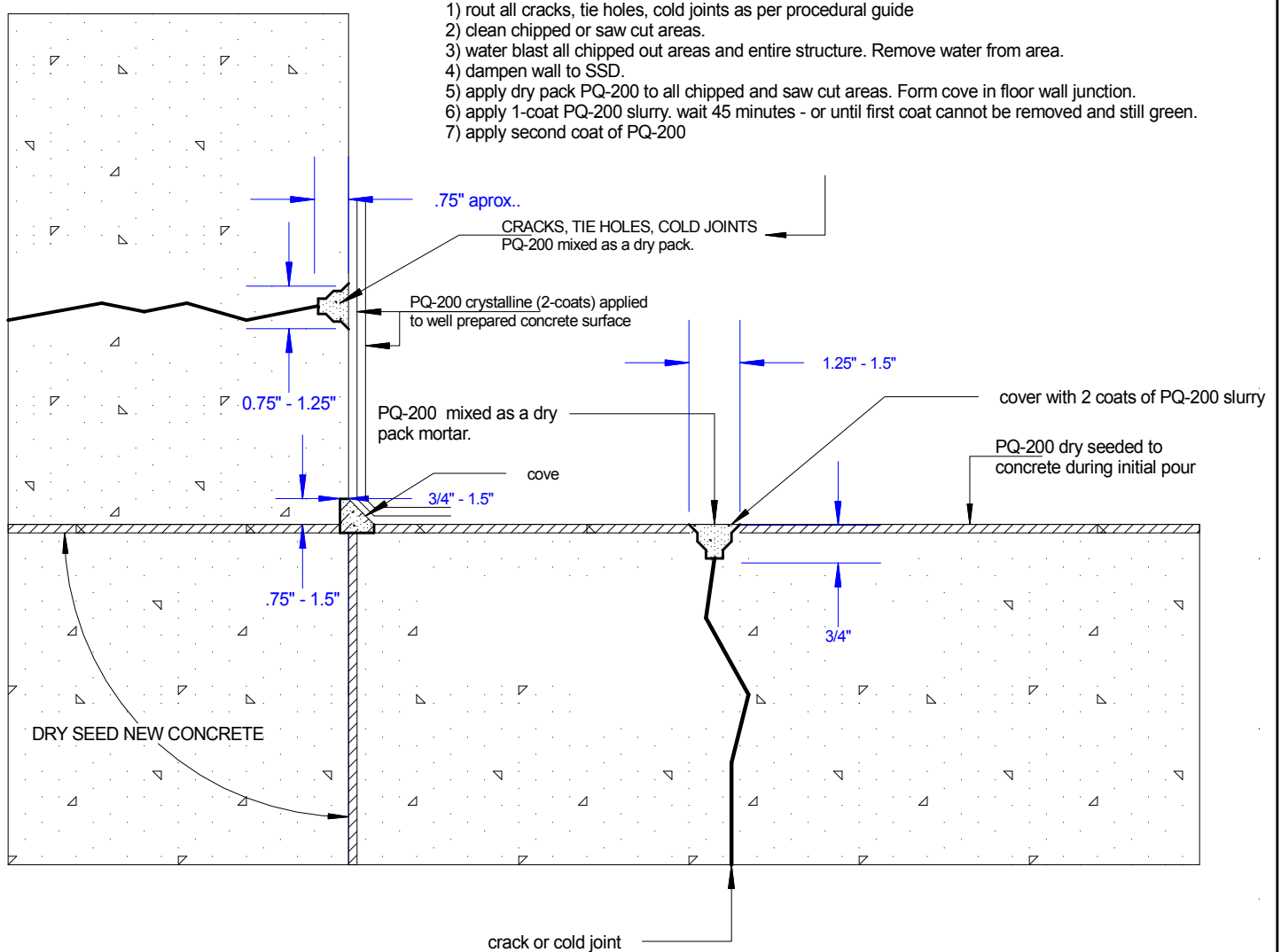
Scale:

Project:



Crystalline crack and cold joint repair

detail>> C-010-1B



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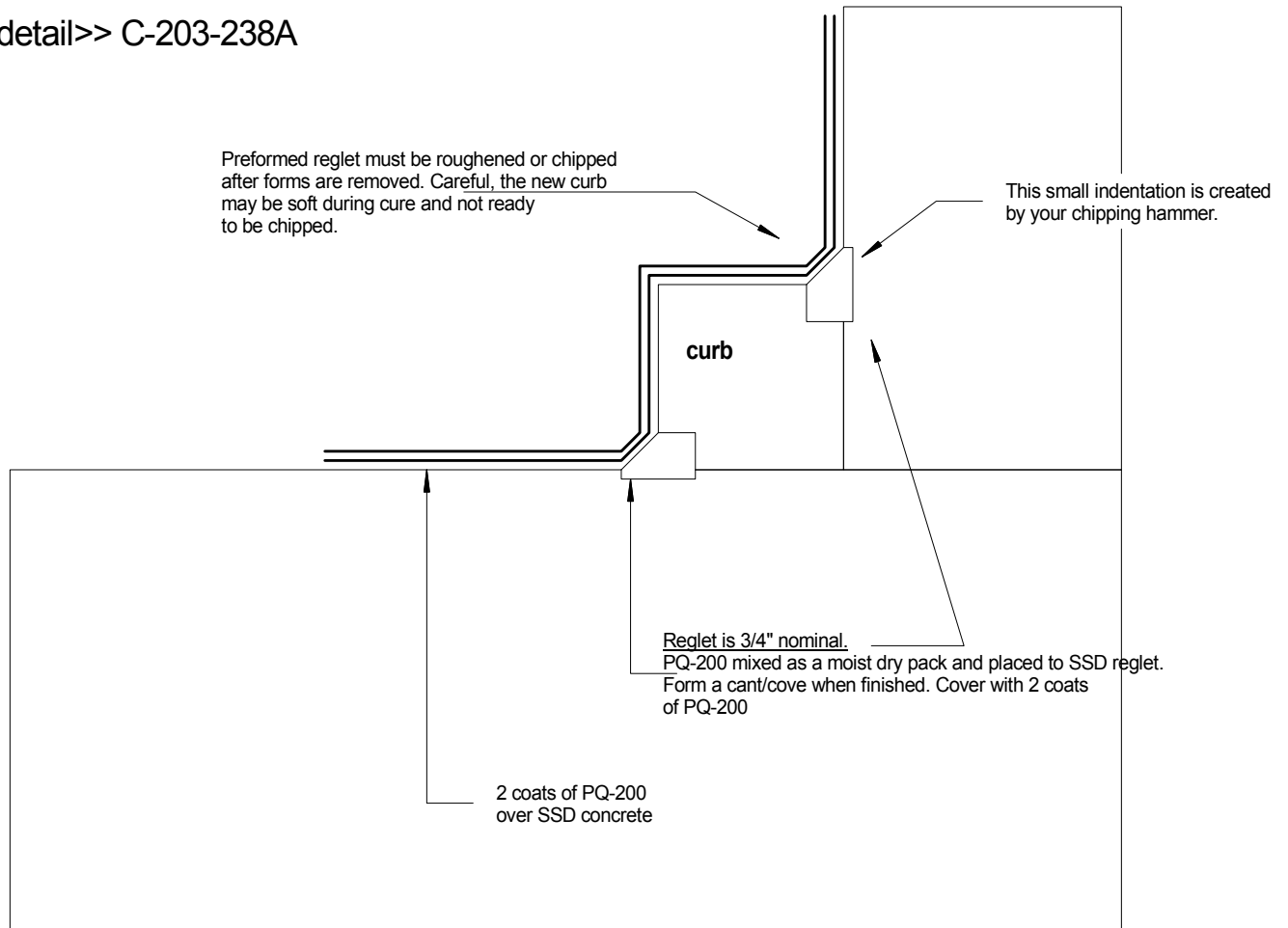
Project:



Crystalline curb reglet.

Detail used for preformed reglet's.

detail>> C-203-238A



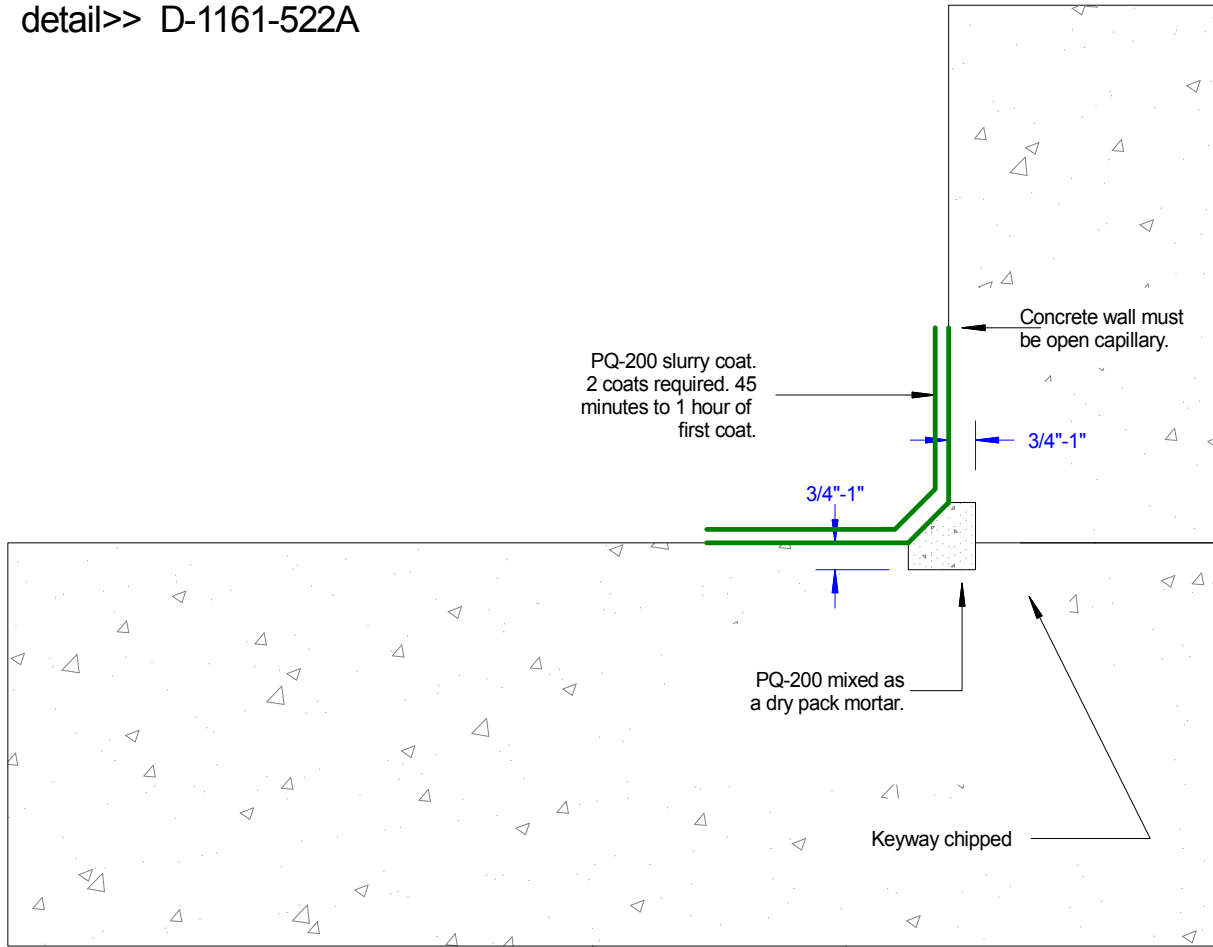
Note: Judge your reglet size along with your capability to roughen the reglet when the forms are removed. If that means a slightly larger reglet, judge accordingly.





Chemical Crystalline Reglet - Floor Wall Transition

detail>> D-1161-522A



Note: The key/reglet must be damp prior to the application of PQ 200 dry pack mortar.

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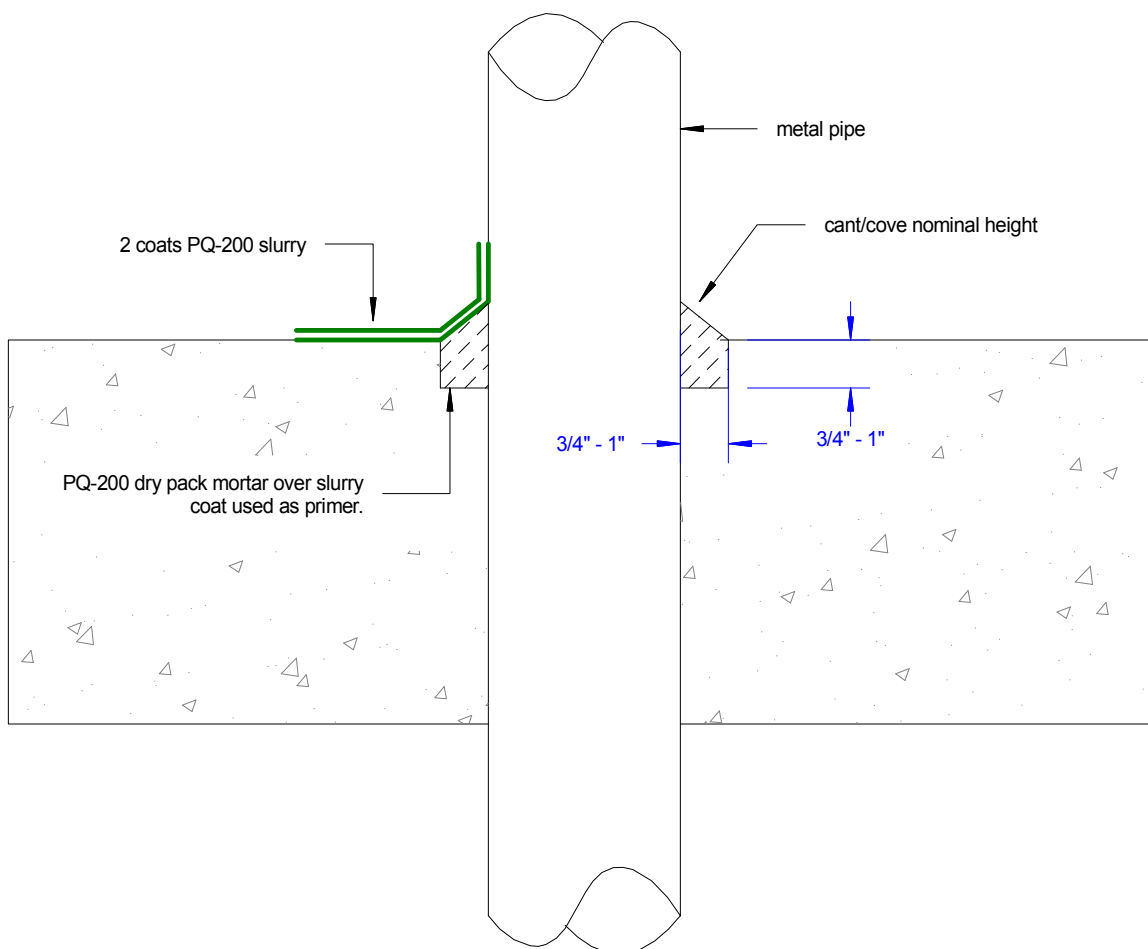
Scale:

Project:



PQ-200 metal pipe protrusion.

detail>> D-2008-553A



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| <u>Project:</u> | | |