SECTION 07 16 16

CRYSTALLINE WATERPROOFING

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\*\* NOTE TO SPECIFIER \*\* Xypex Chemical Corp.; dry shake slab application.
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This section is based on the products of Xypex Chemical Corp., which is located at:
13731 Mayfield Pl.
Richmond, BC, Canada V6V 2G9
Toll Free Tel: 800-961-4477
Tel: 604-273-5265
Fax: 604-270-0451
Email: [request info (info@xypex.com)](https://admin.arcat.com/users.pl?action=UserEmail&company=Xypex+Chemical+Corp.&coid=36630&rep=&fax=604-270-0451&message=RE:%20Spec%20Question%20(07162xpx):%20%20&mf=)
Web: <https://www.xypex.com>
 [ [Click Here](https://www.arcat.com/arcatcos/cos36/arc36630.html) ] for additional information.
Xypex waterproofing accomplishes waterproofing by forming crystals in the capillary pores of concrete. It can be used in 4 ways: 1) surface application on new or existing concrete surfaces, 2) dry shake application on fresh horizontal concrete surfaces incorporated into the concrete surface during the finishing process, 3) applied to the surfaces of construction joints between successive pours, and 4) mixed into the concrete. The latter two applications are not included in this section, and are normally included in the cast-in-place concrete section.
Xypex waterproofing can be used above and below grade, on decks, elevator/sump pits, planters, swimming pools, tunnels, clarifier tanks, digester sections, reservoirs and wet wells, underground vaults and dry wells, manholes, ferro-cement boats and floating docks, and many other difficult to waterproof applications.
Xypex may be painted or otherwise coated, plastered, or tiled. However, because the waterproofing forms a relatively smooth surface and fills the concrete pores, the waterproofed surface may not have enough suction for bonding of cementitious materials like plaster and tile setting materials without the use of special bonding agents. It may be necessary to field test waterproofed surfaces to determine what preparation is necessary to ensure adhesion.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project. Edit the scope of surfaces to be treated to suit project requirements. Be sure to indicate which side the waterproofing is to be applied to, unless indicated on the drawings.

* + 1. Crystalline waterproofing of concrete surfaces.
		2. Crystalline waterproofing of top surface concrete substrates, above-grade or below-grade, on either dry or wet side of substrates.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete. Concrete surfaces.
		2. Section 03 30 00 - Cast-in-Place Concrete.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 1999.
		2. ASTM C 267 - Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes; 1997.
		3. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction; 1998a.
		4. COE CRD-C 48 - Standard Test Method for Water Permeability of Concrete; 1992.
		5. ICRI CSP-3 - Guidelines Instructions for Concrete Surface Preparation.
		6. NSF 61 - Drinking Water System Components - Health Effects; 2000a.
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data: Manufacturer's data sheets on each product to be used, including:
			1. Preparation instructions and recommendations.
			2. Storage and handling requirements and recommendations.
			3. Installation methods.
		3. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
			1. Testing Agency: Independent laboratory meeting the requirements of ASTM E 329 and certified by the United States Bureau of Standards or other applicable international standard for certification of testing laboratories.
		4. Certificates: Product certificates signed by manufacturer certifying that:
			1. Materials comply with specified performance characteristics and physical requirements.
			2. Installer is qualified and approved by manufacturer.
		5. Manufacturer's report on field inspection of substrates, prior to installation.
		6. Close Out: Executed warranties.
	2. QUALITY ASSURANCE
		1. Manufacturer Qualifications: An ISO 9001 certified firm with not less than 25 years experience manufacturing crystalline waterproofing of the type specified, able to provide test reports showing compliance with specified performance characteristics, and able to provide on-site technical representation to advise on installation.
		2. Installer Qualifications: Experienced in work of the type specified in this section and approved in writing by waterproofing manufacturer.
		3. Preinstallation Meeting: Prior to starting work, conduct a meeting with the waterproofing installer, installers of adjacent work, and waterproofing manufacturer's representative to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements; notify the Owner and Architect/Engineer at least one week in advance of meeting.
	3. DELIVERY, STORAGE, AND HANDLING
		1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
		2. Store products in manufacturer's unopened packaging until ready for installation.
		3. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
	4. PROJECT CONDITIONS
		1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
	5. WARRANTY

\*\* NOTE TO SPECIFIER \*\* Verify the warranty period with both the manufacturer and the installer. Do not specify warranty period that either party will not honor

* + 1. Manufacturer's Warranty: Provide manufacturer's standard warranty document executed by authorized company official; warranty period: \_\_\_\_ years commencing on Date of Substantial Completion.
		2. Installer's Warranty: Provide warranty signed by installer as follows:
			1. Installer warrants that, upon completion of the work, surfaces treated with crystalline waterproofing will remain free of water leakage resulting from defective workmanship or materials for a period of \_\_\_\_ years from Date of Substantial Completion.
			2. In the event that water leakage occurs within the warranty period from such causes, the installer shall, at his own expense, repair, replace, or otherwise correct such defective workmanship and materials.
			3. Installer shall not be liable for consequential damages.
			4. Installer's liability shall be limited to repair, replacement, or correction of defective workmanship and materials.
			5. This warranty excludes leaks or other defects due to causes beyond the installer's control, including but not limited to structural failure, movement of the structure, fire, earthquakes, tornadoes, and hurricanes.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Xypex Chemical Corp., which is located at: 13731 Mayfield Pl.; Richmond, BC, Canada V6V 2G9; Toll Free Tel: 800-961-4477; Tel: 604-273-5265; Fax: 604-270-0451; Email: [request info (info@xypex.com)](https://admin.arcat.com/users.pl?action=UserEmail&company=Xypex+Chemical+Corp.&coid=36630&rep=&fax=604-270-0451&message=RE:%20Spec%20Question%20(07162xpx):%20%20&mf=); Web: <https://www.xypex.com>
		2. Obtain all crystalline waterproofing products from a single source.

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
	1. MATERIALS
		1. Waterproofing Products: Provide installed products that have been tested in accordance with the following standards and conditions, when tested using cured concrete samples made without admixtures, with waterproofing at manufacturer recommended coverage rates:
			1. Penetration: At least 12 inches (300 mm) penetration of crystal-forming material, evidenced by scanning electron microscope photographs.
			2. Permeability: No measurable leakage through waterproofed concrete, when tested in accordance with COE CRD-C 48 at 405 feet (123.4 m) of head or 175 PSI (1200 KPa) using 2 inch (50 mm) thick, 2000 PSI (13.8 MPa) compressive strength concrete.
			3. Chemical Resistance: No detrimental effects when tested using 4000 PSI (27.6 MPa) compressive strength concrete in accordance with ASTM C 267 using hydrochloric acid (pH of 3.5), brake fluid, transformer oil, ethylene glycol, toluene, and caustic soda as test mediums for duration of 84 days each; minimum of 14 percent increase in concrete compressive strength when tested in accordance with ASTM C 39/C 39M.
			4. Potable Water Contact Approval: NSF certification for use on structures holding potable water, based on testing in accordance with NSF 61.

\*\* NOTE TO SPECIFIER \*\* The following single coat application is essentially dampproofing. Delete either the following paragraph or the next, describing two-coat waterproofing.

* + 1. Waterproofing: Xypex Concentrate and Xypex Modified, single coat crystalline waterproofing; proprietary compound of Portland cement, silica sand and active chemicals, mixed with water in proportions recommended by manufacturer to achieve full coverage with application method used.

\*\* NOTE TO SPECIFIER \*\* Edit the following to select single coat of two coat application from the following paragraphs. Two-coat waterproofing can be used above or below grade on positive- or negative-pressure sides of walls, foundations, pits, tunnels, swimming pools, clarifier tanks, digester tanks, vaults, manholes, and docks.

* + 1. Waterproofing: Xypex two-coat crystalline waterproofing.
			1. First Coat: Slurry of Xypex Concentrate; proprietary compound of Portland cement, silica sand and active chemicals, mixed with water in proportions recommended by manufacturer to achieve the specified coverage with application method used.
				1. First Coat Coverage: 1.25-1.5 lb/sq yd (0.65-0.8 kg/sq m) when using two coat application.
				2. First Coat Coverage: 2.0 lb/sq yd (1.09 kg/sq m) when using single coat application.
			2. Second Coat: Xypex Modified; proprietary compound of Portland cement, silica sand and active chemicals, mixed with water in proportions recommended by manufacturer to achieve full coverage with application method used.
				1. Second Coat Coverage: 1.25-1.5 lb/sq yd (0.65 - 0.8 kg/sq m) for second coat in a two coat application.
		2. Top-of-Slab Waterproofing: Dry shake powder application on fresh concrete; Xypex Concentrate DS1 and DS2, proprietary compound of Portland cement, silica sand and various active chemicals, formulated as a powder compound for dry shake application.

\*\* NOTE TO SPECIFIER \*\* The following repair compound is used for sealing strips at construction joints or for repair of cracks and honeycombs.

* + 1. Dry Pack Repair Compound: Dry pack consistency mixture of Xypex Concentrate; proprietary compound of Portland cement, silica sand and active chemicals; and water in proportions recommended by manufacturer.
		2. Patching Compound: Single component, fast-setting, non-shrink, high bond strength hydraulic cement; Xypex Patch 'n Plug.
1. EXECUTION
	1. EXAMINATION
		1. Do not begin installation until substrates have been properly prepared.
		2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
		3. Obtain waterproofing manufacturer's approval of substrates; submit field inspection report.
		4. Do not install unless substrate and ambient air temperatures are within range acceptable to waterproofing manufacturer.
	2. NEWLY PLACED HORIZONTAL CONCRETE SURFACE
		1. Comply with manufacturer's instructions, including product data, technical bulletins, catalog installation instructions, and product carton instructions.
		2. Newly placed concrete should be free of bleed water and be able to support the weight of a power trowel. Apply a rough wood float or broom finish.
		3. Immediately after floating the surface, apply one-half of the dry shake material evenly by a hand or mechanical spreader at rate the recommended by manufacturer.
		4. As soon as the dry shake material has absorbed moisture from the base slab, finish the concrete surface and incorporate the dry shake material into surface during the finishing process.
	3. PREPARATION OF CURED CONCRETE
		1. Prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions.
		2. Clean laitance, curing compounds, excess form oil, dirt film, paint, coatings or other foreign matter harmful to the performance of waterproofing from surfaces of cured concrete to be treated.

\*\* NOTE TO SPECIFIER \*\* Horizonal surfaces should have a rough wood float or broom finish. If a smooth trowel finish is needed on horizontal surfaces, use the dry shake method of waterproofing (above).

* + 1. Prepare cured concrete surfaces in accordance with ICRI CSP-3 if necessary to provide open capillary surface to provide tooth and suction for treatment; use acid etching, sandblasting, waterblasting, or other methods.
		2. Defects: Rout out defects, such as cracks, faulty construction joints, honeycombing, form tie holes, and other defects to sound concrete, and repair.
			1. Chip defective areas into a U-shaped slot 1 inch (25 mm) wide and minimum 1.5 inch (37 mm) deep.
			2. Clean slot, wet, saturate with water and remove surface water.
			3. Apply specified slurry coat to slot at rate recommended by manufacturer.
			4. Allow slurry coat to reach initial set.
			5. Fill cavity with specified dry pack repair compound.
			6. Compress tightly into cavity using pneumatic packer or hammer and blocks.
		3. Rock Pockets, Honeycombing, and Other Defective Concrete:
			1. Rout out defective areas to sound concrete.
			2. Remove loose material and saturate with water.
			3. Remove surface water and apply a scrub coat of specified patching compound.
			4. While the scrub coat is fresh,fill cavity to surface with specified patching compound.
		4. Coves: At right-angle intersections cove the joint for smooth transition of waterproofed surface.
			1. Apply specified slurry coat to slot at rate recommended by manufacturer.
			2. Fill and form surfaces using specified dry pack repair compound or waterproofing material in mortar consistency while slurry coat is still green, but after slurry coat has reached initial set.
			3. Trowel into a cove shape.
		5. Construction Joints: Apply sealing strips at each construction joint by filling grooves coinciding with construction joint.
			1. Clean slot, wet, saturate with water and remove surface water.
			2. pply specified slurry coat to slot at rate recommended by manufacturer.
			3. Allow slurry coat to reach initial set.
			4. Fill cavity with specified dry pack repair compound.
			5. Compress tightly into cavity using pneumatic packer or hammer and blocks.

\*\* NOTE TO SPECIFIER \*\* Expansion joints must be designed for waterproofing treatment by the design professional, in consultation with the manufacturer. If treatment is not indicated on drawings, edit the following to describe method of waterproofing expansion joints.

* + 1. Expansion Joints: Treat as indicated on drawings.
	1. INSTALLATION ON CURED CONCRETE
		1. Comply with manufacturer's instructions including product data, technical bulletins, catalog installation instructions, and product carton instructions.
		2. Mix materials in accordance with manufacturer's instructions.
		3. Wet concrete surfaces and saturate with clean water to the manufacturers required SSD condition to ensure migration of crystalline chemicals into concrete; Remove excess water before the application such that there is no glistening water on the surface. If concrete dries out before application, it must be re-wetted.
		4. Exposed Surface Application: Apply waterproofing uniformly with semi-stiff bristle brush or spray under conditions and application rate recommended by manufacturer.

\*\* NOTE TO SPECIFIER \*\* Delete the following two paragraphs if only 1-coat application has been specified.

* + - 1. Apply second coat in less than 48 hours while first coat is still green, but after reaching initial set.
			2. Use light pre-watering between coats when rapid drying conditions occur.
		1. Sandwich (Topping) Slab Application: Place topping material while waterproofing material is still "green" (less than 48 hours) but after it has reached an initial set. The preferred time frame is 12 to 24 hours after the application of Xypex coating. Curing by misting the coating with water should be done between application of coating and installation of concrete overlay. Ensure coating is in the required SSD condition prior to placement of concrete

\*\* NOTE TO SPECIFIER \*\* Proper curing of Xypex treatment is essential in order to prevent premature evaporation of moisture from the concrete substrate and to aid in the hardening of the Xypex cementitious coating. Poor air circulation may impede proper curing.

* + 1. Curing: Cure exposed waterproofing treatment using a mist fog spray of clean water after coating has hardened sufficiently not to be damaged by spray; do not use plastic sheeting laid directly on waterproofing; air circulation is required.
			1. If water curing is not possible, follow manufacturer's recommendations for curing using chemical curing agent approved by manufacturer.
			2. Avoid coating damage with spray operation.
			3. Spray treated surface 3 times a day for 2 to 3 days.
			4. In hot climates, spray treated surfaces at intervals recommended by waterproofing manufacturer.
			5. During curing period, protect treated surfaces from rainfall, ambient temperature below freezing, and puddling of water.
			6. Provide supplementary air circulation as recommended by waterproofing manufacturer.

\*\* NOTE TO SPECIFIER \*\* The following paragraph applies to reservoirs, tanks and other liquid structures. Delete if not required.

* + - 1. Concrete Structures to Hold Liquids: Cure waterproofed concrete surfaces for 3 days and allow coating to set for 12 days before filing with liquid; for hot corrosive liquids allow to set for additional 6 days before filling.
		1. Comply with waterproofing manufacturer's recommendations for sequencing construction operations after waterproofing applications to avoid conditions detrimental to performance of waterproofing application.
	1. FIELD QUALITY CONTROL
		1. Manufacturer's Field Services: Provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instruction
		2. Do not cover waterproofed surfaces with other construction until they have been observed by manufacturer's field representative and Architect/Engineer.

\*\* NOTE TO SPECIFIER \*\* Carefully evaluate the following provisions. Some applications may not be possible to flood test. In cases where leaks cannot be observed directly, it may be necessary to measure the water level to determine whether leakage occurs. Delete the following if not required.

* + 1. Tank and Foundation Testing:
			1. Testing: Fill tanks or, for foundation works, shut off dewatering system as soon as practical so that the structure shall be exposed to its normal service conditions. Examine for leaks.
			2. Monitoring:
				1. Actively leaking cracks and joints shall be left to self-heal for as long as practical. Depending on job site and ambient conditions crack healing can be expected to take several days to weeks.
				2. Note that lower temperatures will extend the times for crystalline development.
				3. Any crack or joints that do not heal in the allowable time frame shall be repaired.
				4. Moving cracks shall be repaired using polyurethane injection or other appropriate method.
			3. Repair: Use Xypex repair procedures to seal any static crack or joint that does not self-heal. Contact Xypex Technical Services Representative for appropriate repair procedures.
	1. CLEANING AND PROTECTION
		1. Clean spillage and overspray from adjacent surfaces using appropriate cleaning agents and procedures.
		2. Protect installed product from damage during construction; do not allow traffic on unprotected waterproofed surfaces.
		3. Do not backfill against waterproofed surfaces for at least 36 hours after installation; use moist backfill material when backfilling occurs less than 7 days after installation.
		4. Do not apply paint or other coatings for at least 21 days; before applying coatings neutralize waterproofed surface as recommended by waterproofing manufacturer.
		5. Touch-up, repair or replace damaged products before Substantial Completion.
	2. SCHEDULE:

\*\* NOTE TO SPECIFIER \*\* Include schedule when Drawings do not clearly identify locations for application. Edit the schedule of surfaces to be treated to suit project requirements. Be sure to indicate which side the waterproofing is to be applied, unless clearly indicated on the drawings. Consider the following examples when developing a schedule.

* + 1. Provide waterproofing of concrete substrates, using surface application, in the following locations:
			1. Dry side of elevator pits, sump pits, and \_\_\_\_\_\_\_.
			2. Dry side of tunnels, underground vaults, dry wells, and manholes.
			3. Wet side of water tanks, flumes, clarifier tanks, digester sections, reservoirs and wet wells.
			4. Wet side of planters and swimming pools.
			5. All outer surfaces of floating docks, above and below water level.
			6. \_\_\_\_\_\_\_\_\_.

END OF SECTION