SECTION 03 05 00

INTEGRAL WATERPROOFING OF CONCRETE

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\*\* NOTE TO SPECIFIER \*\* Xypex Chemical Corp.; crystalline waterproofing admixture and treatment of construction joints between successive pours.
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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(03050xpx):%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 is used in two ways in this section: 1) mixed into the concrete, and 2) applied to the surfaces of construction joints between successive pours to prevent leakage through the joint. Two other applications, surface application on new or existing concrete surfaces, and dry shake application on fresh horizontal concrete surfaces incorporated into the concrete surface during the finishing process, are included in Section 07 16 16 - Crystalline Waterproofing.
As an admixture, Xypex Admix consistently increases concrete strength, enables concrete slabs and walls to resist extreme hydrostatic pressure without surface coatings, and seals cracks up to 1/64 inch (0.4 mm) wide. It is approved for use by EPA, NSF International, and Agriculture Canada for potable water applications and is less costly for the same result than most other methods of waterproofing.
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Xypex Admix canbe used above and below grade, and is especially useful for reservoirs, sewage and water treatment plants, secondary containment units, tunnels and subway systems, underground vaults, foundations, parking structures, swimming pools, and precast concrete components.
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. Be sure to indicate which side the waterproofing is to be applied to, unless indicated on the Drawings.

* + 1. Crystalline waterproofing admixture for concrete.
		2. Crystalline waterproofing treatment of construction joints between successive concrete pours.
		3. The work of this section applies to concrete in the following locations:
			1. Water contact surfaces in treatment plant.
			2. Water storage tanks and reservoir.
			3. Tunnels, underground vaults, dry wells, and manholes.
			4. Parking structure.
			5. Swimming pool.
			6. \_\_\_\_\_\_\_\_\_.
	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.
		2. Section 07 16 16 - Crystalline Waterproofing.
	1. REFERENCES

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

* + 1. ACI 305R - Hot Weather Concreting.
		2. ACI 306R - Cold Weather Concreting.
		3. ACI 308 - Standard Practice for Curing Concrete.
		4. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
		5. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
		6. ASTM C 666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
		7. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
		8. COE CRD-C 48 - Standard Test Method for Water Permeability of Concrete.
		9. NSF 61 - Drinking Water System Components - Health Effects.
	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. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
		4. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment of cable tension and periodic cleaning and maintenance of all railing and infill components.
	2. QUALITY ASSURANCE
		1. Manufacturer Qualifications: A Manufacturer to be ISO 9001 registered, and to have no less than 10 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 acceptable to waterproofing manufacturer.
		3. Preinstallation Meeting: Before installation, conduct a meeting with the Contractor, waterproofing installer, installers of adjacent work and work penetrating waterproofing, and the waterproofing manufacturer's representative to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer' 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 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
		1. Manufacturer's Warranty: Provide manufacturer's standard warranty document executed by authorized company official; warranty period: \_\_\_\_ years commencing on Date of Substantial Completion.
	6. EXTRA MATERIALS
		1. See Section 01 60 00 - Product Requirements.
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(03050xpx):%20%20&mf=); Web: <https://www.xypex.com>

\*\* 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

\*\* NOTE TO SPECIFIER \*\* Consult with a Xypex Technical Services Representative for the most appropriate Xypex Admix for your project. See manufacturer literature for Setting Time and Strength for more details.

* + 1. Waterproofing Admixture: Xypex Admix; proprietary compound of Portland cement, silica sand and active chemicals; provide product and mix ratio that produce concrete that complies with specified requirements in Section 03 30 00 - Cast-in-Place Concrete and the following:
			1. Type:

\*\* NOTE TO SPECIFIER \*\* Select one of the following paragraphs as required for the project and delete those not required.

* + - * 1. Xypex Admix C-500 / C-500NF: Formulated to have minimal or no effect on setting time.
				2. Xypex Admix C-1000 / C1000NF: Formulated for concrete mix designs where a normal or mildly delayed set is desired.
				3. Xypex Admix C-2000 / C2000NF: designed for warmer climates and projects where a slower hydration rate is typically required.
			1. Test Data:
				1. SEM Analysis: Provide evidence of crystalline formation by independent scanning electron microscope photographs.
				2. Permeability:

No measurable leakage through waterproofed concrete, when tested in accordance with COE CRD-C 48 at 350 feet (106 m) of head or 150 psi (1034 kPa). After 5 days untreated samples shall leak and the treated samples shall exhibit no measurable leakage.

Independent testing shall be performed according to EN 12390-8. Treated samples shall be exposed to water with a pressure of 0.5 MPa for 72 hours. Treated samples must exhibit a reduction in permeability coefficient of at least 80% when compared to control concrete. Control samples must have a depth of penetration of at least 50 mm.

* + - * 1. Chemical Resistance: Weight loss of treated samples shall be significantly less than control samples, when tested as follows:

Test specimens consisting of concrete made with admixture dosage rates (to weight of cement) of 3 percent, 5 percent, and 7 percent, and a control sample prepared without admixture.

Immerse samples in 7 percent sulfuric acid and weigh daily.

When weight loss of control sample reaches 50 percent, stop test and weigh treated samples.

* + - * 1. Compressive Strength: Treated sampled shall exhibit equal or increased strength compared to samples prepared without admixture, when tested in accordance with ASTM C 39/C 39M after 28 days.
				2. Potable Water Contact Approval: NSF certification for use on structures holding potable water, based on testing in accordance with NSF 61.
		1. Slurry 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. Coverage: 2.0 lb/sq yd (1.09 kg/sq m).
1. EXECUTION
	1. CONCRETE MIXING AND PLACING
		1. Comply with requirements of Section 03 30 00 - Cast-in-Place Concrete. Xypex Admix must be added to concrete mix at time of batching.
		2. Under normal conditions, the crystalline waterproofing powder shall be added to the concrete mix at the following rates. For enhanced chemical protection or for meeting specific project requirements or where the concrete mix design contains higher than 25 percent Type F fly ash content or includes a Portland cement/slag cement/type C fly ash blend, consult with manufacturer or its authorized representative to determine appropriate dosage rates.
			1. Xypex Admix C-500: 2% - 3% by weight of cement content
			2. Xypex Admix C-500 NF: 1% - 1.5% by weight of cement content
			3. Xypex Admix C-1000: 2% - 3% by weight of cement content
			4. Xypex Admix C-1000 NF: 1% - 1.5% by weight of cement content
			5. Xypex Admix C-2000: 2% by weight of cement content
			6. Xypex Admix C-2000 NF: 1% by weight of cement content

\*\* NOTE TO SPECIFIER \*\* Some retardation of set may occur when using Xypex Admix. The amount of retardation will depend upon the concrete mix design, the dosage rate of the admixture, the temperature of the concrete, and climatic conditions. Concrete made with the admixture may develop higher ultimate strength than plain concrete.

* + 1. Make and test trial mixes under project conditions to determine setting time and strength of concrete; obtain manufacturer's recommendations regarding mix design, project conditions, and dosage rate.
		2. Add waterproofing admixture at time of batching and blend thoroughly, following manufacturer's instructions.
		3. Concrete placement shall be in accordance with ACI 309R: "Guide for Consolidation of Concrete" or other applicable standard. Special attention is to be given to consolidation at joints, penetrations and other potential leakage locations.
		4. In hot weather comply with ACI 305R; in cold weather comply with ACI 306R; use monomolecular film (evaporation retardant) on slabs during hot, dry, or windy conditions.
		5. Moist cure concrete in accordance with ACI 308; if moist curing is not possible, use curing compound complying with ASTM C 309.
	1. CONSTRUCTION JOINTS
		1. General: Comply with manufacturer's instructions, including technical bulletins, catalog installation instructions, and product packaging labels.
			1. Verify substrate conditions installed as specified in Section 03 30 00 - Cast-in-Place Concrete, are acceptable for product installation in accordance with manufacturer' instructions; do not install unless substrate and ambient air temperature are within range acceptable to waterproofing manufacturer.
			2. Prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions.
			3. Clean laitance, dirt film, paint, coatings or other foreign matter harmful to the performance of waterproofing from surfaces of cured concrete to be treated.
			4. Mix materials in accordance with manufacturer's instructions.

\*\* NOTE TO SPECIFIER \*\* Inclusion, type and position of waterstops are at the discretion of the designer. Expanding waterstops may be placed on Xypex after it has dried or before Xypex slurry application. Xypex slurry may only be applied over waterstop if approved by waterstop manufacturer.

* + 1. Construction and Cold Joints: In addition to waterstops, provided as specified in Section 03 30 00 - Cast-in-Place Concrete, apply one coat of Xypex Concentrate slurry at a rate of 2 lb./sq. yd. (1 kg/m2) to joint surfaces between concrete pours. Moisten surfaces prior to slurry application. Apply slurry and keep moist for 12 hours then allow slurry to set or dry. Where joint surfaces are not accessible prior to pouring new concrete, contact Xypex Technical Services Representative for assistance.

\*\* NOTE TO SPECIFIER \*\* For additional information, see Xypex Schematic Drawings for standard construction joint details.

* + 1. Sealing Strips: Where hydrostatic conditions exist, sealing strips shall also be applied at construction joints by filling grooves that are created along the joints. Dimensions of the grooves shall be 1 inch (25 mm) wide and 1.5 inches (37 mm) deep. If grooves are not been pre-formed then chip grooves to those dimensions. Fill the groves as follows:
			1. Apply slurry coat of Xypex Concentrate to slot in accordance with manufacturer's instructions or recommendations.
			2. While slurry coat is still tacky, fill slot with Xypex Concentrate Dry-Pac.
			3. Compact tightly using pneumatic packer or hammer and block.
			4. Wet Dry-Pac surface lightly with water, then apply a slurry coat of Xypex Concentrate at a coverage rate of 1.5 - 2 lb./sq. yd. (0.8 - 1 kg/m2) over sealing strip and extending to 6 inches (150 mm) on either side.
	1. FIELD QUALITY CONTROL
		1. Do not cover admixture treated concrete with other construction until it has been observed by manufacturer's field representative and Architect/Engineer.
		2. After removal of forms, patch and repair honeycombing, rock pockets, tie holes, faulty construction joints, cold joints, and cracks using waterproofing admixture manufacturer's recommended procedures.
		3. Manufacturer's Field Services: Provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of concrete batching and product installation in accordance with manufacturer's instructions.

\*\* NOTE TO SPECIFIER \*\* Carefully evaluate the following provisions and edit as required. 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.

* + 1. Examination for Defects: Do not conceal Xypex treated concrete before it has been observed by Architect/Engineer, waterproofing manufacturer's representative or other designated entities. Concrete shall be examined for structural defects such as honeycombing, rock pockets, tie holes, faulty construction joints, cold joints and cracks larger than 1/64 inch (0.4 mm). Such defects to be repaired in accordance with manufacturer's repair procedures as noted above.
		2. Testing for Tanks and Foundation Works:
			1. Testing: Fill tanks or, for foundation works, shut off dewatering system as soon as practical so that the structure shall be exposed to it's 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. Any crack or joints that do not heal in the allowable time frame shall be repaired.
				3. Moving cracks shall be repaired using polyurethane injection or other appropriate method.
				4. Lower temperatures will extend the times for self-heal crystalline development.
			3. Repair: Use Xypex repair procedures to seal any static crack or joint that does not self-heal. See Method Statements (www.xypex.com/technical/statements) or contact Xypex Technical Services Representative for appropriate repair procedures.
	1. CLEANING AND PROTECTION
		1. Protect installed concrete from damage during construction.
		2. Normal backfilling procedures may be used after concrete has been cured
		3. Admix treatment of concrete does not adversely affect the bond of subsequently applied materials. Follow surface preparation and other relevant directions of the coating or parge material manufacturer.

END OF SECTION