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**1. Product Name**

Xypex Concrete Waterproofing by Crystallization

**2. Manufacturer**

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**3. Product Description**

**BASIC USE**

Xypex is a unique chemical treatment for the waterproofing and protection of concrete that is suitable for the following applications:

- Foundation walls.
- Manholes.
- Parking decks.
- Reservoirs.
- Sewage and water treatment tanks.
- Tunnels.
- Underground vaults.

Xypex can be used on either poured-in-place concrete or concrete block and can be applied to either the interior or exterior surface with equal results.



**CHARACTERISTICS**

Xypex waterproofs underground structures from the inside against hydrostatic pressure. By the process of diffusion and because the chemicals in Xypex have an affinity with water, the crystalline formation migrates throughout the pores and capillary tracts of concrete even against strong hydrostatic pressure.

When mixed with water and applied as a cementitious coating, the active chemicals in Xypex cause a catalytic reaction that generates a non-soluble crystalline formation of dendritic fibres within the pores and capillary tracts of concrete. Thus, the concrete itself becomes permanently sealed against the penetration of water or liquids from any direction.

Xypex protects concrete and reinforcing steel. The Xypex treatment is highly resistant to most aggressive substances, pH 3-11 constant contact and pH 2-12 periodic contact. By preventing the intrusion of chemicals, salt water, sewage and other harmful materials, Xypex protects concrete and reinforcing steel from deterioration and oxidation. The concrete is also protected against spalling, efflorescence, popouts and other damages caused by weathering, bleeding of the salts and internal expansion and contraction during the freeze/thaw cycle.

Xypex permits concrete to breathe. The Xypex crystalline formation has fixed-size air spaces so small that water cannot pass through. It does allow the passage of air and vapour; thus the concrete is able to breathe and become thoroughly dry, preventing moisture vapour buildup.

Xypex products are non-toxic. They have been approved by NSF International (National Sanitation Foundation), U.S. Environmental Protection Agency, Agriculture Canada and many other governmental health agencies throughout the world for use on concrete structures that hold potable water or are in contact with foodstuffs.

**ADVANTAGES**

- Not just a surface coating.
- Not dependent upon continuity of membrane for waterproofing action.
- Seals hairline cracks up to 0.4 mm (1/64").
- No surface priming or levelling required.
- Cannot puncture, tear or come apart at the seams.
- Does not require protection during backfilling or during placement of steel, wire mesh or other materials.
- Can be applied to moist or green concrete.



- Less costly to apply than most other waterproofing methods.

**COMPOSITION AND MATERIALS**

Xypex is manufactured in the form of a dry powder compound consisting of Portland cement, very fine treated silica sand and various active proprietary chemicals.

**TYPES**

Xypex crystalline waterproofing technology is available in three forms:

- As a coating: For new or existing structures.
- As a dry shake material: For new horizontal surfaces.
- As an admixture: Included in the concrete mix at the time of batching.

**Xypex Concentrate**

Used as a single coating on above- or below-grade concrete, or as the first of a two-coat application where two coats are required. See Xypex Specification Manual. Also used as a Dry-Pac for sealing construction joints and for



repair of cracks, faulty construction joints and honeycombing. Xypex Concentrate is the most chemically potent of the Xypex crystalline waterproofing materials.

**Xypex Modified**

Used as a second coat to reinforce Xypex Concentrate where two coats are required and as a single coat for exterior dampproofing.

**Xypex Concentrate DS1 and DS2**

Dry shake formulations designed for application on fresh horizontal concrete prior to finishing operations.

**Xypex Admix**

Used as an integral waterproofing admixture that is included in the concrete mix at the time of batching.

**Xypex Patch'n Plug**

Fast-setting, non-shrink, high bond strength hydraulic cement compound for concrete repairs. Stops flowing water in seconds. Patch'n Plug seals cracks and tie holes. It is also used for the general repair or patching of concrete. Patch'n Plug can be used in conjunction with Xycrylic Admix to increase the compressive strength and bond strength of existing concrete.

**Xycrylic Admix**

An acrylic polymer formulation specifically designed for use as an admix to fortify Portland cement mixes. Xycrylic Admix increases hardness, durability, bonding capability and chemical resistance.

**Xypex Gamma-Cure**

Can be used as an alternative to water curing for certain Xypex applications. Contact the manufacturer for further information.

**LIMITATIONS**

**Storage**

Xypex products must be stored dry at a minimum temperature of 7°C (45°F).

**Shelf Life**

The shelf life is one year when stored under proper conditions.

**Other Uses**

Xypex is not designed for use in expansion joints or chronically moving cracks.

**4. Technical Data**

**APPLICABLE STANDARDS**

**ASTM International (ASTM)**

- C 267-01(2006), Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.

- C 672/C 672M-03, Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.

Din Deutsches Institut Fur Normung e.V. (Germany)

- DIN 1048-1 - 1991-06, Testing Concrete; Testing of fresh concrete.
- DIN 1048-2 - 1991, Testing Concrete; Testing of hardened concrete (specimens taken in situ).
- DIN 1048-4 - 1991, Test Methods for Concrete; determination of the compressive strength in hardened concrete in structures and components; application of reference lines and evaluation with special methods.
- DIN 1048-5 - 1911, Testing Concrete; testing of hardened concrete (specimens prepared in mould).

Japanese Institute of Standards (JIS)

- JIS A6204 - Chemical Admixtures for Concrete.

Osterreichisches Normungsinstitut (Austria)

- ONORM B-3308 Testing of Concrete.

US Army Corps of Engineers (USACE)

- CRD C-48 Permeability of Concrete.

USA Standard No. N6.9.

- Protective Coatings for the Nuclear Industry.

**Xypex**

- Xypex Specification Manual.

**APPROVALS**

Approved for use in structures containing foodstuffs or potable water by:

- NSF International - NSF 61 Potable water approval.
- U.S. Environmental Protection Agency
- Agriculture Canada.
- Contact manufacturer for additional international approvals information.

**PHYSICAL/CHEMICAL PROPERTIES**

**Permeability**

- USACE CRD C48-73 Testing: 51 mm (2") thick, 13,780 kPa (2000 psi), Xypex treated, concrete samples were pressure tested up to a 124 m (405') water head of 1.2 MPa (175 psi), which was the limit of the testing apparatus. While untreated samples showed marked leakage, the Xypex treated samples, as a result of the crystallization process, became totally sealed and exhibited no measurable leakage.
- DIN 1048 Testing: 200 mm (7-7/8") thick Xypex treated concrete samples were pressure tested up to 7 bars (700 kPa) (70 m (230') water head) for 24 hours to determine water impermeability. While the reference specimens

measured water penetration up to a depth of 92 mm (3-5/8"), Xypex treated samples measured water penetration of zero to an average of 4 mm (5/32").

- ONORM B-3303 Testing: Xypex treated concrete samples were pressure tested to a maximum 7 bars (700 kPa) (70 m (230') water head) for 10 days. The test revealed that while 26 mL (0.9 oz) of water had penetrated the untreated concrete samples, none had penetrated the Xypex treated samples. Test specimens were then broken and showed water penetration to a depth of 15 mm (.58") on untreated samples but no measurable water penetration on the Xypex treated samples.

**Chemical Resistance**

- ASTM C 267 Testing: Xypex treated cylinders and untreated cylinders were exposed to hydrochloric acid, caustic soda, toluene, mineral oil, ethylene glycol, pool chlorine, brake fluid and other chemicals. Results indicated that chemical exposure did not have any detrimental effects on the Xypex coating. Tests following chemical exposure measured an average 17% higher compressive strength in the Xypex treated specimens over the untreated control samples.

**Freeze/Thaw Durability**

- ASTM C 672 Testing: Xypex treated samples restricted chloride ion concentration to below the level necessary to promote electrolytic corrosion of reinforcing steel. Visual examination of untreated panels after 50 cycles showed a marked increase in surface deterioration as compared to Xypex treated panels.
- JIS A6204 Testing: The resonating frequency of both untreated and Xypex treated concrete samples were measured throughout 435 freeze/thaw cycles. At 304 cycles, the Xypex treated samples showed 96% relative durability compared to 90% in the untreated samples. At 435 cycles, the Xypex treated samples measured 91% relative durability compared to 78% in the untreated reference samples.
- Radiation Resistance.
- USA Standard No. N6.9-1967 Testing: After exposure to 5.76 x 10 (4) rads of gamma radiation, the Xypex treatment revealed no ill effects or damage.



**5. Installation**

**PREPARATORY WORK**

**Surface Preparation**

- Concrete surfaces to be treated must be clean and free of laitance, dirt, films, paint, coatings or other foreign matter.
- Surfaces must also have an open capillary system so as to provide "tooth and suction" for the Xypex treatment. If surfaces are too smooth, the concrete should be acid etched, lightly sandblasted or waterblasted.
- Structural defects such as cracks, faulty construction joints and honeycombing should be routed out to sound concrete and repaired in accordance with Xypex Specification Manual Repair Procedures. It should be noted, however, that Xypex is not designed for use in expansion joints or chronic moving cracks.
- Horizontal surfaces should have a rough wood float or broom finish. On fresh horizontal concrete, Xypex Concentrate DS1 or DS2 powder can be power trowelled into the surface while it is still in its plastic state.

**Wetting Concrete**

Prior to the application of Xypex, concrete surfaces must be thoroughly wetted with clean water to control surface suction, aid the proper curing of the treatment and ensure the growth of the crystalline formation deep within the pores of the concrete. Excess surface water should be removed before the application.

**METHODS**

To mix Xypex for slurry coat application, the Xypex powder is mixed with clean water to a creamy consistency in the following proportions by volume:

**Mixing for Brush Application**

- 0.8 kg/m<sup>2</sup> (1.5 lb/yd<sup>2</sup>) - Mix five parts powder to two parts water.
- 1.0 kg/m<sup>2</sup> (2.0 lb/yd<sup>2</sup>) - Mix three parts powder to one part water.

**Mixing for Spray Application**

For 1.5 lb/yd<sup>2</sup> (0.8 kg/m<sup>2</sup>) formulation, mix five parts powder to three parts water. The mix may vary with equipment type.

**Mixing for Dry-Pac**

Mix six parts Xypex Concentrate powder with one part clean water by volume. Do not mix too wet; otherwise, mix may crack and spall as it dries.

**APPLICATION**

The Xypex treatment should be applied with a semi-stiff bristle brush, a janitor's broom for large

horizontal applications, or with specialized spray equipment. For recommended equipment, contact Xypex or the nearest distributor.

The Xypex treatment must be uniformly applied under the conditions and quantities specified. One coat should have a thickness of 1.6 mm (1/16"). When a second coat is required, it should be applied after the first coat has reached an initial set but is still green (less than 48 hours). Light pre-watering between coats may be required due to drying. The Xypex treatment cannot be applied in rain or during freezing conditions.

**Coverage**

For normal surface applications, the coverage rate per coat is 0.8 kg/m<sup>2</sup> (1.5 lb/yd<sup>2</sup>). For construction joint surfaces, the coverage rate is (2.0 lb/yd<sup>2</sup>). See mixing instructions.

**Curing**

- A misty fog spray of water must be used for curing the Xypex treatment.
- Curing must begin as soon as the Xypex coating has hardened sufficiently so that it is not damaged by a fine spray. Under most conditions, it is sufficient to spray Xypex treated surfaces three times a day for two to three days.
- In hot, dry weather, spraying may be required more frequently.
- During the curing period, the Xypex treatment must be protected from rainfall, frost and puddling of water.
- For concrete structures that hold liquids, e.g., reservoirs and tanks, the Xypex treatment should be cured for three days and then allowed to set for 12 days before filling with liquid.

**6. Availability & Cost**

**AVAILABILITY**

Xypex products are available through a global network of factories, regional distributors, dealers, construction supply outlets and retail building supply outlets.

Contact Xypex Chemical Corporation for the name of the nearest supplier.

**COST**

Because Xypex does not require surface preparation such as priming, leveling or protection during backfilling, it is less costly to apply than most other waterproofing methods.

**7. Warranty**

Xypex warrants that the products manufactured by it shall be free from material defects

and will be consistent with its normal high quality. Should any of the products be proven defective, the liability to Xypex shall be limited to replacement of the product ex-factory. Xypex makes no warranty as to merchantability or fitness for a particular purpose. This warranty is in lieu of all other warranties express or implied. User shall determine the suitability of the product for the intended use and assume all risks and liability in connection therewith.

**8. Maintenance**

When properly installed by an applicator experienced in the installation of crystalline waterproofing, Xypex is permanent and requires no maintenance.

**9. Technical Services**

Technical assistance, including more detailed information, product literature, test results, project lists, assistance in preparing project specifications and arrangements for application supervision, is available by contacting Xypex Chemical Corporation or the nearest Xypex distributor.

**10. Filing System**

- MANU-SPEC®
- Sweet's Catalog Files
- Additional product information is available from the manufacturer.

