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Produced by Reed Construction Data, this 3-part Specification utilizes Construction Specifications Canada's (CSC) *Manual of Practice* (MoP), including *MasterFormat*[™], *SectionFormat*[™] and *PageFormat*[™]. Each publication is available from CSC. A 3-part Specification is a manufacturer-specific product specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Optional text is indicated by brackets, []. SPEC NOTES precede specification text. Trade/brand names with appropriate product model numbers, styles and types are used in SPEC NOTES and in the specification text Article titled "Acceptable Material." Metric conversion, where used, is soft metric conversion. This 3-part Specification specifies concrete concentrate admixture for concrete mix, as manufactured by Xypex Chemical Corporation. Revise 3-part Specification section number and title below to suit project requirements, specification practices and section content. Refer to CSI/CSC *MasterFormat* for other section numbers and titles. Delete unused optional text and SPEC NOTES in final copy of specification in accordance with CSC recommended specification writing practice.

SECTION 07 16 19
METAL OXIDE WATERPROOFING

1 General

1.1 SECTION INCLUDES

.1 This Section specifies crystalline waterproofing of concrete substrates, above-grade or below-grade, on either dry or wet side of substrates.

1.2 RELATED SECTIONS

SPEC NOTE: Include in this Article only those sections that directly affect the work of this Section and are referenced in the project section. Do not include Division 00 or Division 01 sections since it is assumed that all technical sections are related to all project Division 00 and Division 01 sections to some degree.

.1 Section [03 30 00 - Cast-in-Place Concrete].

SPEC NOTE: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain Reference Article when specifying products and installation by an industry reference standard. If retained, list only standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Division 01 Section 01 42 19 - Reference Standards may include the full names and addresses of the organizations whose standards are referenced in a project. The section can also be used for the editions or dates of referenced standards not otherwise indicated. Edit the following lists and delete standards not required for the specific project.

1.3 REFERENCES

.1 American Concrete Institute (ACI).

.1 ACI 308, Standard for Curing Concrete.

.2 ASTM International (ASTM).

- .1 ASTM C267, Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
- .2 ASTM C672, Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
- .3 US Army Corps of Engineers (USACE).
 - .1 USACE CRD C-48, Permeability of Concrete.
- .4 USA Standards.
 - .1 USA Standard No. N69, Protective Coatings for the Nuclear Industry.

1.4 ADMINISTRATIVE PROCEDURES

SPEC NOTE: Describe requirements for meetings to co-ordinate materials and techniques, and to sequence related work for sensitive and complex items.

- .1 Pre-installation Meetings: Conduct pre-installation meeting [one week] prior to commencing [work of this Section] [and] [on-site installations] to verify project requirements, substrate conditions, co-ordination with other building subtrades, and to review manufacturer's installation instructions and warranty requirements. Comply with [Section 01 31 19 - Project Meetings].
- .2 Sequencing: Sequence with other work in accordance with Section [01 12 16 - Work Sequence]. Comply with manufacturer's written recommendations for sequencing construction operations.

SPEC NOTE: Include requirements for coordinating work that requires unusual scheduling with work in another Section.

- .3 Scheduling: Schedule with other work in accordance with Section [01 32 13 - Scheduling of Work].

1.5 ACTION SUBMITTALS

- .1 General: Submit listed action submittals in accordance with Contract Conditions and Section [01 33 00 - Submittal Procedures].
- .2 Product Data: Submit product data, including manufacturer's manufacturer's printed data sheets and catalogue pages illustrating products to be incorporated into project for specified products.
 - .1 Submit [2] [_____] copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

1.6 INFORMATION SUBMITTALS

SPEC NOTE: Describe certificates intended to document affirmations by the Contractor or other entities that the work is in accordance with the Contract Documents

- .1 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

SPEC NOTE: Specify submittals intended to document manufacturer installation, storage, and other instructions.

- .2 Installation Instructions:
 - .1 Submit manufacturer's installation [,storage] [and] [handling] instructions.

1.7 CLOSEOUT SUBMITTALS

- .1 Warranty Documentation: Submit warranty documents specified.

SPEC NOTE: Include standards, limitations and criteria that establish an overall level of quality for products and quality for work for this Section. Co-ordinate with Section 01 43 00 - Quality Assurance.

1.8 QUALITY ASSURANCE

- .2 Qualifications

- .1 Manufacturer: Capable of providing field service representation during construction and approving application method.
- .2 Applicator: Experienced in performing work of this section and who has specialized in installation of work similar to that required for this project.

SPEC NOTE: Specify special and unique packing, shipping or handling instructions, and special measures needed to prevent damage to products prior to application or installation. Co-ordinate with Section 01 61 00 - Common Product Requirements.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements

- .1 Deliver material in accordance with Section [01 61 00 - Common Product Requirements] and in accordance with manufacturer's written instructions.
- .2 Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project

- .2 Storage and Handling Requirements

- .1 Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Dry store crystalline waterproofing products at [7]°C ([45]°F) minimum.

- .3 Packaging Waste Management

SPEC NOTE: Include the following paragraphs to specify information that will provide direction to the Contractor for the disposal of construction waste materials using environmentally responsible methodology which divert waste from landfill sites.

- .1 Separate waste materials for [reuse] [and] [recycling] in accordance with [Section 01 74 19 - Construction Waste Management and Disposal].

SPEC NOTE: Manufacturer may take back packaging and delivery materials for recycling.

- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal [paper] [plastic] [polystyrene] [corrugated cardboard] [metal banding] packaging material [in appropriate onsite bins] for recycling
- .4 Fold up metal and plastic banding, flatten and place in designated area for recycling.
- .5 Remove pallets from site and return to supplier or manufacturer.

1.10 SITE CONDITIONS

SPEC NOTE: Specify the ambient conditions under which the work must be performed in order for the work results to provide the specified quality. Conditions can include factors such as temperature, humidity, lighting, or conditions of completion of related work or substrates.

- .1 Ambient Conditions: Apply crystalline waterproofing when substrate and ambient air temperature are within range acceptable to manufacturer.

SPEC NOTE: Co-ordinate this Article with CCDC 2, or other Agreement documents, Contract Conditions and with Section 01 78 36 - Warranties. Consult with manufacturer for specific warranty requirements.

1.11 WARRANTY

- .1 Project warranty: Refer to [CCDC 2] for project warranty provisions and co-ordinate with Section [01 78 36 - Warranties].
- .2 Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit other rights Owner may have under Contract Documents or Canadian Law.

SPEC NOTE: Co-ordinate this Article with manufacturer's warranty requirements.

- .3 Warranty period: [1 - year], commencing on Date of Substantial Performance of Work.

2 Products**2.1 MANUFACTURERS**

- .1 Ensure manufacturer has minimum [5] years experience in manufacturing components similar to or exceeding requirements of project.
- .2 Manufacturer List

- .1 Xypex Chemical Corporation, 13731 Mayfield Place, Richmond, BC Canada V6V 2G9; Telephone: (800) 961-4477, (604) 273-5265; Fax: (604) 270-0451; E-mail: info@xypex.com; website: www.xypex.com.

SPEC NOTE: If a Division 01 Section covers this substitution on a project-wide basis, do not repeat that requirement here. Do not include substitution procedures here unless not defined elsewhere.

- .3 Substitution Limitations

- .1 Substitutions: [In accordance with Section 01 25 13 - Product Substitution Procedures] [No substitutions permitted].

2.2 PERFORMANCE CRITERIA

- .1 Permeability: USACE CRD-C-48-73 Permeability of Concrete.
- .2 Chemical Resistance: ASTM C267.
- .3 Freeze and Thaw and Deicing Chemical Resistance: ASTM C672.
- .4 Radiation Resistance: Protective Coating for the Nuclear Industry per USA Standard No. N69.

SPEC NOTE: Include the following Article for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal" and "or approved equal" may cause ambiguity in the specifications.

2.3 CRYSTALLINE WATERPROOFING

SPEC NOTE: Xypex Concentrate® is a light grey powder which, when mixed with water, is used as a waterproofing slurry coat on above- or below-grade concrete as a single coat or as the first coat of a two-coat application. When mixed in a Dry-Pac® consistency, Xypex Concentrate® can be used for sealing strips at construction joints or for repair of cracks and honeycombs.

- .1 Crystalline waterproofing on finished concrete: Compound of Portland cement, silica sand and other active chemicals.

- .1 Acceptable material: Xypex Chemical Corporation, Xypex Concentrate®.

SPEC NOTE: Xypex Modified® produces a harder finish and is less expensive than Xypex Concentrate®.

- .2 Crystalline waterproofing on finished concrete: Compound of Portland cement, silica sand and various other active chemicals.

- .1 Acceptable material: Xypex Chemical Corporation, Xypex Modified®.

SPEC NOTE: Use the following Article when a dry shake application is required on a horizontal substrate prior to finishing. Co-ordinate with section 03300 - Cast-in-Place Concrete. Contact Xypex Chemical Corporation for advice on which of the two Xypex Dry Shake Concentrates, DS1® or DS2®, is best suited to the project requirements.

- .3 Crystalline waterproofing on unfinished concrete: Powder compound of Portland cement, silica sand and various other active chemicals, for dry shake application. Co-ordinate with Section 03 30 00 - Cast-in-Place Concrete.

- .1 Acceptable material: Xypex Chemical Corporation, Xypex Concentrate [DS1®][DS2®].

- .2 Acceptable material: Xypex Chemical Corporation, Xycrylic Admix®.

- .4 Crystalline waterproofing admixture for concrete batching: Powder compound of Portland cement, silica sand and various other active chemicals. Co-ordinate with Section 03 30 00 - Cast-in-Place Concrete.

- .1 Acceptable material: Xypex Chemical Corporation, Xypex Admix C2000.

SPEC NOTE: Specify this admixture for concrete batching during cooler ambient temperatures.

- .2 Acceptable material: Xypex Chemical Corporation, Xypex Admix C1000.

2.4 CONCRETE REPAIR

SPEC NOTE: Xypex Patch 'n Plug® is a fast-setting, non-shrink, high bond strength, single-component hydraulic cement compound for concrete repairs. For waterproofing, the product can be used in conjunction with Xypex Concentrate®. Xypex Patch 'n Plug® may be used in conjunction with Xypex Xycrylic Admix® to increase bond strength to existing concrete.

- .1 Repair of cracks in concrete: High bond strength hydraulic cement compound.

- .1 Acceptable material: Xypex Chemical Corporation, Xypex Patch 'n Plug®.

- .2 Co-ordinate concrete repairs with Section 03 01 30.71 Rehabilitation of Cast-in-Place Concrete.

2.5 CONCRETE CURING

SPEC NOTE: Xypex Gamma-Cure® is a light blue liquid that is diluted with water to form a curing agent specifically designed for Xypex Crystalline products. Use of Gamma-Cure may eliminate need for water curing Xypex coatings. Consult with Xypex Chemical Corporation for specific recommendations.

.1 Concrete Curing Liquid:

- .1 Permeability: To U.S. Army Corps of Engineers, CRD-C-48.
- .2 Chemical resistance: To ASTM C 267.
- .3 Freeze/thaw and de-icing chemical resistance: To ASTM C 672.
- .4 Radiation resistance: Protective coating for nuclear industry in accordance with USA Standard No. N69.
- .5 Acceptable material: Xypex Chemical Corporation, Xypex Gamma-Cure®.

2.6 MIXES

SPEC NOTE: Add Xypex Admix to concrete mix at time of batching. The sequence of procedures for addition will vary according to the type of batch plant operation and equipment.

- .1 Mix materials in accordance with [Xypex Chemical Corporation's] [manufacturer's] written instructions.
- .2 Slurry Coat Mix: Mix [Xypex powder] [waterproof admixture powder] with clean water in proportions by volume as follows:
 - .1 Brush application:
 - .1 For coverage of [0.8] kg/m² ([1.5] lb/sq yd): mix 5 parts powder to 2 parts water.
 - .2 For coverage of [1.0] kg/m² ([2.0] lb/sq yd): mix 3 parts powder to 1 part water.
 - .2 Spray application:
 - .1 For coverage of [0.8] kg/m² ([1.5] lb/sq yd): mix 5 parts powder to 3 parts water. Adjust mix to suit spray equipment type and as recommended by manufacturer's representative.
 - .3 Dry-pac mix: Mix 6 parts [Xypex Concentrate] [waterproof admixture powder] with 1 part clean water by volume.

2.7 SOURCE QUALITY CONTROL

- .1 Ensure concrete concentrate admixture materials are from single manufacturer.

3 Execution**3.1 INSTALLERS**

- .1 Provide experienced and qualified technicians to carry out application and installation of concrete concentrate admixture

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations, specifications, including product technical bulletins, catalogue installation instructions, product carton handling, storage and installation instructions.

3.3 PREPARATION

- .1 Ensure surfaces are clean and free of laitance, dirt, film, paint, coatings or other foreign matter harmful to performance of waterproofing materials.
- .2 Ensure surface has open capillary system to provide tooth and suction for crystalline waterproofing material. Where concrete surfaces are too smooth, as determined by [Xypex Chemical Corporation's] [manufacturer's] representative, acid etch, sandblast or waterblast as recommended by [Xypex Chemical Corporation] [waterproofing manufacturer].
- .3 Rout out defects, such as, cracks, faulty construction joints, honeycombing and other defects to sound concrete and repair in accordance with [Xypex Chemical Corporation's] [waterproofing manufacturer's] repair procedures manual.
- .4 Finish horizontal surfaces to receive crystalline waterproofing treatment using rough wood float or broom.

3.4 REPAIR OF SURFACE DEFECTS

- .1 Form tie holes, construction joints, cracks:
 - .1 Chip defective areas in "U" shaped slot [9.1] mm x [25.4] mm ([3/4] inch x [1] inch) wide and minimum [25.4] mm ([1] inch) deep.
 - .2 Clean slot, wet-saturate with water and remove surface water.
 - .3 Apply slurry coat of waterproofing admixture at rate of 0.8 kg/m² (1.5 lb/sq yd) to slot.
 - .4 Allow slurry to reach initial set.
 - .5 Fill cavity with waterproofing admixture.
 - .6 Compress tightly into cavity using pneumatic packer or hammer and blocks.
- .2 Rock pockets, honeycombing or 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 one slurry coat of waterproofing admixture.
 - .4 After slurry has set, but while still "green," fill cavity to surface with hydraulic cement.
- .3 Coves, sealing strips, expansion and control joints:
 - .1 Prepare concrete joint surfaces by application of one coat of waterproofing admixture in slurry form at 1.0 kg/m² (2.0 lb/sq yd).
 - .2 Apply waterproofing admixture or Portland cement fortified admixture in mortar consistency while slurry coat is still green, but after slurry coat has reached initial set.
 - .3 Coves: Trowel apply and pack Portland cement fortified admixture into cove shape.
 - .4 Sealing strips: Fill pre-formed grooves, [19.1] mm ([3/4] inch) wide and minimum [25.4] mm ([1] inch) deep, located at construction joints with waterproofing admixture. Compact tightly using pneumatic packer or hammer and block.

SPEC NOTE: Treat expansion joints as a special condition as directed by design professional. Contact a technical representative from Xypex Chemical Corporation for advice on the best way to treat expansion and control joints on the project.

- .5 Expansion and control joints: Treat expansion joints as special condition as directed by design professional.

3.5 INSTALLATION

SPEC NOTE: Co-ordinate installation with Xypex Chemical Corporation's or the manufacturer's written installation details and instructions. Refer to Xypex Chemical Corporation Standard Construction Joint Details, Above and Below Grade Details, Deck Details, Elevator/Sump Pit Detail, Planter Detail, Swimming Pool Detail, Tunnel Detail, Clarifier Tank Detail, Digester Section Detail, Reservoir/Wet Well Detail, Underground Vault/Dry Well Detail, Manhole Detail, Ferro-Cement Boat/Floating Docks Details, Standard Metal Pipe Detail and other special details.

- .1 Wetting Concrete: Treat saturate surfaces with clean water to enhance crystallization formation process within concrete. Remove excess surface water before application of waterproofing treatment.
- .2 Construction: Apply 1.0 kg/m² (2.0 lb/sq yd) of waterproofing admixture in slurry form to joint surfaces between concrete pours. Moisten joint surfaces prior to slurry application.
- .3 Surface Application: Apply waterproofing treatment uniformly with semi-stiff bristle brush under conditions and application rate recommended by [Xypex Chemical Corporation] [manufacturer]. Consult with [Xypex Chemical Corporation] [manufacturer] for application when spray equipment is used.
 - .1 One-coat application: Apply waterproofing admixture slurry coat at rate and locations indicated.
 - .2 Two-coat application: Apply Portland cement fortified admixture slurry coat while first coat of waterproofing admixture is still "green," but after reaching initial set. Use light, pre-watering between coats when rapid drying conditions occur.
- .4 Sandwich (topping) Application:
 - .1 Place topping material while waterproofing application is still "green," but after reaching initial set.
 - .2 Use light, pre-watering between coats when rapid drying conditions occur.
 - .3 Cure waterproofing in accordance with [Xypex Chemical Corporation's] [manufacturer's] written instructions prior to topping application.
- .5 Dry Shake Application: Apply waterproofing powder to fresh horizontal concrete surfaces. Incorporate powder into surface during concrete finishing process.

SPEC NOTE: Check with Xypex Chemical Corporation technical representative for application rate that best suits project requirements.

- .6 Application Rate: [_____ kg/m² ([_____ lb/sq yd)].

SPEC NOTE: 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.

- .7 Curing:
 - .1 Cure waterproofing treatment using misty fog spray of clean water after waterproofing coating has hardened.
 - .2 Avoid coating damage with spray operation. Spray waterproofing treated surface 3 times each day for 2 to 3 days.

- .3 In hot climates, as determined by [Xypex Chemical Corporation] [treatment manufacturer], spray waterproofing treated surfaces at intervals recommended by [Xypex Chemical Corporation] [treatment manufacturer] technical representative.
- .4 During curing period, protect treated surfaces from rainfall, frost and puddling of water.

SPEC NOTE: Include the following Article for reservoirs, tanks and other liquid holding structures.

- .5 Concrete liquid structures: Cure waterproofing treated concrete surface of structures that hold liquids for 3 days and allow treatment to set for 12 days before filling structure with liquid.

3.6 FIELD QUALITY CONTROL

SPEC NOTE: Use the following Articles only when manufacturer's field services are desired to verify the quality of the installed components. Establish the number and duration of periodic site visits required by Xypex Chemical corporation or the manufacturer and specify below. Consult with Xypex Chemical Corporation or the manufacturer for services required. Delete if field services are not required.

- .1 Have [Xypex Chemical Corporation's] [manufacturer of products supplied under this Section] review work involved in the handling, installation/application, protection and cleaning of its product[s], and submit written reports in acceptable format to verify compliance of work with Contract.
- .2 Manufacturer's field services: Provide [Xypex Chemical Corporation's] [manufacturer's] field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with [Xypex Chemical Corporation's] [manufacturer's] instructions.
- .3 Schedule site visits to review work at stages listed:
 - .1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
 - .2 [Twice] during progress of work at [25%] and [60%] complete.
 - .3 Upon completion of the work, after cleaning is carried out.
- .4 Obtain reports, within [three] days of review and submit immediately to [Owner] [Architect] [Consultant].

3.7 CLEANING

- .1 Do cleanup in accordance with Section [01 74 00 - Cleaning and Waste Management] and Section [01 74 13 - Progress Cleaning].
- .2 Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

3.8 PROTECTION

- .1 Protect installed product from damage during construction in accordance with Section [01 76 00 - Protecting Installed Construction].

END OF SECTION