



# KRYSTOL® WATERSTOP SYSTEM

## Section 03 & 07 - Cementitious Crystalline Waterstop

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Crystalline waterproofing joint system – Provide Krystol Waterstop System consisting of Krystol Waterstop Grout and Krystol Waterstop Treatment, for all non-moving construction joints to provide waterproofing by growth and penetration of hydrophilic crystals into the concrete.
- B. Provide all written materials and site services necessary to complete the installation as herein specified.

#### 1.2 RELATED SECTIONS

\*ATTENTION SPECIFIER\* Edit to add or remove sections as required for the project.

- A. Section 03 30 00 – Cast-in-Place Concrete
- B. Section 07 16 16 – Crystalline Waterproofing

#### 1.3 REFERENCES

\*ATTENTION SPECIFIER\* Delete references not required by the text of the edited specification.

- A. COE CRD-C 48 – Standard Test Method for Water Permeability of Concrete; 1992.
- B. NSF 61 – Drinking Water System Components - Health Effects; 2000a.

#### 1.4 SUBMITTALS

- A. Certificates of Conformance or Compliance: Before delivery of the materials a copy of the manufacturer's certificates, attesting that materials meet the requirements specified, shall be submitted to and approved by the contracting officer.
- B. Product Literature: Manufacturer's descriptive product literature shall be submitted and shall consist of detailed specifications, available performance test data and installation instructions.
- C. Certified Laboratory Test Reports: Before delivery of materials, copies of the reports of all tests specified herein or in reference publications shall be submitted to and approved by the contracting officer.
- D. Test reports shall be accompanied by certificates from the manufacturer certifying that the previously tested material is of the same type, quality and make as that proposed for this project.
- E. Training: Contractor shall advise manufacturer's representative 2 weeks prior to placement of jointing materials to ensure manufacturer's representative can be available on-site for application training.
- F. Shop Drawings: Show construction joint types, layout and location.
- G. References: Product must have a history of over ten years of successful use and must be accompanied by a list of job sites of a similar nature.

#### 1.5 QUALITY ASSURANCE

- A. Provide Krystol Waterstop System consisting of Krystol Waterstop Grout and Krystol Waterstop Treatment manufactured by Kryton International Inc., 1645 East Kent Avenue, Vancouver BC, V5P 2S8. Tel: 604.324.8280 or other licensed manufacturing facility.
- B. Installer/Applicator shall be an experienced installer approved by the manufacturer or by a non-approved installer under direct supervision of a manufacturer's representative or an independent materials engineering company.
- C. Prior to installation, hold a meeting of all relevant parties required for successful installation of waterproofing products to verify installation methods and warranty requirements. Relevant parties may include the waterproofing installer, installers of adjacent work or work penetrating waterproofing, manufacturer's representative and project engineer/architect.

#### Kryton International Inc.

1645 East Kent Avenue, Vancouver BC, Canada V5P 2S8 | TEL 1.604.324.8280 | FAX 1.604.324.8899 | TOLL FREE 1.800.267.8280 | WEB kryton.com

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### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged packages bearing the manufacturer's name, brand designation and batch number.
- B. Store materials in a dry storage area to avoid contact with moisture.

### 1.7 WARRANTY

- A. Provide manufacturer's standard warranty document authorized by manufacturer's representative for 25 year material warranty from date of substantial completion for projects utilizing the Krystol Waterstop System in conjunction with concrete treated with KIM waterproofing admixture.

## PART 2 PRODUCTS

### 2.1 WATERPROOF JOINT SYSTEM FOR NON-MOVING JOINTS:

- A. System Components: The Krystol Waterstop System shall consist of the waterproofing grout Krystol Waterstop Grout and waterproofing coating Krystol Waterstop Treatment manufactured by Kryton International Inc. - located at: 1645 Kent Avenue East, Vancouver BC V5P 2S8; Toll Free Tel: 800.267.8280; Tel: 604.324.8280; Fax: 604.324.8899; Email: info@kryton.com; Web: www.kryton.com
- B. Krystol Waterstop Grout Internal (K-322i) shall be used for the internal installation method. Application Instruction 4.11 — Waterproofing Horizontal Construction Joints (Internal Method). Krystol Waterstop Grout External (K-322x) shall be used for the external installation method (Application Instruction 4.12 to 4.22 — Use of Krystol Waterstop System).
- C. Internal jointing (completely encased in concrete) shall be color coded to allow for visual inspection of application procedures prior to covering with concrete. Color coding shall be as follows: Krystol Waterstop Grout = Red, Krystol Waterstop Treatment = Yellow. Color coding is not required for External joint installation.
- D. Waterproofing materials shall consist of cement, quartz silica and active ingredients that promote the growth of insoluble, hydrophilic hydration crystals within the concrete.
- E. Waterproofing materials shall not contain chlorides.
- F. Waterproofing materials shall not provide waterproofing by way of hydrophobic ingredients such as oils, stearates, silanes, silicate salts or other hydrophobic treatment. Manufacturer must certify in writing the absence of these materials.
- G. Krystol Waterstop Grout shall be non-shrink, non-toxic, fast setting, contain hydrophilic crystal producing chemicals, and when mixed with water and installed according to the manufacturer's written procedures withstand water pressure of 417 m (1250 ft.) of head pressure when tested in accordance with USACE C48-92.
- H. Krystol Waterstop Treatment shall consist of a cementitious powder and hydrophilic crystal producing chemicals that when mixed with water and installed according to the manufacturer's written procedures shall promote crystal growth and penetration to a minimum depth of 10 cm (4 in.) in both directions from the coated surface.
- I. Adjacent concrete (slabs and walls) shall be waterproofed with KIM (Krystol Internal Membrane) as per section 03305 and Application Instructions 1.11 to 1.22 — Use of KIM Admixture where applicable.
- J. Obtain all crystalline waterproofing products from a single source.
- K. Substitutions: Not permitted.



## PART 3 EXECUTION

\*ATTENTION SPECIFIER\* The waterstop details will vary depending on the joint profile, whether the joint is subject to hydrostatic pressure, and whether the concrete is cast-in-place or shotcrete. The Krystol Waterstop system is intended for static (non-moving) joints only. It is common to use the internal method, Application Instruction — 4.11 Waterproofing Horizontal Construction Joints (Internal Method), for wall-to-slab joints, and the external method, Application Instruction 4.12 — Waterproofing Horizontal & Vertical Construction Joints (External Method), for vertical joints. Specific instructions for the external method when used with shotcrete are available in Application Instructions 4.21 and 4.22 — Use of Krystol Waterstop System. Modified versions of the external method are available for shrinkage control joints (Application Instruction 4.14 — Waterproofing Horizontal & Vertical Control Joints) and joints not subject to hydrostatic pressure, Application Instruction 4.13 — Dampproofing Horizontal Construction Joints (1-Step Method). Joints in suspended slabs are vulnerable to movement and should be kept watertight using a flexible sealant following the procedure in Application Instruction 4.31 — Waterproofing Suspended Slab Joints. Additional information about specifying the best joint details is available at [www.kryton.com](http://www.kryton.com) or from your Kryton representative.

### 3.1 EXAMINATION AND SURFACE PREPARATION

- A. Safety precautions shall conform to the manufacturer's MSDS and all local regulations.
- B. Do not begin installation until substrates have been properly prepared.
- C. Concrete surfaces to receive waterstop material must be clean and free of contaminants or debris. Remove from laitance, oils, curing agents, sealers and all foreign material from surfaces to be treated. Use a chipping hammer or scabber to remove all loose or protruding aggregates. Some exposed aggregate is ideal.
- D. Saturate the surface by high pressure water blasting, then remove all standing water so the surface is only slightly damp (saturated-surface-dry or SSD). Re-saturate surfaces prior to installing each component of the Krystol Waterstop System.
- H. Strictly follow manufacturer's published procedures for mixing, application and curing of waterproofing products.

### 3.2 INSTALLATION

\*ATTENTION SPECIFIER\* The use of "Internal" or "External" installation will depend on the design of the joint as described below. Note that Waterstop Grout Internal (K-322i) and Waterstop Grout External (K-322x) are separate products and are not interchangeable. For detailed installation procedures, consult Application Instruction 4.11 to 4.31 — Use of Krystol Waterstop System.

#### 3.2.1 Internal Installation for Wall-to-Slab Joints subject to hydrostatic pressure:

- A. The Krystol Waterstop System shall be mixed and installed in all horizontal non-moving construction joints subject to hydrostatic pressure according to Kryton Application Instruction 4.11 — Waterproofing Horizontal Construction Joints (Internal Method).
- B. Apply Krystol Waterstop Grout (K322i) in center of joint area in a triangular strip. If reinforcing bar is present, install as close to the center and possible.
- C. Place plastic grout with 50 mm (2 in.) margin trowel, then use Kryton Triangle Trowel or similar tool to form a continuous triangular line of grout.
- D. The triangular line of Krystol Waterstop Grout shall have a base of 50 mm (2 in.) and a height of 30 mm (1.25 in.) with uniformly angled sides. Ensure that the clearance around the grout triangle is sufficient to allow for proper consolidation of concrete around the joint. Recommended clearance is 150% of the largest nominal aggregate size in the concrete. Ensure a minimum of 50mm (2 in.) cover between the Krystol Waterstop Grout and the exterior of the concrete wall. Product usage is 15 m (50 ft.) of installed material per 25 kg (55 lb.) pail.



- E. Apply a coating of Krystol Waterstop Treatment after the Krystol Waterstop Grout has reached sufficient strength not to be damaged by application of Krystol Waterstop Treatment. Apply Krystol Waterstop Treatment with a stiff bristled brush employing a circular, scrubbing motion to achieve maximum contact and penetration.
- F. Spreading rate of the Krystol Waterstop Treatment is 1 kg/m<sup>2</sup> or 0.2 lb./sq. ft. (3 lineal meters per 1 kg for a 30 cm wide coating or 10 lineal feet per 2.2 lb. for 12 in. joint). Krystol Waterstop Treatment shall be applied to the entire width of the joint and cover the previously installed Krystol Waterstop Grout.
- G. Forms may be closed immediately after inspection. Protect the completed Krystol Waterstop System from rain, freezing or rapid evaporation for a minimum of 12 hours or until covered by concrete.

### 3.2.2 External Installation for Wall-to-Wall, Slab-to-Slab and Slab-to-Wall Joints subject to hydrostatic pressure

- A. Krystol Waterstop Treatment:
  - 1. The Krystol Waterstop System shall be mixed and installed in all non-moving construction joints subject to hydrostatic pressure according to Application Instruction 2.12 — Waterproofing with Surface Application (Spray Method) and Application Instructions 4.12 and 4.21 — Use of Krystol Waterstop System.
  - 2. Apply Krystol Waterstop Treatment to the entire contact area where the two pours will meet. Apply Krystol Waterstop Treatment with a stiff bristled brush employing a circular, scrubbing motion to achieve maximum contact and penetration.
  - 3. Spreading rate for Krystol Waterstop Treatment is 1 kg/m<sup>2</sup> or 0.2 lb./sq. ft. (3 lineal meters per 1 kg for a 30 cm wide coating or 10 lineal feet per 2.2 lb. for 12 in. joint).
  - 4. Protect application from rain, freezing conditions and rapid evaporation.
- B. Krystol Waterstop Grout
  - 1. Form a keyway to intersect the joints. A suitable keyway may be made from a dressed 40 by 40 by trimming one edge so it tapers to 30 mm (2 x 2 in. tapered to 1.25 in.). Do not use release agents on the keyway form.
  - 2. Attach keyway to formwork, or for slabs and shotcrete, press the keyway into the concrete/shotcrete while it is still slightly plastic.
  - 3. Remove keyway forms from the hardened concrete.
  - 4. The keyway must be clean and of free of release agents, debris and laitance. Soak the keyway to a saturated-surface-dry (SSD) condition. Do not leave standing water.
  - 5. Pack keyway with Krystol Waterstop Grout (K-322x) as per manufacturer's written procedures. Usage is 7.5 m (25 ft.) of installed material per 25 kg (55 lb.) pail.
  - 6. Protect the application from rain, freezing conditions and rapid evaporation for 48 hours.

### 3.2.3 External application for shrinkage control joints

- A. The Krystol Waterstop System will be installed at all shrinkage control joints according to Application Instruction 4.14 — Waterproofing Horizontal & Vertical Control Joints.
- B. Create a crack inducing plane of weakness at all shrinkage control joint locations shown on the drawings.
  - 1. Form a keyway at the joint location. A suitable keyway may be made from a dressed 40 by 40 by trimming one edge so it tapers to 30 mm (2 x 2 in. tapered to 1.25 in.). Do not use release agents on the keyway form.
  - 2. Install a keyway on each side of the form at the joint location. For blind side walls, substitute a crack inducing PVC waterstop (Greenstreak #639 or similar) for the keyway on the blind side of the form.
  - 3. Remove keyway forms from hardened concrete.
  - 4. Keyway must be clean and of free of release agents, debris and laitance. Soak keyway to saturated-surface-dry (SSD) condition. Do not leave standing water.



5. Pack keyway with Krystol Waterstop Grout (K-322x) as per manufacturer's written procedures only if there is no active leakage. Usage is 7.5 m (25 ft.) installed material per 25 kg (55 lb.) pail. Consult the manufacturer for procedures to repair leaking joints.
6. Protect the application from rain, freezing conditions and rapid evaporation for 48 hours.

### 3.2.4 Damproofing of joints not subject to hydrostatic pressure

- A. Krystol Waterstop Treatment:
  1. The Krystol Waterstop System shall be mixed and installed in all non-moving construction joints not subject to hydrostatic pressure according to Application Instruction 4.13 — Damproofing Horizontal Construction Joints (1-Step Method).
  2. Apply Krystol Waterstop Treatment to the entire contact area where the two pours will meet. Apply Krystol Waterstop Treatment with a stiff bristled brush employing a circular, scrubbing motion to achieve maximum contact and penetration.
  3. Spreading rate for Krystol Waterstop Treatment is 1 kg/m<sup>2</sup> (0.2 lb./sq. ft.) (3 lineal meters per 1 kg for a 30 cm wide coating or 10 lineal feet per 2.2 lb. for 12 in. joint).
  4. Protect application from rain, freezing conditions and rapid evaporation for a minimum of 12 hours or until covered by concrete.

### 3.3 FIELD QUALITY CONTROL

- A. Do not cover the Krystol Waterstop System with concrete until it has been observed by manufacturer's field representative or Architect/Engineer.
- B. Inspection in two stages:
  1. Following the installation of Krystol Waterstop Grout, an inspector shall visually inspect the application to verify the presence of the "red" triangular strip in the correct location and proper dimensions.
  2. Following the installation of Krystol Waterstop Treatment, an inspector shall visually inspect the application to verify the presence of the "gold" slurry coat covering the entire contact area of the joint including the previously installed triangle of Grout.
- C. If a two stage inspection is not possible, a single inspection shall verify the presence of the "gold" slurry of Krystol Waterstop Treatment which shall cover the entire contact area of the joint. At or near the center of the joint shall be a raised triangle with the proper dimensions for Krystol Waterstop Grout. A small section of the "gold" treatment may be removed from the triangle to verify the presence of "red" grout underneath.

*\*ATTENTION SPECIFIER\* Not all applications will be possible or relevant to water test. Measure change in water level to determine if leaks exist if leaks cannot be directly observed. Delete this section of not required.*
- D. Where applicable, water test structures capable of holding water for 24 hours after conclusion of curing period. Repair identified leaks and repeat water testing until structure is watertight.

## END OF SECTION