



# Krystol® waterstop system (Shotcrete)

(Horizontal and Vertical Construction Joints)

### SCOPE

Application Instruction 203 details the procedure to properly install the Krystol® Waterstop System in all shotcrete-to-shotcrete construction joints. The Krystol Waterstop System is installed in place of other less reliable joint systems and allows for flexible scheduling and easy inspection.

### WHERE TO USE

Follow these instructions at all preplanned, shotcrete-to-shotcrete construction joints such as those at the end of a shift of shooting. For unintended cold joints caused by rapidly setting shotcrete during a scheduled shift, refer to the modified procedure in Application Instruction 204. For slab-to-wall intersections, refer to Application Instruction 201.

### LIMITATIONS

The Krystol® Waterstop System is intended for non-moving joints only. For moving joints, use an engineered expansion joint.

### SAFETY PRECAUTIONS

For professional use only. These products contain Portland cement and will become caustic when mixed with water or perspiration. Avoid contact with skin and eyes. Wear protective clothing including goggles, impervious gloves and long sleeves. See the material safety data sheets for these products.

### COVERAGE

Material	Coverage
Krystol Waterstop Grout™ EXTERNAL (Grey)	3.33 kg/m (6.6 lbs/yard) = 7.5 lineal meters per 25 kg pail (25 feet per 55 lb pail)
Krystol Waterstop Treatment™	1 kg/m <sup>2</sup> = 3 lineal meters per 1.0 kg for a 30 cm joint = 10 lineal feet per 2.2 lbs for a 12" joint

### STEP 1: PREPARE THE SURFACE

- Shotcrete surfaces to receive the Krystol Waterstop System must be sound, clean and free of contaminants or debris. Joints should be prepared by high-pressure water blasting to remove overspray, rebound, dust, curing compounds or other contaminants.

**VERY IMPORTANT:** Surfaces to receive the Krystol Waterstop System must be brought to a saturated surface-dry (SSD) condition. This means that the pores of the shotcrete are completely saturated with water but no free water remains at the surface. Pre-soak the surface with water then remove excess water with a towel just before applying the Krystol Waterstop Treatment or Grout.

### TOOLS AND MATERIALS

- Krystol Waterstop Grout™ EXTERNAL (Grey)
- Krystol Waterstop Treatment™
- Mixing Bucket, drill and paddle
- Natural bristle concrete brush
- Margin Trowel
- Watering can and towel
- High pressure water blaster
- Clean water supply

### REFERENCE:

**Application Instruction 107**  
Instructions for Shotcrete Nozzleman and Crew

**Application Instruction 108**  
Instructions for Shotcrete Inspector

**Application Instruction 201**  
Krystol® waterstop system (Internal Method) - wall to slab

**Application Instruction 204**  
Treatment of Unintended Cold Joints When Bench Gunning

**Technical Data Sheet 501**  
Krystol Internal Membrane™ - KIM®

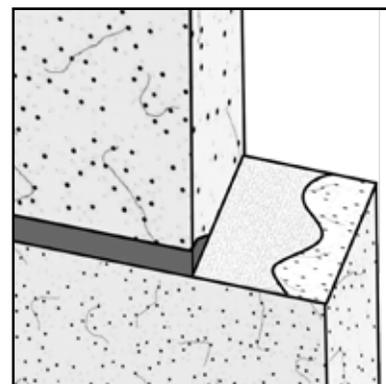
**Technical Data Sheet 602**  
Krystol Waterstop Grout™ - External

**Technical Data Sheet 603**  
Krystol Waterstop Treatment™



### STEP 2: INSTALL KRYSTOL WATERSTOP TREATMENT™

1. Mix Treatment to a thick slurry consistency (5 parts powder to 2 parts clean water by volume).
2. Apply Treatment to coat the intended joint area of the existing shotcrete using a concrete brush. Employ a circular, scrubbing motion so as to achieve maximum adhesion and penetration.
3. Apply Treatment at a spread rate of 1 kg/m<sup>2</sup> (5 square feet per pound). Be sure to cover the entire contact area of the joint.
4. Protect the application from damage by rain or rapid drying until the next layer of shotcrete is placed.
5. The subsequent layer of shotcrete must be placed while the Krystol Waterstop Treatment is still plastic (within 90 minutes under most conditions).



### STEP 3: CREATE A KEYWAY

1. Create a square keyway approximately 40mm deep by 25mm wide (1.5 inches deep by 1 inch wide) at the intersection where the two shotcrete sections will meet. A keyway can be created in a number of ways including but not limited to:
  - a.) Tacking on a form before the subsequent layer of shotcrete is placed and removing the form to produce the keyway.
  - b.) Using a trowel while the shotcrete is still green to dig out a keyway to the proper dimensions.

### STEP 4: PREPARE THE KEYWAY

1. If present, remove keyway forms from the set shotcrete. Take special care to ensure that no wood is left in the keyway.
2. Ensure that the keyway is clean. Remove any form release agents, dirt or debris.

### STEP 5: INSTALL KRYSTOL WATERSTOP GROUT™

**NOTE:** Wait at least 28 days before filling the keyway with Krystol Waterstop Grout to allow initial concrete shrinkage to take place first.

**NOTE:** Only proceed if the keyway is NOT leaking water. If water is leaking through the keyway, STOP and finish the application using the crack repair procedure described in Application Instruction 301.

1. Mix Krystol Waterstop Grout to a stiff putty consistency using the following procedure. Begin by mixing 3 parts powder with 1 part water by volume until smooth. Then add an additional part of powder (for a total of approximately 4 to 1) and continue mixing to obtain a sag free paste. The mixture will appear dry at first, but with vigorous mixing the Krystol chemicals will dissolve and the mix will become smooth and workable.
2. Mix only as much material as can be placed in 30 minutes. Note that material left standing will quickly stiffen, but vigorous mixing will restore plasticity. Do not add water to the material once it has started to set. Over-watering will result in shrinkage cracking.
3. Tightly pack the Krystol Waterstop Grout into the keyway so that it is flush with the surface.
4. Protect the Grout application from damage by rain, rapid drying or freezing for at least 24 hours.