QUIKRETE®

CEMENT & CONCRETE PRODUCTS™

TRAINING MODULE: 7

Concrete Repair Products & Techniques

Concrete is one of the most durable and versatile building materials available. Concrete's rigid characteristics make it an ideal wear surface. Because of it's rigid nature, however, exterior concrete can develop cracks and surface scaling due to it's exposure to freezing and thawing, traffic and ground movement. With proper attention to surface preparation, material selection and curing, durable repairs can be made to concrete, extending it's useful life.

Repairing Damaged Concrete Surfaces

1. **Surface Preparation**:
   Proper surface preparation is critical to achieve a successful concrete repair. A solid, clean surface is necessary so that the repair material can permanently bond to the damaged area. Depending on the condition and size of the repair area, various techniques can be used to improve the likelihood of a successful repair.

It is extremely important to remove any unsound concrete from the repair area. This can be achieved using a hammer and chisel (always wear gloves and eye protection) or with a masonry grinding disc on a portable drill. A heavy duty (3500 psi) pressure washer can also be used to remove delaminating concrete.

The edges of the repair area should be as vertical as possible.

Once all unsound concrete is removed the surface should be cleaned of dirt, oil and grease prior to application of the repair material. QUIKRETE® Concrete & Asphalt Cleaner should be scrubbed into the surface of the repair area with a stiff bristle brush and then rinsed with clean water.

2. **Selecting the Appropriate QUIKRETE® Concrete Repair Material**:

• QUIKRETE® concrete repair products are designed and formulated for specific repair applications. Understanding the repair conditions and choosing the correct product for the job are essential for a long-lasting repair.

• **For thin repairs to small area with a chipped or damaged surface** QUIKRETE® Vinyl Concrete Patcher should be used. **Vinyl Concrete Patcher** is enhanced with special exterior grade polymer resin that has strong bonding properties. The material can be applied to from ¼ down to a “feather-edge”. **QUIKRETE® Concrete Patching Compound** is another option for small non-structural repairs. The pre-mixed acrylic material dries to a firm yet flexible finish.

• **For thin repairs to large, worn & spalling concrete surfaces QUIKRETE® Concrete Resurfacer** is the appropriate repair material selection. Concrete Resurfacer is modified with advanced polymer additives to provide a durable new surface to concrete subjected to foot & vehicle traffic. Concrete Resurfacer can be applied with a squeegee, trowel or brush. It can also be used to make deep repairs prior to applying the thin resurfacing coat. The existing surface should be prepared with a 3500 psi pressure washer to clean and remove all loose material.

• **For thick concrete overlays from ½" to 1 ½" QUIKRETE® Sand** (Topping) **Mix** should be used along with **QUIKRETE® Acrylic Fortifier** as part of the mixing water. The Acrylic Fortifier improves the bond between the new and existing concrete and improves the flexural (flex) strength in the sand-cement mix. For concrete **overlays over 1 ½" QUIKRETE® Crack Resistant Concrete Mix** or **QUIKRETE® 5000** can be used. **QUIKRETE® Concrete Bonding Adhesive** must be applied to the existing concrete surface before applying the concrete overlay.

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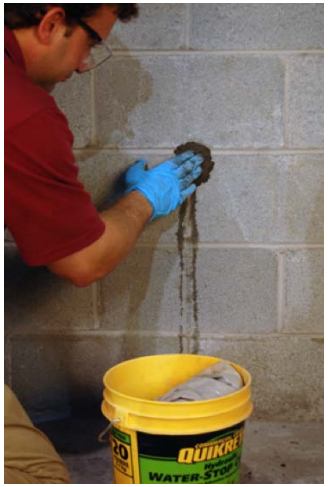
• **For repairs to concrete edges and corners QUIKRETE® Quick-Setting Cement** should be used along with **QUIKRETE® Acrylic Fortifier**. Quick-Setting Cement can be molded and shaped to match the surrounding contour of the concrete and sets in about 10 minutes. Acrylic Fortifier provides the bond strength necessary for a long-lasting repair.



• **For repairing leaks in a concrete or masonry wall QUIKRETE® Hydraulic Water-Stop Cement** should be used. Hydraulic Water-Stop is designed to instantly stop active leaks and sets in just 3-5 minutes. Hydraulic Water-Stop expands as it sets to lock the repair in place.

3. Mixing the repair material:

The proper water ratio and mixing procedures are important factors in achieving a successful repair. The more water that is added during the mixing process, the weaker the bond strength and compressive strength will be.

The mixing water should be accurately measured and placed in the mixing container before the repair material is added. For small repairs, mixing can be done by hand with a margin trowel or small brick trowel. For larger repairs, the use of a ½" drill with a mixing paddle and 5 gallon bucket is recommended. The repair material should be mixed for 3-5 minutes until a lump-free consistency is achieved.

QUIKRETE® repair materials that are polymer modified, such as Vinyl Concrete Patcher and Concrete Resurfacer or those that are mixed with Concrete Acrylic Fortifier, should be thoroughly mixed for 3-5 minutes and then allowed to sit undisturbed for 5 minutes. This will provide the time for the polymer to fully activate. Prior to application the material should be remixed. Additional water may be added in small amounts to achieve the desired consistency.

It is important not to “re-temper” (add more water to the mix) after the repair material begins to set. Re-tempering will weaken the repair and can cause shrinkage cracking or spalling. Only enough material should be mixed that can be placed and finished before the stated initial set time for the product.

4. **Applying the QUIKRETE® concrete repair material:**

Prior to applying the repair material the repair area should be dampened with water. Enough water should be used to saturate the concrete substrate and any standing water must be removed. This step is necessary because concrete is essentially a rigid sponge. Dry concrete will absorb water from the repair material and can cause a weakened bond and shrinkage cracking.

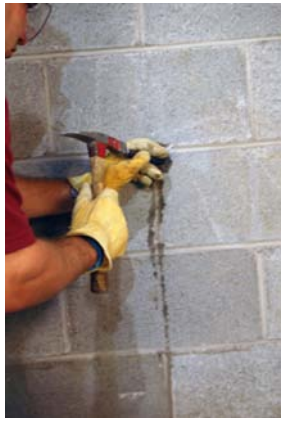
The repair material should be built up in layers with the first layer being pressed into the repair area with firm trowel pressure.

5. Finishing the repair material:

Using a margin trowel or finishing trowel, smooth the surface of the patch so that it is level with the surrounding concrete. Avoid adding water to the surface of the patch. The additional water can cause surface color inconsistencies, a weakened surface and shrinkage cracks.

A masonry brush can be used to recreate a non-slip broom finish typically found on exterior concrete surfaces. The repair should be protected from foot traffic for 24 hours and vehicle traffic for 3 days.

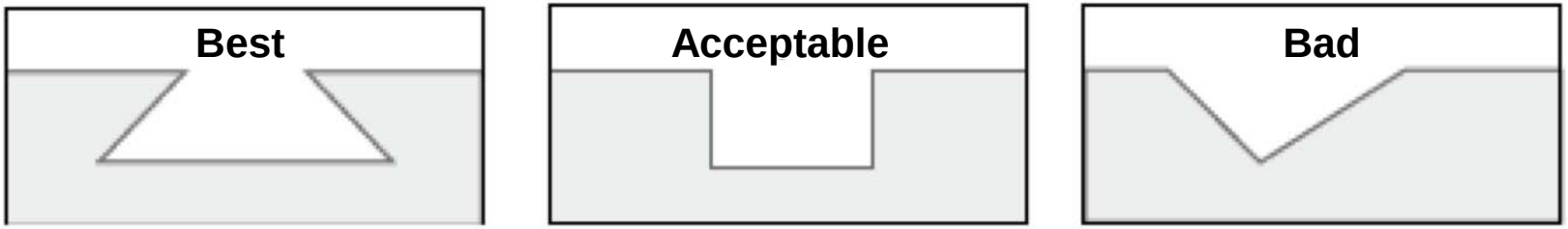
Repairing cracks in concrete and masonry:
The first step toward repairing cracks in concrete is to determine if the crack is a result of continual slab movement. If so, the crack should not be repaired with a rigid concrete repair material. Additional movement will result in the failure of the crack repair. Flexible crack fillers, such as polyurethane or acrylic caulks are the best solution for moving cracks. Other factors, including crack width and location need to be considered in determining the best repair material and application method to use.



1. Crack preparation:

Using a chisel, break away any deteriorating concrete and square the edges of the crack. Beveling the edges in an inverted “V” shape can help lock the repair material in place. Remove the loose material with a vacuum or brush and thoroughly dampen the crack. Be sure to remove any standing water before applying the repair material.

Recommended Crack Preparation



• The best way to repair cracks in concrete is to enlarge the crack first by chiseling a keyway along the crack path with a cold chisel. The best holding power for the new patch material is achieved if you chisel in a dovetail shape. A square keyway will also work. A V-shaped keyway will ultimately lead to failure of the repair.

2. Selecting the appropriate crack repair material:

• **For cracks up to ½" wide, QUIKRETE® Quick-Setting Cement** should be used along with **QUIKRETE® Concrete Acrylic Fortifier** in place of part of the water. Cracks of ½" or more are often a result of significant slab movement or long-term deterioration. Crack repairs in this situation can improve the appearance of the slab and address tripping hazards, but the crack is likely to reappear as the slab expands and contracts with temperature changes or other movement.

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For cracks less than ½" wide several repair caulks and sealants from QUIKRETE® are available:

• **QUIKRETE® Concrete Repair** is a sanded acrylic caulk designed to match the color and texture of the surrounding concrete surface. Concrete Repair can be used on horizontal or vertical surfaces and dries to a firm, durable material. Concrete Repair is not ideally suited for moving cracks.

• **QUIKRETE® Self-Leveling Polyurethane Sealant** is a flowable, highly flexible sealant and crack repair caulk. Self-Leveling Polyurethane Sealant will cure to a smooth gray surface appearance. The caulk is ideal for repairing crack and expansion joints that exhibit continual slab movement and will elongate up to 700% without failing. For large cracks and joints backer rod (foam rope) should be placed in the crack before applying the sealant. Polyurethane sealant works best when it is bonded only to the inside edges of the crack or joint.

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• **QUIKRETE® Concrete Crack Seal** is an easy to use, flowable crack sealant that dries to a firm, smooth, gray appearance. Deep cracks should be filled with sand up to 1/4” below the surface prior to applying Concrete Crack Seal. The sealant should be applied in multiple thin layers.

• **QUIKRETE® Non-Sag Polyurethane Sealant** is a highly flexible sealant and crack repair caulk used for vertical or horizontal applications. Non-Sag Polyurethane Sealant will cure to a smooth gray surface appearance. The caulk is ideal for repairing crack and expansion joints that exhibit continual slab movement and will elongate up to 800% without failing. For large cracks and joints backer rod (foam rope) should be placed in the crack before applying the sealant. Polyurethane sealant works best when it is bonded only to the inside edges of the crack or joint.

• **QUIKRETE® Mortar Repair** is a sanded acrylic caulk designed to match the color and texture of the surrounding mortar joint. Mortar Repair can be used on horizontal or vertical surfaces and dries to a firm, durable material. The square applicator tip is designed to smooth the Mortar Repair caulk as it is being applied.

• **QUIKRETE® Stucco Repair** is a sanded acrylic caulk designed to match the texture of the surrounding stucco surface. Stucco Repair can be used on horizontal or vertical surfaces and dries to a firm, durable material.

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Anchoring bolts and metal posts in concrete:
Setting bolts, handrails or metal posts in existing concrete requires the use of a special highly fluid, “expansive” cement material called anchoring cement. Standard cement based products shrink as they cure and will leave a void between the existing concrete and the cement mix surrounding the post. Anchoring cement expands as it cures, locking the post in place.

QUIKRETE® Exterior Use Anchoring Cement is a pourable, rapid setting, expansive cement that sets in 10-30 minutes. Exterior Use Anchoring Cement is a portland cement based product and is suitable for wet environments and can be used for interior or exterior applications.