



# Bond Strength Test Procedure

## TDS 104

### NON-DESTRUCTIVE TESTING:

Non-destructive testing to determine if there are voids or bond failures below the surface of cement renders can be accomplished using infrared thermographic procedures.

This consists of allowing the surface to warm in the sun and then using infrared cameras or film to photograph and plot temperature gradients on the surface area. On interior surfaces, a battery of heat lamps may be used to warm sections of the surface. Areas that entrap air or are de-bonded will be insulated from the supporting concrete slab and will show a higher surface temperature, under infrared photography, than render that is bonded to heavy massive concrete.

This technique is used by utility companies and energy companies to photograph building exteriors and determine areas of heat loss or leakage. Modifications of this technique have been successfully used to plot de-bonded areas on building facades.

### CONVENTIONAL METHOD (traditional destructive testing techniques): DRILLING CORES

Use a core drill, 3" (76 mm) minimum diameter and preferably 4" (102 mm) diameter, to drill through the render and a minimum of 1" (25 mm) into the concrete supporting slab.

A metal plate, slightly smaller than the core drill size, is then attached to the core sections using rapid hardening epoxy adhesive.

The metal plate should be a minimum 1/8" (3 mm) thickness and be drilled and tapped or threaded to receive a bolt minimum 3/8" (9 mm) diameter. After the epoxy has hardened, the bolt is threaded into the plate and then attached to a hydraulic pulling device with a calibrated gauge. Tension is then applied to the plate and the force required to break bond is recorded. Using the total force applied and the area of the core, the force per unit area can be calculated. When cores are pulled and examined, the location of the bond separation should be determined, i.e., does the separation occur between the render (stucco) and the bond coat, between the bond coat and the concrete slab, within the surface of the concrete slab, or within the render (stucco)?

### PERFORMING TENSILE PULL TESTS:

There are no official standards for tensile bond strength of renders and stuccos applied to concrete. There is, however, a requirement under Australian Standards 2358 "Adhesive for Ceramic Wall Tile" which fixes a minimum tensile bond strength of cement based adhesives after seven days. This bond strength requirement is a minimum of 0.15 MPa (22 psi). British Standards 5980:1980 also establishes a tensile adhesion requirement for ceramic tile adhesives of >950 N on a 75 x 75 mm sample, i.e., >0.17 MPa (25 psi).

Assume that test results exceeding the minimums will result in permanent problem-free installations.

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TDS 104.doc

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