

## Tensile Bond Results with MasterFinish EA 48 Liquid Surface Etch

### Overview

Proper concrete surface preparation is essential in ensuring the long-term performance of a grout installation. Many equipment operations require a coarse preparation of the concrete foundation to ensure an adequate bond and proper load and energy transfer into the foundation. ICRI CSP values of 5-10 are typical for industrial equipment and API 686 specifies a 1" profile for rotating equipment. Unfortunately, aggressive techniques such as bush hammering are commonly employed to achieve such aggressive profiles, often resulting in sub-surface cracking in the substrate (e.g. bruising). When using aggressive preparation techniques, it is recommended to follow with a shotblast to remove loose or friable concrete and ensure a sound surface. Applying a liquid surface etchant such as MasterFinish EA 48 to the concrete surface during placement can replace the procedure described above and results in an ICRI CSP 10 after the surface is power washed the following day.

### Experimental Procedure

A concrete mix (Table I) was placed in a 12"x12"x4"(d) form and screeded/floatated. MasterFinish EA 48 was applied to the concrete surface using a low-pressure sprayer around the time of initial set. The concrete was covered with plastic and allowed to set for 24 hours, after which the plastic was removed and the surface was thoroughly rinsed with potable water (Figure 1). The coarse concrete surface was cured with wet burlap under plastic cover for 7 days, followed by a 14-day air cure. MasterFlow 648 was mixed and placed directly on the above-described concrete surface and allowed to cure for 7 days. The test "dollies" were adhered to the cured MasterFlow 648 surface using a neat 2-component epoxy adhesive; the grout surface was sanded and solvent-wiped prior to the application of the epoxy to ensure a good bond. The epoxy adhesive was allowed to cure for 24 hrs to ensure it attained adequate strength for the test. A core drill was used to core around the adhered test "dollies" and the core holes penetrated into the substrate 1/4". The tensile bond strength was determined according to ASTM C 1583, "Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)."

Table I: Concrete Mix Design

Cement Type 1	550 lbs/yd <sup>3</sup>
# 57 Stone	1800 lbs/yd <sup>3</sup>
Sand	1401 lbs/yd <sup>3</sup>
Water	270 lbs/yd <sup>3</sup> (32.4 gal)
Slump	6.5"
28-day Compressive Strength (design)	5000 psi.

## Results

The results of the direct tensile bond tests are listed in Table II and shown in Figure 2.

Table II: Results of ASTM C 1583 Tensile Bond Testing

Tensile Bond Strength	Failure Mode
450 psi	Concrete
>500 psi	Concrete
450 psi	Concrete
>500 psi	Concrete

## Conclusion

MasterFinish EA 48 can successfully be used in lieu of aggressive mechanical preparation techniques to achieve a surface roughness comparable to a CSP 10 as defined in ICRI 310.2R and achieve an excellent bond with MasterFlow 648 epoxy grout.



Figure 1: Concrete surface after MasterFinish EA 48 was rinsed and the surface was allowed to dry.



Figure 2: Sample after bond testing. In all cases, the failure occurred within the concrete substrate.