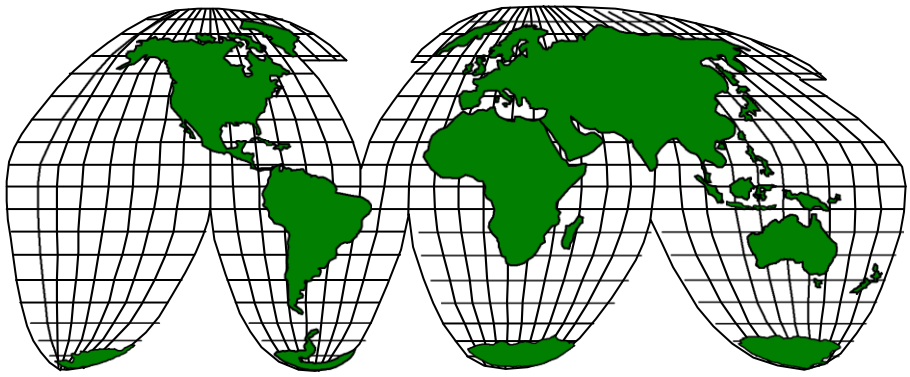

Evaluation of Burger King Bomanite 800 GRIT PE/TS & PE/HDI Concrete Floor Samples

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CONFIDENTIAL

Date: **July 1, 2005** **RTI# 05-0493**

Prepared By: **C. Allen**

Sent To: **L. Maniatis**

Subject: **Evaluation of Burger King 800 GRIT PE/TS & PE/HDI Concrete Floor Samples**

OBJECTIVE

To perform coefficient of friction (COF) and compatibility testing on two decorative concrete floor samples submitted by Burger King.

BACKGROUND

Burger King is reviewing floor samples for installation in new Burger King Restaurants and has requested COF testing to determine slip resistance of two concrete floor samples and compatibility testing to determine stainability and cleanability.

TEST SAMPLES

800 GRIT Penetrating Epoxy with TECSEAL;
800 GRIT Penetrating Epoxy with Highe Density Impregnator;

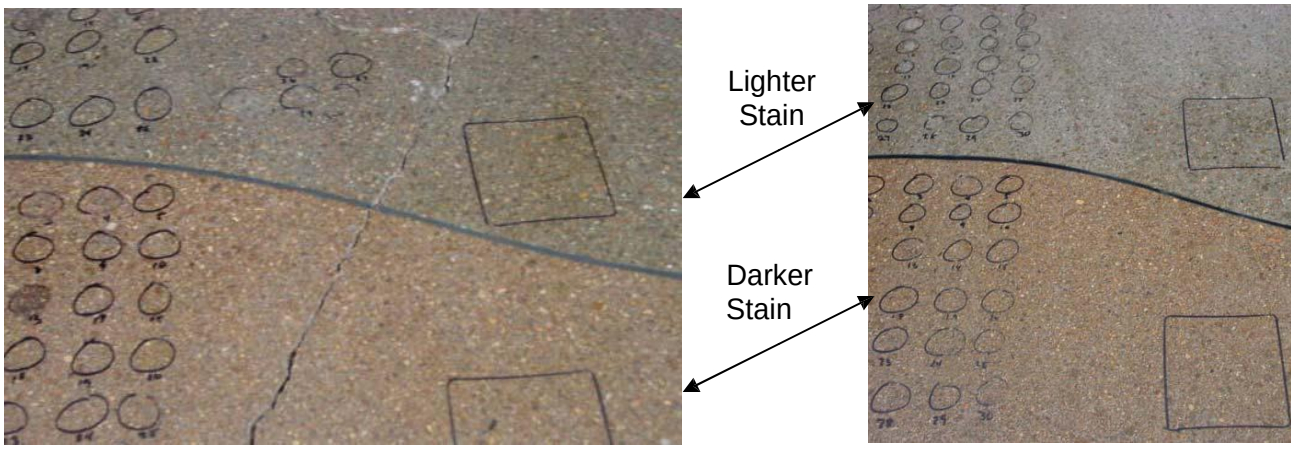
PROCEDURE

Coefficient of Friction (COF) Testing
To determine slip resistance, each sample was evaluated using the Brungraber Mark II Slip Tester. In an attempt to simulate actual field conditions, the test was executed under two different soil levels utilizing spent shortening. Testing was performed using a 4" x 4" area on the sample.

Chemical Compatibility Substrate Testing
Test was designed to determine cleanability and staining potential of tile samples. Testing was performed using a spot test, in which common soil substances were applied to the samples. After 24 hours, the substances were removed using running water and a soft bristled brush. This procedure was repeated once more for a total of two 24 hour exposure time periods. The test areas were examined after drying.

RESULTS

RESULTS Cont.



800 GRIT; PE/TS

800 GRIT; PE/HDI

Table 1. Coefficient of Friction (COF) Test Results

Sample	Clean		Low Soil (0.05g)		High Soil (0.20g)	
	Clean Dry	Clean Wet (Water)	Greasy Dry	Greasy Wet (Water)	Greasy Dry	Greasy Wet (Water)
800 GRIT; PE/TS Lighter Stain	1.0	0.30	0.63	0.08	0.04	0.03
800 GRIT; PE/TS Darker Stain	1.0	0.38	0.12	0.18	0.02	0.04
800 GRIT; PE/HDI Lighter Stain	1.0	0.38	0.57	0.27	0.06	0.02
800 GRIT; PE/HDI Darker Stain	1.0	0.32	0.22	0.13	0.07	0.06

NOTE: Due to possible variability in the manufacturing process of the polished concrete with Stain Guard, these test results are applicable only to the samples tested.

RESULTS Cont.

TABLE 2. Compatibility Test Results

TABLE 2. Compatibility Test Results	800 GRIT PE/TS		800 GRIT PE/HDI	
	Lighter	Darker	Lighter	Darker
CAPITAL® MPSC (Use Solution)	NE	NE	NE	NE
CAPITAL® MPSC (Concentrate)	NE	NE	NE	NE
LIQUID STORM™ Power Wash Detergent (Use Solution)	NE	NE	NE	NE
LIQUID STORM™ Power Wash Detergent (Concentrate)	NE	NE	NE	NE
MARVEL™ 3-in-1 Cleaner/Degreaser (Use Solution)	NE	NE	NE	NE
MARVEL™ 3-in-1 Cleaner/Degreaser (Concentrate)	S	NE	NE	NE
KADET® Quarry Tile Floor Cleaner (Use Solution)	NE	NE	NE	NE
KADET® Quarry Tile Floor Cleaner (Concentrate)	S	S	S	S
Kay Enzymatic (Use Solution)	NE	NE	NE	NE
Kay Enzymatic (Concentrate)	NE	NE	S	S
TOUCH-UP™ Glass Cleaner Super Concentrate (Use Solution)	NE	NE	NE	NE
TOUCH-UP™ Glass Cleaner Super Concentrate (Concentrate)	NE	NE	NE	NE
DAZZLE™ Cleaner and Polish (RTU)	S	NE	NE	NE
KAY® SINK SANITIZER (Use Solution)	NE	NE	NE	NE
KAY® Liquid Bleach (Use Solution)	NE	NE	NE	NE
KAY® Liquid Bleach (Concentrate)	S	S	S	NE
KAYQUAT II (Use Solution)	NE	NE	NE	NE
KAYQUAT II (Concentrate)	NE	NE	S	S
Write-Away™ Graffiti Remover (RTU)	S	S	S	S
DeLimer™ Lime Scale Remover (Use Solution)	S	NE	NE	NE
SPIRIT™ Restroom Cleaner (RTU)	S	NE	NE	NE
Spent Shortening	S	NE	S	NE
Ketchup	NE	NE	NE	NE
Mustard	S	NE	S	NE
Mayonnaise	NE	NE	NE	NE
Dill Pickle Juice	NE	NE	S	NE
Coffee	NE	NE	NE	NE
Soda	NE	NE	NE	NE

NE – No Effect
S – Stain
RTU – Ready to Use

DISCUSSION

Coefficient of Friction (COF) Testing

The American National Standards Institute (ANSI) has not established a minimum COF above which a floor surface is considered to provide a non-hazardous walkway surface. However, there have been several industry and government studies that have addressed the appropriate COF threshold for slip resistance. As reported by the American Society for testing Materials (ASTM) Committee D-21 in ASTM Standard D-2047: "Floor polishes having a coefficient of static friction, as measured by the James Machine, of not less than 0.5 traditionally have been recognized as providing non-hazardous walkway surfaces." Industry studies recognize that a floor surface with a COF of 0.5 and above generally provides a non-hazardous walkway surface. As the COF approaches 0.30 – 0.35, the floor surface becomes progressively more slippery.

All the submitted concrete samples meet the industry standards under clean-dry testing conditions. The lighter stain for both samples meet the industry standard under light soil. Other testing parameters illustrate a decrease in slip resistance below the industry standard as soil and water are added to the treated concrete floor samples.

Chemical Compatibility Substrate Testing

The submitted polished concrete samples both had a grid line separating two different stains, a lighter stain and a darker stain. The lighter stain on both samples illustrated a higher susceptibility to staining as opposed to the darker stain. The manufacturer's technical bulletin with maintenance recommendation is attached for review. Use solution of KADET® Quarry Tile Floor is recommended for daily cleaning and maintenance of the PE/TS (Penetrating Epoxy TexSeal) and PE/HDI (Penetrating Epoxy High Density Impregnating Sealer) samples. The kitchen area should be deck brushed using KADET® Quarry Tile Floor nightly and the front of the house should be deck brushed at least once per week. Testing should be completed to determine the effect of deck brushing on concrete sealants.