



## Construction Testing Laboratories Limited

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July 11, 2008

Report No.: MS08-06 Revised

MS International Inc.  
2095 North Batavia Street  
Orange, California  
U.S.A. 92865

**Attention:** Mr. Ruben Balingit

**Subject:** Abrasion Resistance Determination of Glazed Ceramic Tiles  
( Venice Tiles )

**Reference:** 1) Determining Visible Abrasion Resistance of Glazed Ceramic Tile  
(ASTM C-1027-99 Reapproved 2004)

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Dear Ruben,

### **1.0 Introduction**

On May 16, 2008, Construction Testing Laboratories Limited received a shipment of Venice 13"x 13" tiles for Abrasion Resistance testing. The shipment consisted of 5 tiles. Sample identification was previously assigned by the client. The samples were prepared and the test procedures discussed below were performed.

### **2. Procedures**

**2.1 Test Specimens:** Eleven, defect-free, representative tile samples, were prepared.

**2.2 Size of Specimens:** The original tile for testing was cut into 100 mm by 100 mm squares with each cut piece labelled according to the number of revolutions to be applied for each abrasion stage.

**2.3** The sample surfaces was thoroughly cleaned and completely dried in a drying oven capable of operation at  $110 \pm 5$  °C and cooled to room temperature before testing.

**2.4 Abrasion Procedure:** A metal holder was clamped on the glazed surfaced of each test specimen on the abrasion apparatus and abrasive load was introduced with number of revolutions presetted for each abrasion stage test of 100, 150, 600, 750, 1500, 2100, 6000 and 12000.

**2.5** Test specimens were cleaned using 10% hydrochloric acid solution prepared by adding 263 mL of 38% hydrochloric acid to 837 mL of distilled water. Samples were then rinsed under running water and dried in the oven.

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**2.6 Evaluation of Surface Abrasion:** The specimens of Venice tiles were then viewed in the viewing box equipped with fluorescent lighting providing 300-lux illumination for abrasion comparison. The lowest number of abrading cycles that show an apparent visual difference between abrading tile and unabraded tile was recorded.

**2.7** The results were verified by retesting at the abrasion stage where failure is observed and on the next higher and lower abrasion stages.

**3.0 Result:** Abrasion resistance of Venice tiles falls on Class 111 type (750 revolution stage).

**4.0 Closure:** Venice tile was found to be under Class 111 type according to ASTM C 1027-99 (Reapproved 2004).

We trust that this will meet with your requirements. If there are any questions, please do not hesitate to contact the undersigned.

Respectfully submitted  
**Construction Testing Laboratories Limited**



Bill Wong, P. Eng.  
Manager

*1 cc: Client*

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May 27, 2008

Report No.: MS08-02 Rev.

MS International Inc.  
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Orange, California  
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Fax: 714-685-7600

**Attention:** Mr. Ruben Balingit

**Subject:** Slip Resistance of Porcelain Tiles.

**Reference Standard:** Determining the Co-Efficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method (ASTM C 1028-96)

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Dear Ruben,

### 1.0 Introduction

On May 13, 2008, Construction Testing Laboratories Limited received three samples of Venice tiles, in order to determine the static coefficient of friction.

### 2.0 Procedure

The Neolite friction material was prepared as instructed by the Standard by sanding with 400 grit silica paper. The Neolite surface was re-sanded after each separate step of the procedure. Calibration of the Neolite heel assembly was then performed using the ASTM C 1028 Standard Tile in dry and then wet condition in order to determine the dry and wet calibration factors. Testing was then accomplished on the sample by performing four pulls, with each pull being 90° from the previous pull. The samples were tested in "dry" condition followed by testing in "wet" condition. The samples were then cleaned with Hillyard's Renovator solution and retested.

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**3.0 Test Results**

The static coefficient of friction results are listed on the table below.

**Table No. 1: Slip Resistance of Porcelain Tiles. (ASTM C1028-96)**

Samples	Calibration Factor		As Received Tiles		Cleaned Tiles		Average Coefficient of Friction		Overall Coefficient of Friction
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry and Wet
<b>Venice</b>	<b>0.17</b>	<b>-0.12</b>	<b>0.90</b>	<b>0.63</b>	<b>0.95</b>	<b>0.63</b>	<b>0.92</b>	<b>0.63</b>	<b>0.78</b>

**4.0 Closure**

The static coefficient of friction of the Venice tiles was found to exceed 0.60 under all of the test conditions.

The Occupational Safety and Health Administration recommends a static coefficient of 0.5 on walking surfaces, while the Access Board recommends 0.6 on walking surfaces with disability.

We trust this will meet your report requirements. If additional information is required, please contact the undersigned.

Respectfully submitted  
**Construction Testing Laboratories Limited**



Bill Wong.  
Manager

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