



*Progressive Engineering Inc.*

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**ROYAL MOULDINGS, Ltd.**

ASTM D2394 Coefficient of Friction Test on  
Zuri Deck Boards (Dry and Wet)

7/20/2012



This test report contains seven (7) pages, including the cover sheet. Any additions to, alterations of, or unauthorized use of excerpts from this report are expressly forbidden.

2012-712  
(A)

## 1. TITLE

ASTM D2394 Coefficient of Friction Test on Zuri Deck Boards (Dry and Wet)

## 2. OBJECTIVE

To determine the static coefficient of friction of Zuri deck board in a dry and wet condition.

*This test report pertains only to the specimens tested. It remains the sole responsibility of the manufacturer to provide a product consistent to that which was tested.*

## 3. TESTED FOR

Royal Mouldings Limited  
135 Bear Creek Road  
Marion, VA 24354

## 4. TESTING ORGANIZATION

*Progressive Engineering Inc.*  
58640 State Road 15  
Goshen, IN 46528  
[www.p-e-i.com](http://www.p-e-i.com)

*See IAS Evaluation Report TL-178 for ISO 17025 Accreditation.*

## 5. TESTING PERSONNEL

Laboratory Manager - Jason R. Holdeman  
Project Manager - Andrew Alger



## 6. REFERENCE STANDARDS

**ASTM D2394-05** - Standard Test Method for Simulated Service Testing of Wood and Wood-Base Finish Flooring

## 7. TEST EQUIPMENT

- Deflection Gauge (PEI #830)
- Load Cell 200 lb (*PEI* #415)
- Data Acquisition System (*PEI* #643)

## 8. TEST SPECIMEN

Deck Board - 1" thick x 5-1/2" wide x 48" long pieces of foam plastic Zuri Deck Boards manufactured by Royal Mouldings. Three specimens with different color wood grain capstock surfaces were provided to PEI by Royal Mouldings for testing. PEI labeled the samples with A & B for the longitudinal direction of the board and C & D for the transverse direction of the board. *The samples were marked "G1", "Q4", and "AA4" as-received. See attached photographs for details.*

## 9. TEST SET-UP

### A. Dry Test Set-up

The test sample was placed on a flat rigid surface and set against a wood stop block. A 25 pound test sled with a 4" x 4-1/2" prime grade leather heel adhered to it was placed on the test sample. A cable, with one end connected to a hydraulic cylinder and the other end attached to the test block, was used to pull the test block.

### B. Wet Test Set-up

The test setup was identical to the dry setup with the exception that distilled water was applied to the test sample before the 25 pound test sled was positioned on the test sample.

## 10. TEST PROCEDURE

A data acquisition system recorded the load and displacement of the test sled throughout the entire test. The maximum load recorded was used for the static coefficient of friction. The average of all of the load points collected during the 2 inch/minute load rate period was used for the sliding coefficient of friction.

### A. Static COF Dry and Wet

The test was performed by applying a load at a gradual rate of approximately .05 inch/minute and recording the maximum force required to set the test sled in motion. A total of four pulls were performed on each test sample with each pull perpendicular to the last. The wet test was performed identically except that distilled water was added to the test surface.

### B. Sliding COF Dry and Wet

After the initial slip, "Static COF", the load rate was increased to 2 inch/minute for at least 1" of travel. The wet test was performed identically except that distilled water was added to the test surface.

**11. TEST RESULTS**

See the attached data sheets for individual test results.

**12. CONCLUSION**

The ASTM D2394 Dry and Wet coefficient of friction, static and sliding, of Royal Moulding's **Zuri Deck Board** is shown in the table below for both the longitudinal and transverse axis of the boards provided for testing.

**Coefficient of Friction<sup>1</sup> of Zuri Deck Boards**

	DRY		WET	
	Static	Sliding	Static	Sliding
Longitudinal	<b>0.85</b>	<b>0.72</b>	<b>0.97</b>	<b>0.76</b>
Transverse	<b>0.81</b>	<b>0.70</b>	<b>0.89</b>	<b>0.74</b>

<sup>1</sup>- The COF shown is the average of all of the samples used for each direction, respectively.

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## ASTM D2394 Coefficient of Friction (Dry)

Date: 6/18/2012  
Client: Royal Moulding  
Specimen: Zuri Deck Boards

PEI Project No.: 2012-712

Sled Weight (lb): 25.24

### DRY Static Coefficient of Friction (COF)

Load Rate: .05"/minute

Direction *		Sample No. / Force (lb)			Average	
		AA4	Q4	G1	Force (lb)	Static COF **
Longitudinal	A	19.8	21.8	21.8	21.1	<b>0.84</b>
	B	21.0	21.7	23.0	21.9	<b>0.87</b>
Transverse	C	20.2	20.9	19.2	20.1	<b>0.80</b>
	D	21.2	18.5	22.9	20.9	<b>0.83</b>

### DRY Sliding Coefficient of Friction (COF)

Load Rate: 2"/minute

Direction *		Sample No. / Force (lb)			Average	
		AA4	Q4	G1	Force (lb)	Sliding COF ***
Longitudinal	A	18.0	18.3	18.8	18.4	<b>0.73</b>
	B	18.0	18.1	18.5	18.2	<b>0.72</b>
Transverse	C	18.0	17.4	17.2	17.5	<b>0.70</b>
	D	18.0	17.8	17.7	17.8	<b>0.71</b>

\* - Direction indicates the pull direction of the sled. The A/B and C/D directions are 180° opposite directions, respectively.

\*\* - Static COF is equivalent to the maximum force exerted on the sled in order to cause movement divided by the sled weight.

\*\*\* - Sliding COF is equivalent to the average force exerted on the sled in order to maintain movement divided by the sled weight.

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**ASTM D2394 Coefficient of Friction (Wet)**

Date: 7/20/2012  
Client: Royal Moulding  
Specimen: Zuri Deck Boards

PEI Project No.: 2012-712

Sled Weight (lb): 25.24

**WET Static Coefficient of Friction (COF)**

Load Rate: .05"/minute

Direction *		Sample No. / Force (lb)			Average	
		AA4	Q4	G1	Force (lb)	Static COF **
Longitudinal	A	24.7	23.8	25.7	24.7	<b>0.98</b>
	B	24.5	23.4	24.3	24.1	<b>0.95</b>
Transverse	C	21.6	21.9	21.8	21.7	<b>0.86</b>
	D	24.8	22.3	22.6	23.2	<b>0.92</b>

**WET Sliding Coefficient of Friction (COF)**

Load Rate: 2"/minute

Direction *		Sample No. / Force (lb)			Average	
		AA4	Q4	G1	Force (lb)	Sliding COF ***
Longitudinal	A	19.5	18.9	19.3	19.2	<b>0.76</b>
	B	18.8	19.1	19.2	19.1	<b>0.75</b>
Transverse	C	19.2	17.8	18.3	18.4	<b>0.73</b>
	D	19.5	17.9	19.1	18.8	<b>0.75</b>

\* - Direction indicates the pull direction of the sled. The A/B and C/D directions are 180° opposite directions, respectively.

\*\* - Static COF is equivalent to the maximum force exerted on the sled in order to cause movement divided by the sled weight.

\*\*\* - Sliding COF is equivalent to the average force exerted on the sled in order to maintain movement divided by the sled weight.

COF Testing Details

Project No.: 2012-712 (A)



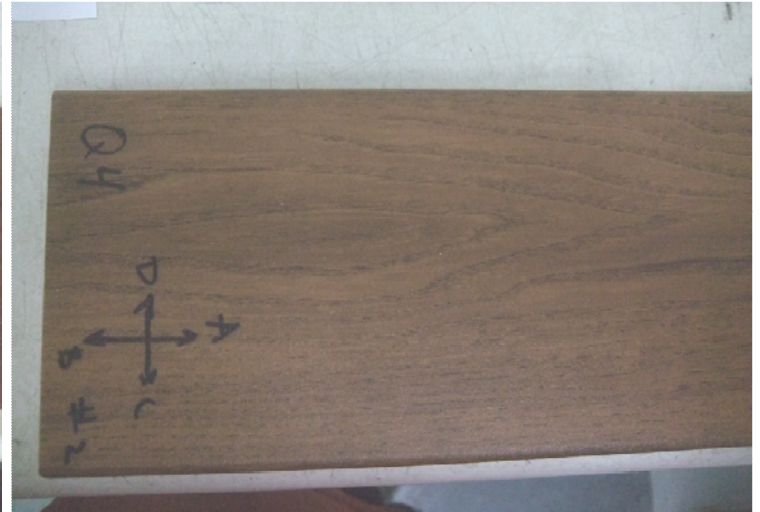
Dry Test Setup



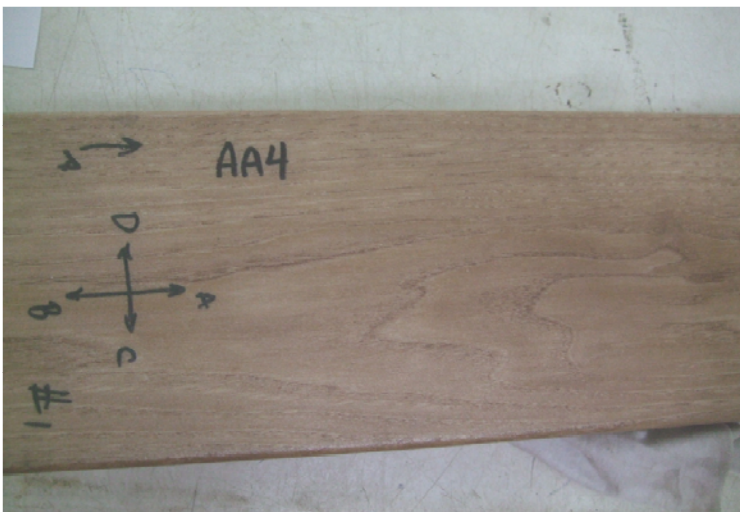
Wet Test Setup



Sample G1



Sample Q4



Sample AA4



Surface Texture Detail