

Walkway Safety Audit

Diagnostic Tribometry to compare performance of PURETI Coat

Audit Request:

PURETi Group LLC, “PURETi”, has requested a diagnostic tribometry audit on the effect upon pool deck surface slip resistance after an application of PURETi Coat. Three audit locations were selected (Table 1: Audit Sites).

Location	Area	Address	Surface
Aria Resort	Pool Deck	3730 S Las Vegas Blvd, Las Vegas, NV 89109	Methyl Methacrylate (5 yr old)
MGM Grand, Wet Republic	Ramp	3799 S Las Vegas Blvd, Las Vegas, NV 89109	Ground concrete with solvenated acrylic sealer
MGM Grand, Wet Republic	Entrance to Woman’s Washroom	3799 S Las Vegas Blvd, Las Vegas, NV 89109	Ground concrete with solvenated acrylic sealer
Green Valley Ranch	Entrance	2300 Paseo Verde Pkwy, Henderson, NV 89052	Methyl Methacrylate with shark grip (3 yr old aluminum oxide)

Audit Protocol:

Two areas per audit location were prepared and cleaned on each test surface using a cleaning protocol completed by PURETi and World Class Facility Services. A Regan Scientific BOT-3000 was used to test both Wet Static Coefficient of Friction (WSCOF, ANSI B101.1) and Wet Dynamic Coefficient of Friction (WDCOF, ANSI B101.3). The audit process followed B101.0 (Walkway Surface Auditing Procedure for the Measurement of Walkway Slip Resistance). The tribometer used was Substratum1 (Appendix 1, Tribometer Data)

Prior to each test a verification test and reference tile test were completed to validate the BOT-3000 was operating within specification. Examples of the verification test and reference tile test printouts are shown enclosed (Appendix 2: Verification and Reference Printout).

Audit Summary:

The audits were conducted using ANSI B101.0, B101.1, and B101.3. All surfaces audited showed no significant traction change after application (Table 2: Audit Results). All Coefficient of Friction measurements before and after the application of the PURETi product remained in the range of “lower probability of slipping” (Table 3: Wet SCOF Metrics, Table 4: Wet DCOF Metrics).

The three (3) locations and audit detail are included as follows:

1. Rio Hotel (Appendix 3)
2. Aria (Appendix 4)
3. Green Valley Ranch (Appendix 5)

Table 2: Audit Results					
Location	Area	No Pureti WSCOF	Pureti WSCOF	No Pureti WDCOF	Pureti WDCOF
Aria Resort	Pool Deck	0.88	0.92	0.65	0.66
MGM Grand, Wet Republic	Ramp	0.99	0.98	0.72	0.65
MGM Grand, Wet Republic	Entrance to Woman’s Washroom	0.71	0.78	0.54	0.51
Green Valley Ranch	Entrance	1.00	1.00	0.75	0.74

Table 3: Wet SCOF Metrics	
Wet SCOF Value	Available Traction
WSCOF ≥ 0.60	High Traction - Lower probability of slipping
0.40 ≤ WSCOF < 0.60	Moderate Traction - Increased probability of slipping
WSCOF < 0.40	Minimal Available Traction - Higher probability of slipping

Table 4: Wet DCOF Metrics	
Wet SCOF Value	Available Traction
WDCOF ≥ 0.45 (inclines)	High Traction - Lower probability of slipping
WDCOF ≥ 0.42 (level)	
0.30 ≤ WSCOF < 0.45 (inclines)	Acceptable Traction - Increased probability of slipping
0.30 ≤ WSCOF < 0.42 (level)	
WSCOF < 0.30	Low Traction - Higher probability of slipping

Appendix 1: Tribometer Data

Tribometer Data	
Type	BOT-3000
Manufacturer	Regan Scientific
Name	Substratum1
Serial Number	1110
Firmware Version	1818
Calibration Date	12/02/2014

Appendix 2: Verification and Reference Printout

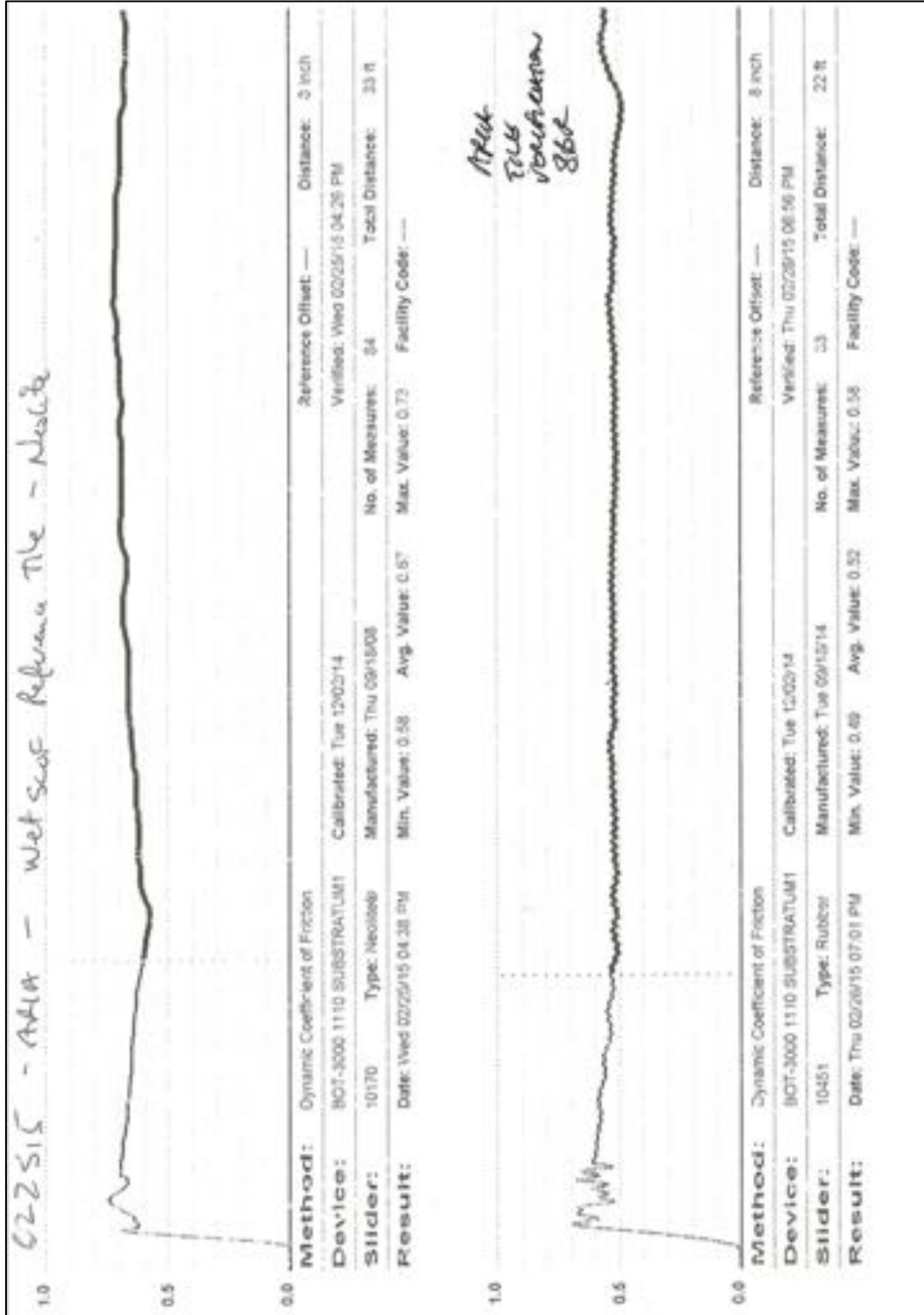
Verification Test Printout

Prior to any testing per B101.0 a BOT-3000 tribometer must be verified using the manufacturer's process. The BOT-3000 the verification test is an automatic process. Shown below are examples of the verification printouts from the completed audits. All audits were completed after Substratum1 had passed the verification test.

Verification Results	Verification Results	Verification Results
<p>Device BOT-3000 1110 SUBSTRATUM1 Calibrated: Tue 12/02/14</p> <p>Slider Type: Verification Manufactured: Fri 02/05/08 No. of Measures: 17</p> <p>Verification Date: Thu 02/05/15 06:56 PM Result: passed</p> <p>Location: LIQUID, ARVA</p> <p>Signature: <i>[Signature]</i></p>	<p>Device BOT-3000 1110 SUBSTRATUM1 Calibrated: Tue 12/02/14</p> <p>Slider Type: Verification Manufactured: Fri 02/05/08 No. of Measures: 16</p> <p>Verification Date: Thu 02/05/15 01:28 PM Result: passed</p> <p>Location: CUR</p> <p>Signature: <i>[Signature]</i></p>	<p>Device BOT-3000 1110 SUBSTRATUM1 Calibrated: Tue 12/02/14</p> <p>Slider Type: Verification Manufactured: Fri 02/05/08 No. of Measures: 15</p> <p>Verification Date: Thu 02/05/15 11:56 AM Result: passed</p> <p>Location: Wet CASH REPUBLIC</p> <p>Signature: <i>[Signature]</i></p>

Reference Tile Test Printout

Prior to any testing per B101.0 a BOT-3000 tribometer must be verified using the required sensor for the applicable standard (B101.1, B101.3) and the manufacturer's supplied reference tile. Shown below are examples of reference tile test printouts from the completed audits. All audits were completed after Substratum1 had successfully been tested using the reference tile with the appropriate sensor (Neolite, SBR).



Appendix 3: Rio Hotel Audit

Location:	Rio Hotel, Wet Republic					
Auditor:	David Collette, WACH					
Tribometer:	BOT-3000 Substratum1					
Date:	2/26/15					
Time:	9:00AM					
Address:	3799 Las Vegas Blvd, Las Vegas, NV, 89109					
Risk Class:	C (Normally wet, shoes or barefoot)					
Description:	Pool Deck					
Floor Type:	Ground concrete with Solvenated acrylic sealer					
Verification Test Pass:	Yes					
Ref Tile Test Wet SCOF Pass:	Yes Wet Neolite DCOF@ 8 inches, Distilled Water, Value 0.64 +/- 0.04					
Ref Tile Test Wet DCOF Pass:	Yes Wet SBR DCOF@ 8 inches, 0.1% SLS Solution, Value 0.48 +/- 0.04					
Wet SCOF	Site 1: Upper Ramp - PURETI	Site 2: Entrance Woman's bathroom - RHS No PURETI	Site 2: Entrance Woman's bathroom - LHS PURETI			
ANSI B101.1 - Neolite	0.98	0.76	0.77	NOTE: Wet SCOF >= 0.60 is considered high traction		
	0.99	0.66	0.78	0.4,0.6 is considered moderate traction		
	0.00	0.00	0.00	<0.4 is minimal traction		
Samples (Only 2 required if no dir bias)	0.00	0.00	0.00			
	0.99	0.71	0.78			
Wet DCOF	Site 1: Upper Ramp - PURETI	Site 2: Entrance Woman's bathroom - RHS No PURETI	Site 2: Entrance Woman's bathroom - LHS PURETI			
ANSI B101.3 - SBR	90 deg	90 deg	90 deg	NOTE: Wet DCOF >= 0.42 is considered high traction		
	0.69	0.64	0.51	0.3 to 0.42 is considered moderate traction		
	0.71	0.63	0.50	<0.3 is minimal traction		
	0.75	0.67	0.51	If incline (max 1:12 or 4.76 degrees) >0.45		
Average of 3 samples	0.72	0.65	0.51			
	180 deg	180 deg	180 deg			
	0.00	0.00	0.00			
	0.00	0.00	0.00			
	0.00	0.00	0.00			
Average of 3 samples	0.00	0.00	0.00			
Average of 6 samples	0.72	0.65	0.51			
Upper WDCOF Limit	0.79	0.71	0.56	NOTE: All Samples must be within upper and lower limit		
Lower WDCOF Limit	0.65	0.58	0.46			

Site 1: Ramp (Upper ramp area has PUREti applied)



NOTE: B101.1 and B101.3 tests were done across the ramp surface and not in the direction of foot traffic to eliminate gravity due to the angle of the ramp. The ramp material is non-directional allowing the BOT-3000 traction readings to be used to compare the before and after traction measurements.. The B101.3 test is only valid up to an incline angle of 4.76 degrees.

Site 2: Entrance Woman's Bathroom (LHS has PURETI applied)



Appendix 4: Aria Audit

Site 1: Cabana (RHS has PURETi applied)



Appendix 5: Green Valley Ranch Audit

Location:	Green Valley Ranch		
Auditor:	David Collette, WACH		
Tribometer:	BOT-3000 Substratum1		
Date:	Feb 26		
Time:	10:30AM		
Address:	2300 Paseo Verde Pkwy, Henderson, NV 89052		
Risk Class:	C (Normally wet, shoes or barefoot)		
Description:	Pool Deck		
Floor Type:	MMA with shark grip (aluminum oxide 3 years old)		
Verification Test Pass:	Yes		
Ref Tile Test Wet SCOF Pass:	Yes	Wet Neolite DCOF@ 8 inches, Distilled Water, Value 0.64 +/- 0.04	
Ref Tile Test Wet DCOF Pass:	Yes	Wet SBR DCOF@ 8 inches, 0.1% SLS Solution, Value 0.48 +/- 0.04	
	Site 1: Entrance - LHS No PURETI	Site 1: Entrance - RHS PURETI	
Wet SCOF			
ANSI B101.1 - Neolite	1.00	1.00	NOTE: Wet SCOF >= 0.60 is considered high traction
	1.00	1.00	0.4-0.6 is considered moderate traction
	0.00	0.00	<0.4 is minimal traction
Samples (Only 2 required if no dir bias)	0.00	0.00	
	1.00	1.00	
	Site 1: Entrance - LHS No PURETI	Site 1: Entrance - RHS PURETI	
Wet DCOF			
ANSI B101.3 - SBR	90 deg 0.72	90 deg 0.72	NOTE: Wet DCOF >= 0.42 is considered high traction
	0.76	0.71	0.3 to 0.42 is considered moderate traction
	0.75	0.76	<0.3 is minimal traction
Average of 3 90 samples	0.74	0.73	If incline (max 1:12 or 4.76 degrees) >0.45
	180 deg 0.74	180 deg 0.73	
	0.78	0.76	
	0.74	0.75	
Average of 3 180 samples	0.75	0.75	
Average of 6 samples	0.75	0.74	
Upper WDCOF Limit	0.82	0.81	NOTE: All Samples must be within upper and lower limit
Lower WDCOF Limit	0.67	0.66	

Site 1: Entrance (LHS has PURETi)

