

SOTTER ENGINEERING CORPORATION
Floor Slip Resistance Consultants

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*Licensed by the State of California
Board of Professional Engineers
And Land Surveyors*

*Certified by the City of Los Angeles
as an official slip resistance testing
laboratory for flooring*

CERTIFIED

ANSI A137.1/A326.3 Flooring Slip Resistance Test Results

Client: **Chemcar USA**

Report date: 3/31/2021

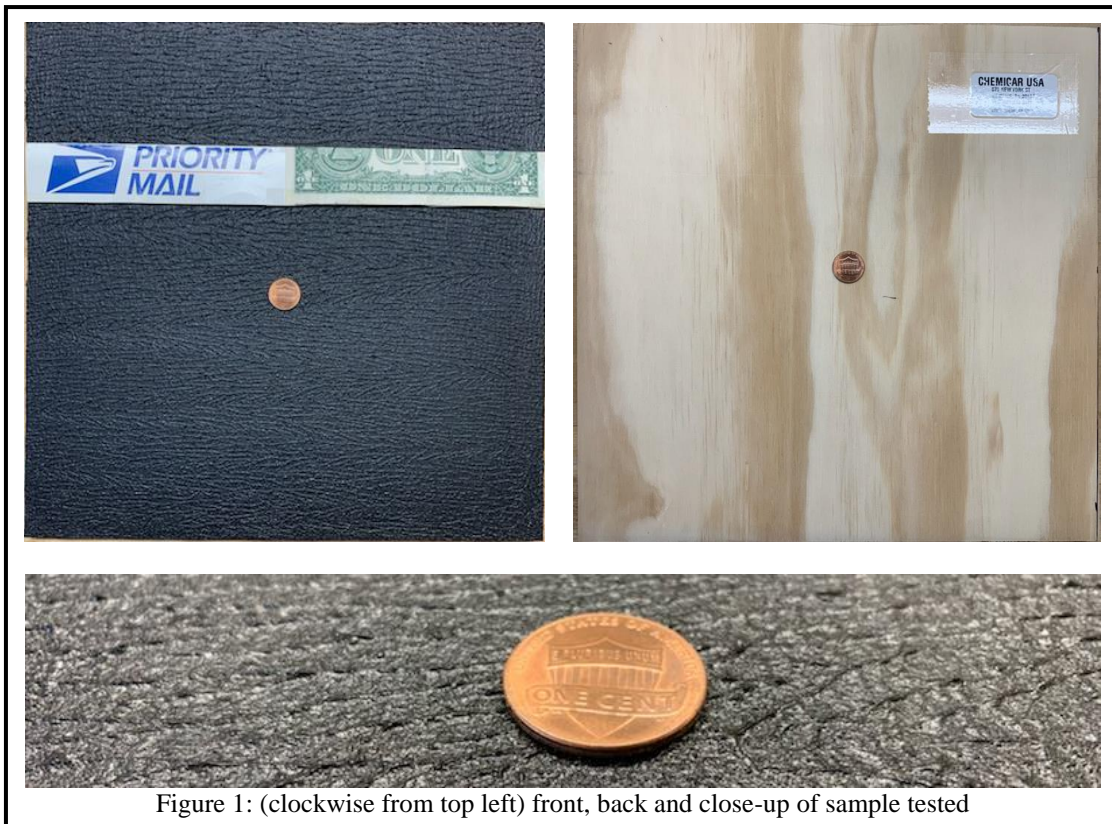
Flooring: **Tekton 64-B**

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Test no.: 2103-3121

Date tested: 3/30/2021

Figure 1 shows the sample. Red, green, blue, and white color references are included, with a U.S. penny (1/16 inch thick) for scale. The back of the sample is included to aid in positive identification.



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Flooring: **Tekton 64-B**

ANSI A137.1/A326.3 Dynamic Coefficient of Friction Test

The American National Standards Institute (ANSI) published the A137.1-2012 American National Standard test for measuring dynamic coefficient of friction (DCOF) of common hard-surface indoor level floor materials in 2012. This ANSI standard was incorporated as a requirement in “Section 2103.6 Ceramic Tile” of the 2012 International Building Code published by the International Code Council. (It was removed for the next edition in 2015.) That section states that “Ceramic tile shall be defined in, and shall conform to the requirements of, ANSI A137.1.” ANSI published A326.3 in 2017, which uses the same test method as A137.1, but allows for all hard flooring materials to be tested, adds some disclaimers, and describes the method for testing in the field.

Average Dynamic Coefficient of Friction (DCOF), cleaned with Renovator #120, and tested with BOT-3000E digital tribometer using SBR rubber slider and 0.05% SLS water solution:

Area #1 Wet: 0.61, 0.59, 0.61, 0.66; **Avg. = 0.62**

Area #2 Wet: 0.68, 0.67, 0.63, 0.61; **Avg. = 0.65**

Area #3 Wet: 0.68, 0.68, 0.68, 0.69; **Avg. = 0.68**

Overall average: Wet: 0.65

T = 72 degrees F; Relative humidity = 44%; BOT recalibration due July 2, 2021

BOT-3000E strain gauge verified on day of test.

ANSI A326.3: DCOF on validation surface (10.1.7) before/after testing and whether in range: passed/passed

High dynamic coefficient of friction values indicate potentially good traction. The ANSI A326.3 standard, Section 3.1, states that

“Unless otherwise specified, hard surface flooring materials suitable for **level interior spaces expected to be walked upon wet with water shall have a wet DCOF of 0.42 or greater** when tested using SBR sensor material and SLS solution as per this standard. However, hard surface flooring materials with a DCOF of 0.42 or greater are not necessarily suitable for all projects. The specifier shall determine materials appropriate for specific project conditions, considering by way of example, but not in limitation,

“type of use,
traffic,
expected contaminants,
expected maintenance,
expected wear, and
manufacturers’ guidelines and recommendations.

“... The presence on installed hard surface flooring materials of water, oil, grease, and/or any other elements which reduce traction, creates slippery conditions ... Applications with exposure to such elements require extra caution in product selection, use, and maintenance. ... When tested using SBR sensor material and SLS solution as per the procedure in this standard, hard surface flooring materials with a wet DCOF of less than 0.42 shall only be installed when the surface will be kept dry when walked upon and proper safety procedures will be followed when cleaning the hard surface flooring materials.”

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ANSI A326.3 further states, “The coefficient of friction (COF) measurement provided in this standard is an evaluation of hard surface flooring materials under known conditions using a standardized sensor material prepared according to a specific protocol. As such **it can provide a useful comparison of surfaces, but does not predict the likelihood a person will or will not slip on a hard surface flooring material.**”

This standard has no recommendations for outdoor floors or for ramps.

Respectfully submitted,
SOTTER ENGINEERING CORPORATION



J. George Sotter, P.E., Ph.D.
President



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Flooring Slip Resistance Test Results:
Assessment for Sustainable Slip Resistance (SSR)

Client: **Chemicar USA**

Report date: 3/31/21

Flooring: **Tekton 64-B**

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Sample no.: 2103-3122

Date tested: 3/30/21

Sample Size: 12"x12" How and when sample obtained: supplied by client on 3/30/21

Figure 1 shows the sample. Red, green, blue, and white color references are included, with a U.S. penny (1/16 inch thick) for scale. The back of the sample is included to aid in positive identification.



Figure 1: (clockwise from top left) front, back and close-up of sample tested

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AS HB198:2014 (AS/NZS 4586) Pendulum Sustainable Slip Resistance (SSR) Test

Tested before and after wet abrasion using a 3M heavy duty green pad loaded with 1000 grams (2.2 lb) of weight. This report applies to the sample tested only. The pendulum is the national standard test device for pedestrian slip resistance in at least 50 nations on five continents and has been endorsed by Ceramic Tile Institute of America since 2001. It has been in continuous use since 1970 for assessing slip resistance of pedestrian surfaces, and is the most widely accepted slip resistance test device worldwide. The trailing edge of a three-inch-wide spring-loaded slider, which is attached to the end of a 20-inch pendulum, contacts the tested surface when the pendulum is released from a horizontal position. The slider contact path length is pre-set to 124-126 mm (approximately 5 inches). The pendulum pushes a pointer that stops and stays at the high point of the pendulum's swing. For more information and video, please visit <https://safetydirectamerica.com/pendulumfloorsliptestng>. The hard Four S ("Standard Shoe Sole Simulating") rubber is generally used for pendulum testing unless the flooring area will be primarily used by barefoot people, in which case the softer TRL rubber may be used. The soft rubber is more representative of bare feet and soft shoe soles, such as is usually found on running shoes.

**Pendulum Test Value (PTV), as received, with Four S (96) hard rubber slider:
Dry: 53 Wet: 45**

**Pendulum Test Value, after 500 cycles of abrasion, with Four S rubber slider:
SSR Wet: 53**

High Pendulum Test Values indicate potentially good traction. AS HB 198: 2014 recommends a range of situation-specific minimum Pendulum Test Values as shown in the attached table below. The Ceramic Tile Institute of America (CTIOA) and United Kingdom Slip Resistance Group (UKSRG) make a more general recommendation and say that a minimum pendulum test value of 36 for level floors is considered "low slip potential". According to CTIOA and UKSRG, values of 25-35 are classed as "moderate slip potential". Values of 0-24 have "high slip potential". Slip resistance can be affected by factors such as floor coatings, abrasives, detergents, contamination, chemical treatments, and wear.

The abrasion method is used to assess the propensity of flooring to lose wet slip resistance. A typical specification for Sustainable Slip Resistance of new flooring is that the wet PTV after **500 cycles of abrasion** should be **35 or higher**.

Respectfully submitted,
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President



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			Minimum wet PTV (or BPN)	
Building or walkway type	Line no.	Location or function of area	Hard rubber slider	Soft rubber slider
External pavements and ramps	1	External ramps with slopes steeper than 1 in 14 (4.1 degrees)	55	45
	2	External ramps, slopes less than 1 in 14	45	40
	3	Level surfaces: external sales areas (e.g. markets), external car parks, external colonnades, walkways, pedestrian crossings, balconies, verandas, carports, driveways, courtyards, roof decks	45	40
	4	Car parks, undercover	35	35
Hospitals and aged care facilities	5	Bathrooms and ensuites in hospitals and aged care facilities	35	35
	6	Wards and corridors in hospital and aged care facilities	25	20
Hotels, offices, public buildings, schools, kindergartens; entries and access areas including common areas, internal elevator lobbies	7	Dry area	12	NS
	8	Hotel bathrooms, ensuites and toilets	25	20
	9	Hotel kitchens and laundries	25	20
	10	Restroom facilities in offices, bars and shopping centers	35	35
	11	Transitional areas, intended to be kept dry	25	20
	12	Wet area	35	35
Kitchens (commercial), serving areas, cold stores	13	Commercial kitchens	55	45
	14	Serving areas behind bars in bars and clubs	45	40
	15	Cold stores and freezers	45	40
Loading docks	16	Loading docks under cover	55	45
Sports stadiums	17	Undercover concourse areas	35	35
Supermarkets and shopping centers	18	Dry areas in separate shops in shopping centers	12	NS
	19	Fast food outlets, buffet food servery areas, food courts and fast food dining areas in shopping centers	35	35
	20	Fresh fruit and vegetable areas in shops and supermarkets	35	35
	21	Shop entry areas with external entrances	35	35
	22	Supermarket aisles (except fresh food areas)	12	NS
	23	Wet areas in separate shops in shopping centers	35	35
Swimming pools and sporting facilities	24	Communal changing rooms	35	35
	25	Communal shower rooms	45	40
	26	Swimming pool decks	45	40
	27	Swimming pool ramps and stairs leading to water	55	45
Stairs	28	Dry treads or landings	35	35
	29	Wet treads or landings	45	40
NS - not specified				

Table 1. Recommended minimum PTV from the June 2014 Australian standard. The minimum values in this table are both more permissive (values below 36) and more conservative (values above 36) than the CTIOA and UKSRG standards discussed on the previous page. We consider the standard summarized on this page to be the world's most sophisticated. However, the choice between the two is left to the reader.