

05 Slip Resistance

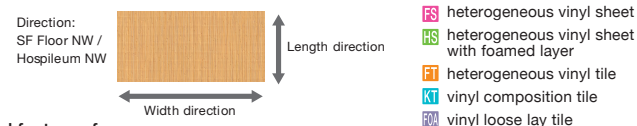
Fall accident - slipping and stambling frequently happen on the floorings where the slipperriness varies greatly compared to normal conditions when the substance (water,dust etc.) is left. Also, slip resistance can differ according to the material of the sole of footwear. The flooring which hardly occurs fall accident, in other words slip resistant flooring, is the one which is not affected by any situation for its slipperiness.

C.S.R. Value for each floor coverings*

*C.S.R.=Coefficient of Slip Resistance

Product Name	Overall Thickness (mm)	Slippery									Not slippery		Evaluation	
		C.S.R. Value	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0			
Vinyl Sheets	NW	NONWAXLEUM NW (TS7000 series)	2.0			0.43					0.79		B	
		NONWAXLEUM NW (TS5000 series)	2.0			0.42					0.74		B	
		MATURE NW	2.0			0.42					0.67		B	
		DEODORANT NS TOWARE NW	2.0				0.50				0.90		A	
		FLOORLEUM SOILUD NW	2.0			0.42					0.69		B	
		FLOORLEUM LATTICE NW	2.0			0.42					0.69		B	
		FLOORLEUM FLAKE NW	2.0			0.42					0.69		B	
		FLOORLEUM NATTY NW	2.0			0.42					0.69		B	
		Vinyl Tiles	NW	SF FLOOR NW	2.8			0.44				0.76		B
				SF FLOOR NW + UNDERLAY SHEET	7.3			0.41				0.79		B
SF FLOOR NW3.5MM (made-to-order product)	3.5					0.44					0.75		B	
HOSPILEUM NW	2.0					0.43				0.73		B		
HOSPILEUM NW + UNDERLAY SHEET	6.5					0.42				0.79		B		
FLOORLEUM PLAIN/MARBLE	2.0					0.46				0.84		B		
ANTIBACTERIAL FLOORLEUM PLAIN/MARBLE	2.0					0.42				0.81		B		
ANTIBACTERIAL FLOORLEUM PLAIN/MARBLE + UNDERLAY SHEET	6.5					0.40				0.82		B		
OPELEUM	2.0					0.45				1.02		B		
FLOORLEUM RITTI EMBOSS	2.0 (salient)						0.56			0.77		A		
Others	-	SUPER K SHEET	2.0			0.46				1.08		B		
		SUPER K SHEET EXCELLA	2.0			0.46				0.81		B		
		NS4400 AQUATREAD (NS4401 - NS4408)	2.0				0.53			0.72		A		
		NS4400 AQUATREAD (NS4411, 4412, 4421, 4422)	2.0				0.48			0.71		A		
		NEW STANLOAD	2.0			0.43				0.73		B		
		NS FLATTY	2.0				0.50			0.71		A		
		BATHNA ARTI	2.8				0.50			0.76		A*		
		BATHNA FLORE	3.5				0.48			0.77		A*		
		BATHNA REALDESIGN	4.0				0.49			0.73		A*		
		E-CLEAN PREMIUM NW	3.0			0.40				0.88		B		
Carpet Tiles	-	E-CLEAN NONS NW	3.0			0.45			0.67		A			
		E-CLEAN ECONO NW	3.0			0.43			0.91		B			
		ROYAL WOOD	3.0			0.43			0.77		B			
		MATICO V	2.0			0.43			0.70		B			
		FASOL PLUS	3.0			0.40			0.74		B			
		LL FREE 40 NW-EX	4.0			0.40			0.73		B			
		LL FREE EXCELLA (made-to-order product)	5.0			0.46			0.78		B			
		GA-100	6.5				0.56		0.83		A			
		GA-3600	6.8				0.62		0.81		A			
		GA-8900	6.0				0.53		0.63		A			
Others	-	GA-8800EM	7.0				0.65		0.81		A			
		GA-100 + UNDERLAY SHEET FOR CARPET TILES	10.5				0.59		0.80		A			
		GA-8900 + UNDERLAY SHEET FOR CARPET TILES	10.0				0.54		0.63		A			
		DC-1100	10.0				0.61		0.74		A			
		Linoleum	2.5			0.43			0.69		B			
		Coated floor (flat type)	-			0.44			1.06		B			
		Cork tile	5.0			0.44			0.65		B			
		Wood floor	12.0			0.38			0.80		B			

The specimens of these data are of unused floor coverings. Though products other than NS Sheet have good result, they cannot keep their performance depending on how they are used. They may not be able to keep their performance due to changing their form of the surface in certain situation. When slip resistance is required, slip resistant products (NS sheet) are highly recommended. *Please refer to separate data for C.S.R.B. value if you need slip resistance value by bare foot.



[Criteria for Evaluation]

Rank	Test Result(C.S.R. Value)	Recommendable Applications
A	≥ 0.45 / Wet + Dusty	Kitchens, restrooms, and so forth where water is most likely to be used.
B	≥ 0.40 / Wet + Dusty	The place where water is hardly used and people are walking in normal condition.
C	< 0.40 / Dry or Wet + Dusty	Not recommendable for hospitals and welfare facilities

Products which don't state slip resistance are ranked lower than B. *Slip resistant products: The products which have surface embossing or equivalent finish in order not to slip in wet + dusty condition.

Guidelines for Evaluating the Data;

Judge in condition of both Dry and Wet/Dusty. The bigger the number of C.S.R. value (the index of slip resistance), the less slippery. If the number between Dry and Wet + Dusty is close it can also contribute to slip resistance.

Guidelines of environmental factors of slipping and stambling;

Cause	Reason
The floor is slippery	= The number of C.S.R. value is small
The floor is slippery (easy to stambling)	= The number of C.S.R. value is big
Slipperiness of flooring changes	= Different floor covering materials are installed Water, oil or equivalent is split Sand or equivalent is left Rug & Mat or equivalent is installed
More/less slipperiness than expected	
Slipping or stambling due to misjudgment and no physical response	

*All the testing was conducted by TOLI's in-house labs unless otherwise specified. The data shows actual test results, not guaranteed values.

$$C.S.R. \text{ value (Coefficient of Slip Resistance)} = \frac{\text{Maximum tensile load(N)}}{\text{Vertical load (785N)}}$$

Test Method;

Slip Resistance Test (JISA 1454)
Attach the rubber sole to the slipping piece (56cm² bottom size) with edge angled 30degrees. Load 780N, pull upward 18degrees with 785N/sec. C.S.R value is the maximum tensile load divided by vertical load.
It is the index of evaluation for slip resistance. 785N means vertical load in assumption of walking. 785N/sec. means strength for horizontal direction in assumption of walking.



C.S.R.B. Value for each floor coverings

(C.S.R.B. Value, Sensory test by barefoot)

Product Name	Overall Thickness (mm)	Slippery									Not slippery		Evaluation	Sensory Test by Barefoot		
		C.S.R.B. Value	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2						
Vinyl Sheets	FS	FLOORLEUM PLAIN/MARBLE	2.0			0.63				0.74					-	1
		NS550 GARDENT	2.5							0.99		1.03			O	5
		BATHNA ARTI	2.8								1.07		1.13		O	5
		BATHNA FLORE	3.5								1.07		1.20		O	5
		BATHNA REALDESIGN	4.0							0.99			1.18		O	5
Others	-	Rubber flooring for bathroom	-						0.93		1.05			O	2	
		Regular flooring for prefabricated bathroom	-						0.85		1.02			O	3	
		Regular ceramictile	-									1.19	1.19	O	4	

FS heterogeneous vinyl sheet
HS heterogeneous vinyl sheet with foamed layer

C.S.R.B. Value

[Criteria for Evaluation]

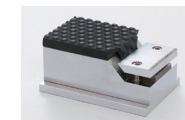
O - safe level (C.S.R.B. Value: ≥0.7, 0.3% soapy water)

Guidelines for Evaluating the Data;

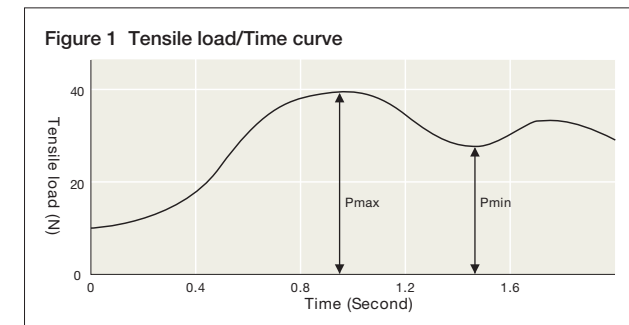
According to the test result in actual bathroom, it can be safe level when C.S.R.B. Value is more than 0.7 with 0.3% soapy water.

Test Method;

This is the assumption test to measure the slipperiness of barefoot. Use the same test machine as slip resistance test, apply an uneven rubber piece (refer to photo). Pull under the same condition as measurement of C.S.R. Value. C.S.R.B. value is the number of total of Pmax and Pmin (refer to figure 1) divided by vertical load (785N). The higher number of C.S.R.B., the better slip resistance.



$$C.S.R.B. \text{ Value} = \frac{P_{max}(N) + P_{min}(N)}{\text{vertical load (785N)}}$$



Sensory test by barefoot

[Criteria for Evaluation]

5 - Extremely safe
4 - Fairly safe
3 - safe
2 - Slightly anxious
1 - Anxious

Guidelines for Evaluating the Data;

According to the test result in actual bathroom, it can be safe when the result is better than 3.

Test Method;

Install the floor coverings on the slope (gradient of 10%), pour 0.3% soapy water. Evaluate the slipperiness by barefoot walking with a shuffle on the floor coverings. Set the criteria as "NS500 gardent = grade 5" and "Floorleum Plain = grade 1". Evaluate relatively for each floor covering by 5-grade-evaluation.