SLIP RESISTANCE
TECHNICAL INFO

Safety on floors is mandatory, requested by society and by law: specific requirements are established for areas with higher risk of slipping because of type of traffic or risk of contamination on the floor (water, oils, food, dirtiness...)

SEVASA's **CriSamar®STEP** and **LuxRaff®** non slip glass for floors, stairs and ramps are leading this market because of their high slip resistance coefficient, the wide range of finishes and designs -from transparent to translucent, the aesthetic appeal and the daylighting benefits they bring to a space.

TEST METHODS AND CERTIFICATIONS

Test Methods **ANSI A137.1-2017** (Dynamic Coefficient of Friction), **UL 410** (Slip Resistance Floor Surface Materials), and **UNE ENV 12633** (Pendulum Test, friction under wet and dry conditions), **DIN 51130** (Shoe Shod Ramp), **DIN 51097** (Barefoot Ramp), are specially designed to fit the specific requirements detailed by international safety bodies; such as the German "*Berufsgenossenschaft*" for those areas with risk of slipping.

SEVASA NON SLIP METHODS AND CERTIFICATIONS				
ANSI A137.1-2017	UL 410	DIN 51130	DIN 51097	UNE ENV 12633

ANSI A137.1-2017 (DCOF)

This test establishes the slip resistance of a surface by the dynamic coefficient of friction (DCOF). It should be used the measuring device BOT 3000, equipped with a rubber sensor, and after applying a slightly soapy solution of 0.5% detergent and water.

The norm stablishes a minimum DCOF value of >42 for wet indoor areas. It provides a useful comparison of surfaces, but does not predict the likelihood a person will or will not slip on a hard surface flooring material.

UL 410 – SLIP RESISTANCE FLOOR SURFACE MATERIALS

This method establishes the static coefficient of friction of the glass surface tested as received and tested after used (by standard method to force the surface to a heavily used condition).

SEVASA non-slip floor glass: Coefficient of friction values ranges over 0,6% and 0,8% depending on design and test. Please consult with Sevasa your project to define model.

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DIN 51130 – SHOE SHOD RAMP TEST

This method fits the specific requirements detailed by the German Social Insurance Body "*Berufsgenossenschaft*" for those areas with risk of slipping.

DIN 51130 - Shoe shod	
Degrees	**R Value**
3º to 10º	R9
10º to 19º	R10
19º to 27º	R11
27º to 35º	R12
35º +	R13

It establishes the slip resistance of a surface to shoe shod traffic, tested on a ramp with a surface lubricant. The angle of inclination permitting to be standing with security, without slipping, defines the results. The range should be between R9 and R13.

SEVASA non-slip floor glass: *(values might differ depending on design)*

LuxRaff® Regular, LuxRaff® Solid**:** R9
CriSamar®STEP_**T**-Series (transparent) + **LuxRaff® Stone**: R10
CriSamar®STEP_**S**-Series (satined): mostly R11
CriSamar®STEP_**X**-Series (extra non-slip): from R12 to R13.

(See Chart of requested slip resistance level by working rooms and areas at the end of this document).

Areas with barefoot traffic (swimming pools, bathrooms, shower rooms, beach areas…) demand different characteristics.

DIN 51097 – BAREFOOT RAMP TEST

This method fits the specific requirements detailed by the German Social Insurance Body "*Berufsgenossenschaft*" for those barefoot areas with risk of slipping.

It establishes the slip resistance of a surface under wet and barefoot conditions. A barefoot person walks on the material, at different inclined angles and saturated with soapy water. The angle that allows the person to be still standing safely, without slipping, is recorded.

DIN 51097 Barefoot .		Inclination angle
	CLASS A	≥ 12º
	CLASS B	≥ 18º
	CLASS C	≥ 24º

SEVASA non-slip floor glass: *(values might differ depending on design)*

LuxRaff® Regular, LuxRaff® Solid**:** Class A
CriSamar®STEP_**T**-Series (transparent): Class A
CriSamar®STEP_**S**-Series (satined) + **LuxRaff® Stone**: mostly Class B
CriSamar®STEP_**X**-Series (extra non-slip): mostly Class C

DIN 51097 – Slip resistance properties in barefoot areas

Area of application:
Barefoot areas in swimming baths and preliminary washing rooms at sports centres for which the statutory accident insurance agencies are responsible.

Test method:
DIN 51097. Testing of floor coverings, determination of slip resistance; barefoot exposed to wet.

Barefoot areas:

Classification groups and areas of application:

Classification group	Lower limit value	Upper limit value	Areas
A	12°	18°	Barefoot hallways (mainly dry)
			Individual and group changing rooms with lockers
			Pool floors in the non-swimmer areas, where the water level exceeds 80 cm
B	> 18°	24°	Barefoot hallways, if not classified in A
			Showers
			Area surrounding the disinfectant sprayers
			Pool surrounds
			Pool floor in the non-swimmer areas, where the water level exceeds 80 cm
			Pool floor in the non-swimmer areas in the tide effect pool
			Lift slab floors
			Paddling pools
			Steps leading into the water
			Steps, of maximum 1 m width with hand rails, leading into the water
			Steps outside of the pool area
C	> 24°		Steps leading into the water, if not classified in B
			Foot baths
			Inclined pool borders

ASTM C1028 – SLIP RESISTANCE

This used to be, for many years, the test method from the *American Society for Testing and Materials* determining the static coefficient of friction, under both wet and dry conditions over flooring surfaces. Today this test is withdrawn from ASTM since the static coefficient has been considered a not very reliable one, not based on scientific slip and fall research.

This is a General Information Chart of SEVASA's non-slip glass products. Aiming for constant improvements, SEVASA might offer different characteristics of its products. Please consult before specifying.

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DIN 51130 – Slip resistance working rooms and areas

SLIP-PROOF PROPERTIES
EDITED BY HVBG
(The German Federation of institutions for statury accident insurance and prevention)

0	**Workplaces and rooms in general ***	
0.1	Entrance areas, indoors **	R9
0.2	Entrance areas, outdoors	R11 o R10 V4
0.3	Stairs ***	R9
0.4	Outdoor stairs	R11 o R10 V4
0.5	Common areas (lavatory, locker rooms, showers)	R10
	Recreation rooms (work canteens, break rooms)	R9
	First aid rooms	R9
1	**Production of margarine, edible fats and oils**	
1.1	Melting fat	R13 V6
1.2	Edible oil refineries	R13 V4
1.3	Margarine production and packaging	R12
1.4	Edible fat production and packaging, and edible oil bottling	R12
2	**Milk production and processing, cheese production**	
2.1	Fresh milk processing and butter production	R12
2.2	Cheese production, storing and packaging	R11
2.3	Ice-cream production	R12
3	**Chocolate and confectionery production**	
3.1	Boiling sugar	R12
3.2	Cocoa production	R12
3.3	Base pastry production	R11
3.4	Chocolate bars, hollow confectionery and chocolates production	R11
4	**Bakery production (bakeries, confectioners, bakery products with long shelf-life)**	
4.1	Pastry production	R11
4.2	Fats or other liquid materials processing areas	R12
4.3	Washing rooms	R12 V4
5	**Meat butchering, transformation and processing**	
5.1	Slaughterhouse	R13 V10
5.2	Offal and entrails processing area	R13 V10
5.3	Meat cutting up and boning	R13 V8
5.4	Sausagemeat preparation	R13 V8
5.5	Cooked cold-cut meat production	R13 V8
5.6	Cured cold-cut meat production	R13 V6
5.7	Cold-cut meat curing room	R12
5.8	Store for guts	R12
5.9	Brine area, smokehouse	R12
5.10	Poultry processing	R12 V6
5.11	Meat and sliced product preparation and packaging	R12
5.12	Production rooms with outlet	R12 V8
6	**Fish processing and transformation, grillroom**	
6.1	Fish processing and transformation	R13 V10
6.2	Grillroom	R13 V6
6.3	Mayonnaise production	R13 V4
7	**Vegetable production and processing**	
7.1	Sauerkraut production	R13 V6
7.2	Canned vegetable production	R13 V6
7.3	Sterilization rooms	R11
7.4	Preparation areas for vegetables to be processed	R12 V4
8	**Wet production areas of foodstuffs and beverages**	
8.1	Ageing and fermentation cellars	R10
8.2	Beverage bottling, fruit juice production	R11

DIN 51130 – Slip resistance working rooms and areas

9	**Kitchens, dining halls**	
9.1	Catering kitchens (restaurant or hotel kitchens)	
9.1.1	Up to 100 meals a day	R11 V4
9.1.2	Over 100 meals a day	R12 V4
9.2	Kitchens in institutes, schools, kindergartens, sanatoriums	R11
9.3	Kitchens in hospitals and clinics	R12
9.4	Industrial kitchens for university and work canteens	R12 V4
9.5	Fast-food and snack-bar kitchens	R12 V4
9.6	Kitchens for defrosting and heating up meals	R10
9.7	Kitchens in companies, guesthouses and hospital units	R10
9.8	Washing-up areas	
9.8.1	Washing-up areas for facilities in points 9.1, 9.4, 9.5	R12 V4
9.8.2	Washing-up areas for facilities in point 9.2	R11
9.8.3	Washing-up areas for facilities in point 9.3	R12
9.9	Dining halls, restaurant rooms, work canteens, incl. corridors used for supply and service	R9
10	**Cold rooms, cold stores**	
10.1	For unpacked goods	R12
10.2	For packed goods	R11
11	**Points of sale, sales areas**	
11.1	Goods and meat delivery area	
11.1.1	For unpacked goods	R11
11.1.2	For packed goods	R10
11.2	Goods and fish delivery area	R11
11.3	Staff corridors for meat and cold-cut counter	
11.3.1	For unpacked goods	R11
11.3.2	For packed goods	R10
11.4	Staff corridor s for bakery and confectioner counter, unpacked goods	R10
11.5	Staff corridors for dairy produce and grill, unpacked goods	R10
11.6	Staff corridors for fish counter	
11.6.1	For unpacked goods	R12
11.6.2	For packed goods	R11
11.7	Staff corridors, except areas from point 11.3 to 11.6	R9
11.8	Meat preparation areas	
11.8.1	For meat processing, except areas mentioned in point 5	R12 V8
11.8.2	For meat transformation, except areas mentioned in point 5	R11
11.9	Areas for preparing bunches of flowers	R11
11.10	Commercial spaces with fixed ovens	
11.10.1	For bakery production	R11
11.10.2	For heating up pre-packed food (bread, confectioneries)	R10
11.11	Commercial spaces with fixed fryers or grills	R12 V4
11.12	Commercial spaces, customer rooms	R9
11.13	Areas for preparation of self-service food	R10
11.14	Cash desk and packaging areas	R9
11.15	Outdoor commercial spaces	R11 o R10 V4
12	**Public health/assistance rooms**	
12.1	Disinfection rooms (with water)	R11
12.2	Prewashing sterilization rooms	R10
12.3	Rooms for the unit waste storage	R10
12.4	In-house units	R10
12.5	Rooms for thermal baths, hydrotherapy, mud preparation	R11
12.6	Washing area before entering operating theatres, plaster rooms	R10
12.7	Sanitary facilities, bathrooms in hospital units	R10
12.8	Rooms for medical diagnosis and therapy, massage rooms	R9
12.9	Operating theatres	R9
12.10	Hospital with in-house units and corridors	R9
12.11	Surgeries, day hospital	R9
12.12	Pharmacies	R9
12.13	Laboratories	R9
12.14	Hairdressing salons	R9
13	**Laundries**	
13.1	Rooms with washlines or washers/extractors	R9
13.2	Rooms where laundry isn't spin-dried	R11
13.3	Rooms for ironing	R9

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14	**Concentrated feed production**	
14.1	Dry feed production	R11
14.2	Concentrated feed production using water and fats	R11 V4
15	**Hides and textile production**	
15.1	Tannery rooms with water delivery system	R13
15.2	Rooms with defleshing equipment	R13 V10
15.3	Rooms with waste of hide tanning	R13 V10
15.4	Areas where hides are waterproofed with grease	R12
15.5	Textile dyeing	R11
16	**Lacquering/ Spray painting units**	
16.1	Wet grinding units	R12 V10
17	**Ceramic tiles manufacturer**	
17.1	Wet grinders of ceramic raw materials	R11
17.2	Mixers; processing materials such as tar, pitch, graphite, synthetic resins	R11 V6
17.3	Pressing (moulding); processing materials such as tar, pitch, graphite, synthetic resins	R11 V6
17.4	Casting units	R12
17.5	Glazing units	R12
18	**Stone and glass processing and working**	
18.1	Stone cutting and grinding	R11
18.2	Glass shaping: blowing, glass for jars, glass for building industry	R11
18.3	Hollow glass and glass plate grinding units	R11
18.4	Insulating glass production; use of desiccants	R11 V6
18.5	Glass plate packaging and dispatching, use of release agents	R11 V6
18.6	Glass acid polishing plant	R11
19	**Cement factories**	
19.1	Cement washing areas	R11
20	**Warehouses**	
20.1	Oil and fat warehouses	R12 V6
20.2	Canned food warehouses	R10
20.3	Outdoor warehouses	R11 o R10 V4
21	**Chemical and thermal treatments for iron and metal**	
21.1	Pickling units	R12
21.2	Hardening units	R12
21.3	Laboratories	R11
22	**Metal machining and processing**	
22.1	Galvanizing units	R12
22.2	Cast iron machining	R11 V4
22.3	Machining units (for ex. turning, milling), moulding units, drawing (pipe	R11 V4
22.4	Parts washing units, steam treatment	R12
23	**Vehicle repair shops**	
23.1	Service and repair units	
23.2	Service and inspection pits	R11
23.3	Washing room and areas	R12 V4
		R11 V4
24	**Aircraft repair plants**	
24.1	Aircraft hangars	
24.2	Servicing plants	R11
24.3	Washing areas	R12
		R11 V4

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25	**Waste water treatment plants**	
25.1	Pumping rooms	
25.2	Sludge dewatering units	R11
25.3	Filtering plant units	R12
		R12
26	**Fire stations**	
26.1	Vehicle parks	
26.2	Fire hose maintenance areas	R12
		R12
27	**Banks**	
27.1	Window areas	R9
28	**Garages**	
28.1	Garages not exposed to the weather	R10
28.2	Garages exposed to the weather	R11 o R10 V4
28.3	Outdoor car parks	R11 o R10 V4
29	**Schools and kindergartens**	
29.1	Entrance areas, corridors, recreation rooms	R9
29.2	Classrooms	R9
29.3	Stairs	R9
29.4	Toilet and lavatory	R10
29.5	Kitchens for practical sessions in schools (see n°9)	R10
29.6	Kindergarten kitchens (see n°9)	R10
29.7	Wood machine areas	R10
29.8	Practical work areas	R10
29.9	Playgrounds	R11 o R10 V4
30	**Company outdoor environments**	
30.1	Pavements	R11 o R10 V4
30.2	Loading ramps	
30.2.1	Sheltered	R11 o R10 V4
30.2.2	Not sheltered	R12 V4
30.3	Sloping loading ramps (for wheelchairs for ex)	R12 V4
30.4.1	Refuelling facilities	R12
30.4.2	Sheltered refuelling facilities	R11

Edited by:

HVBG (The German Federation of institutions for statutory accident insurance and prevention)

(*) For floors in wet areas to be walked on barefoot, please refer to informative report GUV-I 8527 and test method DIN 51097.

(**) The entrance areas in nº 0.1 are directly accessible from the outside; moisture or dirt can enter or be carried in.

(***) Stairs where moisture or dirt can enter or be carried in.