FOSROC
CONSTRUCTIVE SOLUTIONS

TECHNICAL BULLETIN

Slip Resistant Flooring
using broadcast aggregates

Slip resistant flooring is critical to meet safety requirements and create an accident-free environment. Slip hazards can be attributed to a number of causes including type of surface material, degree of wear, maintenance, presence of water or other liquids, type of footwear and slope of the surface. The floor finish is therefore a key factor in achieving the required slip resistance rating.

Most floor coatings develop an inherent degree of slip resistance depending on the coarseness of the finish. For example, Polyurethane cement products naturally develop higher degrees of slip resistance compared to Epoxy based coatings.

It is important to note however, that a coarse finish does not guarantee a high slip resistance rating. In addition, low to high slip resistance is independent of whether chemical resistance is required, so you must ensure the product and slip resistance solution you choose satisfies the required slip rating.

SLIP RATINGS

There are 4 types of slip resistance ratings that may be encountered for internal or external floors. You will find products that report results for some, or in many cases all, ratings.

Testing is performed in a laboratory according to test methods detailed in AS4586: 2013 Slip resistance classification of new pedestrian surface materials. The resultant slip ratings are indicative of the coating being applied in accordance with directions in the Technical Data Sheet. Tests are performed on newly coated surfaces and therefore do not take into account wear which can affect the long-term slip resistance of some surfaces.

Below is a summary of the tests and resultant ratings.

Test name	Used for	Rating
Dry floor friction test	Slip resistance of dry surfaces, the results are not applicable for the same surface in the wet condition.	D1/D0
Wet pendulum test	Slip resistance of surfaces when wet.	P0-P5
Wet-barefoot inclining platform test	Slip resistance of surfaces intended for applications which become wet during normal use and are subject to barefoot traffic.	A/B/C
Oil-wet inclining platform test	Slip resistance of surfaces intended for industrial applications where footwear is required.	R10-R13

The dry floor friction test and wet pendulum test can be performed on-site for verification of the slip rating achieved after application and drying, Fosroc does not perform this testing, it must be completed by a contracted professional.

WHAT LEVEL OF SLIP RESISTANCE DOES A FLOOR NEED TO MEET?

For guidance and recommendations on the minimum degree of slip resistance required for common applications refer to HB 198:2014 – Guide to the specification and testing of slip resistance of pedestrian surfaces, published by Standards Australia.

The National Construction Code (NCC) also specifies ratings, but for a limited number of applications.

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USE OF AGGREGATES

In many cases, the coating alone will not provide the required slip resistance. In this case, most commonly, broadcast aggregates are used to develop the necessary degree of slip resistance and meet the required slip resistance rating. In some cases, a coating may already have the slip resistance aggregate incorporated within the product, or the aggregate may be able to be stirred in to the product.

The most common types of broadcast aggregates used in the industry are Silicon dioxide/Silica sand, Aluminium oxide, Calcined bauxite and Silicon carbide. Selection of the appropriate aggregate will depend on the type of area and industry in which the floor is in service.

As a guide:

- Silicon dioxide/Silica sand is recommended for general purpose dry applications, medium duty storage areas and loading/unloading bays, it does not have the durability of Aluminium Oxide, Calcined Bauxite or Silicon Carbide.
- Aluminium Oxide and Calcined Bauxite are recommended for heavy duty areas, including wet processing areas and cold rooms where good durability is required.
- Silicon Carbide is the most durable option and is recommended for any area where durability can not be compromised.

Check the usage instructions of the chosen aggregate, all aggregates are not compatible with all coatings and may cause application issues if not used correctly.

DOSAGE RATE

Aggregates can be applied at a range of dosage rates, from lightly broadcast - sparse, to maximum, blinding coverage. The dosage rate affects not only the slip resistance achieved, but also the appearance and cleanability of the floor.

- The more aggregate that is applied, the more difficult the surface is to clean.
- A lighter broadcast of a larger aggregate makes the floor easier to clean, but can still achieve good slip resistance.

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THE NITOFLOR® ANTI-SLIP GRAINS RANGE

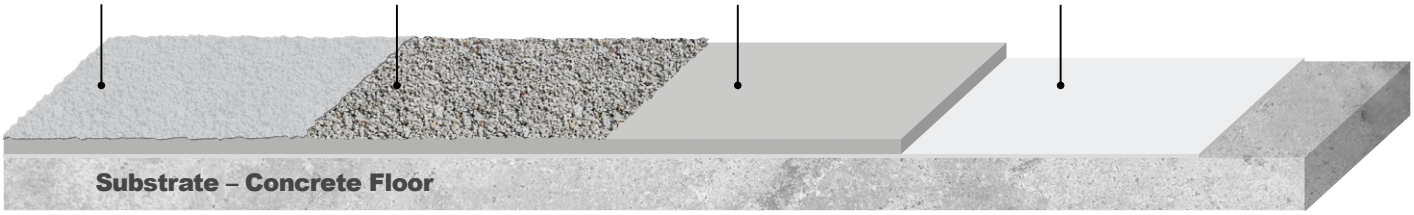
The Nitoflor Anti-Slip Grains range provides slip resistant options for epoxy roll-coats, polyurethane cement systems and tamping into wet concrete.

	Name	Technology	Nominal size	Colour	Primary use	Recommended dosage (broadcast)
	Nitoflor Anti-Slip Grains 01	Graded #16/30 silica sand	0.5 – 1.0mm	Natural sand	For use with Nitoflor epoxy roll-coats and polyurethane cement flooring systems.	Epoxy roll-coats: Light effect: 50 to 100g/m² Fully blinding: up to 500g/m² Polyurethane cement:3 to 4kg/m²
	Nitoflor Anti-Slip Grains 02 (Previously known as Nitoflor Medium Grit)	Graded #30/60 silica sand	0.25 - 0.5mm	Natural sand	For use with Nitoflor epoxy roll-coats.	Light effect: 50 to 100g/m² Fully blinding: up to 500g/m²
	Nitoflor Anti-Slip Grains 21	>70% graded #16/30 Calcined Bauxite	0.5 – 1.0mm	Buff	For use with Nitoflor polyurethane cement systems. Ideal for wet zones and floors that require hot water or steam cleaning.	2 to 3kg/m²
	Nitoflor Anti-Slip Grains 31 (Previously known as Nitoflor Anti-Slip Grains)	>92% Silicon Carbide	0.5 - 1.4mm	Silvery/ Black	For tamping into wet concrete to provide slip resistance as the concrete wears.	0.5kg/m²
	Nitoflor Anti-Slip Grains 41	>Graded HDPE granules	0.2 - 0.35mm	White	Used mixed into the flooring material during the application of thin coatings such as Nitoflor PA to make the surface slip resistant.	25g to every 1 litre of sealer (mixed in)

APPLICATION - BROADCAST

Nitoflor Anti-Slip Grains are broadcast on to the almost wet surface of the base coat then sealed with a top coat. The grains should be allowed to fall vertically on to the floor coating rather than be thrown across the surface, as this may cause ridges or scour the coating, and damage the film.

Top Coat	Broadcast aggregates	Base Coat or Topping	Primer (optional)
Cementitious Flooring: Nitoflor PU200 as a sealer coat **Epoxy flooring:** Nitoflor FC150 HP-SL, Nitoflor N	Selection of aggregate is based upon the slip resistant requirements. Select from: Nitoflor Anti-Slip Grains 01 Nitoflor Anti-Slip Grains 02 Nitoflor Anti-Slip Grains 21 Nitoflor Anti-Slip Grains 31	**Cementitious Flooring:** Nitoflor PU600 as a topping. Thickness of the application depends upon the floor performance requirements. **Epoxy flooring:** Nitoflor FC150 HP-SL, Nitoflor N	**Cementitious Flooring:** Nitoflor PU600 as a scratch coat (1.0 to 1.5mm) or Nitoflor PU200 as a primer. **Epoxy flooring:** Depending on the final floor requirements, Nitomortar 903 can be used as a primer.
Purpose: To seal the surface and to achieve a balance between slip rating requirements and cleanability.	**Purpose:** To provide slip resistance.	**Purpose:** Protection of the floor against thermal / mechanical / chemical stresses. To hold the aggregates to develop the required slip resistance.	**Purpose:** To bind the dust on the concrete substrate and to facilitate the adhesion of the base coat to the substrate.



Note - diagram is for illustrative purposes only, final texture and appearance of the floor may differ.

Tamping into wet concrete – Nitoflor Anti Slip Grains 31 are specifically designed for sprinkle on applications to suitably prepared concrete floor surfaces, either monolithically (on a new concrete slab), or with a suitable floor screed. Tamp in the grains flush with the surface using a steel trowel.

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SLIP RATINGS TABLE

Use this table as a guide to find a product and aggregate that will meet your slip resistance requirements. Results are based on application of the maximum recommended level of aggregate. All testing was completed by an independent third party. Test certificates can be requested from your Fosroc Representative.

Technology	Base Coat	Aggregate – broadcast to excess	Top Coat	Slip rating			
				Dry Floor Friction	Wet Pendulum	Wet Barefoot Ramp	Oil Wet Ramp
Polyurethane Cement	**Nitoflor PU200**	Nil	**Nil**	D1	P4	N/A	N/A
		Anti-Slip Grains 01	**Nitoflor PU200**	D1	P5	B	R11
		Anti-Slip Grains 31	**Nitoflor PU200**	D1	P4	A	R10
	Nitoflor PU600	Nil	**Nitoflor PU200**	D1	P4	N/A	N/A
		Anti-Slip Grains 01	**Nitoflor PU200**	D1	P5	C	R11
		Anti-Slip Grains 11	**Nitoflor PU200**	D1	P5	C	R12
		Anti-Slip Grains 21	**Nitoflor PU200**	D1	P5	C	R13
		Anti-Slip Grains 01	**Nitoflor PA**	D1	P5	N/A	N/A
100% Solids Epoxy	**Nitoflor FC150 HP-SL**	Nil	**Nitoflor FC150 HP-SL**	D1	P0	N/A	
		Anti-Slip Grains 01	**Nitoflor FC150 HP-SL**	D1	P5		
		Anti-Slip Grains 02	**Nitoflor FC150 HP-SL**	D1	P5		
		Anti-Slip Grains 21	**Nitoflor FC150 HP-SL** (when used as a self-leveller)	D1	P5		
		Anti-Slip Grains 01	**Nitoflor PA**	D1	P5		
		Anti-Slip Grains 02	**Nitoflor PA**	D1	P5		
Polyaspartic		Nil	**Nitoflor PA**	D1	P1	N/A	
		Anti-Slip Grains 41	**Nitoflor PA**	D1	P3	N/A	R10
Solvent Free Novolac Epoxy	**Nitoflor N**	Nil	**Nil**	D1	P1	N/A	
		Anti-Slip Grains 01	**Nitoflor N**	D1	P5		
		Anti-Slip Grains 02	**Nitoflor N**	D1	P5		
		Anti-Slip Grains 31	**Nitoflor N**	D1	P5		

Other slip ratings can be achieved by using different dosage rates of aggregate, contact your Fosroc Representative for more information.

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PRODUCT DETAILS

Description	Size	Product code
Nitoflor Anti-Slip Grains 01	20kg	FC611080-20kg
Nitoflor Anti-Slip Grains 02	20kg	FC605185-20kg
Nitoflor Anti-Slip Grains 21	20kg	FC611082-20kg
Nitoflor Anti-Slip Grains 31	20kg	FC605180-20kg
Nitoflor Anti-Slip Grains 41	500g	FC611083-0.5kg

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