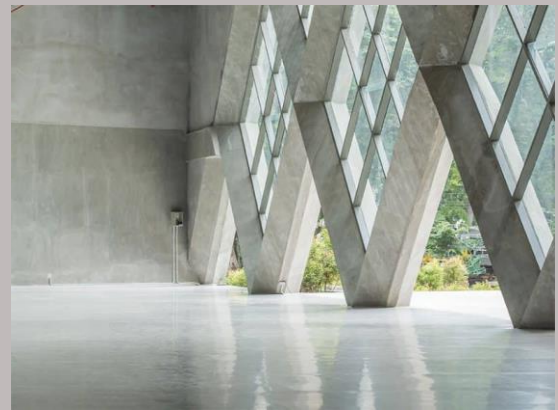




Measurable, Credible,  
Sustainable Flooring



## The Problem with Polished Concrete Floors

Frustrated Architects, Engineers and building owners currently have had no way of measuring the variation and unpredictability of the finished appearance and durability of polished concrete floors.

Specifying the process to a certain grit or gloss number can produce different results from one floor to another, so floors that looked good and met the required gloss level in the beginning often turned out to wear more quickly and require more maintenance than they should. This lack of control and predictability has impacted on the credibility of the polished concrete floor industry.

Currently gloss meters are used to measure how light is scattered. But ambient lighting, or even a high-gloss coating will distort the reading for favourable results. A gloss meter can be fooled and do not reveal the true condition of the polished concrete surface or expected life of the floor.

## The Solution

Internationally the concrete floor polishing industry has been searching for a better way to evaluate the refinement of polished concrete to reassure Architects, Engineers and building owners that they are getting the floor they expect.

The American Concrete Sawing & Drilling Association (CSDA) along with ASME, ASTM and ACI, developed specifications titled “Measuring Concrete Micro Surface Texture.” The ST-115 standard details methods and sets parameters for measuring the microscopic average roughness (RA) of a concrete surface using a RA Meter.



*The Ra Meter measures both Metric and Imperial. The probe on the underside physically measures the texture of the surface to 0.00001mm. 1 micron= 0.001mm.*

The RA measure is key to achieving the desired appearance, performance, and sustainability of the finished polished floor. The surface texture is measured by running a Ra meter over the surface. The reading of the variations measured in microns can be expressed as a surface texture grade. These grades are not ratings of “good” or “bad”: they are objective, measurable levels that determine the level of refinement as heavy texture,” “ground,” “honed” and “polished.”

SURFACE TEXTURE FINISHES CHART			
(STG) Surface Texture Grade	Unit of Measure = Ra		Surface Grade
	µin	µm	
A-1	2	0.0508	Finish by Design Spec.
A-2	4	0.1016	Finish by Design Spec.
A-3	8	0.2032	High Polish
B-1	16	0.4064	Medium Polish
B-2	32	0.8128	Low Polish
B-3	64	1.6256	Honed Smooth
C-1	125	3.175	Honed
C-2	250	6.35	Ground
C-3	500	12.7	Heavy Texture

Surface Text texture Finishes Chart.		
Surface Texture Grade	Micro Meter	Surface Grade
A-3	0.2032 to 0.4063	High Polish
B-1	0.4064 to 0.8127	Medium Polish
B-2	0.8128 to 1.6255	Low Polish
B-3	1.6256 to 3.174	Honed Smooth
C-1	3.175 to 6.349	Honed

## The Benefits

The ST-115 standard allows the Architects, Engineers and building owners to specify a level of finish by specifying the desired Ra range that the contractor must reach. Grit or a gloss number is no longer relevant. If the required specification is based on ST-115 there is no way around it, the finished floor must be within the specified range. This means regardless of who is doing the polishing or the condition of the concrete surface, the same floor finish is achieved every time.

The Ra readings reflect two important aspects of the surface being created. The first is the effectiveness of the tooling to refine the surface. The second is the ability to fill all micro cracks and pinholes so an impervious surface is achieved when required.

## Important aspects of the finished floor to be considered when selecting the right surface.

**Areas where Hygiene is important such as medical facilities, Restaurants, multi storey buildings and family homes**, an impervious surface where bacteria cannot form, and breed is very important or water transferring through a floor effecting the space below.

Recommended product to fill the open surface: <https://decocrete.eu/product-list/decopinfix/>

Chemically hardened concrete contains a large amount of Calcium Hydroxide (Ca(OH)<sub>2</sub>) . This is a soft salt, which dissolves in water and slowly migrates out of the concrete, causing dusting and efflorescence. Polished concrete systems convert this calcium hydroxide by various types of colloidal silica into a hard cement stone (CSH), which fills the pores, making the concrete denser, harder, and more durable.

Recommended product to densify/harden the surface: <https://decocrete.eu/product-list/decosil/>

Once impervious, the surface will be more accurate with the RA readings as there will be much less influence of micro cracks and pinholes. Readings shall be taken of the polished concrete surface (Without Sealer) every 50m<sup>2</sup> to confirm the specified finish. If the project is less than 50m<sup>2</sup> total then, one texture reading shall be taken for every 10m<sup>2</sup>.

Recommended for high protection: <https://decocrete.eu/product-list/decostainstop/>



Once the selected Sealer has been applied readings with a slip meter shall be taken to confirm the finish floor surface is slip resistant when wet. This is defined as having a surface that gets a Co-efficient of Friction (CoF) reading greater than 0.4 or a Slip resistant value (SRV) of 39 or greater.

**For a Commercial/Warehouse Floor**, it will not be so important to achieve an impervious surface as the Hygiene aspect is not so important, but it is important to chemically hardening concrete and converting the calcium hydroxide into a hard cement stone (CSH), which fills the pores, making the concrete denser, harder, and more durable.

Recommended product to densify/harden the surface: <https://decocrete.eu/product-list/decosil/>  
This surface will impact on the accuracy of the RA readings as the micro cracks and pinholes will alter the texture of the surface and be read by the RA meter, increasing the Roughness Average. Care needs to be taken to read areas with minimal impact from microcracks and pinholes as the level of surface refinement from the tooling is what needs to be measured. Readings shall be taken of the polished concrete surface (without sealer) every 50m<sup>2</sup> to confirm the specified finish. If the project is less than 50m<sup>2</sup> total then, one texture reading shall be taken for every 10m<sup>2</sup>.

Recommended for Commercial/outdoor use: <https://decocrete.eu/product-list/decostainstop/>



Once the selected Sealer has been applied readings with a slip meter shall be taken to confirm the finish floor surface is slip resistant when wet. This is defined as having a surface that gets a Co-efficient of Friction (CoF) reading greater than 0.4 or a Slip resistant value (SRV) of 39 or greater.

## **Considerations of the Sealer/ Stain-Guard used to protect the finished surface.**

Solvent based Stain guards offer maximum stain protection of the concrete surface and are fully penetrating. The disadvantage is the high levels of VOCs.

Water based Sealers offer very good stain protection and allow the concrete to breathe. They generally do not offer the same level of Stain resistance as the Solvent based products. Water based products can be mainly penetrating/slightly topical, or more topical, depending on the design specifications of the manufacturer. This will affect the surface texture and slip resistance of the finished surface.

Recommended for high protection: <https://decocrete.eu/product-list/decostainstop/>

Please note: The first coat of a penetrating sealer smoothens the texture of the polished surface by 3-4%, this also reduces the slip resistance of the surface by 3-4%. A second coat can smoothens the texture of the polished surface by 50-60%, this also reduce the slip resistance by up to 50-60% making the slip resistance more dependent on the sealer. For a more topical Sealer, the slip resistance reduces by up to 50-60% making the slip resistance more dependent on the sealer, with only 1 coat.

While the sealer is a sacrificial coat to preserve the finished concrete surface, if a low polished finish is reliant on a topical sealer to achieve the desired high finish, the surface will breakdown much faster as the topical sealer will not withstand the wear and tear as concrete will. It is better to maximise the refinement of the concrete when appropriate and minimise the thickness of the sealer.

### **The relationship of Natural polished Gloss and Slippage.**

There is a trade-off of natural gloss from the polishing of the surface and slippage that needs to be considered. The higher the natural gloss the higher the slippage risk.

For public areas and residential floors where wet surfaces are likely and minimal slippage risk is preferred the B-2 range needs to be prioritised over a surface with high refinement. This surface texture offers good slip resistance when wet and a good level of polish.

For warehouses where the surface needs to maximise the safe operations of a Forklift, a B-3 range would be the range best suited in achieving an acceptable level of refinement and slip resistance.

Surface Text texture Finishes Chart.		
Surface Texture Grade	Micro Meter	Surface Grade
A-3	0.2032 to 0.4063	High Polish
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### **The filling of Expansion cuts should be done with a product that has the following properties:**

- Good level of adhesion to the faces of the expansion cuts.
- Elasticity to move with the expansion/contraction of the concrete slab.
- Able to withstand the impact of foot traffic and machinery.

Note: Expansion joints should not be filled before 28 days after placing to allow curing time for the concrete slab.

### **Managing the placing of a new Concrete Slab.**

When possible, there are aspect of a concrete surface that should be achieved to maximise the best polished result and minimise the time and cost to achieve it.

- Establish with the customer their expectation of the exposure of the surface. If the preferred surface is a cream finish, then a tight/ well power floated surface should be

achieved. If the surface is salt/pepper or full exposure, the pour needs to be placed with minimal aeration and be placed level/flat.

- Minimising additives in the concrete is preferred as some additives can affect the finish of the polished floor. UV stable additives only.
- Minimal shrinkage to minimise cracking.
- Maximum large aggregate for fully exposed finish.
- No more than 100mm slump.
- No inclusion of Steel or Fibreglass fibres.

## **Existing Concrete Slabs.**

For existing concrete slabs, any existing damage / imperfections need to be addressed and agreed to by the contractor and customer as to what realistically is achievable to mitigate the damage/imperfection before the contractor starts the job.

## **Exposure Specification Table Level Type of Exposure**

**Paste Region:** Surface finishing to reside in the upper region of the concrete. Removal of latency and machine/finishing trowel marks only.

**Sand Finish:** Aggregate fines and sands located in the upper region of the concrete. This finish has a good ratio of paste/sand typically 50/50 mix.

**Moderate Aggregate:** Exposure of all the fine aggregates including medium pea size aggregate. Limit depth of cut not to expose aggregate larger than half the aggregate size.

**Coarse Aggregate:** Majority of exposed aggregates located at the surface being full size.

## **Roughness Average Meters Accuracy**

Depending on the model and brand of the RA meter, the inaccuracy can be between 10-15%.

Therefore, when establishing the texture of a surface it must be considered as a range of readings not a specific number.

The nature of concrete is an imperfect and inconsistent material. When measuring its texture with a highly sensitive RA Meter, allowance for the variations that will result and the effect in the readings must be considered. 10% variation is suggested.

**Instrument Accuracy** – The Ra meter reading shall not deviate by more than  $\pm 5\%$  from the true Ra value of the sample texture to calibrate the meter.

## **Maintenance of the Polished surface.**

The sustainability of finished concrete floors require maintenance. If maintained properly, it will result in lower maintenance costs than other floor finishes.

Polished concrete systems convert calcium hydroxide by various types of colloidal silica into a hard cement stone (CSH), which fills the pores, making the concrete denser, harder and more durable. Therefore, a cleaning agent, specific for polished concrete maintenance must contain colloidal silica (reactive nano silica) which is responsible for this conversion.

Concrete is a very hard material, but not acid resistant. The best cleaning agent is neutral to low alkaline.

Recommended: <https://decocrete.eu/product-list/decoclean/>