Drafting an Understanding of Densified & Polished Concrete

Course Number ICC03E (On Demand)

Provider: CureCrete / Ashford Formula / RetroPlate System
An AIA Continuing Education Program
Credit for this course is 1 AIA CE LU/HSW

Course Description

This course will provide an understanding of the benefits and limitations of chemically densified and mechanically refined polished concrete. You will learn how to recognize how specifications influence the final outcome. We will conclude by discussing environments and industries conducive to densified and polished concrete.

Learning Objectives

Upon completion of this course, the design professional will be able to:

1. Explain the densifying and polishing process and differentiate it from traditional floor coatings
2. Differentiate polishing/grinding techniques and their sustainable factors
3. Identify the sustainable attributes of concrete in terms of materials, indoor air quality, and energy savings and how this can contribute to earning LEED certification
4. Explain the role of densified and polished concrete in passive solar design
5. Identify the benefits of densified and polished concrete floors in terms of design flexibility, maintenance, energy savings, and occupant health

What is Concrete?

What Are the Considerations When Specifying Concrete?

EXTERIOR

INTERIOR - SCHOOLS

INTERIOR - RETAIL

INTERIOR - RESIDENTIAL

INDUSTRIAL

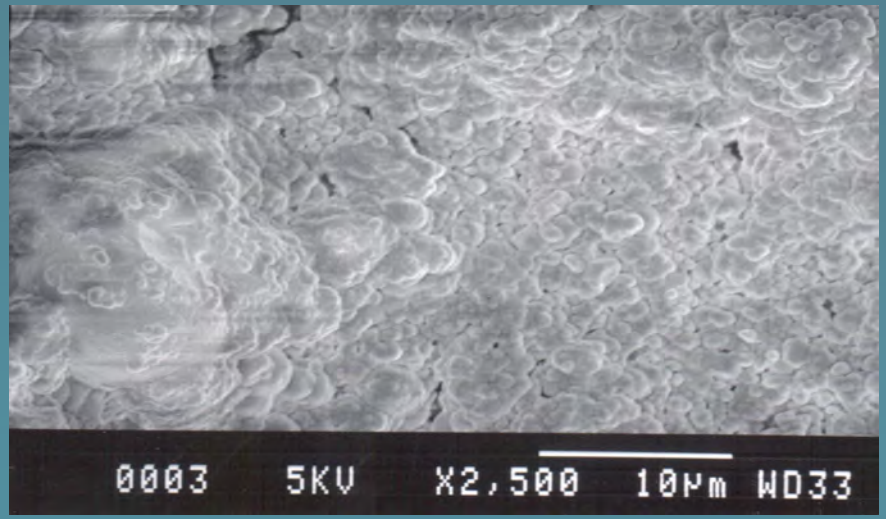
What Are the Considerations When Specifying Concrete?

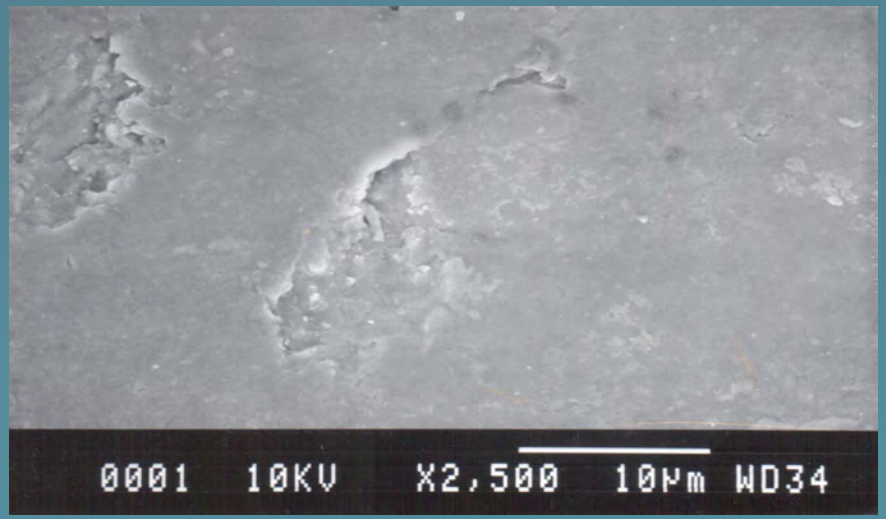
STEEL TROWELED

DENSIFIED & BURNISHED

DENSIFIED & POLISHED

The Shortfalls of Concrete Hydration and the Need for Chemical Densifiers



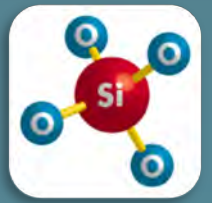


Creating Calcium Silicate Hydrate
with the addition of a silicate densifier

Silicates vs. Siliconates

Silicates

- Completely inorganic chemistry
- Form 3-dimiensional crystals



Simplified silicate molecule

Siliconates

- Partially organic chemistry. The carbon site, being organic, is not reactive
- Siliconates may be slightly more resistant to water penetration in the early months, but not over the long term

Simplified siliconate molecule

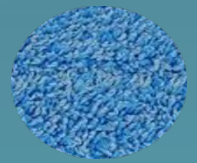
Comparison of silicates vs colloidal silica

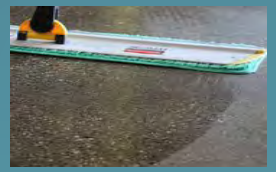
Main characteristics of densification with a silicate-based densifier

- Increases the strength of the concrete and minimizes/eliminates dusting concerns
- Is worked into the pores with an aggressive brushing action
- Creates a crystallization that increases repellency

Main characteristics of this process are:

- Attaches itself to the concrete through a chemical bond, not through a chemical reaction.
- Is applied topically with a microfiber pad
- It does not create a crystallization growth





What Exactly is Densified Concrete?

Why do you Specify Densified Concrete?

Densified Concrete in Use

Airline Hangars

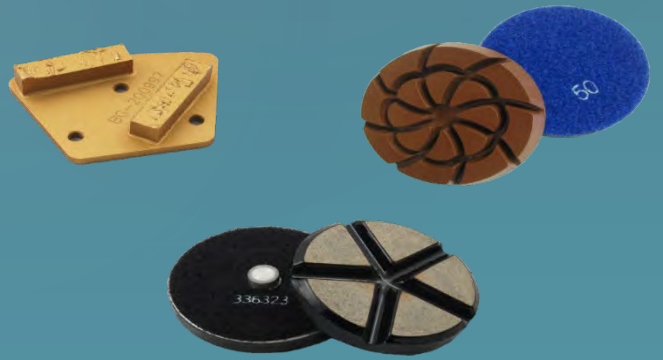
Convention Centers

Densified Concrete in Use

Alberto Culver

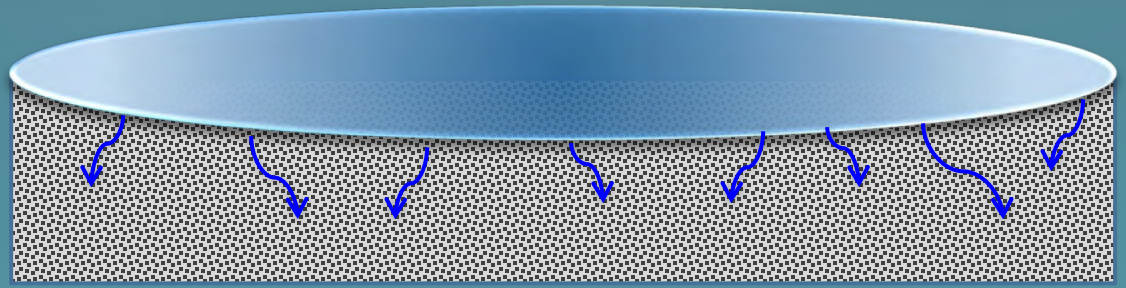
IKEA

How to Produce Densified & Polished Concrete



How Densified & Polished Concrete Works

Through capillary action the densifier is drawn into the concrete's surface to interact with the un-reacted Calcium Hydroxide, mimicking the original curing process



Benefits of Polished Concrete

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Increased reflectivity 30%
and beyond

Increased impact resistance up
to 21%*

Meets ANSI standards for
non-slipperiness*

Has been shown to increase abrasion
resistance of up to 400%*

* These figures are the results of 3rd party independent testing of a specific modified sodium silicate. Request independent testing from a manufacturer prior to writing your performance based specifications for concrete polishing.

Standardization for Polished Concrete

Cream, Natural

Medium Aggregate, Integral

Salt & Pepper, Dyed

Large Aggregate, Natural

What Are Your Color Options with Polished Concrete?

INTEGRAL

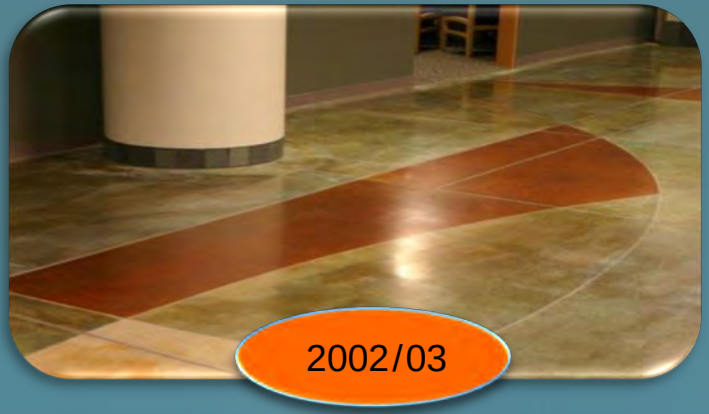
DRY SHAKE

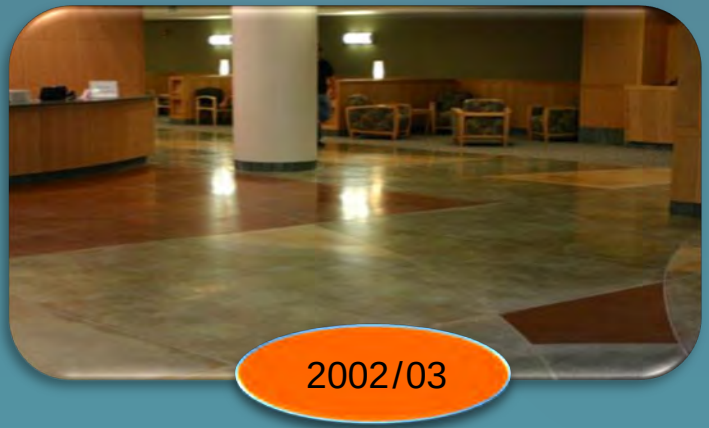
DYES

ACID STAIN

ACID STAIN

St. Peter's Hospital





Todd Beamer High School

DYES

CEMENTITIOUS TERRAZZO
& INTEGRAL COLOR

BROADCAST AGGREGATE or GLASS & INTEGRAL COLOR

OPTIONS: Stencils & Engraving

OPTIONS: Radiant Heat

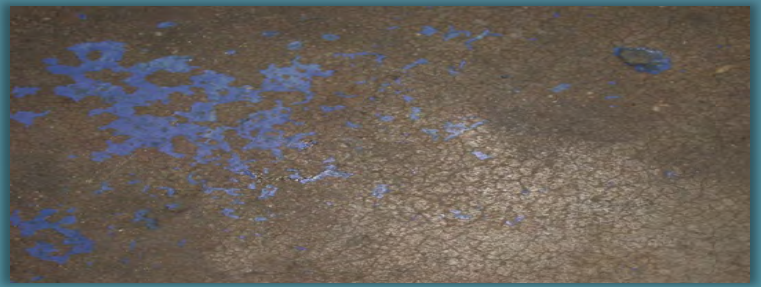
Limitations of Densified & Polished Concrete

Acid resistance

Not elastomeric

Will not hide variations in the concrete color

Limitations of Coatings/Coverings



Problems From Poor Finishing / Protection

Writing Proper Specifications

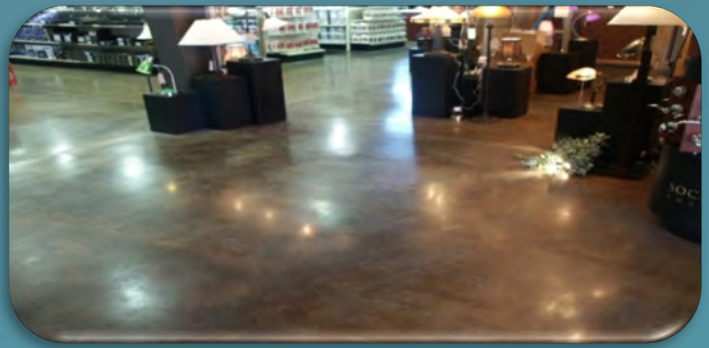
- Use CSI Master Format for well written specifications
  - 03 35 00 Concrete Finishing *(Densification Only)*
  - 03 35 43 Polished Concrete Finishing
  - 03 35 43.13 Polished and Dyed Concrete Finishing
  - 03 35 43.16 Polished and Stained Concrete Finishing
  - 09 61 19 Concrete Floor Staining *(For Densified Only)*

Where Polished Concrete Can Be Specified

- Restaurants
- Hospitals
- Condos
- Schools
- Convention Centers
- Industrial

Where Polished Concrete Can Be Specified

- Automotive
- Green Building
- Warehouses
- Big Box / Retail
- Commercial
- Logos



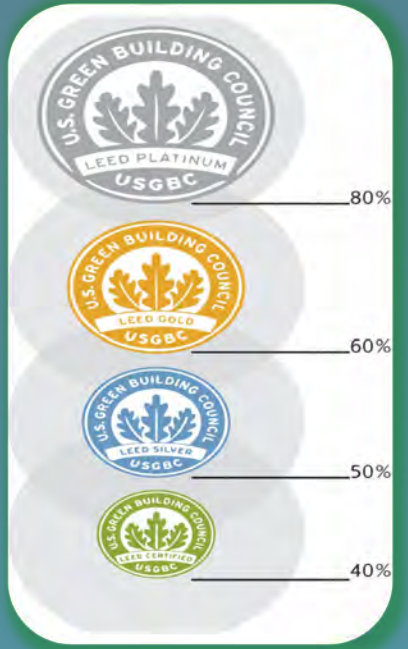
Sustainability and LEED®

Completed Project

Initial Rendering

LEED as the Yardstick

Leadership in Energy & Environmental Design



Sustainability Benefits

- Energy cost savings
- Reduce life-cycle impacts
- No off-gassing
- Improved thermal comfort
- Increased daylighting

Take the (LEED) Credit!

EA prerequisite Minimum Energy Performance (required)
EA credit Optimize Energy Performance (potential - 18 points)

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MR credit Building Life-Cycle Impact Reduction (potential - 5 points)

Take the (LEED) Credit!

EA prerequisite Minimum Energy Performance (required)
EA credit Optimize Energy Performance (potential - 18 points)
MR credit Building Life-Cycle Impact Reduction (potential - 5 points)

EQ credit Low-Emitting Materials (potential - 3 points)

Take the (LEED) Credit!

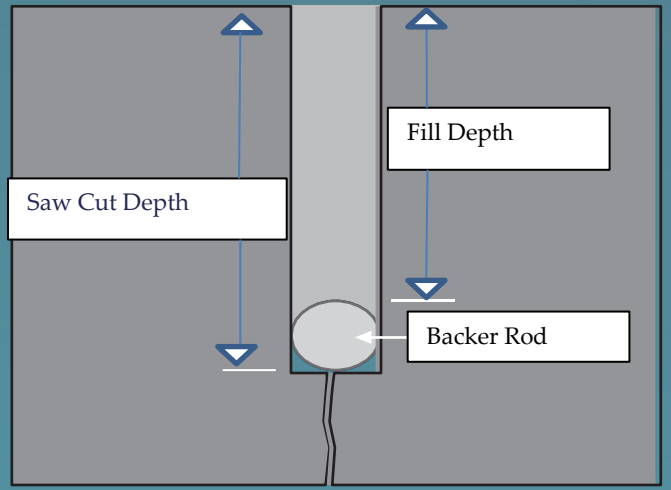
EQ credit Thermal Comfort (potential - 1 point)

Take the (LEED) Credit!

EQ credit Daylight (potential - 3 points)

Joints: The Effect On Your Finished Floor Performance and Appearance

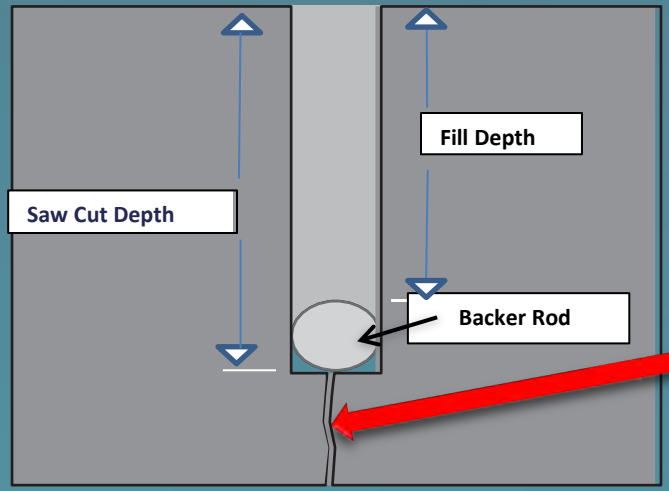
Saw Cut / Contraction Joints



Typical Saw cut depths per slab thickness

Saw Cut Depth	Slab Thickness
1 inch, (25mm)	4 inch, (100mm)
1 ½ inch, (38mm)	6 inch, (150mm)
2 inch, (50mm)	8 inch, (200mm)

Joints: The Effect On Your Finished Floor Performance and Appearance



Joints: The Effect On Your Finished Floor Performance and Appearance


1


2


3

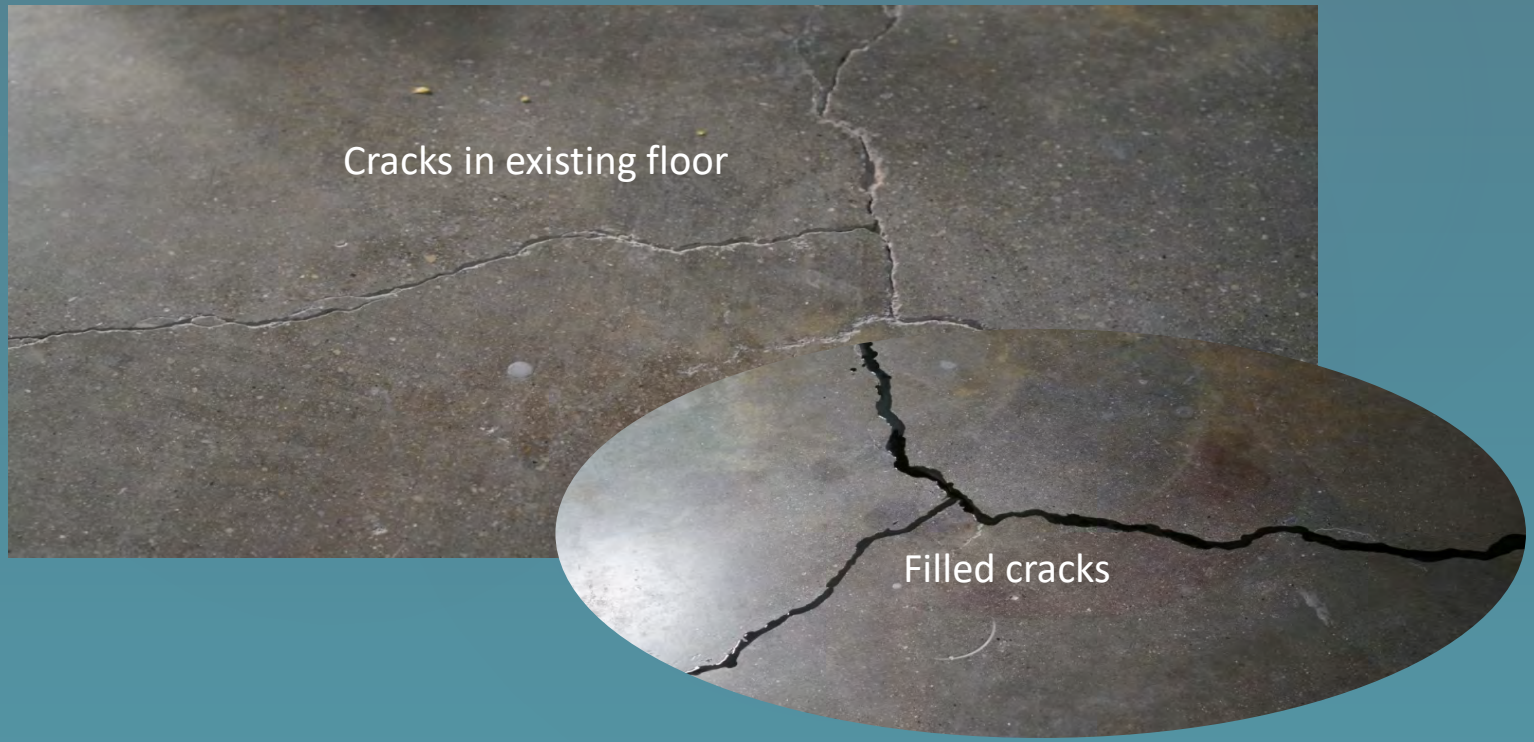

4

Joints: The Effect On Your Finished Floor Performance and Appearance

Standard Gray

Un-Tinted

Cracks: They Do Not Have To Affect Your Finished Floor Performance and Appearance



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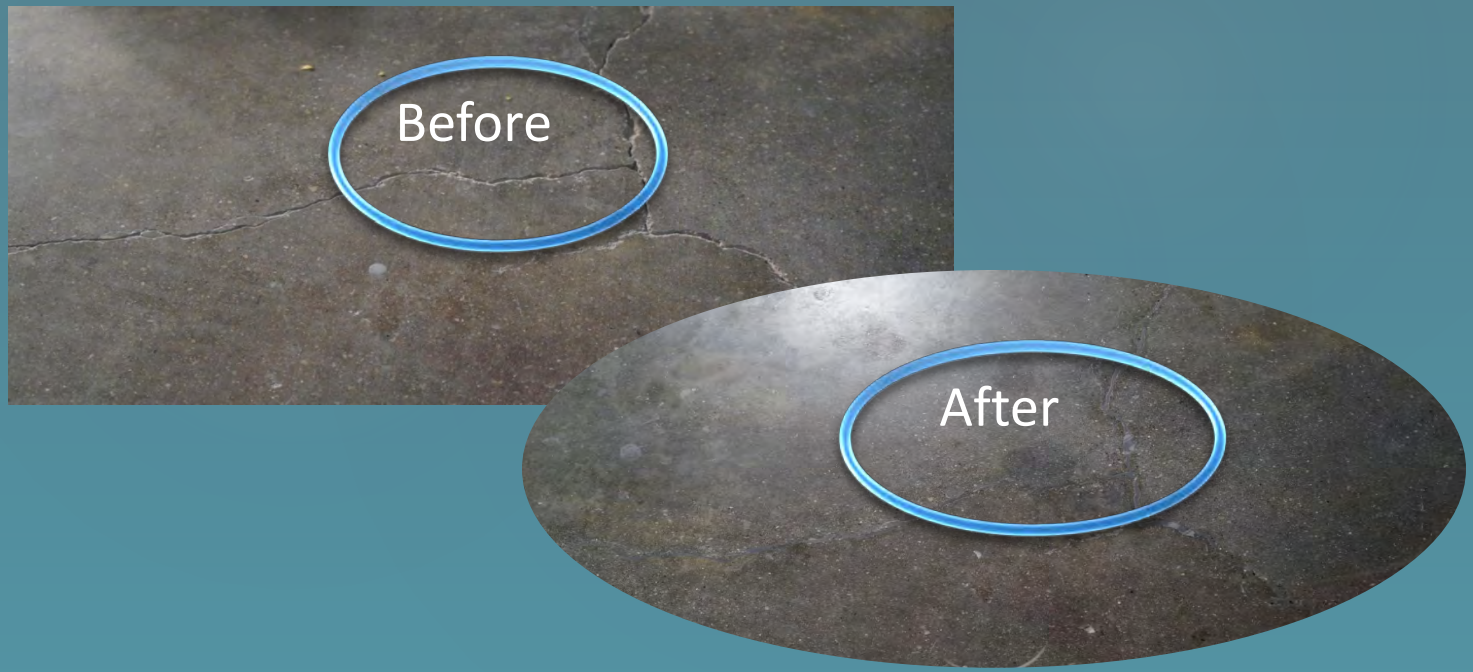

Create An Understanding of Maintenance

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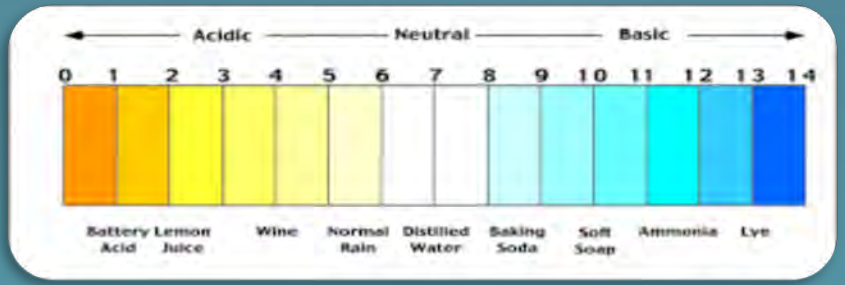
When maintained correctly, polished concrete floors have been shown to be one of the safest hard surface floors in regards to safety. Rated “Acceptable” per ANSI B-101.3.

Proper Maintenance Specifications

It is in your best interest to recommend a cleaner that has been specifically formulated for Densified and Polished Concrete.

You want the cleaner to be relatively similar in pH to the concrete floor surface. Most cleaners specifically formulated for these floors have an "in solution" pH of 9.5 - 9.9. Not a pH of 7.



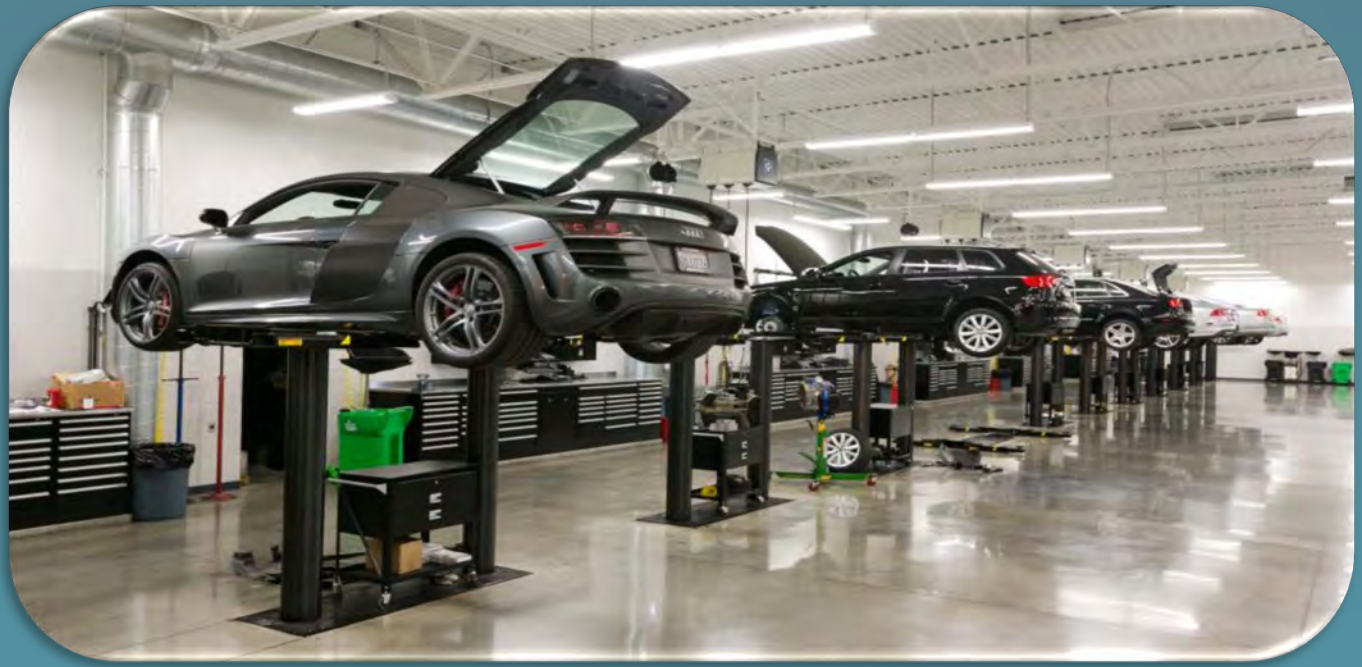
Cost Per Square Foot of Floor Coverings and Finishes based on 10 Year Life Cycle

Product	Installed Cost	Annual Maintenance Cost	Expected Life	Ten-Year Life-Cycle Cost
Acrylic Coating	$0.25	$0.50	6-12 mos	$7.50 (min)
Epoxy Coating	$1.50-$5	$1.50	1-5 yrs	$16.50 - $20
Urethane Coating	$0.75-$2	$1.50	2-9 yrs	$15.75 -$17
Sheet Vinyl	$3-$5	$1.50	9 yrs	$18 - $25
VCT	$1.50-$4	$1.50	10+ yrs	$16.50 - $19
Carpet	$2.50	$1.50	5-10 yrs	$17.50 - $20
Ceramic Tile	$7-$8	$1.50	10+ yrs	$22 -$23
Cement Terrazzo	$12	$.70	10+ yrs	$19
Epoxy Terrazzo	$13	$.50	10+ yrs	$18
Polished	$2-$4	$.25	10+ yrs	$4.50 - $6.50
Polished w/ Color	$2.50-$6	$.25	10+ yrs	$5 - $8.50
Densified, Only	$.15-.40	$.25	20+ yrs	$2.65–$2.90

Sources: Environmental Building News, National Terrazzo and Mosaic Association, and other independent sources. These figures are based on averages and do not take into account the cost of downtime and loss profits during product replacement. 2012

Kimbell Art Museum

Pacific Audi, Torrance, CA



Bennett High School, Salisbury, MD

California Academy of Sciences

Bass Pro Shop

Express Headquarters, Columbus, OH

Autodesk Offices

Child Development Centre

JCPenney, New York City

Solar Panel Fabrication

Mercadona – Home Improvement, Spain

Grocery Store, Mexico

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