

THE CONCRETE FLOOR REPORT

NEWS FOR EVERYONE WHO DESIGNS, BUILDS, MAINTAINS, OR OWNS CONCRETE FLOORS

A Publication of The MJA Company, Serving New York Since 1988

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SPECIAL REPORT

Cold Weather Concreting: The Unseen Dangers



It seems that it is always too hot or too cold to place concrete, but we always do.

In the winter months, we have to plan for more than just the cold weather. Low temperatures can harm concrete in the early stages of hydration, but attempts to raise the temperature of the environment is often a disaster. The number one unseen danger is carbonation. Concrete can become carbonated at any time, but is most vulnerable when being placed.

How carbonation happens:

The process of carbonation is quite simple, and can be very costly. Heaters that burn fossil fuel produce flue gasses that contain carbon dioxide (CO₂). Carbon dioxide is heavier than air. Therefore, it can settle into the bleed water of the concrete. When that happens, the carbon dioxide gas actually dissolves in the concrete's bleed water and forms carbonic acid.

Freshly placed concrete goes through two rather quick, and opposite phases.

1. The first phase is *hydrophobic*, when the concrete bleeds water to the surface.
2. The next phase is *hydrophilic*, when the concrete absorbs the bleed water back into the concrete. **If carbonic acid is present in the bleed water, it will chemically react with calcium hydroxide in the cement paste and form a compound called calcium carbonate.**

"Often, carbonated concrete surfaces are non-serviceable unless properly treated."

Calcium carbonate is a very soft, white powder. When it is found at the surface of concrete, the concrete is said to be "dusting." The carbonated surface of the concrete is soft and has low abrasion resistance. Often, such a concrete surface is non-serviceable.

The calcium carbonate powder can be washed away from a carbonated concrete surface, but will return in a few days. That's because the water used to wash the powder away is absorbed into the concrete. As the water evaporates, it pulls more of the powder to the surface and the cycle begins again.

If the damage is not too great, the problem can be solved by applying a chemical hardener having a silicate or silicate base. The chemical hardener will chemically react with the calcium carbonate to form calcium silicate hydrate, which is the same compound that is formed when portland cement hardens (hydrates). Depending of the level of damage, the concrete may require several applications of chemical hardener.

This rule could save your slab:

The temperature of concrete has a direct effect on the set and strength gain of concrete. The optimum curing temperature for concrete is 70°F. It would seem that we are always placing concrete at temperatures very much higher or lower. A good rule of thumb for determining the work time of concrete is the *20° Half & Double Rule*.

Twenty Degrees Half and Double Rule:

Most concretes will take twice as long to set at 50°F as at 70°F, and at 90°F will take half as long as at 70°F. This rule is very useful tool in determining timing for placing and finishing of concrete.

As the temperature drops, the rate of strength gain also drops. As the temperature approaches 50°F, the rate of strength gain slows greatly. As the temperature approaches 40°F, the rate of strength gain is extremely slow, and at 32°F, it stops.

At about 28°F the water in the pores of the concrete starts to freeze. Early freeze thaw protection is a must in cold weather. Once proper air-entrained concrete reaches 500 psi compressive strength, it can withstand one freeze thaw cycle without damage. But play it safe: it is often difficult to determine when concrete has reached 500 psi.

Play it safe:

It is best to play it safe even after the concrete has matured and been put into service. It is best to not apply deicing salt to the concrete until the concrete is one year old. Some DOT's are following this practice. The concrete must be allowed to mature. This is especially true of concrete placed in the late fall.

To learn more about cold-weather concrete, get a copy of ACI 306, Cold Weather Concreting at <https://tinyurl.com/coldconcrete>



GUEST AUTHOR:

Is a high gloss floor “slippery?”

Brent Johnson: B.S. Ed, Walkway Auditor Certificate Holder (WACH), Certified XL Tribometry, Certified Forensic Consultant (CFC)

Building on the Spring, 2017 issue of “The Concrete Floor Report” that discusses the natural slip resistance of diamond polished concrete, let’s look at the different ways to document the slip resistance of your properly installed polished concrete floor.

Everyone involved in a construction project should be concerned about the slip resistance of the floor. Like many forms of flooring that is high gloss, when people look at polished concrete it is often assumed to be “slippery”.

What exactly do we mean when we say a floor is “slippery?”

Is it one of those things where, “you’ll know it when you see it”? Not really. In fact what you may conclude when you look at a high gloss floor, could be wrong! There is an objective way to determine how “slippery” a floor is by measuring the coefficient of friction (COF). The coefficient of friction is a quantitative means of determining traction levels. An onsite Walkway Safety Audit can be used to satisfy the concerns that a floor may be slippery. This is not based on the concrete’s appearance, but rather on objective test data.

Why is this important you ask? Obviously, you want to provide your customer with a floor that is functional, low maintenance, long lasting, and looks great. It is just as important that you document the coefficient of friction of your completed project to protect yourself and your customer in the case of a slip and fall incident.

Winning in Court

As an example, there was a slip and fall case where the polished concrete installer had performed coefficient of friction tests and documented that the polished concrete walkways were in compliance with the ANSI B101 national standards. Unfortunately someone did slip and fall on a wet floor in this particular store and brought suit against the owners.

When it was brought out at the trial that the COF readings performed after installation and subsequent readings two years later were both in the “High Traction” range, the defense prevailed 11-1.

The defense triumphed in this case because they could demonstrate with objective evidence that the floor was “High Traction” when installed and continued to be “High Traction” two years later because it was properly maintained. Documenting the floor coefficient of friction, proper maintenance, and use of the proper standard were the keys to protecting all involved from what might have been a large judgment.

Mandatory Testing

Many construction specifications are now requiring coefficient of friction tests to be performed by qualified personnel before acceptance. Unfortunately, some architects do not specify which tests are required, or they specify inappropriate or outdated standards. What are the current standards for installed walkways and who should be performing these tests?

There is only one nationally recognized standard for coefficient of friction testing valid for use on an installed polished concrete floor; the ANSI/NFSI B101.3-2012.

Unfortunately, in recent years there has been some confusion in the industry as to which standard to use. Some of this confusion comes from the fact that the Tile Council of North America has begun touting their ceramic tile manufacturer’s standard, the A137.1, as a standard to be used for polished concrete. This standard specifically states that it is not a safety standard and is solely

“The negative results of using the wrong standard for testing has been demonstrated in several recent court cases.”

intended as a quality control standard for uninstalled ceramic tile. This is hardly a standard you would want to use to defend the performance of your polished concrete floor. The negative results of using the wrong standard for testing has been demonstrated in several recent court cases. The B101.3 standard is more rigorous and is the appropriate testing standard for polished concrete and other installed hard surface walkways.

ANSI Certified Walkway Audits

Floor owners and tenants should utilize walkway auditors trained to follow the guidelines of the ANSI/NFSI B101.3-2012 standard and in the methodology to properly conduct walkway coefficient of friction testing. The highest and most comprehensively trained auditors have obtained the designation, Walkway Auditor Certificate Holder (WACH). This is a certificate from the only ANSI accredited training course in the nation. The WACH credential demonstrates that the technician conducting your audit is skilled in the completion of comprehensive walkway audits and has successfully completed the ANSI accredited training course at the National Floor Safety Institute.

By utilizing properly trained personnel using the correct testing methods and standards, you can document and demonstrate an evidentiary trail of due diligence for your client and the performance of your finished floor surface from the time of installation and for years to come. This can prevent you from having to face unwarranted litigation in the event of a slip and fall incident.

Slip resistance is of prime importance to The MJA Company. On staff is Western New York’s only ANSI accredited WACH (Walkway Auditor Certificate Holder) with extensive training and certification from the National Floor Safety Institute (NFSI). He is available to test and certify any polished concrete floor for slip resistance.

Contact the MJA Company to arrange an ANSI accredited walkway audit.

About the author: Brent Johnson

B.S. Ed, Walkway Auditor Certificate Holder (WACH), Certified XL Tribometry, Certified Forensic Consultant (CFC)

As the first NFSI/ANSI Walkway Auditor Certificate Holder, Brent Johnson has helped pioneer the walkway auditing industry and is now an instructor for the National Floor Safety Institute. Mr. Johnson is an educator and consultant to the manufacturing, restaurant, retail, insurance, and safety industries to further their efforts in the prevention of slip and fall injuries.

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MJA PROJECTWATCH A few of the notable projects completed since our last issue.

AMTRAK Train Station • Rochester, NY

- Moisture membrane with exposed aggregate: 5,000 sq. ft.
 - Detectable tactile yellow warning strip: 3,600 sq. ft.
- August 2017

Cummins, Inc. • Lakewood, NY

- Polished concrete, Joint rebuilding and filling, concrete repairs: 7,500 sq. ft.
- June 2017

Chautauqua Amphitheatre, Chautauqua Institute Chautauqua NY

- Penetrating sealer, microtopping: 2,500 sq. ft.
- February, 2017

Amazon • Lancaster, NY

- Cleaning and application of hardener/densifier: 480,000 sq. ft.
 - Concrete floor repairs and diamond polishing of office space: 15,000 sq. ft.
 - Control joint filling: 15,000 linear ft.
 - Line stripe removal: 7,800 linear ft.
- July, 2017



AMTRAK Train Station • Rochester, NY

Contact The MJA Company for an extensive project list. We'll be happy to fill you in on all the details. (716) 831-7091

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| • Crack Repair | • Concrete Floor Performance Audits |
| • Control Joint & Saw Cut Filling | • Certified Walkway Safety Audits |
| • Surface Repair | |

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