

Having Concrete on roofs is fairly typical. The concrete used could either be normal-weight or structural light-weight concrete. Both pose challenges with the roofing installation because of the concrete moisture and there not being a way to properly test the concrete in the exterior and re-wetting environment. Most testing is based on interior, steady-state conditions, and I have not seen a roof manufacturer provide a guide to a testing result. **More attention has been given to this topic by the industry and the National Roofing Contractors Association (NRCA) because of the onslaught of litigation over the last few years. Below I have summarized concerns below and provide action items that we should take to limit our liability on this matter.**

As General Contractors, we need to be concerned with this type of construction as we have no control over the drying process which negatively affects the roofing. When possible, during design, identify this concern with the design team early. This is not always possible when we are not part of the design process, however, we should still discuss the concern and try and work out a plan to alleviate the challenge. *Note that this concern should also be reviewed for existing construction and re-roofing projects.*

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- Normal & structural light weight concrete roof issues -Typically an issue with moisture leaving the slab in an uncontrolled environment, such as a roof condition due to exterior RH (*relative humidity*) and frequently re-wetting of the slab.
- If concrete is needed on the roof, **normal weight concrete is recommended by the NRCA** due to the increased moisture content in structural light-weight concrete.
- Roof warranties DO NOT cover moisture from below the roofing from the concrete and construction generated moisture.**
- Silicate additives in the concrete have been proved to be approximately 2x as permeable as concrete that has no additive per NRCA testing. (I have personally tested the concrete myself, which aligns with NRCA's tested results)**

Industry Reported Problems Associated with Structural Light-Weight Concrete per the NRCA

- Moisture accumulation** - Excessive moisture from concrete deck can be pressure-differential driven into and condensed within a roof system.
- Adhesion loss**. Presence of moisture can result in deterioration of moisture-sensitive roofing materials and adhesive bond loss between adhered material layers.
- Adhesive issues** with *water-based and low-volatile organic compounds*. Excessive moisture can affect adhesive curing and drying rates. Also, moisture can result in adhesive "rewetting," resulting in bond strength loss.
- Metal and fastener corrosion**. Excessive moisture can contribute to and accelerate metal components' corrosion, including fastener corrosion.
- Insulation R-value loss**. The accumulation and presence of moisture in most insulation products will result in reduced thermal performance (lower effective R-value).
- Microbial growth**. The presence of prolonged high-moisture contents in contact with organic-based materials, such as wood fiberboard, perlite board and organic insulation facer sheets, can support microbial growth.

Current & Future Industry Moisture Testing :

- THERE IS NO CURRENT TESTING ABILITY TO ACCURATELY TEST THE MOISTURE IN ROOF CONCRETE.**
- THERE IS NO CURRENT SCALE THAT RELATES TO MOISTURE IN THE CONCRETE THAT INDICATES WHEN IT IS ACCEPTABLE TO INSTALL ROOFING MATERIALS ON CONCRETE.**
- A 28-day waiting period has nothing to do with moisture, only the strength of the concrete and should NOT be used as a guide to install roofing.
- Performing a hot drop test (hot asphalt), only confirms the top surface is moisture free, not the concrete slab.
- Performing an ASTM D4263 "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method." sealing the perimeter of a plastic sheet to the concrete is unreliable and easily manipulatable.
- Performing an ASTM F2170 probe test is designed for an accumulated environment, which the roof is not, and results will be unpredictable and unreliable. **THIS TEST IS FOR INTERIOR USE ONLY.**
- Performing ASTM F2659 "Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-Destructive Electronic Moisture Meter" does not have a value that relates back to roofing installation.
- Venting the roof is typically not an option, depending on how the roof air retarder is designated and designed.

AS AECOM SHOULD NOT BE APPROVING THE CONCRETE FOR INSTALLATION. A PARTY SUCH AS THE OWNER, ARCHITECT, ROOF MANUFACTURER, or ROOF CONTRACTOR WILL NEED TO ACCEPT THE CONCRETE MOISTURE TO BEGIN ROOF INSTALLATION UNLESS WE REMOVE THE MOISTURE CONCERN FROM THE EQUATION BY:

- INSTALLING A TORCH APPLIED (Best) OR PEEL AND STICK VAPOR RETARDER ON THE CONCRETE.**
 - The vapor retarder can be installed as soon as the concrete is dry, since we are not relying on the adhesion of the vapor retarder. This should assist with your schedule.**
- MECHANICALLY FASTENING AT LEAST THE FIRST LAYER OF INSULATION to remove the adhesion unknown of the vapor retarder.**
 - The fasteners should be 300 series stainless steel or ceramic coated fasteners (by roofing Mfr)**
- IN PT SLABS. ALWAYS SCAN THE CONCRETE AND MARK ON THE WALL IF THE TENDONS ARE LESS THAN 3" MINIMUM FROM THE TOP SIDE.**

If we have concrete on the roof, contact the Architect and have the system designed to account for the issues identified in this bulletin. Earlier the better.

Talk to your Roofing Contractor as soon as possible - Contact Corey if you need assistance.

An article published by Concrete International dated January 2012 by Peter Craig and Bill Wolfe called "Another Look at the Drying of Lightweight Concrete"

A comparison of drying times for normal weight and lightweight floors identified that **non-conditioned, non-wetting environment (a roof is neither—and therefore, time is unable to be determined)** will produce internal RH above 83% after almost a year for structural light weight and above 80% for normal weight concrete.



Moisture has created wrinkles and bubbles on this fully adhered vapor retarder installation.

The finish of your concrete roof is important.

Peel and Stick or torch applied will require a smooth trowel finish **DO NOT END THE FINISHING WITH A BULL FLOAT.**



NRCA has tested structural light weight roof systems 4-7 years old with results 89%-99% range

NRCA has tested silicates within light weight concrete and normal weight concrete with results of permeability of the concrete 2x that of non-treated concrete.

DO NOT USE SILICATES

Placing holes in your roof vapor retarder is not an issue, as the fasteners are metal, which is a vapor retarder and the holes that they produce (under compression) are typically filled with the fastener, which provides a very good overall vapor retarder installation.

Today's fasteners are designed to be installed in concrete and will not corrode.