Sure-Seal®/Sure-White® Adhered Roofing Systems

"Attachment V"
Construction Generated Moisture

August 2007

A. While buildings should ultimately be designed to fit their intended purpose and accommodate their occupants, they must also tolerate various construction conditions (i.e., time of construction, material and process used).

In cold climatic regions, buildings in their construction phase will most likely experience an aggressive upward moisture drive as a result of hydration of freshly poured concrete floors and the practice of using oil or propane fired heaters.

According to NRCA:

1. Construction processes can release large quantities of water vapor. For example, wall or ceiling plaster or 4" thick concrete slabs release roughly one quart of water (2 pounds) for each square foot of surface area during the drying process. A building that is 120,000 square feet in size could experience up to 30,000 gallons of construction-generated moisture.

2. The combustion process of an oil-or propane-fired heater, used for temporary heat during construction, produces more water as a by-product of burning than the weight of the fuel consumed. Approximately one gallon of water will be produced for each gallon of heating oil burned. This generated moisture, if not addressed through ventilation or contained using vapor retarders, will subject the roof assembly to potential harmful effects that vary from mold

3. accumulation to reduced insulation efficiency.

B. **Moisture Migration**

Moisture vapor penetrates a roof assembly either by **air leakage** or by **diffusion**.

1. **Air leakage** occurs through joints in the metal deck or tilt-up panels, insulation and joints and gaps around penetrations. Air leakage will also occur as a result of imperfections, such as punctures and tears.

2. **Diffusion** of moisture is caused by the differences in vapor pressure that occur with varying temperature conditions and relative humidities. The greater the temperature differential, the more active the moisture drive.

Air leakage can allow the transport of significantly greater amounts of moisture than can be transported by way of diffusion.

C. **Impact of Air Leakage**

Warm, humid air that infiltrates through gaps and joints will begin condensing beneath the roofing membrane and could freeze in colder temperatures. Hot, humid air will always seek the path of least resistance, thus, insulation joints become the most common route. High levels of moisture condensing along the insulation joints could eventually break the cell structure of polyiso insulation allowing gases to escape, which in turn promotes board shrinkage and possible edge collapse.

D. **Preventing Moisture Damage**

While occupancy generated moisture is usually addressed through the use of a vapor retarder, construction generated moisture can be addressed by simply incorporating multiple layers of insulation and staggering the joints. This will significantly reduce air leakage, which is responsible for the transport of greater amounts of moisture into the assembly.

NRCA recommends 2 or more layers of roof insulation, which has long been recognized as an advantage in terms of eliminating heat transfer and maximizing roof system efficiency. Studies have also revealed an 8 - 10 % reduction in

energy costs between assemblies with equal R-Value when designed with multiple layers versus those designed with a single layer of insulation.