



Danger in the Damp – Dealing with Mold

An Online Continuing Education Course for Engineers

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Introduction

Over time, I have read various quotes on how long it would take, should mankind suddenly cease to be, for natural elements to succeed in erasing all trace of our existence here on this planet. Those estimates have ranged from an improbable two hundred years to over ten thousand years. In fact, I once read that should all other geological activities cease, such as earthquakes, plate movement, and glacier activity, at the end of that ten thousand years, the Earth would be a completely smooth sphere. In all these predictions, the driving force behind such drastic surface modification is water.

One thing is certain. With erosion paths cut into solid rock as solid evidence, water in various forms contains immense power to eat away or destroy whatever is in its path. The Grand Canyon offers mute testimony to the chances of anything else withstanding its onslaught. The ability to quarry rock, using only water poured into cracks atop a cliff face, demonstrates the power and force of water expanding as it turns to ice. Steam simply goes wherever the slightest opening allows its pressure to be alleviated.

One other thing is certain. Whether it takes a year, two hundred or ten thousand, without intervention, water can and will destroy our man-made structures. If a problem develops that opens a pathway for intrusion, one rainy season can render a building unsuitable for human use. That is why flashing, seals, air intentional pressure differentials and other means have been developed and implemented. They are preventive measures in our battle to keep water and ice from destroying our built environments.

The purpose of this course is to ensure one thing. By the time water shows up on the inside of our buildings, we want to make sure it's had to work very hard to get in. At the very least, that it's had to bypass our best efforts and best materials to get there.

Glossary of Terms Regarding Water Intrusion

Air Barrier: *Material(s) meant to control the movement of air across or through an exterior wall system or assembly*

Air Handler: *Equipment with a blower or fan, and related equipment such as controls, condensate drain pans, and air filters, not including ductwork, registers or grilles, or boilers and chillers, designed to move air across or through heating or cooling coils to temper it before forcing it into building spaces*

Alligatoring: *Deep cracks that appear in bituminous surfaces of built-up or smooth surface roofing, giving it the appearance of an alligator's hide. The cracks often result from by material shrinkage*

ASHRAE: *An acronym for the American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.*

Asphalt: *A viscous material created by distilling petroleum. Besides its use in roadway surfaces, its composition from oil makes it useful in water-proofing built-up roofs and wall surfaces*

ASTM: *An acronym for the American Society for Testing and Material*

Ballast: *Heavy material, such as rock, gravel or pavers, used to hold roofing and roofing membranes down and prevent wind uplift forces from removing them*

Bitumen: *A common word for asphalt or coal tar pitch*

Blister: *Raised portion of a roofing surface, created by pressure from trapped air or water vapor beneath it*

Built-up Roofing (BUR): *Continuous roof covering, comprised of layers of saturated or coated roofing felt, laid alternately with layers of bitumen*

Cant Strip: *A triangular strip at the base of a joint between a horizontal deck or other surface, and a vertical wall or other surface, used to provide a more gradual transition between flashing and roof membrane(s)*

Capillary Break: *A groove creating too large a gap to be bridged by a drop of water, thereby preventing water movement through capillary action*

Chase: *A groove or opening through framing or sheathing materials, created to form a clear pathway through which to run electric or plumbing lines*

Cladding: *Materials applied over other surfaces to increase durability, weathering, corrosion, infiltration or impact resistance*

CMU: *An acronym for a concrete masonry unit*

Commissioning: *Procedures implemented prior to occupancy of a structure, that often includes testing and adjusting HVAC, electrical, plumbing and other systems, and instructing building representatives in the use of the building, its systems, and its maintenance*

Coping: *Material(s) used to cap off or finish the tops of walls, piers, pilasters or chimneys, sloped to shed water and intended to waterproof and make more weather resistant, the structures they cap*

Crack: *A break in a roofing membrane or other exterior cladding, that allows the passage of moisture*

Cricket: *Flashing on the uphill side of a chimney or other vertical roof penetration, shaped to form a small ridge, to divert flowing rainwater around the penetration*

Drainage or Drain Plane: *Building components exposed to weather at the plane separating “wet” and “dry” sides of a building enclosure. These stop incoming water and allow it to drain back outside the building envelope.*

Dry Well: *A deep hole, usually covered and often filled with rocks, created to hold water till it naturally soaks into the ground.*

Eave: *A protective overhang at the lower edge of a sloped roof*

Enthalpy: *A measurement representing the total energy of a thermodynamic system. It includes the energy required to create a system and energy required to displace its environment*

EPDM: *An acronym for ethylene propylene diene monomer, a synthetic rubber single-ply roof membrane*

Expansion Joint: *A gap created between two surface areas, to allow expansion and contraction or separate movement between the two surfaces with no resulting damage*

Fascia: *Finish material creating the vertical face at the end of a flat or sloping roof, or roof overhang*

Fishmouth: *An opening created between lapped layers in built-up roofing, when the adhesion between them fails*

Flashing: *Sheet materials used to connect or span gaps between membrane joints, drains, gravel stops and other places where membranes are interrupted. Base flashing normally extends up from one surface and counterflashing normally extends down from another, over the base flashing, to create surfaces resisting infiltration with positive water flow*

Forebay: *A depressed area, created before and lower than the inlet of a storm basin or other stormwater management facility, that acts as a storage area where sediment and heavy pollutants can be trapped and settle out before drainage reaches the main basin*

Gravel Stop: *A flanged sheet metal strip, installed with the top edge slightly higher than the roof surface, to prevent loose aggregate from washing off. It also provides a finished edge detail for roofs*

HVAC: *An acronym for heating, ventilation and air conditioning*

Hygrothermal: *Referring to heat and humidity*

Impervious: *Does not allow water or moisture to pass through*

Micromanometer: *An instrument designed to measure minute differences in pressure*

Modified Bitumen: *Asphalt with modifiers added to increase flexibility in cold temperatures and stability and resistance to flow in warm temperatures*

OSB: *An acronym for Oriented Strand Board. A panel formed of strand-type flakes, deliberately aligned in specific directions to make the product stronger and stiffer, resulting in improved properties over a similar panel with random flake orientation*

Parapet: *The portion of a wall assembly extending above an adjacent roof*

Plenum: Space between a ceiling and floor above, often containing mechanical and electrical equipment, sometimes used for air distribution

Ponding: Shallow pools of water that collect on the surface of a roof

PVC: An acronym for polyvinyl chloride and a generic term for single-ply plastic sheet membrane with overlapping seams that are welded through the application of solvents or hot air

R-value: Time required for one Btu of energy to penetrate one square foot of a material, for each degree of temperature difference on opposite sides of the material. It is a measure of the resistance of a material to allow heat to pass through

Scupper: An opening for draining otherwise trapped water through a vertical face like a parapet, from off the top of an adjacent intersecting plane

Section: A drawing showing how a structure would appear if cut through by a plane

Shingle-wise: Overlapping layers of material, such as shingles, that shed water like rainwater

Slope: The ratio between the vertical rise and the horizontal span of an angled surface

SMACNA: An acronym for the Sheet Metal and Air Conditioning Contractors' National Association

Soffit: The finish face of a roof overhang

