Moisture in Concrete, General Information

Hydrostatic VS. Water Vapor:

Hydrostatic: In concrete slab or floor work, hydrostatic (water) pressure is caused by water in the liquid phase, which is entering the structure through cracks, wall-to-floor joint or some other construction defect and is visible as water, i.e. ponding on the interior floors (rain water through windows excluded); as visible water.

Water Vapor: Liquid water in the gas phase, which can readily permeate a semi-permeable substrate such as concrete. Water vapor is water in the gas or vapor phase and is not visible either as "wet" areas or "ponded" water; you cannot see water vapor.

Osmosis:

The method or mechanics of the travel of a gas or vapor through a semi-permeable membrane is called "Osmosis" which can be defined as the "movement of a gas through a semi-permeable membrane solution of higher solute concentration…water movement is driven by a force that tends to equalize the concentrations of dissolved solute (typically salts) on the two sides of the membrane, [which] can lead to liquid-filled blisters." Where the "gas" is water vapor, and the "semi-permeable membrane" is the hardened concrete.

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Osmosis does not produce "pressure" such as what happens when one of these blisters is perforated (liquid squirts out under pressure), that is a hydraulic function of the water being squeezed through the concrete matrix, not from osmosis.

Water in Concrete

Water for hydration: Water/cement ratio; The ratio of the weight of water to the weight of cement used in a concrete mix & has a direct influence on the quality/strength of the concrete produced.

Water of Convenience/placement: Water added for placement, the amount of excess water added to the ready mix to ease placing. The readymix truck driver usually does this especially if weather conditions are hot; the wait to pour is long or for any other reason that may stall the pour.

Water of retention; Residual water trapped in concrete or the water left over after hydration has taken place. This water is trapped in the capillaries and bleedwater tracks and will remain in the concrete for quite a long time, emanating from the slab as water vapor for years to come.