



NATIONAL PLASTERERS COUNCIL

## Understanding the Key Technical Terms: Hydration & Curing

*Initial Release: January 2010*

*Last Revised: January 2019*

**Introduction** – The essential element in all good communications is that the parties involved understand the vocabulary or language used by one another in expressing their ideas and thoughts. If an idea or thought is expressed that holds two different interpretations, then communication breaks down, or at the very least is confusing and perplexing to all parties. The National Plasterers Council addresses such an issue in Technical Bulletin #2, with regard to the often-misused terms of *'hydration'* and *'curing'*.

**General Description** – In the NPC Technical Manual, 9<sup>th</sup> Edition, *'hydration'* is defined as...“the chemical reaction between hydraulic cement and water forming new compounds, most of which have strength producing properties.” The American Concrete Institute defines *'hydration'* as the formation of compounds by combining water with hydraulic cement.<sup>1</sup>

The Portland Cement Association, in “Design and Control of Concrete Mixtures”, describe how hydraulic cement sets, or hardens, by reacting with water. During this reaction, called hydration, cement combines with water to form a stone-like mass.”<sup>3</sup>

*'Curing'* is typically applied to cement and concrete trades to describe the actions taken to ensure that the maturation process or hydration process continues. Curing of plaster is defined in the NPC Technical Manual (Pg. 27) as the act or process by which the cementitious surface coating continues hydration. For the interior finishes of swimming pools, curing is done by immersing the cementitious coating in water as soon as possible after final set. The hydration of the cementitious compounds will continue underwater.”<sup>1</sup>

**Question** – What is meant by '*curing*'?

**Answer** – In the American Concrete Institute 'Concrete Primer' publication, curing is explained as follows: "The term curing is used in reference to the maintenance of a favorable environment for the continuation of these chemical reactions; that is, the retention of moisture within or supplying moisture to the concrete and protection against extremes of temperature. It is through early curing that the internal structure of the concrete is built up to provide strength and water tightness. While simply retaining moisture within the concrete may be sufficient for low to moderate cement contents, mixes that are rich in cement generate considerable heat of hydration, which may expel moisture from the concrete in the period immediately after setting. With such concrete, water curing should begin as soon as possible with free water kept on the concrete to replace any lost moisture and to help dissipate heat"<sup>2</sup>

ACI simplifies this statement in their definition of curing as: "the maintenance of a satisfactory moisture content and temperature in concrete during its early stages so that desired properties may develop."<sup>2</sup>

The Portland Cement Association defines the objectives of curing are to:

- 1) prevent (or replenish) the loss of moisture from concrete, and
- 2) maintain a favorable concrete temperature for a definite period of time.<sup>3</sup>

By immersion or "ponding" curing of a swimming pools' cementitious surface, the hydration process is allowed to proceed without the accelerated loss of moisture from evaporation, wind, and other factors. This "ponding" curing will also greatly reduce the tendency of the surface to develop shrinkage cracking.

**Summary:** Hydration is *the chemical reaction* of hydraulic cement with water that forms new cement compounds, ultimately producing a stone-like mass. Curing is the process or method of *providing sufficient moisture* for the hydration or maturation process to proceed until the pool's cementitious interior finish achieves its desired properties.

Interior cementitious finishes begin to hydrate during the mixing process with water. The new finish is cured by filling the pool with water after the surface has hardened to a point that it can be immersed.

#### References:

- 1.) *National Plasterers Council Technical Manual*, 9<sup>th</sup> Edition, 2018, National Plasterers Council, 1000 N. Rand Rd., Suite 214, Wauconda, IL., 60084, [www.npconline.org](http://www.npconline.org).
- 2.) *Concrete Primer*, Bryant Mather, Celik Ozyildirim, CT-1, SP-1 (02), (ISBN: 9780870310997), [American Concrete Institute, 38800 Country Club Dr., Farmington Hills, MI., 48331, www.concrete.org](http://American Concrete Institute, 38800 Country Club Dr., Farmington Hills, MI., 48331, www.concrete.org).
- 3.) *Design and Control of Concrete Mixtures*, Steven Kosmatka and William Panarese, 13<sup>th</sup> Edition, 1990, Portland Cement Association, 5420 Old Orchard Rd., Skokie, Illinois, 60077, [www.cement.org](http://www.cement.org).