Methods for Proper Concrete Curing

NOTE: The discussion below pertains only to the curing of non-colored concrete for normal applications. For colored, architectural or any exceptional types of concrete, special curing procedures are required. In such cases it is advisable to contact the material manufacturer. For detailed information on recommended practices for curing concrete, refer to "Standard Practice for Curing Concrete" (ACI-308).

Why Curing is So Important

Improper curing can easily cut the strength of even the best concrete by 50 percent. Curing simply means keeping the water in the concrete where it can do its job of chemically combining with the cement to change the cement into a tough "glue" that will help develop strong, durable concrete. Good curing means keeping the concrete damp and above 50 °F (10 °C) until the concrete is strong enough to do its job. Recommended practice calls for a minimum of seven days curing (except for high early strength concrete) or the time necessary to attain 70 percent of the specified compressive or flexural strength, whichever period is less.

All concrete must be cured to attain maximum strength. Correctly cured concrete is best from every standpoint: It shrinks less, cracks less and dusts less. It is stronger, is more durable and is more wear resistant.

Start curing the concrete as soon as possible after it has hardened. Early drying – especially in hot, windy weather – must be prevented or the concrete will not attain its full potential quality. Refer to ACI Committee 305, "Report on Hot Weather Concreting."

Methods of Curing

- **Membrane Curing Compounds** are the preferred (most practical and widely used) method of sealing moisture in the concrete. Easy to spray, roll or brush on and low in cost, these curing compounds generally require only one application. These method is effective for slabs, vertical walls or irregular surfaces. For flatwork, cover the dried curing compound with scuff-proof building paper or polyethylene tarp to protect the surface from marring by other trades until the curing is complete. If a membrane curing compound is used, make sure it meets the moisture retention requirements of ASTM C-309 at the coverage rate specified.

- **Water Spray** is a good curing method but **onl y** if the concrete is kept continually damp. Allowing the concrete surface to dry between sprinklings can cause crazing of the surface and cracking of slabs.

- **Waterproof Curing Paper** holds moisture in the concrete by preventing evaporation. Water is sprayed on the concrete surface and covered with a non-staining, waterproof paper. Edges are overlapped and sealed with waterproof tape. This method is acceptable for slabs but not practical for walls, irregular surfaces or colored floors.

- **Damp Burlap** is sometimes an effective method of curing. However, the burlap must be washed and free of any foreign substances which might stain or harm the concrete. Also wet burlap may be hard to handle for large areas. Once the damp burlap has been spread over the concrete surface, it must be kept continually damp with water spray to replace the water lost through evaporation. It should not be used on colored or metallic floors.

- **Other Methods** include **plastic sheets** which are completely watertight, light in weight and easy to handle. They give good protection during curing. However, care must be taken to ensure that such sheets lie flat against the surface, otherwise mottling of the surface may result. **Damp earth, sand, straw** and **hay** can also be recommended, but their use should be limited to emergency situations. Earth and sand are messy, and hard to handle and to clean up. Straw and hay dry out quickly, can blow away and can be a fire hazard. None of these methods should be used on colored or metallic floors.

Cure Concrete Longer In Low Temperatures

Concrete strength develops more slowly at lower temperatures. Below 50 °F (10 °C) do not expect satisfactory performance from the concrete unless special precautions are taken (See section regarding “Carbonation”). Closely follow job specifications on curing time. In the absence of specifications, concrete should be cured, protected from harmful temperatures and not used until it has developed the required strength. Heaters, if used, must be vented so combustion gases are exhausted outside the enclosure in order to avoid carbonation of the fresh concrete. Refer to ACI Committee 306, “Report on Cold Weather Concreting.”

Results of Proper Curing

- **More Durable Concrete**: Good concrete, properly cured, has fewer pores and crevices where water can enter, freeze, expand and crack the concrete. Air entrainment helps make more durable concrete, but its use must also be accompanied by proper curing.

- **More Wear-Resistant Concrete:** Well cured concrete (28 day curing period) will develop a surface twice as wear resistant as a surface that is cured for only three days. Proper curing prevents dusting and means less cracking, crazing and spalling of the concrete. All in all, the better the curing, the better the concrete.