

(a) Span in this circumstance is defined as the horizontal distance between faces of the supporting elements when measured parallel to the primary reinforcement.

(b) Applicable only when the average modulus of rupture for two tests is not less than 650 psi (4.5 MPa).

When the temperature of the air surrounding the concrete is above and maintained above 32 °F (0 °C) and below 50 °F (10 °C) and the provisions of 842.12 are not in force, the duration of the cure shall be based on a beam test, except that the curing time shall not be less than tabulated above.

When a beam test is not performed, the time specified above for removing falsework and opening to traffic shall be extended one day for each day the temperature of the air surrounding the concrete is below 50 °F (10 °C).

All superstructure concrete, all concrete which is to have a sealer applied, and all construction joints shall be cured in accordance with Method (a) Water Curing. All other concrete shall be cured either by Method (a) Water Curing or Method (b) Membrane Curing. However, if Method (b) is used on areas to be waterproofed, the membrane shall be removed.

Compression rings are not to be installed on pier columns or similar items of construction for the purpose of supporting falsework or subsequent construction until after a 72-hour curing period.

No load shall be applied or other work conducted that will damage new concrete or interfere with its curing. Where work is necessary on new concrete to complete a structure, such as building forms on a footing, workers and materials shall be kept off such concrete until such time as it will not be damaged by the work in progress, but in no case shall the elapsed time between placing the concrete and working on same be less than 36 hours. No work that will interfere with the curing shall be done on concrete placed during cold weather unless insulating material to retain the heat in the mix is placed during periods in the day when the presence of workers will not interfere with the normal curing procedure. When this is done, the normal protection shall be resumed immediately after work is suspended. Proper curing shall have preference and, if necessary, workers shall be kept off so that the concrete may be thoroughly wetted and kept wet until the curing is completed.

Method (a) Water Curing. All surfaces not covered by forms shall be protected immediately after brooming or final finishing with two thicknesses of wet burlap and kept wet by the continuous application of water for a period of not less than 7 days. Formed surfaces shall, after the removal of forms, be cured in like manner for the remainder of the curing period with the entire surface of the concrete being thoroughly drenched with water and covered immediately after forms are removed.

In lieu of continuous sprinkling, wet burlap covered with white polyethylene sheeting or plastic coated burlap blankets 705.06 may be used. They shall be placed wet with the burlap side against the concrete. Adjoining plastic coated blankets or polyethylene sheets used to cover wet burlap shall be lapped sufficiently and held securely in place at laps and edges so that positive moisture seal is provided. White polyethylene sheeting or plastic coated blankets containing holes or tears shall be covered with an additional covering of sheeting or blankets as directed.

Method (b) Membrane Curing. Immediately after the free water has disappeared on

surfaces not protected by forms and immediately after the removal of forms, if such are removed before the end of the 7-day curing period, the concrete shall be sealed by spraying as a fine mist a uniform application of the curing material 705.07, Type 1 or 1D, in such manner as to provide continuous, uniform, water impermeable film without marring the surface of the concrete.

The membrane curing shall be applied in one or more separate coats at the rate of at least 1 gallon per 200 square feet (1 L/5m<sup>2</sup>) of surface. To assure that the proper amount of the curing material is applied, the number of gallons (liters) of curing material in the spray container shall be noted, and the correct area for that volume laid off so that the area of concrete surface to be covered will be such that the approved application rate will be secured. Curing material shall be thoroughly agitated immediately previous to use. If the film is broken or damaged at any time during the specified curing period, the area or areas affected shall be given a complete duplicate treatment of the curing material applied at the same rate as the first treatment.

Unless adequate precautions are taken to protect the surface of the membrane, workers, materials and equipment shall be kept off the membrane for the duration of the curing period.

**842.15 Surface Finish.** Immediately after the removal of forms, all cavities produced by form ties and all other holes, honeycomb spots, broken corners or edges and other defects shall be cleaned, dampened and completely filled, pointed or trued with a mortar of the same proportions as used in the concrete being finished. Exposed surfaces which are not satisfactory to the Engineer because of excessive patching and/or other corrective work, shall be grout cleaned or rubbed as required by the Engineer. Other contiguous exposed surfaces on the structure shall be finished in a similar manner to the extent required to produce a uniform appearance.

On all exposed surfaces, all fins and irregular projections shall be removed with a stone or power grinder, care being taken to avoid contrasting surface textures. Sufficient white cement shall be substituted for the regular cement in the filling of holes and other corrective work to produce finished patches of the same color as the surrounding concrete.

Grout Cleaning. Where grout cleaning is called for on the plans or is necessary for corrective work, the surface, after wetting, shall be uniformly covered with a grout consisting of one part cement to 1 1/2 parts fine sand, 703.03 and sufficient water to produce a consistency of thick paint. White portland cement shall be used for all or part of the cement in the grout, as directed by the Engineer, to give the color required to match the concrete. The grout shall be uniformly applied with brushes or a spray gun, and all air bubbles and holes shall be completely filled. Immediately after the application of the grout, the surface shall be vigorously scoured with a cork or other suitable float. While the grout is still plastic the surface shall be finished with a sponge rubber or other suitable float removing all excess grout. The finishing shall be done at the time when grout will not be pulled from the holes or depressions. After being allowed to thoroughly dry, the surface shall be vigorously rubbed with a dry burlap to completely remove any dried grout. There shall be no visible film of grout remaining on the surface after this rubbing and the entire cleaning operations of any area must be completed on the day it is started. If any dark spots or streaks remain after this operation, they shall be removed with a fine grained