



Quantum Readymix Concrete

CURING & CURING COMPOUNDS

Undoubtedly one of the most neglected aspects of concrete construction practices is PROTECTION and CURING.

Concrete consists of some 20% water by volume and is highly susceptible to moisture loss in both plastic and hardened states. Protection and curing of concrete is simply ensuring a suitable temperature and preventing moisture loss to ensure appropriate strengths are reached. If concrete dries out before sufficient strength is reached, the shrinkage stresses result in cracking.

Effective curing compounds correctly used, can avoid major cracks under adverse weather conditions. Conversely inferior curing compounds are as good as useless. A curing compound of KNOWN quality should always be used.

As a general rule curing compounds should comply with SANS 423/ASTM C309 would be the better ones to use IF correctly used. Resin based curing compounds are generally the best but good wax-based compounds are also suitable. For pavements and external floors a white pigmented resin should be used. Acrylics are generally the least effective compounds. If the concrete finish is to be painted or have another finish applied, the curing compound may have to be removed by shot or grit blasting. This needs to be considered when choosing the compound or alternatively another method of curing should be chosen. Unfortunately curing compounds are often purchased on cost as opposed to quality and the old saying that you get what you pay for applies.

In Gauteng at the onset of spring, temperatures are easily above 30 degrees with a relative humidity of approximately 50% - 60%. Wind speeds now become critical and wind-speeds of 40km/h in spring are easily possible. Under such conditions cracking will occur unless precautions are taken. Since no local specification exists in South Africa for the use of curing compounds, they are often purchased on price alone with little regard to their effectiveness.

If the area to be concreted is a factory or the like the roofing and wall sheeting should be done prior to the concreting which should be a minimum of 30Mpa.

Just as important is the cutting of the slab the next day to deal with cracks resulting from shrinkage & expansion. The depth of the cut, panel sizes and timing etc are just as critical. This topic will however be covered in a future TIP.

WHEN A PERFECT STORM EVOLVES 3 CRITICAL FACTORS COME TOGETHER NAMELY;

- HOT WEATHER CONDITIONS (BUT NOT EXCESSIVELY SO) > 30°C
- LOW HUMIDITY < 60%
- HIGH WINDS > 40 KM/H

Plastic shrinkage cracking is thought to be due to capillary tension forces arising as evaporation takes place from the surface of the concrete. If the fresh concrete is kept inert and complete prevention of evaporation can be achieved, plastic shrinkage will not occur. The sub grade of the surface bed should also always be dampened before concreting starts as a dry sub grade will absorb considerable moisture from the concrete, further exacerbating the problem.

COLUMNS

The best remedy for columns is to leave the shutters in place for as long as possible, alternatively they should be wrapped in plastic sheeting.

Just as important is the cutting of the slab before cracking occurs due to drying shrinkage. The depth of the cut, panel sizes and timing etc are just as critical. This topic will however be covered in a future TIP.

The sub grade of the surface bed should also always be dampened before concreting starts as a dry sub grade will absorb considerable moisture from the concrete, further exacerbating the problem.

SURFACE BEDS

The best would be to build a berm wall on the perimeter of the slab and pond it. One should never underestimate the extent of how much better the structure will be with effective curing and it is well worth the trouble to go the extra mile. When cracking occurs in these structures, they can be anywhere from 25mm to 50mm deep. Once such structures are trafficked, they will show stress signs quite quickly.

The maintenance of such a structure once it has been put to service can be very difficult depending on circumstances. Obviously it is best to get it right first time.

SUSPENDED SLABS

Both suspended slabs as well as surface beds should have the correct curing compound sprayed on as soon as floating is complete.

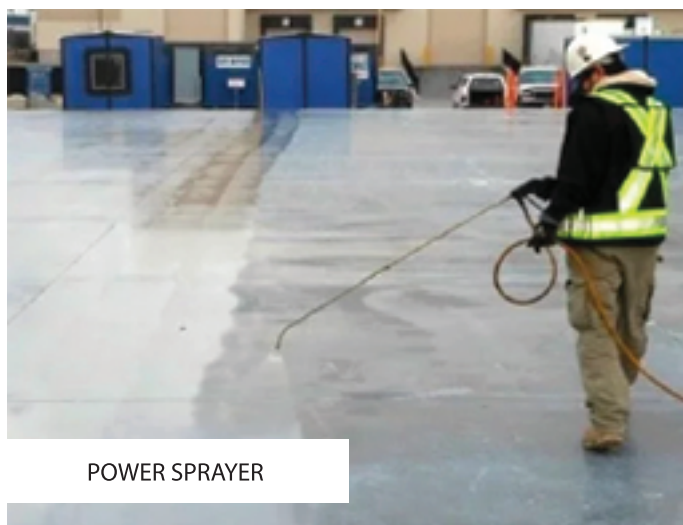
THE CORRECT USE OF CURING COMPOUNDS

- Curing compounds with good water retention properties should be ordered just prior to usage as an effective long shelf life is not a pre-requisite. Curing compounds older than 12 months are highly suspect.
- They should be thoroughly mixed on site prior to use. One can consider rolling the drum on a level surface to facilitate mixing.
- Curing compounds should be applied as soon as possible after casting or formwork removal. In the case of slabs this should be after finishing is complete. Protection is necessary prior to and during finishing.
- The nozzle should be held 300mm to 500mm from the surface depending on the wind conditions. Sometimes a baffle needs to be used to prevent compound loss due to wind.
- Complete and uniform coverage of the surface should be achieved as even small pinholes or areas of neglect will lead to moisture evaporation possibly in two applications at right angles to each other.
- Make sure the nozzle and pipes are thoroughly cleaned after each usage.
- Typical application rates for effective coverage of curing compound are between 2,5m² / litre to 5m² / litre. Both hand operated or power driven spray equipment is acceptable provided the pressure is adequate.
- When spraying in windy conditions a wind shield should be used.



HAND OPERATED SPRAYER

NOTE THE LENGTH OF THE SPRAYING LANCE



POWER SPRAYER



POWER SPRAYER

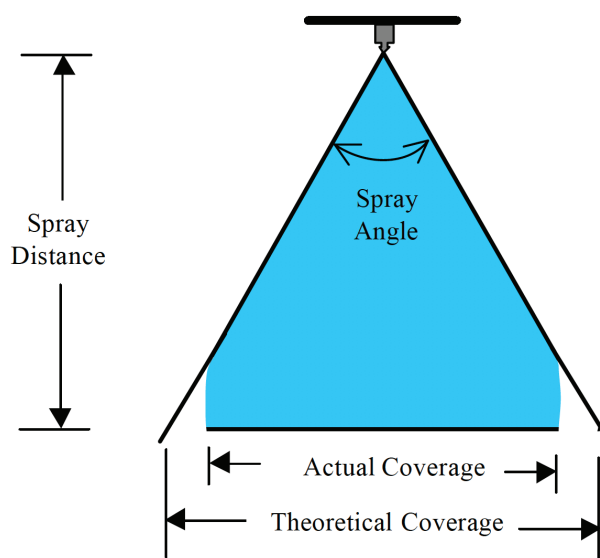


FIGURE 4 SPRAY COVERAGE

FIGURE 4

The unsprayed area between the actual coverage and the theoretical coverage will increase depending on the wind speed and for this reason wind shields are recommended. Windshields made from corrugated iron sheeting (3,6M X 0,85M) attached to extended (1,2M) 38 X 38 brandering on the short side has been observed to be reasonable effective

This Tech info has been reviewed by Brian Perrie from the C&CI

