Concrete cracks and how to prevent them

When installed properly, concrete is one of the most durable and long lasting products you can use around your home. But it is important that concrete contractors follow well-established guidelines with respect to concrete placement. Durable, high strength, and crack resistant concrete does not happen by accident.

Excess water in the mix

Concrete does not require much water to achieve maximum strength. But a wide majority of concrete used in residential work has too much water added to the concrete on the job site. This water is added to make the concrete easier to install. This excess water also greatly reduces the strength of the concrete. Shrinkage is a main cause of cracking. As concrete hardens and dries it shrinks. This is due to the evaporation of excess mixing water. The wetter or soupier the concrete mix, the greater the shrinkage will be. Concrete slabs can shrink as much as ½ inch per 100 feet. This shrinkage causes forces in the concrete which literally pull the slab apart. Cracks are the end result of these forces. The bottom line is a low water to cement ratio is the number one issue effecting concrete quality and excess water reduces this ratio. Know the allowable water for the mix the contractor is pouring, or be very sure you have chosen a reputable contractor who will make sure the proper mix is poured. It is more expensive to do it right. It simply takes more manpower to pour stiffer mixes.

Rapid drying of the concrete

Rapid drying of the slab will significantly increase the possibility of cracking. The chemical reaction, which causes concrete to go from the liquid or plastic state to a solid state requires water. This chemical reaction, or hydration, continues to occur for days and weeks after you pour the concrete. You can make sure that the necessary water is available for this reaction by adequately curing the slab. Curing serves two main purposes: (1) it retains moisture in the slab so that the concrete continues to gain strength, and (2) it delays drying shrinkage until the concrete is strong enough to resist shrinkage cracking. Properly curing concrete improves strength, durability, water tightness, and wear resistance. All the desirable properties of concrete are improved by proper curing!

How to cure concrete.

1. Water cure—The concrete is flooded, ponded, or mist sprayed. It is the most effective curing method for preventing mix water evaporation.
2. Water retaining methods—Use coverings such as sand, canvas, burlap, or straw that are kept continuously wet. The material used must be kept damp during the curing period.
3. Waterproof paper or plastic film seal is applied as soon as the concrete is hard enough to resist surface damage. Plastic films may cause discoloration of the concrete; do not apply to concrete where appearance is important.
4. Chemical Membranes—The chemical application should be made as soon as the concrete is finished. Note that curing compounds can affect adherence of resilient flooring; consult with your flooring contractor and/or chemical membrane manufacturer.

Improper strength

Concrete is available in many different strengths. Verify what strength the concrete you are pouring should be poured at. Talk to the ready mix supplier.

Lack of control joints

Control joints help concrete crack where you want it to. The joints should be ¼ of the depth of the slab and no more than 2-3 times (in feet) of the thickness of the concrete (in inches). So 4-inch concrete should have joints 8-12 feet apart.

Other reasons: (1) Pouring concrete on frozen ground. Don’t do it. (2) Poor compacting. The ground upon which the concrete will be placed must be compacted. The subgrade must be prepared according to your specific soil conditions. Some flatwork can be poured right on native grade. In other areas, 6" of base fill is required along with steel rebar installed in the slab.

Understand what your contractor is doing about each of the above listed items and you will get a good concrete job.