Fast Setting Concrete

Best Practices - 2016

Fast-Setting Concrete - Best Practices

Fast-setting hydrualic concrete is commonly used for concrete repair, restoration and new construction when time is important. Fast strength gain, durability, low shrinkage and high bond strength are critical factors. Common applications include highways, bridges, runways, sidewalks, floors, footings and formed work.

Factor-Blended vs Field-Mixed

Accelerating the curing time of concrete is most commonly done with chemical additives or rapid setting cements. While it is possible to add chemicals to the mix in the field, adding more variables can have a negative affect on consistency and quality. Likewise, some rapid setting cements require additional additives to be added. It is best to use pre-blended cement or concrete mix that is factory-blended and laboratory tested for long-term durability.

Climate conditions and temperature ranges are an important consideration when choosing a fast-setting concrete. Chemical additives accelerate the process and can often create excessive thermal energy. The extra heat can help in cold weather conditions, as long as it is controlled. Too much heat can cause cracking due to temperature differentials, and the heat may cause the binding crystals to react too quickly, not giving them the chance to develop long-term strength. The consistency of a factory-blended mix helps you control temperatures with greater predictability and precision by eliminating potential human error in the field.

Below is a list of the pros and cons of factory-blended vs. field-mixed products.

In-field Mixed - Benefits:
- Can custom mix to local weather conditions
- Can stock fewer mixes, and customize for various applications
- Possible lower initial costs

In-field Mixed - Disadvantages
- Weather can vary significantly from testing day to application day
- Greater potential for human error
- Less consistency
- More variables
- Less control of internal temperature during curing
- Less control of shrinkage

Factory-Blended - Benefits:
- More consistency across an entire project
- Reduced number of variables
- Higher quality, improved durability
- Predictable performance, shrinkage and temperature
- Time-tested formulas
- Long-term confidence
- Reduced chance for human error

Factory-Blended - Disadvantages
- Less flexibility at the pour
- Potentially higher initial costs

Best Practices:

1. Think Climate.
A variety of fast-setting concretes are engineered for different climates and applications. FasTrac 300 Cement is a good all-weather application cement that has excellent workability, yet can be traffic ready in just 2-3 hours. The low-heat formulation makes FasTrac 300 a good choice for warmer climates and minimizes the potential for thermal cracking. FasTrac 303 Cement is a good choice for cold climates, and can also be traffic ready in just 2-3 hours. This latex modified extendable cement demonstrates excellent resistance to freeze/thaw, low permeability, low shrinkage and delivers rapid strength gain.

2. Consider Shrinkage.
Gypsum based cements absorb more water, so when they dry out, they tend to shrink more, and that can present a problem for some applications. FasTrac 300 Cement is a non-gypsum based cement that minimizes cracking from drying shrinkage. Water demand for rapid setting cements is also critical when considering shrinkage potential. Choose a cement that can provide good workability at lower water to cement ratios.

3. Extendability/Workability.
The clock is running, and if you think you may need a little more time to work your concrete, be sure to buy a cement that can be extended without compromising quality or durability. Some in-field mix product manufacturers clearly warn against adding more water or re-tempering the mix to extend workability. FasTrac 300 is renowned for its excellent workability, yet can be traffic ready in just 3 hours.

4. Test!
Always perform a trial batch in the field to assure meeting project specifications while providing desired workability. Variability in aggregates and moisture content can impact the water demand and overall performance of the concrete.

5. Control Variables.
It hot weather, cover your storage piles of aggregate to keep it out of the sun so it won't overheat your concrete during the curing process. In cold weather, do what you can to keep the material above 50°F for similar reasons. Use proper curing methods in hot and cold conditions.

6. Cure it!
The chemicals commonly used in fast-setting concrete can generate heat, cause water to evaporate and interfere with the hydration process so essential to building concrete strength. Keep your concrete hydrated, and within acceptable temperature ranges during the curing process. This is easier when working with a factory mixed product that's tested to produce predictable levels of thermal energy.

7. Bond.
A latex polymer additive can improve adhesion to a variety of surfaces. Prepare the substrate to a proper surface profile that will enhance the bond. FasTrac 303 Cement is an excellent cement for latex or polymer modified applications.

8. Permeability.
If you work in an area where harsh weather conditions, ice or snow, or salt water and salt air are a concern, choose a fast setting concrete that has low permeability to prevent intrusion of chlorides, and damage from freeze/thaw cycles. FasTrac 220 FQ provides low chloride permeability as a stand-alone binder. For applications that require very low permeability consider FasTrac 303 Cement and latex polymer.

9. Fast Yet Durable.
Early strength gain is great, but it doesn't guarantee durability down the road. Accelerating cure times doesn't mean short-cutting the hydration process that ultimately gives concrete its long-lasting strength. A properly formulated mix will speed the process without creating so much heat that it is detrimental to long term performance by preventing hydration crystals from fully forming.

10. Cover Corrosion.
Use a fast-setting cement that also provides low permeability if you work in environments subject to de-icing salt, salt water, severe weather and high humidity and have concerns about embedded steel corroding. Cements that perform at lower water/cement ratios like FasTrac 300 will also reduce the permeability of the concrete.

11. Control Temperatures.
The chemical additives used in fast-setting concrete create heat, which can be a blessing, or a curse, depending on where the pour is located. In cold climates, the extra heat can help keep the concrete above 50°F so it can hydrate fully and develop long-term strength. It hot climates, the heat can be problematic, causing temperature differentials which can lead to cracking. Excessive heat can also cause accelerated evaporation, shortening the hydration process, and depleting the strength of the concrete.

FasTrac MIXING SYSTEMS

FasTrac 220FQ Cement
FasTrac 246 Concrete
Fastrac 300 Cement
FasTrac 303 Cement
FasTrac Shotcrete
FasTrac V/O Mortar
FasTrac ReSurfacer

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