



Why use Forton VF-774 in GFRC?

This question is asked by new, and old, GFRC producers when presented with adding the Forton VF-774 co-polymer to their batch.

The two primary and very extensively tested and documented reasons to use the VF-774 in the batch are:

- The elimination of the 7-day wet cure required to achieve the maximum strengths of the GFRC matrix at 28 days.
- To significantly improve the long-term physical properties of the GFRC composite, especially the aged flexural strain to failure.

In addition to these very important points, there are other points that if taken individually, are hard to quantify, but if taken collectively, contribute to a high quality and high performance GFRC product.

These reasons are:

- UV stability of the Forton polymer so that architectural finishes maintain their “as produced” colors.
- Improved workability of the mix at low water/cement ratios, which further enhances the strength of the cured concrete.
- Easy spraying of vertical surfaces without having the face mix sag.
- Complete dispersion of iron oxide pigments for batch-to-batch color consistency of face mixes
- Hard cured face mixes for better sand blasting uniformity.
- Tighter, denser cured product, which reduces absolute moisture absorption and vapor permeability while at the same time significantly reducing the rate of absorption as a function of time.
- Elimination of crazing and spider cracking in the face mix due to the soft polymer particles in between the cement particle and the sand grain.

When evaluating polymers for GFRC, you should know the following details of the product:

- Polymer chemistry: not all white, milky liquids are equal in performance. Many are not UV stable, nor are they alkali stable in the high pH cement matrix. Some will re-emulsify after curing if they get wet.
- Particle size: this controls the effect of pigmentation and color uniformity batch to batch. If this varies, the same amount of pigment will show a different color in the panel.
- Molecular weight: influences the durability of the polymer in the matrix.
- Polymer solids: you are paying for the amount of polymer solids in the liquid. The higher the polymer solids the better value for your dollar.
- Defoamer: contrary to normal precast, you do not want additional air entrained in the GFRC composite. VF-774 contains additional defoamer to maintain a high quality slurry through the rigors of high shear mixing and spraying.

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Description of Forton VF-774

- Forton VF-774 is an all acrylic thermoplastic co-polymer emulsion.
- It is water-based, non-hazardous material with a polymer solids content of 51%.
- Complies with PCI plant certification program specification Appendix L.
- See Ball Consulting Ltd. Technical Data Sheet for VF-774.
- Can be shipped in drums, totes or bulk tankers, normally within 10 working days of receipt of order.

When to use Forton VF-774

- The addition of Forton VF-774 to GFRC of any normal cement/sand ratio insures the maximum 28 day matrix strengths, which in turn makes a high quality GFRC composite.
- Forton VF-774 is used to eliminate the 7-day wet curing program required of GFRC to obtain the highest matrix strengths. These strengths are factored into the design equations for the finished product.
- The use of Forton VF-774 will reduce color variation in panels.
- It will virtually eliminate drying shrinkage cracks in face mixes.
- It improves the thermal cycling properties of the GFRC panels in situ by reducing the amount of moisture penetration.
- Using Forton VF-774 will improve the spraying of vertical surfaces and the pumping of GFRC pre-mix.
- There is a plastifying effect when using Forton VF-774 that is synergistic with the use of super plasticizers, giving good workability at low W/C ratios.

Mix Design

The normal Forton VF-774 loading in a GFRC mix is between 5 to 7% polymer solids to the weight of cement. This amount is determined by the composite properties desired in the finished product. The higher the amount of polymer, the more water tight and ductile the part will be. The inverse would be true for lower amounts.

<u>Typical Mixes</u>	<u>Spray Chop</u>	<u>Premix</u>	<u>VCAS 160</u>
Portland Type I	100	100	80
Silica Sand	100	85	85-100
Forton VF-774	12-14	10-12	10-14
Water	23-26	24-27	23-27
NEG A-R fiber	5% by weight	3% by weight	3 or 5%
VCAS 160			20
Superplasticizer	4 to 12 oz. adjust workability		

Units can be in pounds or kilos

Uses of GFRC containing VF-774

- Architectural panels and ornamentation
- Artificial rocks
- Planters and flower pots
- Garden Statuary and furniture
- Counter tops and tiles
- Roof slates
- Terra Cotta Replacement Units

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Production Note

- While the use of the Forton polymer is well documented to give equal or better strengths without using a 7 day wet cure, it is strongly recommended to cover the cast parts overnight to hold the heat of hydration in the matrix overnight to insure the most thorough initial cure as possible. This also helps to insure color uniformity.

Health, safety and handling

- Forton VF-774 is a water-based product
- It is non-hazardous and has no flash point
- It is advisable that the production team wear dust masks while spraying
- Forton VF-774 and cement slurry containing Forton VF-774 can easily be washed up with water.
- The water from washing the equipment should be directed to a settling pond to allow the particles of cement, sand and polymer to drop out of suspension. Periodically this pond should be cleaned and the residue be placed where it can air dry for several days, at which point it becomes solid waste and can be hauled to the land fill without problems.

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