FORTON VF-774

Acrylic Co-Polymer For Use In GFRC

PRODUCT OVERVIEW

Forton® VF-774 is an all acrylic, co-polymer dispersion (51% solids) specifically formulated for the GFRC production process. VF-774 is UV stable. It is further formulated to be stable and durable in the high pH Portland cement-based GFRC composite.

The Primary Benefits of Using Forton® VF-774 are:

- **Elimination of the seven day wet cure** required to achieve the maximum strengths of the GFRC composite.
- Significant improvements in the **long-term durability** of the GFRC composite, especially the **maintenance of the long-term flexural strain to failure property, i.e. ductility of the composite (based on a 20 year independent test program).**

PCI Compliance: Forton® VF-774 complies with Appendix G of MNL 130, the Manual for Quality Control for Glass Fiber Reinforced Concrete Products from the PCI for the elimination of the seven day wet cure.

LIQUID POLYMER PROPERTIES

Solids by weight: 51% (±1%)

Viscosity: 100 - 300 cps

pH: 8 - 10

Density at 20°C: 1055 kg/m^3

Tg: 11°C

Particle Size: 0.1300 - 0.2500

Grit: 0 - 50 ppm

Other Advantages to Using Forton® VF-774:

- **Improved workability** of the mix at low water/cement ratios, further enhancing the strength of the cured cement matrix.
- **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.
- **UV stability of the Forton® polymer** means architectural finishes maintain their "as produced" colors.
- **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.

	Typical Range of Premix Properties	Typical Range of Spray-Up Properties
Density (Dry)	110 - 130 pcf	120 - 140 pcf
Compressive Strength (Edgewise)	6,000 - 9,000 psi	7,000 - 12,000 psi
Flexural: Yield (FY)	700 - 1,200 psi	900 - 1,500 psi
Ultimate Strength (FU)	1,450 - 2,000 psi	2,000 - 3,500 psi
Modulus of Elastcity	1.0x10^6 - 2.9x10^6 psi	1.0x10^6 - 3.0x10^6 psi
Direct Tensile: (ASTM C 1230) **Yield (TY)**	600 - 900 psi	700 - 1,000 psi
Ultimate Strength (TU)	600 - 1,000 psi	1,000 - 1,600 psi
Strain to Failure	0.1 - 0.2 %	0.6 - 1.2 %
Shear: Interlaminar	N/A	400 - 800 psi
In-plane	600 - 1,000 psi	1,000 - 1,600 psi
Coeffecient of Thermal Expansion	Approx. 12x10^{-6} in./in./deg. F	Approx. 12x10^{-6} in./in./deg. F
Thermal Conductivity	3.25 - 7.0 Btu/in./hr/ft^2/deg. F	3.25 - 7.0 Btu/in./hr/ft^2/deg. F
Fire Rating (ASTM E-84)	Class A/Class 1	Class A/Class 1

These are typical values and are not to be used for design or control purposes. Each manufacturer must test production composites to establish physical properties for design. The values achieved in practice will be dependent on mix design, quality control of materials, fabrication process and curing. Values achieved after 28-day cure.

USAGE RECOMMENDATIONS

HANDLING & STORAGE... **Forton® VF-774** is supplied in 5-gallon pails (40 lbs/18 kgs), 55-gallon drums (480 lbs/218 kgs) and totes (2,300 lbs/1,043 kgs). **VF-774 should not be allowed to freeze.** Recommended storage temperature range: 50°F - 100°F (10°C - 38°C). VF-774 should be stored in closed containers out of direct sun light and away from direct sources of heat.

SHELF LIFE... Shelf life of VF-774 is one year in unopened containers when properly stored. Smooth-On cannot guarantee shelf life of opened or repackaged units. **Important:** This product has limited shelf life. Use as soon as possible after opening.

PRE-MIXING... VF-774 can separate over time in storage or transit as evidenced by caramel liquid on the surface. Gently stir with a paddle for 30 seconds. Pre-mixing one time per 24 hour usage cycle is recommended.

MEASURING & MIXING... Assemble all components and accessories before you begin.

Required Materials:

- Portland Cement, Type I (White or Gray)
- Silica Sand (washed, graded, dried. 0 Retention on 20 mesh sieve)
- Forton® VF-774
- Water
- Plasticizer (see recommendation based on application method below)
- AR Glass Fiber (see recommendation based on application method below). **Important: Do not use "E" Glass**
- Pigments - UV Stable, Iron Oxide (liquid or dry, if required)
- Weighing Scales- with digital gram accuracy (do not use postal scale, dietary scale, etc.)
- Mechanical / Power Mixer: 5 - 10 hp vertical high shear mixer or CS Unitec handheld MG120, MG140 or MG160 blades
- NIOSH Approved Dust Mask to minimize dust inhalation while using components.
- Mixing Containers

Material	Suggested Products For: **Vibration, Direct Cast Premix**	Suggested Products For: **Sprayed Premix**	Suggested Products For: **Spray Up**
• AR Glass Fiber	Cem-FIL® 60 135 tex - 12mm	Cem-FIL® 60 135 tex - 12mm or 18mm	Cem-FIL® 54/76 Roving
• Plasticizer	WR Grace AdvaCast 555 (or equal)	WR Grace Adva 190 (or equal)	WR Grace Adva 190 (or equal)

Typical mix design proportions are shown in chart below for informational purposes only. Producers should develop their own mix design to accommodate their manufacturing process and local raw materials. Mix designs should target a water-to-cement ratio of .33.

Mix Design - Parts By Weight

	Portland Cement	Sand	VF-774	Water	Plasticizer	AR Glass Fiber
Premix	100	85	10 - 12	24 - 27	4 - 8 oz (118 - 236 ml)	3% by weight of entire mix
Spray Up	100	100	12 - 14	24 - 27	4 - 8 oz (118 - 236 ml)	5% by weight of entire mix

Important: Components should be mixed in proper sequence. Standard concrete mixers may be used, but it is recommended to use a high shear mixer specially designed for GFRC to ensure a thoroughly mixed, lump free slurry is produced.

Step 1: Weigh or batch all materials.

Step 2: Add all liquids, including VF-774 and 2 oz. of plasticizer, to mixer.

Step 3: Start mixer on slow (300-500 rpm).

Step 4: Add pigment if used.

Step 5: Add sand.

Step 6: Add cement and increase mixer speed to high (1,000-1,800 rpm).

Step 7: Mix for 1 - 2 minutes.

Step 8: Add the remaining plasticizer to achieve desired workability.

Step 9: Reduce mixer speed to slow (300-500 rpm) and gradually add fiber (Premix only) until dispersed (typically not more than one minute).

Important: Mixing too long or at too high a speed after fiber has been added can filamentize or damage the fiber, resulting in placement issues and reduced strengths.

APPLYING A RELEASE AGENT... Common mold materials include mold rubber, melamine coated board and birch faced plywood or FRP with tooling resin gel coat. Use a high quality release agent meant for releasing architectural concrete such as Crete-Lease 20 VOC to release GFRC castings from the mold.

CASTING, SPRAYING & CURING...

Casting - Pour mixture in a single spot at the lowest point of mold, and let mixture seek its level. **Vibrating:** After casting, consolidate the slurry and remove entrapped air using a vibrating table or hand vibrator.

Spraying - For higher volume of smaller parts or making large cladding panels, GFRC slurry can be sprayed into molds using rotor/stator or peristaltic pumps specifically designed for GFRC. Regardless of spray pump used, a face coat without fiber is typically applied first. After the face coat has properly stiffened, a fiber backup mix is applied in multiple passes, with proper compaction following each pass. **For low volume application** - A hopper gun (Kraft EZY Deck Pro is recommended) can be used to apply face mix. GFRC back up mix can be applied by hand.

Curing - After placement, cover GFRC with plastic tarp / sheeting to prevent excessive moisture loss and maintain heat of hydration to ensure a proper initial cure. Let cure in the mold for 12-16 hours. Curing temperatures should be maintained above 50°F/10°C in order to ensure proper film forming of the VF-774.