MasterFiber® MAC 360 FF

Synthetic Hybrid Fiber

Overview

MasterFiber® MAC 360 FF is a highly engineered, polypropylene-based synthetic hybrid fiber designed for use as a shrinkage and temperature (secondary) reinforcement. This new hybrid fiber provides unparalleled finishing aesthetics while maintaining concrete performance. MasterFiber MAC 360 FF hybrid fiber strengthens plastic concrete to minimize plastic shrinkage and settlement cracking, while effectively enhancing the post-crack flexural toughness of hardened concrete. Developed by Master Builders Solutions, MasterFiber MAC 360 FF hybrid fiber meets the collective needs of contractors, concrete producers and engineers.

Applications

The most common application for MasterFiber MAC 360 FF hybrid fiber is to replace welded-wire reinforcement (WWR) and small diameter steel bars often used as conventional shrinkage and temperature reinforcement in concrete projects. This includes:

- Hard-troweled concrete
- Industrial and warehouse slabs-on-ground
- Residential and commercial slabs-on-ground
- Concrete pavements, white-topping and overlays
- Composite metal decks
- Architectural panels

MasterFiber MAC 360 FF Hybrid Fiber Benefits and Features:

- Exceptional finishability
- Effective tight crack control
- Provides impact and shatter resistance
- Eliminates the need for welded-wire reinforcement (WWR) and conventional steel bars as secondary reinforcement
- Reliable reinforcement placement
- Excellent post-crack performance
- Improves green strength—permits earlier stripping of forms with less rejection
- Dependable plastic shrinkage control and reduced settlement cracking

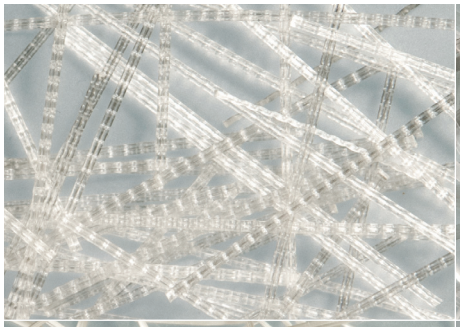
Potential Issues with Conventional Shrinkage and Temperature Steel Reinforcement

Issue	Description and Consequences	
Improper Positioning	WWR “ends up” at the bottom of the slab or the distributed steel is not chaired properly. • Steel reinforcement ineffective in holding cracks tight • Poor aesthetics • Increased slab maintenance costs	 
Jobsite Storage	Space required to store the WWR or steel bars. • Space may be at a “premium” • Handling equipment to unload WWR or steel bars to storage and later to the slab location	
Installation Costs	Significant labor costs are incurred with the installation of WWR or steel bars. • Requires skilled labor • Takes time and delays concrete placement • May require crane or other handling equipment • Typically requires concrete pump or crane/bucket	
Safety	WWR and steel bars pose a safety risk. • Trip and fall hazard • Hand and foot injuries • Lacerations and scrapes • Back strain • Potential to increase the Experience Modification Rate (EMR)	

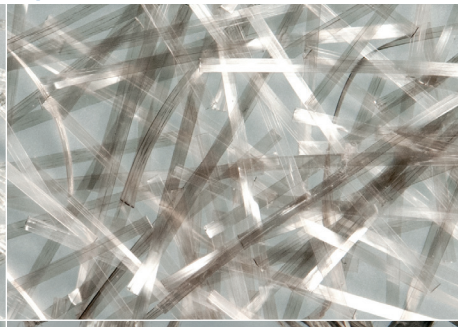
Performance Comparison

Synthetic macrofibers and hybrid fibers are manufactured in different forms and sizes that ultimately affect the placement, consolidation and finishability of fiber-reinforced concrete. The architecture of conventional synthetic macrofibers typically falls under four primary structure variations as shown in the photos below.

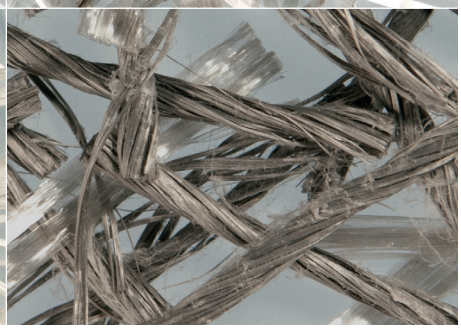
Stick



Tape



Rope A



Rope B

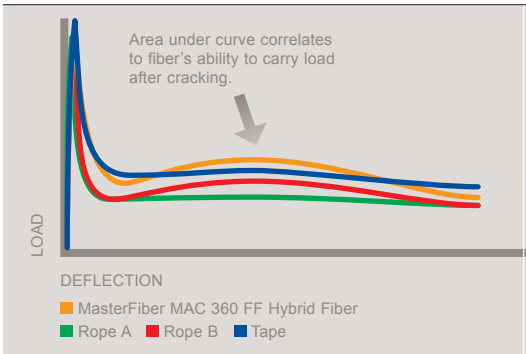
MasterFiber MAC 360 FF hybrid fiber has been engineered to provide post-crack flexural performance equivalent to, if not better than, that provided by most commercially available synthetic macrofibers, at equal dosages. The product's unique blended architecture offers an industry-best overall performance in both post-crack performance and finishability. The following charts summarize data from comparative evaluations to assess the performance of MasterFiber MAC 360 FF hybrid fiber and synthetic macrofibers with rope or tape architecture that are currently available in the marketplace.

MasterFiber MAC 360 FF Hybrid Fiber

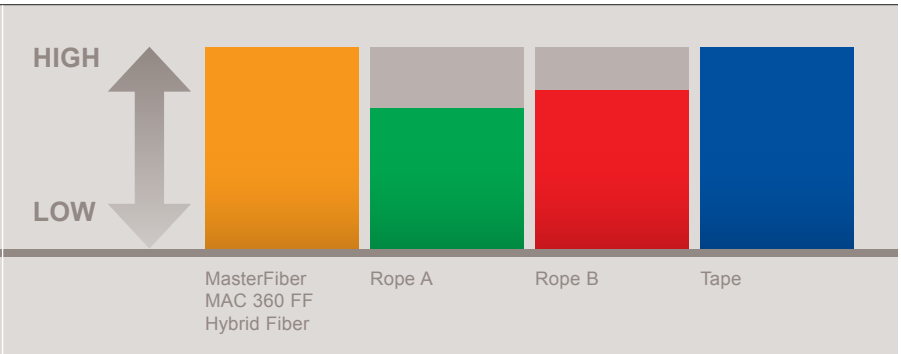
Post-Crack Flexural Performance

The curves below, on the left, show the post-crack flexural performance of the MasterFiber MAC 360 FF hybrid fiber and the rope and tape synthetic macrofibers, based on ASTM C1609/C1609M. As shown below, on the right, the post-crack flexural performance of MasterFiber MAC 360 FF hybrid fiber is relatively equivalent to, if not better than, that provided by the rope and tape synthetic macrofibers.

ASTM C1609 Flexural Performance



Relative Post-Crack Flexural Performance



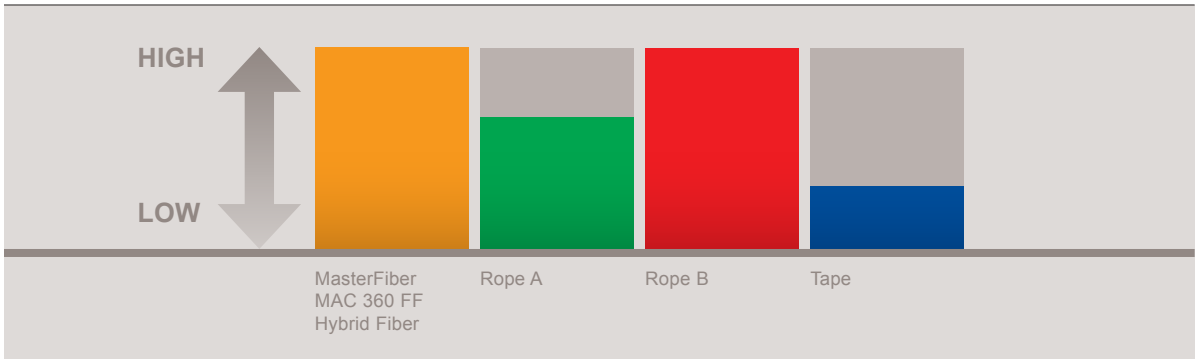
Aesthetic Performance (Finishability)

The finishing aesthetics of hardened concrete slabs reinforced with the MasterFiber MAC 360 FF hybrid fiber and the rope and tape synthetic macrofibers were assessed using the 'Aesthetic Performance Rating' chart below.

Aesthetic Performance Rating	High	Average	Low
Overall Appearance	Approaching plain concrete appearance.	Minimal surface fiber exposure.	Hairy, "whirly-bird" appearance.
Fiber Visibility	Visibility only from an up-close kneeling perspective.	Difficult detection from a standing perspective.	Fibers visible from any viewing perspective.
Slab Surface Texture	Smooth without any abrasiveness. Minimal to negligible fiber detection by touch.	Smooth to minor surface imperfections where fiber ends are exposed.	Rough, sand paper-like texture. Exposed fibers able to collect wind carried debris.

The results below show that MasterFiber MAC 360 FF hybrid fiber provides a surface finish that is relatively equivalent to, if not better than, the rope and tape synthetic macrofibers.

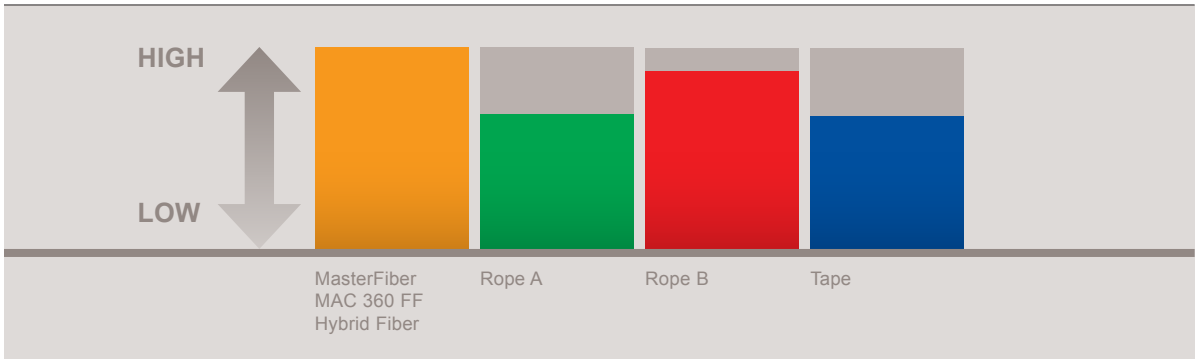
Relative Aesthetic Performance



Overall Post-Crack Flexural Performance and Aesthetics Rating

The overall post-crack flexural performance and aesthetics rating, based on equal weighting of their post-crack flexural and aesthetic performance ratings, was computed for each fiber. As shown below, the MasterFiber MAC 360 FF hybrid fiber provided the best balance between post-crack flexural performance and final finishing aesthetics, relative to the rope and tape synthetic macrofibers.

Combined Mechanical and Aesthetic Performance



MasterFiber MAC 360 FF hybrid fiber offers a truly unique, non-corrosive, three-dimensional alternative solution to welded-wire reinforcement, light diameter bars and the steel fibers used as conventional temperature and shrinkage reinforcement in concrete. Most importantly, MasterFiber MAC 360 FF hybrid fiber provides an aesthetically pleasing surface finish.

Master Builders Solutions

The Master Builders Solutions brand brings expertise to create chemical solutions for construction using experience gained from more than a century in the construction industry.

The know-how and experience of a global community of construction experts form the core of Master Builders Solutions. We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction.

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