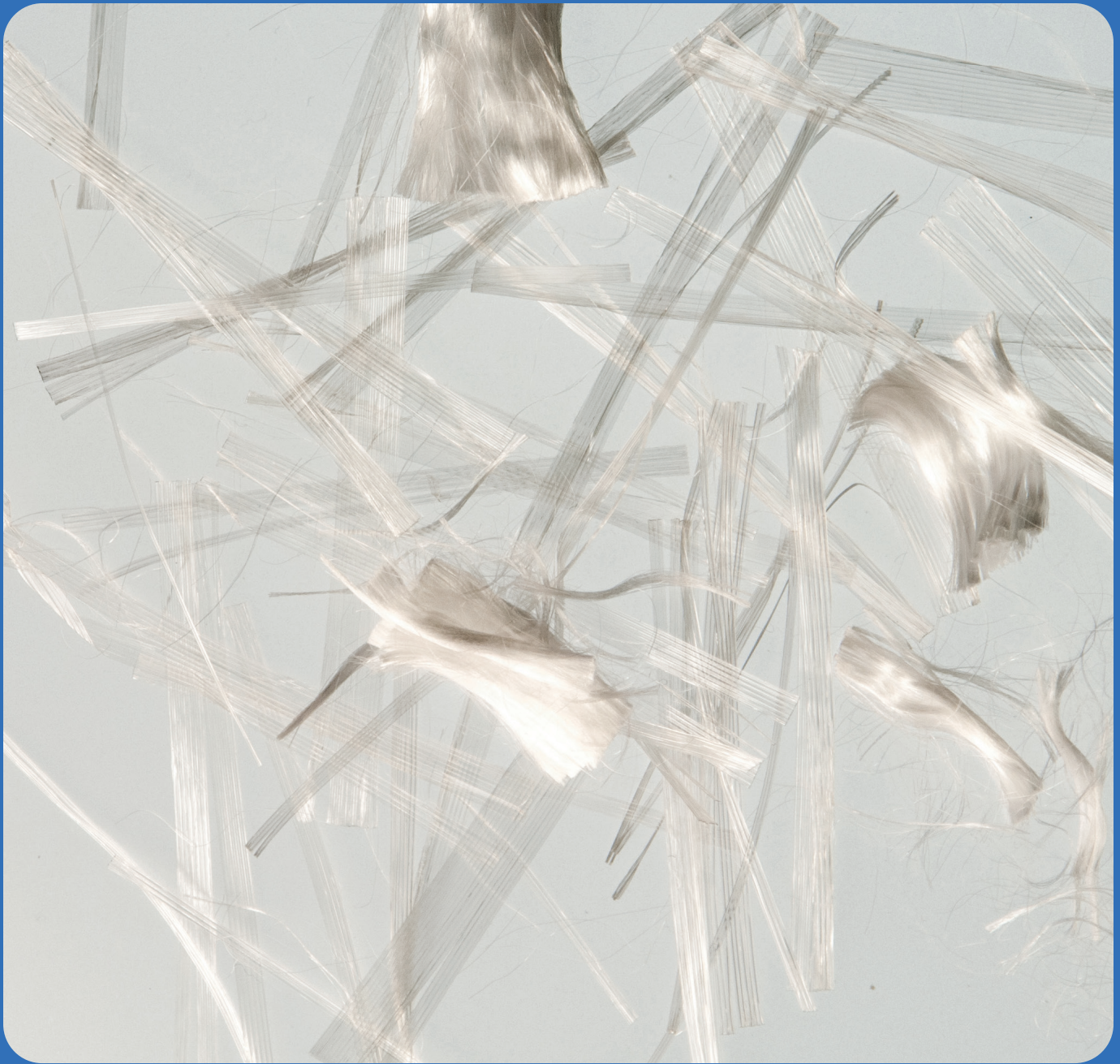


MASTER[®]
» BUILDERS
SOLUTIONS

— MasterFiber[®]
MAC 360 FF
Synthetic
Hybrid Fiber





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

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.




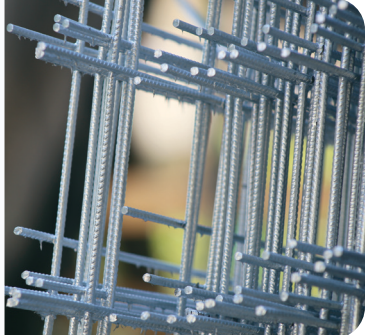


Applications

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

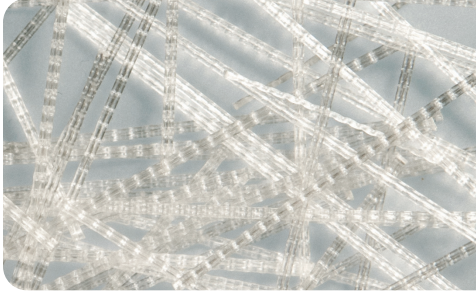
Potential Issues with Conventional Shrinkage and Temperature Steel Reinforcement

Issue	Description and Consequences
Improper Positioning	<p data-bbox="410 478 1023 552">WWR “ends up” at the bottom of the slab or the distributed steel is not chaired properly.</p> <ul data-bbox="410 562 1084 684" style="list-style-type: none"><li data-bbox="410 562 1084 596">• Steel reinforcement ineffective in holding cracks tight<li data-bbox="410 606 621 640">• Poor aesthetics<li data-bbox="410 651 844 684">• Increased slab maintenance costs 
Jobsite Storage	<p data-bbox="410 867 1011 900">Space required to store the WWR or steel bars.</p> <ul data-bbox="410 911 1060 1033" style="list-style-type: none"><li data-bbox="410 911 802 945">• Space may be at a “premium”<li data-bbox="410 955 1060 1033">• Handling equipment to unload WWR or steel bars to storage and later to the slab location 
Installation Costs	<p data-bbox="410 1188 948 1255">Significant labor costs are incurred with the installation of WWR or steel bars.</p> <ul data-bbox="410 1266 1055 1436" style="list-style-type: none"><li data-bbox="410 1266 696 1299">• Requires skilled labor<li data-bbox="410 1310 964 1344">• Takes time and delays concrete placement<li data-bbox="410 1354 1027 1388">• May require crane or other handling equipment<li data-bbox="410 1398 1055 1436">• Typically requires concrete pump or crane/bucket 
Safety	<p data-bbox="410 1530 896 1564">WWR and steel bars pose a safety risk.</p> <ul data-bbox="410 1575 1040 1822" style="list-style-type: none"><li data-bbox="410 1575 670 1608">• Trip and fall hazard<li data-bbox="410 1619 709 1652">• Hand and foot injuries<li data-bbox="410 1663 727 1696">• Lacerations and scrapes<li data-bbox="410 1707 565 1740">• Back strain<li data-bbox="410 1751 1040 1822">• Potential to increase the Experience Modification Rate (EMR) 

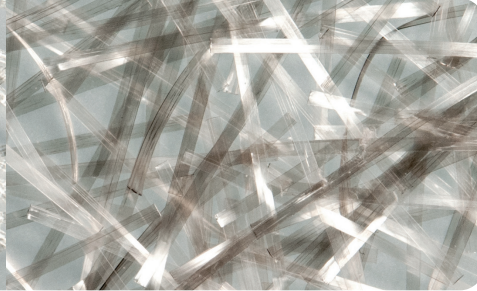
Performance Comparison

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.

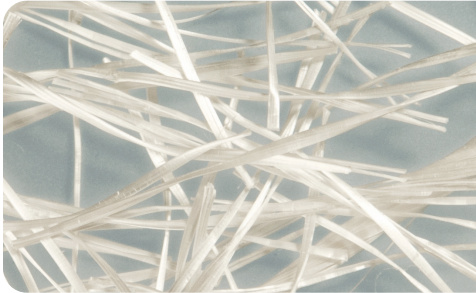
Stick



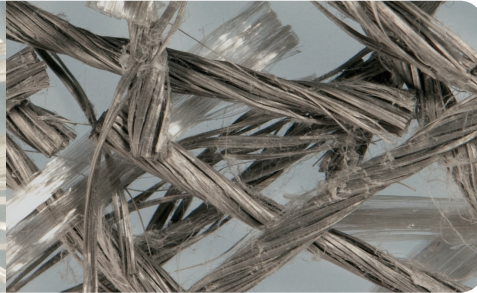
Tape



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

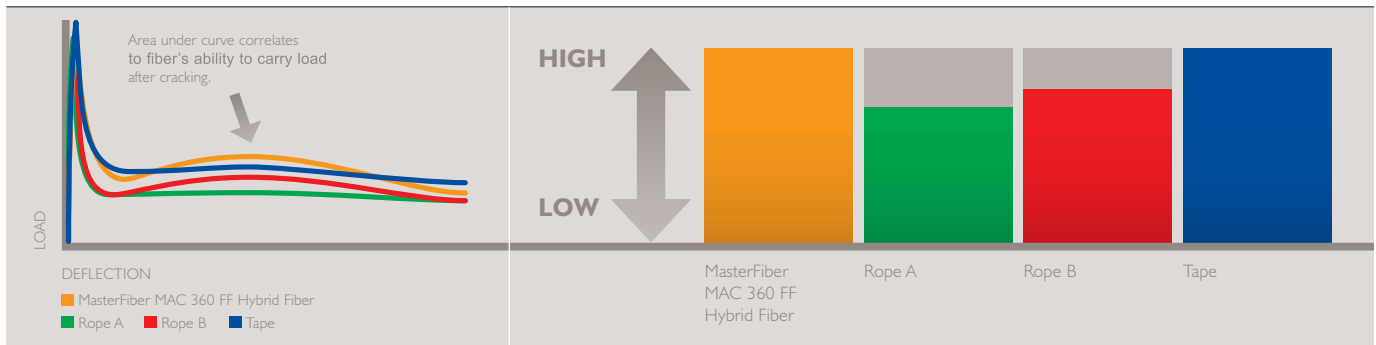


Post-Crack Flexural Performance

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



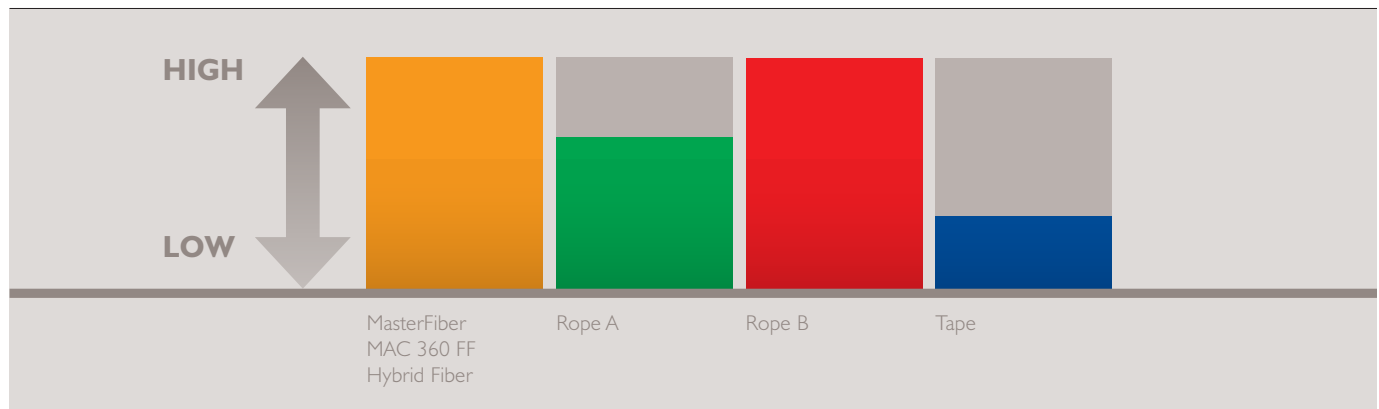
Aesthetic Performance (Finishability)

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 upclose 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.

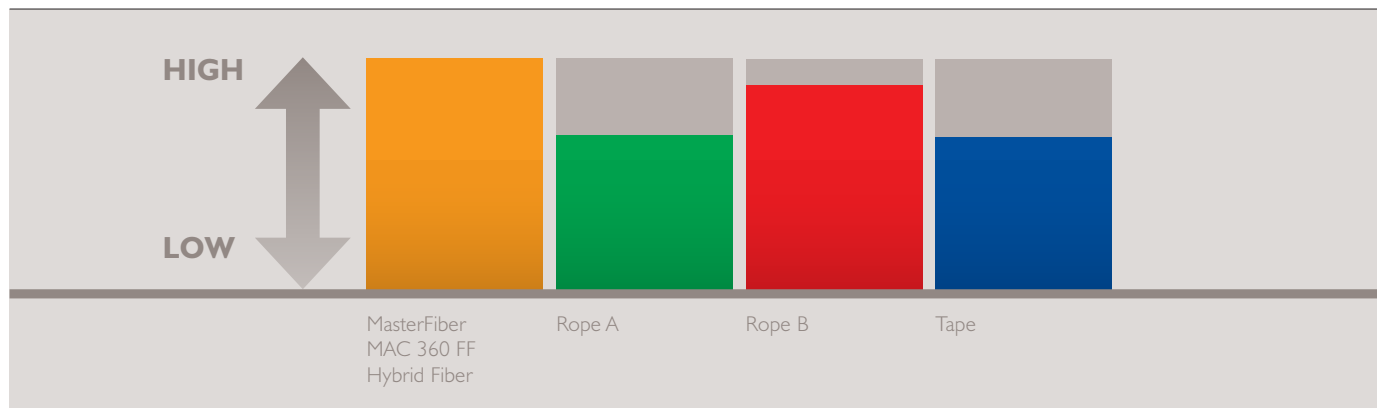
Relative Aesthetic Performance



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.

About Master Builders Solutions

Master Builders Solutions is a leading global manufacturer of concrete admixtures, as well as other sustainable solutions for the construction industry, focussed on delivering its vision: **Inspiring people to build better**. Master Builders Solutions provides value-added technology and market-leading R&D capabilities to improve the performance of

construction materials and to enable the reduction of CO2 emissions in the production of concrete. Founded in 1909, Master Builders Solutions has ca. 1600 employees operating 35 production sites globally, supporting their customers in mastering their building challenges of today – for a decarbonised future.

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