

Fiber Reinforced concrete for crack reduction

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Competitive products based on natural fibers are being developed that show excellent technical performance and harm the environment less than current products. The concept of using fibers as reinforcement is not new. Fibers have been used as reinforcement since ancient times. In the 1900s, asbestos fibers were used in concrete. In the 1950s, the concept of composite materials came into being and fiber-reinforced concrete was one of the topics of interest. Once the health risks associated with asbestos were discovered, there was a need to find a replacement for the substance in concrete and other building materials. By the 1960s, steel, glass (GFRC), and synthetic (such as polypropylene) fibers were used in concrete. The research on fiber for concrete is happening across the globe for a long time. One such development is fibrillated polypropylene [micro-fiber for concrete reinforcement](#).

Fibrillated polypropylene micro fibers are usually used in concrete to control cracking due to plastic shrinkage and drying shrinkage. They also reduce the permeability of concrete and thus reduce bleeding of water. The amount of fibers added to a concrete mix is expressed as a percentage of the total volume of the composite (concrete and fibers), termed "volume fraction" (Vf). Vf typically ranges from 0.1 to 3%. The aspect ratio (l/d) is calculated by dividing fiber length (l) by its diameter (d). Fibers with a non-circular cross-section use an equivalent diameter for the calculation of aspect ratio. If the fiber's modulus of elasticity is higher than the matrix (concrete or mortar binder), they help to carry the load by increasing the tensile strength of the material. Increasing the aspect ratio of the fiber usually segments the flexural strength and toughness of the matrix. However, fibers that are too long tend to "ball" in the mix and create workability problems.

FIBERCRETE – WF (Waved Macro Fiber) from Kalyani Polymers

FIBERCRETE is the latest innovation in polymer extrusion products developed by KALYANI POLYMERS PVT LTD, based in the south of Bangalore engaged in the manufacture of niche polymer products which have been exporting replacements for the Indian market. The company has always maintained the highest quality standards, in terms of Products, Service, and Delivery. There are several types of FIBERCRETE products available. In this article, we have focused on FIBERCRETE – WF (Waved Macro Fiber).

FIBERCRETE WF is a Waved Macro Fiber for concrete reinforcement that complies with ASTM C 1116, IRC: SP: 46 – 2013, MORTH, Standard Specification for Fiber Reinforced Concrete and Shotcrete etc, and is specifically designed to help mitigate the formation of shrinkage cracking in concrete.

Primary Applications of FIBERCRETE – WF (Waved Macro Fiber)

FIBERCRETE – WF (Waved Macro Fiber) has been welcomed unanimously by the Construction, Engineering and Infra Sectors adding value to the Concrete by mitigating its Weakness like water bleed, shrinkage, etc and empowering the modern-day concrete enhancing the versatility of its usage. Some of its application are;

- Industrial, Commercial and primary reinforcement application
- Footings, Foundations, PQC, Canals, Tunnels
- Vault structures, Parking Area, Pavers and other areas where Steel Cannot be used

Benefits of FIBERCRETE – WF (Waved Macro Fiber)

FIBERCRETE – WF (Waved Macro Fiber) offers more resistance to cracking and it is lighter than traditional concrete. It can sustain strain-hardening up to several percent strain, resulting in a material ductility of at least two orders of magnitude higher when compared to normal concrete. It also exhibits crack control behavior. Some of its benefits are given below;

- Controls and mitigates plastic shrinkage cracking
- The waveform for Engineered cross-linking in concrete
- Provides three-dimensional reinforcement against micro-cracking
- Used along with FIBERCRETE FE for Steel substitution
- Reduction of in-place cost versus wire mesh for temperature/shrinkage crack control
- Easily added to the concrete mixture at any time before mixing
- Cost-Effective Alternative to Steel Reinforcement.

Conclusion

During the curing process, concrete experiences shrinkage as the water evaporates. This process can cause cracks or other imperfections in the concrete. Fibers can help to improve a concrete's resistance to shrinkage, which will, in turn, reduce its cracking. In applications where the look and feel of the concrete are important, Waved Macro Fibers can create a clean and seamless finish. From durability to look, Kalyani Polymers Waved Macro Fibers can add a wealth of benefits to your project.
