



## TECHNICAL BULLETIN FC-14

# BLENDED FIBER SYSTEMS FOR CONCRETE REINFORCEMENT

To improve concrete's technical and mechanical properties, the use of micro, macro or blended micro/macrob fibers can be used as reinforcement in a three-dimensional orientation throughout the entire concrete matrix. Homogeneously distributed and randomly oriented, these fibers will mitigate and control cracks in concrete in all directions, improving long-term durability, fatigue resistance and flexural toughness. However, each of these fiber types have different mechanisms in concrete depending on the application and required performance.

Synthetic microfibers are typically used for plastic shrinkage mitigation, providing the early-age tensile strength needed within the matrix when concrete is still plastic, and relying on millions of filaments per pound, it will prevent or reduce the occurrence of cracks. These types of fibers generally do not add any structural capacity to the concrete and are unable to provide any resistance to wider crack openings caused by drying shrinkage or structural stresses. Nevertheless, these products should be regularly specified in any type of concrete or mortar to improve cracking and spalling resistance, freeze-thaw durability and improve the homogeneity of concrete during placement.

Synthetic and/or steel macrofibers are generally used for controlling shrinkage and temperature cracks but can also provide post-crack load carrying capacity in concrete structures allowing for the replacement of wire mesh and light steel rebar for some applications. Dimensional changes due to temperature gradients, shrinkage due to drying, freeze-thaw cycling, ground movement, soil settlement, excessive loading and impact could also result in the formation of cracks in hardened concrete. Macrofibers can be engineered and specified for controlling these cracks and to provide additional toughness and durability.

Not all macrofibers are the same – when requiring engineered performance to be equivalent to conventional reinforcing, it is important to select the correct macrofiber and dosage also considering the ability of the fiber to place, consolidate and finish with ease. Rigid synthetic macrofibers and steel fibers are known for having low fiber volume content per pound, which means they will cover less surface area on concrete and most likely provide lessened shrinkage/temperature crack control. This is where the addition of a microfiber to assist in controlling plastic shrinkage cracking can be advantageous.



*For additional questions, comments or further explanations, please feel free to contact The Euclid Chemical Company at your convenience.*



## TECHNICAL BULLETIN FC-14

# BLENDED FIBER SYSTEMS FOR CONCRETE REINFORCEMENT

## EUCLID CHEMICAL'S TUF-STRAND SUPERMIX PRODUCTS

Euclid Chemical has developed a product line with blended fibers to meet specifications requiring these types of products for concrete reinforcement. TUF-STRAND SuperMix is a macro/micro synthetic fiber blend successfully used as an alternative to steel fibers and welded wire mesh in a wide variety of secondary reinforcement applications. TUF-STRAND SuperMix fibers comply with ASTM C1116, Standard Specification for Fiber Reinforced Concrete and Shotcrete, and are specifically used for the reduction of plastic shrinkage cracks, to improve impact, shatter and abrasion resistance, to increase fatigue resistance, to increase toughness of concrete and provide long term durability of concrete and cement-based building products. This product line has various configurations and lengths of blended TUF-STRAND macrofibers with PSI Fiberstrand monofilament or fibrillated synthetic microfibers including:



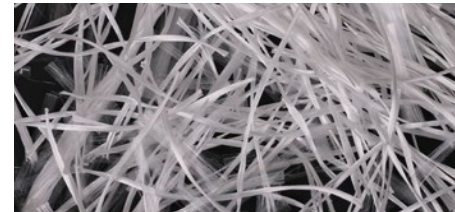
### TUF-STRAND SUPERMIX 31

Blend of 3 lb of macrofiber with 1 lb monofilament microfiber



### TUF-STRAND SUPERMIX 41

Blend of 4 lb of macrofiber with 1 lb monofilament microfiber



### TUF-STRAND SUPERMIX 41F

Blend of 4 lb of macrofiber with 1 lb fibrillated microfiber

Euclid Chemical can also provide its single macrofiber product TUF-STRAND SF which has also been tested and evaluated to provide both plastic shrinkage crack protection and replace conventional reinforcement providing residual strength capacity to the concrete structure. This patented product has a unique dispersion and anchor mechanism which provides a higher surface contact area between the fiber and concrete matrix, improving crack control and providing equivalent performance to a blended macro/microfiber system

For more information on Euclid Chemical's line of fiber products, including TUF-STRAND SuperMix, please contact the Euclid Chemical Company or visit our website at [www.euclidchemical.com/products/concrete-fibers/](http://www.euclidchemical.com/products/concrete-fibers/)