

Silacon Corporation

Model QTFF50-1S Quasi-Q-Tip™ Shaped Fibers

The Silacon Quasi-Q-Tip™-shaped QTSS50-1S SFRC macrofiber for concrete and plastics improves toughness, flexural strength, longevity, pumping, & mixing, while reducing costs from one of our regional factories or at lower cost via our customer owned or leased micro-mills.

A Brief History:

Silacon Corporation created in ‘collaboration’ with Los Alamos National Laboratory the Q-Tip™-like fibers. The latest QTSS50-1S is 50 mm length, 1 mm diameter, fireproof, corrosion resistant. It protects rebar by significantly reducing cracking, eliminates mesh, and most rebar. In addition, it increases bending stiffness and ductility. Silacon introduced optimization artificial intelligence manipulated defining functions for mix design with fiber.

The chart below is the ASTM1399 7-day test, 50-percent improvement compared to leading competitors.

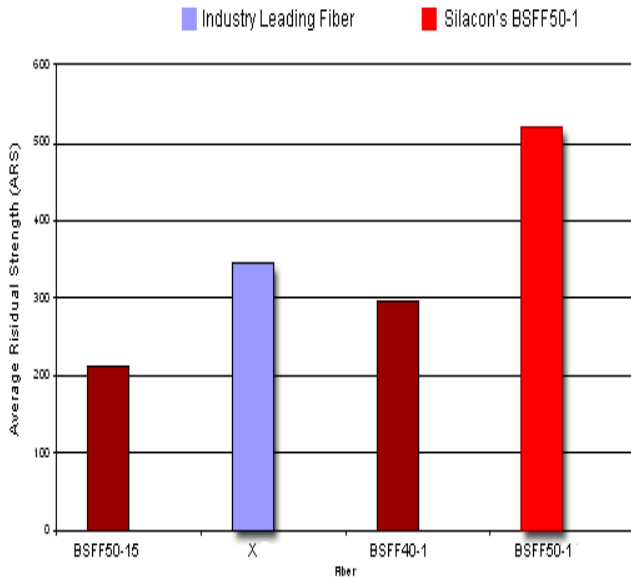


Fig 6: Comparison of Average Residual Strengths of Steel fibers at 7 days

Consider Price-Performance-Delivery..

Dosages to reduce cracking to less than 0.60 MM average:

•Industrial ‘slabs on grade’ precast pipes, bases for utility transformers, heavy machine placements, reservoirs, tank farms:

Apply up to 66-132 PCY observing rheology (stiffness to flow). See our website: (www.silacon.com)

•Polymer concrete:

Apply 44-132 PCY of QTSS50-1S observing compression rating

Fiber Properties:

•The ball on the ends lock tight in the matrix to defeat cracking in concretes and plastics. The fibers need not bond to work well. Additional custom modulated features add structural performance far beyond shrinkage crack control.

•South Dakota School of Mines ASTM 1399 confirmed superiority of the Silacon-LANL derived Q-Tip™ shaped fibers.

•QTSS50-1S are fibers created by mechanical deformation of 1006 or 1008 steel wire of tensile yield of greater than 120 Kpsi.

•GTSS50-1S ARS (Average Residual Strength) is 400 in 4 Kpsi Compression rated PC concrete.

•Model QTFF50-1S fibers are compatible with industry-established competitor application documents and scenarios. Contact our engineers. Propex rules apply to QTSS50-1S regarding 50 mm steel fibers.

•MSDS sheet for QTSS50-1S similar to that of competing 1006 or 1008 steel fibers. See Cargill Steel & Wire DFW Texas

Where to find more detailed Information:

•Contact us in Woodbury, Minnesota Phone 651-738-1965 charles@silacon.com, or silacon@gmail.com www.silacon.com

APPLICATIONS:

•Apply to highways, bridges, driveways, PV solar, wind turbine bases, polymer, PC precast pipes; to eliminate mesh and rebar. QTFF50-1S preferred for natural disaster and waste containment.

• Apply in concrete, plastic, or geopolymer structures for public works, electrical, telecoms, transformers and switchgear vaults, communication’s towers, all marine and automotive structures

•Apply mineral processing structures; offshore platforms, chemical tank farms, mining facilities

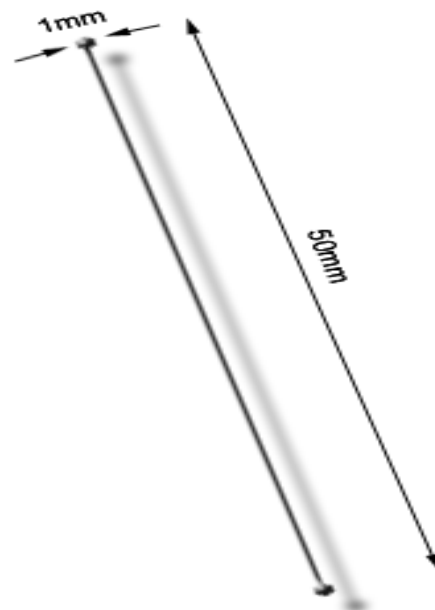
• Apply in industrial plants and robotic enabled warehouses

• Apply in airport runways, game courts, agriculture, and water reservoirs

•GTSS50-1S ships in sealed returnable widely useful weatherproof containers easily rolled to eliminate ‘handling’ stresses.

•QTFF50-1S eliminates corrosive rebar & mesh scenarios in concrete, increases pumping freedom, reduces air entrainment, increases uniformity, lowers construction cost, improves safety, reduces need of saw cuts, and reduces delays.

Silacon offers cost effective advanced design for you via our premier applications team and website.



The Fiber Application Process:

The first step in the fiber application process is mix design. The problem statement is most important. One must ask, "What do we want from this design?" Remember; everything in mix design affects choices and applications of everything else in the mix.

1. The design specification for mix must consider the following:
 - i. Compression expected in Pascals
 - ii. Flexural strength (Bending Stiffness)
 - iii. Plate shear expected.
 - iv. Detailed definition of available materials to make concrete (Constituents)
 - v. Factorial Design of Experiments to determine effects of changes in and to constituents considering:
(Note: The National Institute of Standards and Technology provides excellent mix design information for PC and Polymer based concrete)
 - vi. Quality of Portland cement
 - vii. Surface area and quality of sand and aggregates
 - viii. Environmental conditions
 - ix. Tensile properties of concretion (Mix)
 - x. Permeability of the concrete permitted. (Water and CO₂ ingress)
 - xi. Impulse response toughness required to withstand expected shock
 - xii. Vibration tolerance required
 - xiii. Fatigue properties of concrete required.
 - xiv. Freeze-thaw properties
 - xv. Option of CO₂ carbonation plus hydration

2. The fiber properties:
 - i. Tensile to yield (Young's modulus of fiber material)
 - ii. Anchoring effects, due to nodules (This is a Green's probabilistic elastodynamic neo-Hookean tensor with relativistic manifold extensions.) We seek a Dirac Impulse based solution to the Green's function.
 - iii. A traction tensor related to the fiber (drag on pullout)
 - iv. An adhesion tensor (bonding of the fiber to the mix (Not a significant factor for the QTSS50-1S steel or the PP (Polypropylene))
 - v. Fatigue properties of the fiber
 - vi. Fiber and concretion ductility
 - vii. Deformation tensor of nodules and of contiguous matrix
 - viii. Toughness (Average Residual Strength or ARS) being the energy per unit volume absorbed over a stress period. (Rating of the fiber to ASTM1399 or next level up method)

3. Customer-Silacon Process:
 - a. Silacon contacts the engineer responsible for structural design to receive the specifications, drawings, and special problems needing solutions.
 - b. Silacon analyzes the documents calculating the fiber needs for each part of the project.
 - c. Silacon proposes mix to NIST.gov, ACI and South Dakota School of Mines & Technology (SDSM&T does not assume liability) design based on the price, performance and delivery criteria set out by the engineer.
 - d. The engineer and Silacon agree to terms regarding each fiber application whereupon Silacon reviews the plan with an outside expert firm and testing agency to corroborate the robustness of the design.
 - e. On-line design applies computing engines at very high level mathematical physics to solve and optimize the mix design with fiber (Note: More than fifty factors at up to fifty levels evaluated to optimize the mix design)
 - f. Silacon defines the methods of fiber delivery and mixing.
 - g. Silacon provides (sells) customer Sencrete Sensors to track cure and usage over time.

4. Silacon places an observer at the site to assure QC and process as planned.
 - a. The Nature of SFRC applications is very complex; thus, Silacon on large projects maintains site presence to guarantee performance and solve problems to specification.
 - b. Silacon shall read sensors from Silacon headquarters to monitor health of the state of cure and use over time.