

# STRUX® 90/40 Synthetic Macro-fibers Data Sheet

Synthetic Macro Fiber for reinforcement of concrete

## Product Description

STRUX® 90/40 synthetic macro fibers are a unique form of high strength, high modulus synthetic reinforcement that is evenly distributed throughout the concrete matrix. The macro fibers add toughness, impact and fatigue resistance to concrete and improve residual strength and durability. Unlike traditional microfiber reinforcement, STRUX® 90/40 macro fibers are specifically engineered to provide post-crack control performance.

Reinforced concrete with STRUX® 90/40 macro fibers has been shown to reliably achieve residual flexural strength values in excess of 150 psi (1 MPa) at dosages that can easily be batched and finished. STRUX® 90/40 macro fibers are 1.55 in. (40 mm) in length with an aspect ratio of 90 and have specifically been designed to replace welded wire reinforcement, steel fibers and light rebar reinforcement. STRUX® 90/40 macro fibers are a user-friendly fiber reinforcement, which are easier and safer to use, compared to these other types of reinforcement.

## Compliance and Certification

- ASTM C1116 / C1116M, Standard Specification for Fiber-Reinforced Concrete, Type III Synthetic Fiber-Reinforced Concrete
- ASTM D7508 / D7508M, Standard Specification for Polyolefin Chopped Strands for Use in Concrete
- ANSI/SDI C-2017, Composite Steel Floor Deck Slabs (Section 2.4.B.15.a.3)
- UL and ULC Classified; CBXQ.R13667 and CBXQ7.R13667
- CSA B66-16, Design, material and manufacturing requirements for prefabricated septic tanks and sewage holding tanks
- Evaluated by ICC-ES; see Evaluation Report No. ESR-2942
- CE certification (EN 14889-2)

## Product Advantages

- Can be used to completely or partially replace light rebar, welded wire reinforcement and steel fibers.
- Saves money through reduction or elimination of steel labor and material movement and storage costs, and fewer construction days.
- Enhances jobsite safety by eliminating handling of steel fibers, welded wire reinforcement and rebar.
- Enhances jobsite safety by eliminating tripping hazards commonly associated with welded wire reinforcement and rebar.
- Eliminates concerns of proper positioning of reinforcement.
- Provides superior crack control due to the geometry, elastic modulus, and corrosion resistant properties (non-ferric). Due to unique fiber design and uniform three dimensional dispersion, both plastic and drying shrinkage cracking is reduced, improving the ductility and durability of the concrete.

- Ease of pumping, passes easily through pump grates.
- May be used to provide effective crack width control.
- Reduces shotcrete rebound and improves cohesion.

## Primary Applications

STRUX® 90/40 macro fibers may be used in a variety of ready mix, precast and shotcrete applications including slab-on-ground flooring, overlays, pavements, bridge decks, composite steel floor deck assemblies, mass concrete, thin-walled precast elements (septic tanks, vaults, walls, etc.), tunnel linings, pool construction and slope stabilization.

### Slab-on-Ground

STRUX® 90/40 macro fibers are specially designed for ease of use, rapid dispersion, good finishability and improved pumpability in slab-on-ground flooring and pavements. They may be used in commercial, industrial and residential floors, as well as other flat work and formwork applications.

### Traditional light steel reinforced elements:

STRUX® 90/40 macro fibers can be used as a suitable alternative to welded wire reinforcement or light reinforcing steel specified for temperature and shrinkage reinforcement.

### Precast and Prestressed concrete:

STRUX® 90/40 macro fibers can be used as a replacement for secondary reinforcements of normal and lightweight precast concrete elements and structures. (e.g. staircases, cellars, manholes, pits, septic tanks, vaults, walls etc.)

### Composite Steel Floor Deck for Normal and Lightweight Concrete

STRUX® 90/40 macro fibers can be used as a suitable alternative to welded wire reinforcement or light reinforcing steel specified for temperature and shrinkage reinforcement for composite steel floor deck assemblies. STRUX® 90/40 macro fibers comply with American National Standards Institute/ Steel Deck Institute (ANSI/SDI C-1.0) design code provisions for minimum reinforcing at the minimum addition rate of 4 lb./yd<sup>3</sup> (2.4 kg/m<sup>3</sup>). STRUX®90/40 macro fibers are UL (U.S.) and ULC (Canada) classified with fire ratings up to two hours for D700, F700, D800, F800, D900 and F900 series except for 909, at a maximum addition rate of 5 lb./yd<sup>3</sup> (3 kg/m<sup>3</sup>). To view UL and ULC Classification go online to [www.ul.com](http://www.ul.com), file #R13667.

## Addition Rates

STRUX® 90/40 macro-fiber addition rates are dependent on the specific application and desired properties, and will typically vary between 3 to 8 lb./yd<sup>3</sup> (1.8 to 4.8 kg/m<sup>3</sup>). Please consult your GCP Applied Technologies sales representative for proper addition rate of STRUX® 90/40 macro fibers for your application. Always consult local building codes.

Slab-on-Ground using GCP's STRUX App available for both Android and Apple OS.

## Composite Steel Floor Deck for Normal and Lightweight Concrete

The addition rate of STRUX<sup>®</sup> 90/40 macro fibers as an alternative to specified steel reinforcement for temperature and shrinkage can be easily calculated using GCP's STRUX<sup>®</sup> App available for both Android and Apple OS. Refer to the Uses section of this document for Code Compliance and UL/ULC Classification requirements.

### Guidelines for Usage and Compatibility with Other Admixtures

The utilization of STRUX<sup>®</sup> 90/40 macro fibers may require the use of a mid-range water reducer or a high-range water reducer such as our MIRA<sup>®</sup> or ADVA<sup>®</sup> families of admixtures to restore the required workability. In addition, slight increases in fine aggregate contents may be needed. Please contact your GCP Applied Technologies representative with any questions. STRUX<sup>®</sup> 90/40 macro fibers may be added to concrete at any point during the batching or mixing process. After the macro-fiber addition, the concrete must be mixed at a minimum of 70 revolutions to ensure adequate dispersion. For more detailed instructions, refer to Technical Bulletin TB-1200.

STRUX<sup>®</sup> 90/40 macro fibers are compatible with all GCP admixtures. Their action in concrete is mechanical and will not affect the hydration process of the cement or compressive strength. Each liquid admixture should be added separately to the concrete mix.

### STRUX<sup>®</sup> 90/40 PHYSICAL PROPERTIES FIBERS

Specific gravity	0.92
Absorption	None
Modulus of elasticity	1,389 ksi (9.5 GPa)
Tensile strength	90 ksi (620 MPa)
Melting point	320°F (160°C)
Ignition point	1,094°F (590°C)
Alkali, acid & salt resistance	High
Material	100% virgin polypropylene and polyethylene blend
Electrical and Thermal Conductivity	Low
Nominal Length	1.55 in. (40 mm)
Nominal Aspect Ratio	90
Nominal Equivalent Diameter	0.017 in. (0.43 mm)
Nominal Fiber Count	85,100 per lb (187,000 per kg)

### Finishing

STRUX<sup>®</sup> 90/40 macro fiber-reinforced concrete floors can be finished with most finishing techniques. Due to its characteristics, STRUX<sup>®</sup> 90/40 macro fibers is suitable to be used in power/hand troweled concrete, colored and broom finished concrete.

## Packaging

STRUX® 90/40 macro fibers are available in 1 lb. or 5 lb. (0.5 kg or 2.3 kg) Concrete-Ready™ bags.

## Safety and Handling:

Read and understand the product label and Safety Data Sheet (SDS). All users should acquaint themselves with this information prior to working with the products and follow the precautionary statements. SDSs can be obtained by contacting your local GCP representative or office.

U.S. Patent No. 6,569,525

U.S. Patent No. 6,569,526

U.S. Patent No. 6,758,897

U.S. Patent No. 6,863,969

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GCP Applied Technologies Inc., 2325 Lakeview Parkway, Suite 475, Alpharetta, GA 30009, USA

GCP Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6

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