KRAMPE HAREX®

KNOW WHY.

UHPC

Ultra-high Performance Concrete

Steel fibres **for structural & aesthetical UHPC applications**

UHPC

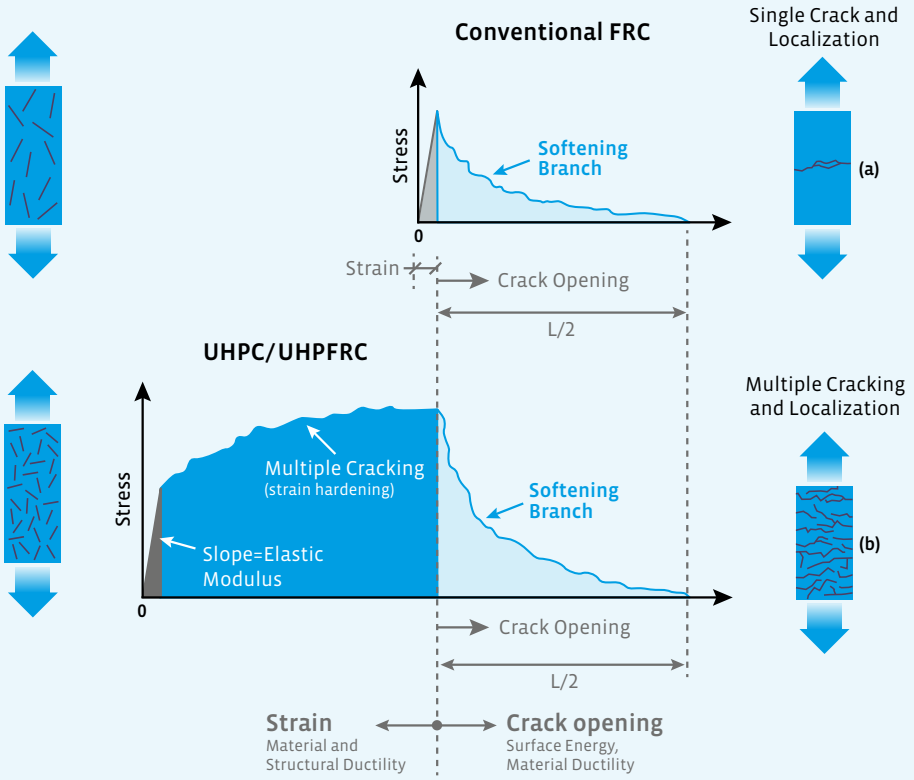


Figure 1:
Typical tensile stress-strain behavior of FRC and UHPC (Naaman, 2003)

UHPC or UHPFRC (Ultra-high-performance fibre reinforced concrete), reaching 150 MPa under compression and showing a strain hardening load deflection behavior, a high packing density with a grain size of 5 mm and a water/cement ratio below 0.25.

The high micro steel fibre content to provide a strain-hardening behavior under tension and a ductile failure mode under compression. UHPC contains steel fibres between 1.5 % to 3 % of the total volume (120 kg/m³ and 240 kg/m³). The relatively high content of steel fibres avoids a brittle failure when very high stresses under compression or bending are reached.

Properties

- UHPC is an extremely compact material with almost no porosity which leads to an extrem tightness
- The corrosion strength even under cracked state and aggressive exposure environments is several times higher than with ordinary reinforced concrete
- Outstanding ductility, high compressive strength, and the quality of the aggregates makes UHPFRC an extremely good material under impact and abrasion
- Significant material savings, extended lifetime and less maintenance allow CO_2 savings despite a relatively high global warming potential of the material
- The lifespan of a UHPC structure is significantly extended

© by Peter Buitelaar

»NEW POSSIBILITIES FOR CONSTRUCTION DESIGN«

© by UHPC solutions

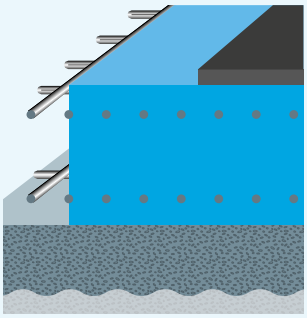
For UHPC KrampeHarex offers straight fibres with a length from 6 mm to 20 mm with a diameter from 0.15 to 0.3 mm. Our factory in Hamm Germany offers custom made geometries on demand. For functional UHPC carbon steel wire fibres are sufficient.

For aesthetical demanding UHPC stainless steel fibres prevent visual defects on the concrete surface due to corrosion. More than 20 years' experience has shown that a stainless-steel grade E304 works well with normal outdoor concrete exposure. For high corrosive exposure from chlorides or acid the grade E316 has been proofed.

Bridge deck preservation

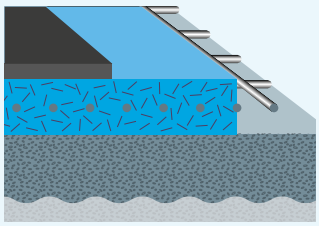
Keeping bridges in a good condition is essential to keep our infrastructure working. Ultra-high-performance fibre reinforced concrete offers enhanced durability and improved life-cycle cost for bridge renovation and repair. Moreover, the method allows to preserve and restrengthen bridges which have reached the design life or which are overloaded.

Several countries have introduced UHPC as a material for bridge preservation and repair by the building authorities. Additionally, UHPC repairs are durable and resilient, requiring less maintenance and fewer follow-up repairs than conventional methods. In countries like France, USA and Switzerland dozens of Bridge Deck Overlays and Girder Repair projects with UHPFRC have been realized.



Reinforced concrete bridge construction

Reduction in panel thickness: approx 60 % concrete volume and weight and less dead weigth



UHPC bridge construction

UHPC for aesthethic design

KrampeHarex steel fibre reinforcement of UHPC cladding elements guaranties the outstanding properties and allows to substitute or reduce rebar reinforcement. Stainless steel micro fibres guarantee the structural and aesthetical properties. UHPC with fibres is expected to have a exceeded lifetime of 100 to 120 years.

© by lisa ricotti

KRAMPE HAREX

KRAMPE HAREX®

KNOW WHY.

FIBRE TYPES

Range of fibres for UHPC (diameter; length; tensile strength)

∅ 0.15 – 0.3 mm |—| 6 – 20 mm ⟷ 1800 – 3000 N/mm²

Most common fibre types

High carbon fibres
(brass coated)

DM 14/0.175

DM 12.5/0.15

Stainless steel fibres
custom made fibres

DG14/0.2 E304
(normal exposure) EC; XC

DG 20/0.3 E316
(high exposure) EC; XD, XS

ECOLOGICAL ADVANTAGES

+ Reduction in concrete volume due to thinner-walled construction compared to conventional reinforced concrete
+ Longer service life due to greater durability resistance against usual exposure
+ Energy savings during production, transportation and construction due to lower material usage
+ Less CO_2-emissions due to significantly shorten construction periods and less traffic disruptions
+ Faster construction and renovation process

YOUR CONTACT PERSONS

Stephan Brendler fka. Müller
Head of Sales Fibres International

Phone +49 172 5666540
E-mail stephan.brendler@krampeharex.com

Michael von Schroetter
International Sales Manager Fibres

Phone +49 162 6134290
E-mail michael.vonschroetter@krampeharex.com

GERMANY

KrampeHarex GmbH & Co. KG
Pferdekamp 6 – 8
59075 Hamm
Germany

Phone +49 2381 977977
Fax +49 2381 977955
Internet www.krampeharex.com
E-mail info@krampeharex.com