HEADER INSTALLATION ESSENTIALS:
TECHNIQUES, TOOLS, AND FIELD-TESTED SOLUTIONS

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KWIKBOND POLYMERS

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Panel

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Watson Bowman Acme

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WHAT TO EXPECT

01 **Choosing & Preparing Materials for Effective Installation**

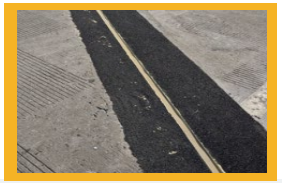
02 **Techniques and Tools by Material Type**

03 **Selecting the Best Materials for Your Application**

04 **Q & A**

IMPORTANCE OF HEADER/NOSING MATERIAL

APPLICATION BY MATERIAL TYPE

Applications	Polyester	Polyurethane	UHPC	Epoxy
				
Spalled or Cracked Concrete	X	X	X	X
Concrete Blockout on each Side of Joint Gap	X	X	X	X
Split-slab Conditions	X	X	X	X
Patching Airport Tarmac and Runway	X (Gray only)	X (Gray only)	X	X
Damp Substrate			X	X
Installation below 40^0 F	X			
Steel Structures	X	X	X	

STRUCTURE IN NEED OF REPAIR/REPLACEMENT

Poor bonding or delamination

Adhesion/Bond Issues

Surface depression or cracking

Support issues

Stress causing damage

No Relief

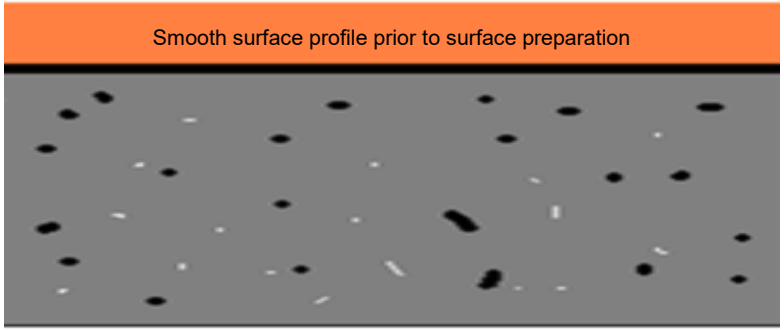
SURFACE PREPARATION IS KEY

Repair Needed

Work in Progress

Ready for Nosing Material

WHY IS SURFACE PREPARATION IMPORTANT?



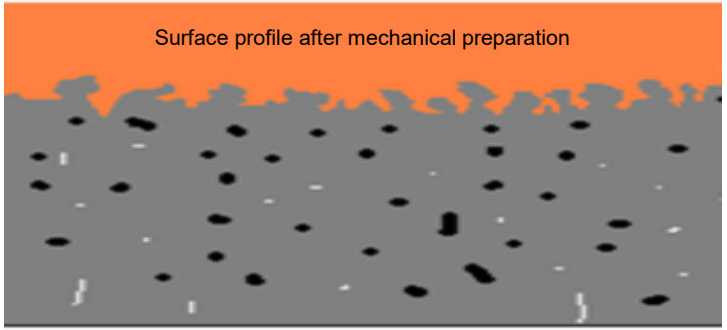


Illustration showing increase in surface area available for bonding after surface preparation

Unprepared surface profile

Prepared surface profile

Prepared surface profile stretched flat to show comparative actual surface available for bonding

UNDERSTANDING PREPARATION METHODS IS IMPORTANT FOR MATERIAL SELECTION

POLYURETHANE - WABOCRETE®II TECHNIQUES, TOOLS AND SOLUTIONS

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POLYURETHANE OVERVIEW

2 component polyurethane elastomeric concrete header with specialty aggregate

POLYURETHANE PERFORMANCE CHARACTERISTICS

ADVANTAGES

- Fast Curing
- Abrasion Resistant
- Bond Versatility
- Material Flexibility

LIMITATIONS

- Moisture/Humidity
- Cold Temperature
- Horizontal Installations
- Small Batches

WABO®CRETE II – STRENGTH WITH FLEXIBILITY

Demonstrates superior **flexibility**, accommodating structural **movement** without compromising **durability**.

POLYURETHANE EQUIPMENT

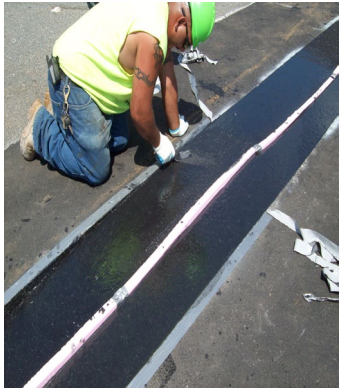
POLYURETHANE INSTALLATION

Form joint opening, apply bonding agent

Mix Part A & B and blend

Pour Part C into blended A & B and mix

Install into blockout



Finish

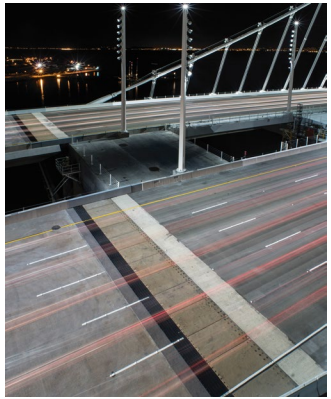
MIXING BONDING AGENT

- Mixing Part A & B

- Applying Bonding Agent

WABOCRETE® II MIXING

OAKLAND BAY BRIDGE PROJECT



Stats:

•The seismic plate joint systems span 47" (1.2 m) openings in the bridge deck

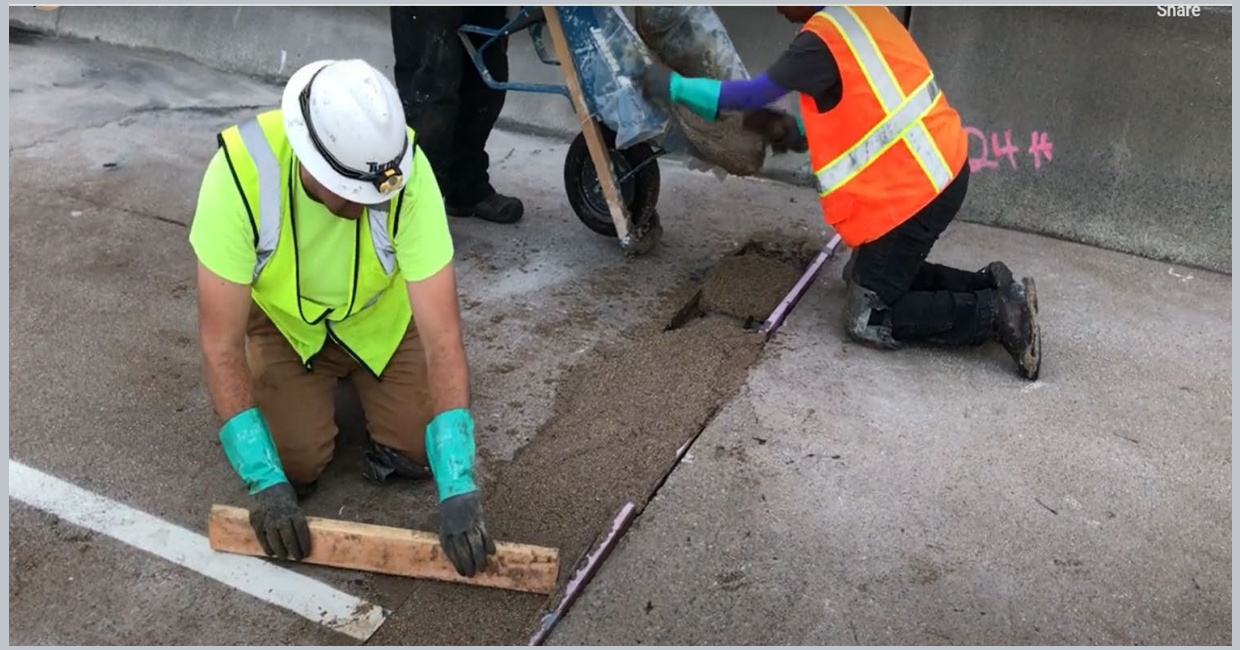
•Accommodates 24”(+/- 12”) of movement

•Average Daily Traffic: 300,000 vehicles

Owner:

California Department of Transportation (Caltrans), District 4 Toll Bridge Program

POLYESTER - PPC 1121: POLYESTER POLYMER CONCRETE TECHNIQUES, TOOLS AND SOLUTIONS



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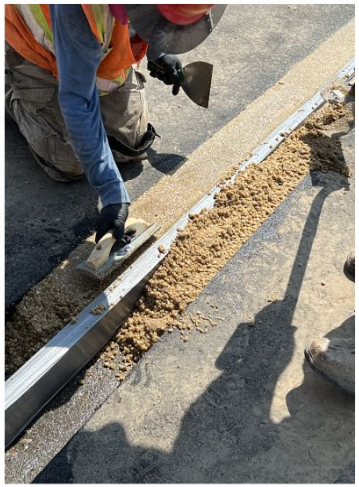
POLYESTER MATERIAL OVERVIEW

- Pre-mixed polymer concrete made of polyester binder resin and graded aggregates with a High Molecular Weight Methacrylate (HMWM) primer system
- Recommended for patching and joint header applications for the rehabilitation and preservation of existing and new bridge structures

POLYESTER MATERIAL BENEFITS & LIMITATIONS

- Benefits
  - Packaging available in individual kit and high production options
  - Suitable for full depth joints - variable thickness between ¾” to 12”
  - Installation temperature range of -10 to 110°F for patches and headers
  - Rapid 2-hour cure
- Limitation
  - Substrate must be visibly dry

INSTALLING POLYESTER HEADER



PPC 1121 MIXING

INTERSTATE 5 IN SEATTLE, WA PROJECT

United Professional Caulking & Restoration, Inc installing expansion polyester joint header

https://www.kwikbondpolymers.com/resources/kwik-bond-polymers-polyester-joint-header/

UHPC - ULTRA HIGH PERFORMANCE CONCRETE
SIKACRETE®-930 UHPC
TECHNIQUES, TOOLS AND SOLUTIONS

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WHAT IS UHPC

- Ultra High-Performance Concrete
  - f’(c) ≥ 20,000 psi
  - flexural strengths up to 7,000 psi
  - No coarse aggregate
  - Contains steel fibers
  - Self-consolidating
  - Excellent durability

Ultra-High Performance Concrete (UHPC) is a cementitious, concrete material that has a minimum specified compressive strength of 17,000 pounds per square inch (120 MPa) with specified durability, tensile ductility and toughness requirements; fibers are generally included in the mixture to achieve specified requirements.
Ultra-High Performance Concrete (UHPC), is also known as reactive powder concrete (RPC). The material is typically formulated by combining portland cement, supplementary cementitious materials, reactive powders, limestone and or quartz flour, fine sand, high-range water reducers, and water. The material can be formulated to provide compressive strengths in excess of 29,000 pounds per square inch (psi) (200 MPa). The use of fine materials for the matrix also provides a dense, smooth surface valued for its aesthetics and ability to closely transfer form details to the hardened surface. When combined with metal, synthetic or organic fibers it can achieve flexural strengths up to 7,000 psi (48 MPa) or greater.

Fiber types often used in UHPC include high carbon steel, PVA, Glass, Carbon or a combination of these types or others. The ductile behavior of this material is a first for concrete, with the capacity to deform and support flexural and tensile loads, even after initial cracking. The high compressive and tensile properties of UHPC also facilitate a high bond strength allowing shorter length of rebar embedment in applications such as closure pours between precast elements.

Ref: Portland Cement Association

PERFORMANCE CHARACTERISTICS
SIKACRETE®-930 UHPC

One component, steel fiber-reinforced, ultra high-performance concrete (UHPC)

- Benefits
  - Long-term durability
  - Pre-packaged solutions
  - Low dust technology
  - Labor savings through faster installation
- Limitations
  - Cure time 12 hours
  - Moisture/humidity intolerant

WHERE IS UHPC USED

- Bridges
  - Precast bridge panel connections
  - Modular superstructural elements
  - Substructure connections
  - Shear keys
  - Header joints
  - Overlays

UHPC BENEFITS

Benefits

- "Ductility"
  - complex, intricate shapes
- Fast-track construction
- Excellent wear resistance
- Excellent impact resistance
- Longer service life
- Improved aesthetics

Limitation

- Batched on site - attention to detail required
- Dust generation

Mars Hill Bridge (Wapello County, Iowa)
110 ft girders with no rebar for stirrups

WHY UHPC?

- Complex, intricate shapes
- High strength
- Fast-track construction
- Excellent post-crack toughening
- Excellent wear resistance
- Excellent impact resistance
- **Longer service life – 80 years!**

Hossain, A. & Chang, C. M., (2023) "Life-Cycle Cost Analysis of Ultra High-Performance Concrete (UHPC) in Retrofitting Applications", *International Interactive Symposium on Ultra-High Performance Concrete* 3(1): 82.
doi: https://doi.org/10.21838/uhpc.16694 Florida International University

UHPC MIXING

SIKACRETE®-930 UHPC

WHAT IS OUR UVP?

- **Quality Assurance**
  - Current solutions are batched on site
  - *Errors can occur*
    - weighing powders
    - measuring admixtures
  - **Sikacrete®-930 UHPC provides confidence of installed product performance.**

SIKACRETE®-930 UHPC

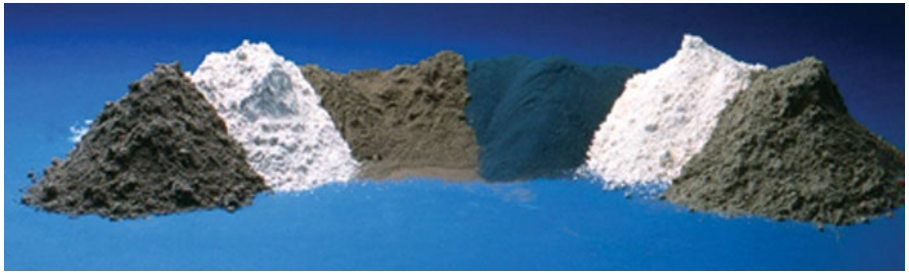
WHAT IS OUR UVP?

- **Safety**
  - Current solutions are batched on site
  - *Dust generation*
  - OSHA respirable quartz considerations
  - **Sikacrete®-930 UHPC incorporates low dust technology**

SIKACRETE®-930 UHPC

WHAT IS OUR UVP?

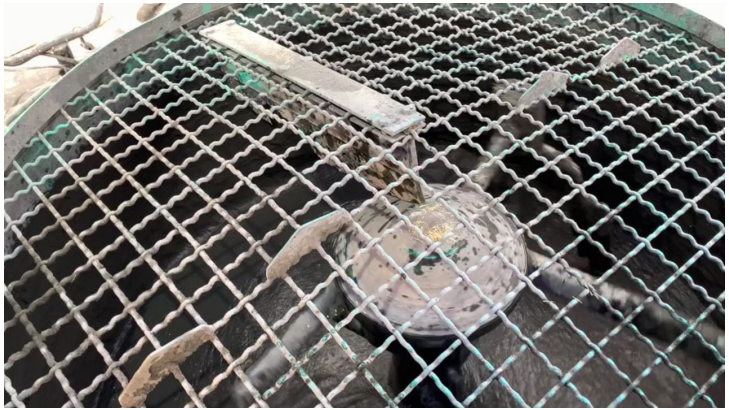
- **Reduced environmental impact**
  - Increased use of supplemental cementing materials through proprietary technology
  - Reduced use of Portland cement
  - **Sikacrete®-930 UHPC**
    - **CO_2 footprint ~ 25% lower**



Ref: Portland Cement Association

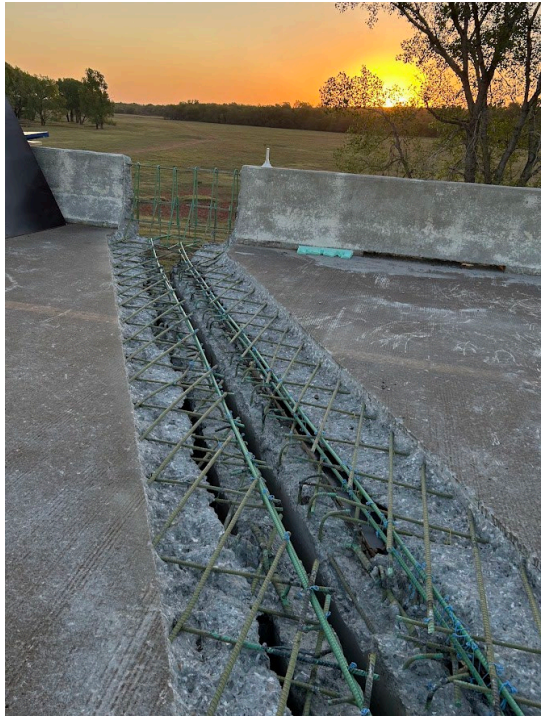
SIKACRETE®-930 UHPC

MIXING & PLACEMENT OF SIKACRETE®-930 UHPC



- **Batch Mixing – 5-7 mins.**
  - Auger mixers – Blastrac
    - 4 cu.ft. mixes
  - Pan mixers
    - modifications may be required
- **Single Bag Mixing – 7-10 mins.**
  - Drill & paddle recommended for small projects
    - Collomix XO-55 Duo

UHPC PROJECT PROFILE – I-35 GUTHRIE, OK



Project:

- Joints and shear keys being replaced on bridged deck.

- Needed to open up for College Football weekend, had to wait until 14K psi.

- Used ~2500 cu.ft.

Owner:

OKDOT

SIKA HEADER / NOSING PRODUCT OFFERING

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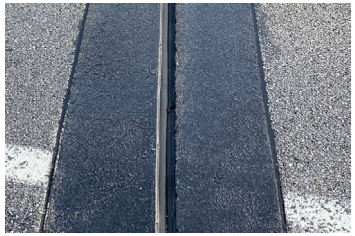
TECHNOLOGY COMPARISON

Characteristics	Polyester	Polyurethane	UHPC	Epoxy
Material Color	Tan (Tintable)	Black, Gray	Dark Gray	Gray
Cure Time	2 hours	1 – 3 hours	12 hours (min)	4 - 6 hours
Temperature	0 F-degrees (min)	40 F-degrees (min)	40 F-degrees (min)	40 F-degrees (min)
Batching	Large Volume/ Single Units	Single Units	Large Volume/ Single Units	Double Units
Moisture	Intolerant	Intolerant	Tolerant	Tolerant
Self-leveling	No	Yes	Yes	Yes
Compressive Strength	Medium-High	Low	High	Medium
Bonding Substrates	Concrete, Steel, Aluminum	Concrete, Steel, Aluminum	Concrete	Concrete, Steel
Full Depth/Structural	Yes	No	Yes	No

SIKA PRODUCT OFFERING

WaboCrete®II	Emcrete II	Emcrete	ElastoPatch
			
Two-component **polyurethane** expansion joint header with specialty aggregate	Two-component **polyurethane** resin mixed with sand and aggregates	Two-component **polyurethane** resin mixed with sand and chopped fiberglass aggregates	Two-component **polyurethane** resin mixed with cast silica sand and aggregates

SIKA PRODUCT OFFERING

PPC 1121	SIKACRETE 930 UHPC	Sikadur®-72 JNS	Wabo®SurfaceMend
			
Single component **polyester** concrete.	Ultra High-Performance Concrete (UHPC) mix in a single-component	Two-component **epoxy** polymer mortar, plus silica aggregate.	Two-part specially formulated **epoxy** polymer concrete system

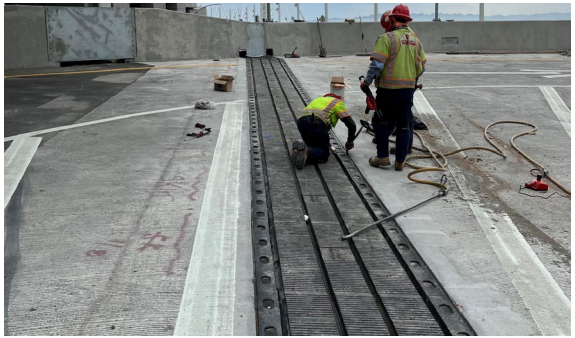
Two-component **Polymer** mortar, plus silica aggregate.

COMPATIBLE WITH JOINT SEALS

Small Movement: 0 – 2 in.

Medium Movement: 2 – 4 in.

Large Movement: >4 in.



COMPATIBLE WITH ARMORED EXPANSION JOINTS

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EVERY STEP OF THE WAY

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