



# Bridge and Transportation

Solutions for Bridge  
Construction, Repair  
and Maintenance



Master Builders Solutions portfolio of products for the bridge industry are built upon a solid foundation of proven, advanced chemistry, and intelligent networking of technologies, know-how, products and service. We help make the structures you build better.

### The Bridge Challenge

Structural integrity and long term durability of bridge elements are critical factors to the health of our nation's bridges. As of 2013 the total number of structurally deficient or functionally obsolete bridges in the FHWA inventory was at more than 20%.

After enduring exposure to the elements, traffic, deicing salts, oil and gas spills, and more, even new bridges can show accelerated deterioration that leads to safety and liability issues, as well as economic impact due to the disruption of traffic delays and bridge closings.

The problems are complex but the challenge is clear: to build, repair and preserve our bridges with the most effective long-term strategies, actions and high performance materials possible.



*At Master Builders Solutions, we work toward developing ever-more intelligent solutions for bridge challenges, ensuring sustainable development, and ultimately making a positive impact on the world for a better future.*



# Bridge and Transportation Construction, Repair and Maintenance

## Deck Protection Solutions

Bridge decks require protection from chloride ion intrusion from de-icing salts, as well as freeze-thaw cycles and traffic erosion over time. Master Builders Solutions offers a wide variety of products to protect bridge decks ranging from water repellents to thin polymer overlays. The ultimate goal is to have a concrete deck free of deterioration, keeping it sound and safe for years to come.

### Water Repellents

Water repellents chemically bond with concrete to create invisible protection that minimizes water intrusion and protects against chloride penetration. Our products provide deep surface penetration creating lasting protection and extending the service life of new and existing bridge decks.

#### MasterProtect® H 400 Sealer

Water-based 40% silane penetrating sealer.

#### MasterProtect H 1000 Sealer

Water-based 100% penetrating silane sealer.

#### MasterProtect H 440HZ Sealer

Solvent-based ≥40% silane penetrating sealer. Ideal for cold weather applications.

### Corrosion Mitigation

Each corrosion problem requires a customized solution based on experience, know-how and the use of the right product. Master Builders Solutions offers more than one solution for corrosion prevention and rehabilitation.

#### MasterProtect 8000CI Corrosion Inhibitor

Surface-applied clear liquid that penetrates concrete to inhibit corrosion of steel bars and tendons. Effective for both new concrete and concrete that is heavily chloride-contaminated or carbonated. Can be used in combination with MasterSeal 630 for increased protection.

#### MasterProtect P 8100AP Epoxy Primer

One-component, zinc-rich, epoxy primer designed to prime and protect reinforcing steel. Hinders corrosion through electrochemical means by preventing anode transfer.

#### MasterEmaco® CP Intact Anodes

Discrete galvanic protection for steel reinforced concrete bridge members. ASTM B418 Type II zinc core and advanced encasement mortar technology provide the most effective corrosion protection against incipient anodes ("ring anode effect") available.

### Crack Sealing

Cracks in concrete are an entryway for water and other contaminants, including chlorides. No matter the size, both large and hairline cracks must be sealed to promote the long term integrity of the deck. Master Builders Solutions provides effective products that are also quick and easy to apply, minimizing traffic closure.

#### MasterSeal® 630 Methacrylate Resin

Methacrylate resin that fully penetrates, seals, and repairs hairline concrete cracks by gravity. Fully cured in one hour allows fast return to traffic. UV resistant.

#### MasterInject® 1000 Epoxy Resin

Penetrates and repairs concrete cracks. Easy to apply by gravity feed. Accepts aggregate broadcast to provide a slip resistant surface.

### High Friction Waterproofing Overlay

Thin epoxy and methacrylate overlay systems provide ideal protection of the concrete deck. These are multiple layer waterproofing membranes that also impart slip resistance and minimize traffic disruption for increased safety.

#### MasterSeal 350 Overlay System

Epoxy-based overlay system that provides high durability and extended service life. Low modulus accommodates thermal movements of the substrate. Primerless system and rapid strength development allow for fast return to traffic.

#### MasterSeal 630 Bridge Deck Overlay System

Methacrylate overlay system that can be applied at temperatures ranging from 14° to 104° F (-10° to 40° C). Resin coats melt into one another creating a cross link bond that cannot be broken, providing exceptional durability and extended deck service life.

## Concrete Repair Solutions

Diagnose, repair and protect: look beyond the superficial damage to identify the underlying cause of deterioration. Develop a repair strategy utilizing the right products to restore the integrity of structural elements. Design the repair strategy to prevent further damage, provide lasting protection and improve the loading capacity of the bridge structure. Our comprehensive product systems offer owners, designers and contractors effective solutions to bridge repair challenges at different levels of complexity.

### Patching

Master Builders Solutions offers a variety of products and technologies for vertical and horizontal patching applications. Vertical patching can be applied by hand, spray, or form and pour. Horizontal patching products provide very rapid setting and early strength allowing return to traffic in as little as 45 minutes.

### VERTICAL PATCHING

#### MasterEmaco N 425 Repair Mortar

Cement-based, polymer-modified, silica fume-enhanced mortar for small repairs by trowel. Fast setting, non-sagging with low shrinkage. Can be placed on vertical or overhead surfaces in lifts up to 2 inches deep without forming.

#### MasterEmaco S 488CI Repair Mortar

Shrinkage-compensated, fiber-reinforced, cement-based structural repair mortar with integral corrosion inhibitor. Provides high early and ultimate compressive, flexural and bond strengths. Applied by both trowel and low pressure spray.

#### MasterEmaco S 466CI Repair Mortar

Flowable, rheoplastic, shrinkage-compensated, cement-based mortar for structural repairs with integral corrosion inhibitor. Recommended for formed vertical and overhead concrete repairs.

### HORIZONTAL PATCHING

#### MasterEmaco T 415 and T 430 Repair Mortars

Rapid-setting, one-component, cement-based patching repair mortars. Produce high early strength and allow a quick return to traffic in as little as 2 hours. Aggregate extendable up to 55% by weight for deep patches. MasterEmaco T 430 is ideal for hot weather applications.

#### MasterEmaco T 1060 and T 1061 Repair Mortars

Very rapid hardening, high early strength, one-component, cement-based repair mortars. Allow return to traffic in 1 hour and epoxy coating in 4 hours. Shrinkage compensated to minimize cracking. MasterEmaco T 1061 can be aggregate extended up to 100% by weight.

#### MasterEmaco T 545 and T 545HT

One-component, magnesium phosphate-based repair mortars. At 70° F (21° C) MasterEmaco T 545 sets in approximately 15 minutes and takes rubber-tire traffic in 45 minutes. Must be applied in ambient temperatures below 85° F (29° C) including freezing temperatures. MasterEmaco T 545HT is designed for ambient temperatures ranging from 85° to 100° F (29° to 38° C).

#### MasterEmaco S 6000 Repair Mortar

Rapid setting, three-component, methacrylate repair mortar. One hour curing allows fast return to traffic. Can be used in sub-freezing temperatures. Can be aggregate extended up to 100% for deep repairs.

### Large Repair

Master Builders Solutions provides solutions for a variety of job site situations involving application by form and pour, spray or underwater.

#### MasterEmaco S 440 and S 440CI Mortars

Flowable, shrinkage-compensated, form and pour micro-concrete. Pre-extended, designed for structural repairs typically from 3 inches to full depth. MasterEmaco S 440 CI contains corrosion inhibitor and is polymer-modified.

#### MasterEmaco S 210SP and S 211SP Mortars

Prepackaged, silica-fume-enhanced mortars with integral corrosion inhibitor. Can be applied with wet or dry process shotcreting methods. MasterEmaco S 211 SP is fiber-reinforced.

#### MasterEmaco 1500HCR Repair Mortars

One-component, innovative technology for crack-free concrete repairs designed to extend the useful service life of bridge elements. Based on the balance of four key properties: shrinkage, tensile creep, tensile strength and modulus of elasticity. Complies with Vision 2020 technical data sheet protocol and passes the ASTM C 1581 shrinkage "Ring" test. Available in five formulations.

- MasterEmaco 1500HCR Self-Consolidating
- MasterEmaco 1500HCR Self-Consolidating Extended
- MasterEmaco 1500HCR Vertical/Overhead

### Concrete Strengthening

Damaged bridges can be restored to full load-bearing capacity, or upgraded to a new capacity level through the MasterBrace® system, which does not alter the original geometry of the structural elements.

#### MasterBrace Strengthening System

Externally-bonded, fiber-reinforced polymer (FRP) strengthening system for structural repairs and reinforcement of structural elements. High strength, lightweight and durable. Can be engineered to upgrade load bearing capacity, restore capacity lost to damage or deterioration, improve seismic performance or correct structural deficiencies in the original construction. The MasterBrace system consists of flexible carbon fiber, glass fiber or aramid fiber fabrics that are applied with system specific epoxy resins and topcoats.



## Grouting Solutions

Master Builders Solutions offers a variety of technologies from cement and magnesium phosphate-based grouts to epoxy and methacrylate. Master Builders Solutions grouts are designed for ease of application, durability and high performance properties. They have been independently tested and certified for use in State DOTs across the country.

### Bearing Pad/Seat

Cement-based grouts and methacrylate mortars for use where load-bearing support and uniform load transfer are required.

#### MasterFlow® 100 Grout

General construction, non-shrink, non-bleed mineral aggregate grout. Can be extended with coarse aggregate. Can also be used for damp-pack applications.

#### MasterFlow 928 Grout

High-precision, non-shrink, non-bleed mineral aggregate grout with high one day and later age compressive strength. Pumpable with extended working time. Resistant to sulfate environments and to freeze/thaw conditions. Ideal for marine environment applications.

#### MasterEmaco S 6000 Mortar

Rapid set, three-component methacrylate mortar that can be applied at temperatures from 14° to 104° F (-10° to 40° C). High strength, reaches 7,000 psi in one hour. Extremely durable. Can be aggregate-extended up to 100%.

### Key Way Joint

Magnesium phosphate-based anchoring products for use in a wide range of ambient temperatures.

#### MasterEmaco T 545 and T 545HT Mortars

Sets in approximately 15 minutes and reaches 2,000 psi compressive strength in one hour at 70° F (21° C). Resistant to freeze/thaw cycles and de-icing chemicals. Suitable for marine environments. Must be applied at temperatures below 85° F (29° C). MasterEmaco T 545HT is designed for ambient temperatures ranging from 85° to 100° F (29° to 38° C).

#### MasterInject 1500 Epoxy Adhesive

Two-component, 100% solids, low viscosity epoxy for injection of fine cracks. Structurally bonds to hardened concrete. MasterInject 1500 can be mixed with aggregate to make high-strength, high-modulus epoxy micro-concrete and mortar.

### Post-Tensioning Grout

Cement-based grouts to encapsulate and protect bonded post-tensioned steel tendons from corrosion.

#### MasterFlow 1205 and 1206 Grouts

Easy to pump for long distances, non-gas forming grouts with extended working time. Both grouts harden without bleeding, settlement, shrinkage or formation of voids. Can be used at temperatures ranging from 40° to 95° F (4° to 32° C). MasterFlow 1205 is ideal for horizontal and inclined tendon applications while MasterFlow 1206 is designed for vertical tendons.

### End Cap Anchorage

Epoxy grout to protect steel tendon end cap anchorages from corrosion.

#### MasterFlow 648 Epoxy Grout

Three-component epoxy grout. High flow allows grouting in confined working space. Non-shrink properties prevent chloride and CO<sub>2</sub> penetration providing protection and averting deterioration. High early and 7-day strength development with excellent adhesion to provide permanent protection to encapsulated anchorages.



## Master Builders Solutions

The Master Builders Solutions brand brings all of MBCC Groups expertise together to create chemical solutions for new construction, maintenance, repair and renovation of structures. Master Builders Solutions is built on the experience gained from more than a century in the construction industry.

The know-how and experience of a global community of MBCC Group construction experts form the core of Master Builders Solutions. We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas

of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global MBCC Group technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction. The comprehensive portfolio under the Master Builders Solutions brand encompasses concrete admixtures, cement additives, chemical solutions for underground construction, waterproofing solutions, sealants, concrete repair and protection solutions, performance grouts and performance flooring solutions.

## Master Builders Solutions products for the Construction Industry:

### MasterAir®

Solutions for air-entrained concrete

### MasterBrace®

Solutions for concrete strengthening

### MasterCast®

Solutions for manufactured concrete product industry

### MasterCem®

Solutions for cement manufacture

### MasterEmaco®

Solutions for concrete repair

### MasterFinish®

Solutions for formwork treatment

### MasterFlow®

Solutions for precision grouting

### MasterFiber®

Comprehensive solutions for fiber reinforced concrete

### MasterGlenium®

Solutions for high-performance concrete

### MasterInject®

Solutions for concrete injection

### MasterKure®

Solutions for concrete curing

### MasterLife®

Solutions for enhanced durability

### MasterMatrix®

Advanced rheology control solutions for self-consolidating concrete

### MasterPel®

Solutions for water tight concrete

### MasterPolyheed®

Solutions for high-performance concrete

### MasterPozzolith®

Solutions for water-reduced concrete

### MasterProtect®

Solutions for concrete protection

### MasterRheobuild®

Solutions for super-plasticized concrete

### MasterRoc®

Solutions for underground construction

### MasterSeal®

Solutions for waterproofing and sealing

### MasterSet®

Solutions for retardation control

### MasterSure®

Solutions for workability control

### MasterTop®

Solutions for industrial and commercial floors

### Ucrete®

Flooring solutions for harsh environments

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