

DUCTAL[®] OVERLAY

ULTRA-HIGH PERFORMANCE CONCRETE



Ductal thixotropic material placed on a bridge deck with a vibratory truss screed



Milled Ductal riding surface on a bridge deck, one year after installation

Ductal Overlay is a thixotropic, ultra-high performance concrete (UHPC) specifically engineered to provide high mechanical strength, very low permeability, and ultra-high durability for horizontal applications such as bridge decks, warehouse floors, and building slabs.

This product contains a high content of steel micro-fiber reinforcement and therefore provides superior crack control and high tensile capacity. It can be installed on sloping grades of 0-15% without the need for top forms.

This product is commonly installed as a 1"-2" thick (3-5 cm) bonded topping layer to provide an impermeable, protective layer at the surface of new and existing concrete slabs. A thicker overlay may be warranted for deeper repairs or when used as a strengthening technique to increase the capacity of the structural system.

By using the Ductal Overlay solution, the service life of the structure can be significantly enhanced and the maintenance costs over the life of the structure can be substantially reduced. The restoration can also be performed with minimal down time due to the short cure time of the product (<2 days).

APPLICATIONS:

- Bridge deck rehabilitation and protection
- Industrial floor slab protection
- Building slab strengthening



Ductal material being transported and placed with a specialized UHPC paver



Ductal Overlay surface finish following placement with a paver

MATERIAL FEATURES

- Bridge deck rehabilitation and protection
- Very low permeability
- Excellent bond strength
- High flexural strength
- High-early age strength
- Low drying shrinkage
- High resistance to chloride penetration
- High resistance to chemical deterioration
- High resistance to abrasion
- High resistance to freeze-thaw damage
- High resistance to scaling
- High compressive strength
- Thixotropic consistency
- Steel micro-fiber reinforcement

BENEFITS

- Allows for placement on sloping grade
- Offers excellent durability
- Prevents rebar corrosion
- Protects against salt and chemical exposure
- Improves structural capacity
- Allows for reduced rebar cover (<1")
- Minimizes rebar lap splice length
- Allows for partial depth vs full depth repairs
- Minimizes added dead loads
- Strengthens and stiffens existing structures
- Allows quick implementation
- Requires minimal surface preparation
- Offers low maintenance
- Eliminates spalling and potholes
- Extends service life¹

¹Ductal's design partners can provide precise and accurate life cycle analysis on a project-specific basis for both new and existing structures. Contact us to learn more.

Ductal Overlay, Ultra High Performance Concrete (UHPC)

1. PRODUCT OVERVIEW

Ductal Overlay is a thixotropic ultra-high performance concrete (UHPC) mix with a high dosage of steel fiber reinforcement. It is the product of choice for applications requiring superior crack control, high bond and tensile strengths, and material stability on a sloping grade during placement. This product offers a combination of high strength, high durability, very low permeability, superior crack control, and slope retention. Refer to additional Ductal Overlay literature for other applications, placement techniques, and safety information.

2. APPLICATIONS

Ductal Overlay is suitable for use in a wide variety of horizontal applications that do not require self-consolidation and instead benefit from material stability on sloping grades of up to 15 percent. This product is particularly well suited for installation as a thin bonded overlay (1-2 inches thick) on new and existing structures to improve mechanical strengths, provide high resistance to environmental degradation, and enhance the long-term durability and service life of the structure. Common applications include:

- Bridge deck overlays
- Industrial floor slab toppings
- Building slab strengthening

3. COMPOSITIONS AND MATERIALS

Ductal Structure consists of Ductal Premix, Steel Fibers, and Liquid Admixture(s).

4. PACKAGING

Premix available in 50 lb., 600 lb., and 2400 lb. bags. Fibers supplied in 44 lb. bags. Admixtures are supplied in 5 gallon pails or 246 gallon bulk totes.

5. FEATURES & BENEFITS

- Extended Service life
- High level of durability against abrasion and environmental conditions
- Very low permeability to liquid and chloride ingress
- High Mechanical Strengths
- High level of Ductility
- Excellent Crack Control

6. APPLICABLE STANDARDS & COMPLIANCE

- ASTM C1856 / C1856M
- U.S. Buy America Compliant (23 CFR Part 635.410)
- ASTM A820 / A820M - 04, Type I cold drawn wire
- ISO 9001:2015

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7. PHYSICAL/CHEMICAL PROPERTIES

	Ductal Overlay
Color / Appearance	Dark Gray Powder
Material Rheology	thixotropic
Density	155 pcf (+/- 5 pcf)
Static Flow, ASTM C1437*	4-6 inches
Dynamic Flow, ASTM C1437*	6-8 inches
Working Time	90 minutes
Time of Setting, ASTM C191*	10 hours
Compressive Strength (24 Hour), ASTM C39*	7,000 psi
Compressive Strength (48 Hour), ASTM C39*	12,000 psi
Compressive Strength (72 Hour), ASTM C39*	13,000 psi
Compressive Strength (7 Day), ASTM C39*	15,000 psi
Compressive Strength (28 Day), ASTM C39*	18,000 psi
Compressive Strength (56 Day), ASTM C39*	20,000 psi
Tensile Strength (28 Days), ASTM C496	1,000 psi
Flexural Strength Ratio (Pp/P1), ASTM C1609*	1.6
Modulus of Elasticity (28 Days), ASTM C469*	6,500 ksi
Long-term Shrinkage (90 Days), ASTM C157*	500 microstrain
Chloride Ion Penetrability (58 Days), ASTM C1202* (without fibers)	<100 coulombs (negligible)
Freeze-Thaw Resistance (300 Cycles), ASTM C666A*	RDM > 98

*as modified by ASTM C1856

8. INSTALLATION

Preparation

Substrate surfaces to be in contact with Ductal[®] Overlay materials should be sound and have a roughened or exposed aggregate finish with 1/8 in. (3 mm) minimum amplitude. The substrate should be pre-wetted and excess water removed prior to material placement. All dirt, oil, grease, dust, or other bond inhibiting materials should be removed to ensure optimal bond strength. Hydro demolition, milling or a combination thereof are recommended preparation methods to ensure all unsound concrete is removed and to minimize micro-fissures at the bonding surface.

Batching

Ductal materials are typically batched onsite using high-shear mixers and can also be mixed in a ready-mix truck. Refer to our Standard Operating Procedures and Ductal Safety Guidelines for more information. Ice may be required to control mix temperature, dependent on ambient conditions.

Placing

Ductal materials should be placed within the product's working time. Ductal Overlay is a thixotropic material which requires external vibration to properly consolidate and finish. After placement, the material should be immediately coated with a curing compound and covered with plastic sheeting to prevent surface dehydration. Contact a Ductal Representative for more information about adjusting to temperature, alternate placement methods, or other site conditions.

Finishing

Ductal Overlay materials may require surface grinding or profiling after curing is complete to meet the desired profile finish grade, riding smoothness, and surface texture. Curing should continue until a minimum compressive strength of 10,000 psi (70 MPa) is achieved.

Ductal Overlay, Ultra High Performance Concrete (UHPC)

9. SAFETY PRECAUTIONS

Ductal shall be stored, mixed, placed and disposed of in accordance with provided Standard Operating Procedures, Ductal Safety Guide and local regulation. If questions remain after document review, please reach out to a Ductal Representative for clarification and/or guidance.

10. STORAGE

All materials should be stored in a dry environment and/or be thoroughly covered to prevent pre-mature exposure to moisture. Materials that have been exposed to moisture should be discarded. Materials should be stored between 40-95°F (4-35°C).

Premix may be stored for up to one year in the original, unopened packaging with proper storage

11. AVAILABILITY

Ductal[®] Steel Fibers for Ultra High Performance Concrete (UHPC) are available throughout most of the United States.

12. WARRANTY

Upon request, Holcim (US) can provide Material Certification Reports demonstrating that Ductal Steel Fibers for Ultra High Performance Concrete meet applicable ASTM and Buy America Act standards. Holcim (US) will not guarantee finish work, having no control over use of this product. Holcim (US) shall not be responsible for the condition of fibers after delivering to the jobsite or distributor.

13. MANUFACTURER

Holcim (US) Inc.
8700 West Bryn Mawr Ave., Suite 300
Chicago, IL 60631
Product Hotline: 888-646-5246
Corporate Phone: 734-529-2411
Corporate Fax: 734-529-4110
Web: www.holcim.us/ductal

14. CORPORATE STATEMENT

Results may differ based upon statistical variations depending upon mixing methods and equipment, raw materials, formulae, manufacturing procedures, temperature, application methods, test methods, actual site conditions and curing conditions. This data sheet provides no guarantee or commitment that the values set forth above will be achieved in any particular application of Ductal[®]. Ductal[®] is a registered trademark and may not be used without permission.

For other Holcim products and solutions, visit www.holcim.us

15. CONTACT INFORMATION

For more information about our products and solutions, please visit: www.holcim.us/ductal or contact us: ductal-na@holcim.com