



SECTION 09 96 70

CONCRETE CERAMIC SURFACE SYSTEM CONCRETE STABILIZATION, ANTI-CORROSION, BIOLOGICALLY IMPERVIOUS COATING *CeramycShield, QuartzSeal*

The Zirconia Product Specifications described below are for use as product reference materials for engineers, architects, contractors, and qualified specifying entities and follows guidelines established by the Construction Specifications Institute (CSI). These specifications are intended solely as technical support to the selection and procurement of the Zirconia product and are not intended to be a substitute for design review and approval of the licensed design professionals for the project.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete Surface System / Concrete sealer / hardener / Impervious coating

1.2 RELATED SECTIONS

- A. 09 96 70 Specialty Coatings
- B. 09 96 13 Abrasion-Resistant Coatings
- C. 09 96 23 Graffiti Resistant Coatings
- D. 09 96 26 Marine Coatings
- E. 09 96 33 High Temperature-Resistant Coatings
- F. 09 97 23 Concrete and Masonry Coatings
- G. Section 07 10 00 Damp proofing and Waterproofing
- H. Section 09 67 00 – Resinous Flooring

1.3 REFERENCES

- A. ASTM International (ASTM):
 1. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials
 2. ASTM D 445 - Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
 3. ASTM C 779 – Standard test Method for Abrasion Resistance of Horizontal Concrete Surfaces

4. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
5. ASTM D 2240 - Standard Test Method for Rubber Property Durometer Hardness.
6. ASTM D 3418 - Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry
7. ASTM D 4060 – Standard Test Method for Abrasion Resistance Taber Abraser.
8. ASTM D 4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
9. ASTM D 6489 - Standard Test Method for Determining the Water Absorption of Hardened Concrete Treated with a Water Repellent Coating
10. ASTM D 6944 – Standard Test Method for Determining the Resistance of Cured Thermal Cycling.

B. LEED 4.2 “Low-Emitting Materials” Compliant

1.4 SYSTEM

- A. Description: A Ceramic Surface System (CSS) uses Alumina and Zirconia Silicates to renew and preserve concrete surfaces. The base-layer, CeramycShield, is a dense ceramic polymer that wraps around and chemically bonds to all elements in the concrete, shielding the surface from the environment. CeramycShield is not affected by wet/dry or freeze/thaw cycles, and will not peel, flake, chalk, or delaminate in any manner. It inhibits attack from water, chlorides, carbonation, biological infection, and sulfates that are the main causes of concrete decay.

The top-layer, QuartzSeal, provides a dense inorganic rubber surface that is easy to clean. This surface has highly charged cationic polymers at the surface that disallow microbial life. QuartzShield further allows the surface to breath-out water vapor, but disallows liquid water from entering the concrete (a “Gortex-like” effect).

Beneficial Characteristics:

1. Chemically bonds to surface permanently
2. Forms penetrating dense protective ceramic film
3. Eliminates porosity
4. Fills shrinkage cracks
5. Is spot repairable
6. Has a long lifespan

Other characteristics

1. Forms breathable ceramic layer
2. Forms a concrete anti-corrosion barrier
3. Biologically Impervious - forms a barrier to microbial occupation
4. Forms a cleanable surface
5. Forms a vapor barrier
6. Forms waterproofing barrier
7. Forms a dampproofing barrier
8. Is Anti-Stain
9. Is Anti-Abrasive
10. Is immune to UV-A,B,C
11. Is immune to salt
12. Is immune to heat and cold extremes
13. Has photocatalytic and metal oxidative properties

Zirconia's CeramycShield, as the base layer, has three (3) parts to be used for proper mixing which are: Part A – Liquefier, Part B – Ceramic Powder, Part C – Densifier rendering a Pot Life of >1 hour under standard conditions of 70° F air temperature and 50% RH.

Zirconia's QuartzSeal, as the sealer top-coat product, is a one-part water-based milky inorganic rubber liquid with indefinite pot life.

B. Recommended Uses:

1. Any application requiring extended life concrete structures, that resist corrosion and biological infection.
2. Bridges (decks, beams, piers/abutments)
3. Tunnels
4. Cast Concrete Products (Slabs, Pipes)
5. CMU Block Walls
6. Commercial and Industrial Floors, walls and ceilings
7. Concrete Roadways, Runways, Sidewalks
8. Energy Infrastructure (Hydro, Nuclear)
9. Greenhouses (interior & exterior)
10. Parking Garages (deck and walls)
11. Retaining and Sound barrier Walls
12. Near Ocean Infrastructure (Seawall, Wharfs and Quays)
13. Hospitals
14. Clean Rooms
15. Waste Containment
16. Water and Wastewater Treatment
17. Theme Parks and Water Parks
18. Animal Husbandry, Food Processing

C. Design Criteria:

1. ACI 302 Class 1 through 4 concrete floors.
2. May be used on Class 5 and 6 floors when used with mineral or metallic aggregate hardeners and toppings, and Class 9, Super-flat floors.
3. Fit for purpose existing concrete slabs and structural elements.
4. Complies with all Federal and State VOC requirements.
5. Independent Test Data, ASTM C 779, Procedure A, reduction of surface abrasion by 50% or more at the 30 minute time interval.
6. Adhesion (Direct Pull-Off) ASTM D4541, >1000 PSI
7. Thermal Expansion, Concrete Compatible
8. Thermal Cycling ASTM D 6944, No Checking, No Cracking, No Blistering
9. Hardness, Shore D, ASTM D2240, 90.0 ± 5.0
10. Tabor Abrasion ASTM D4060 CS-10 @ 1000g load, per 1,000 cycles, 17 Wear Index (excellent hardness)
11. UVA/UVB 315-400nm and UVC 200nm wavelengths, No Chalking, No Cracking, No Delamination
12. High Temperature Service, 2000°F, No Degradation
13. Fire Rating ASTM E84 – 15b, Zero (0) Flame Spread
14. Smoke Generation ASTM E84 – 15b, Zero (0) Smoke

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.

- C. Samples: Furnish representative samples if requested by the Engineer.
- D. Project Specific Information:
 - 1. Test reports.
 - 2. Certificate of rate of application.
 - 3. Signed warranty.
- E. Application Rate: From Installer, based on project requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 2 year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2 year experience installing similar products.
 - 1. Factory trained by manufacturer.
- C. Mock-Up: **(Optional)** As requested, provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship is approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.7 PRE-INSTALLATION MEETINGS

- A. **(Optional)** Convene minimum two weeks prior to starting work of this section.
- B. **(Optional)** At the Architect's request, technical personnel shall be available for a pre-job conference to review installation procedures.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver to jobsite in sealed, labeled containers (Parts A, B and C).
- B. Store and handle to prevent damage to product and environment.

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for required results. Do not install products under environmental conditions outside manufacturer's recommended limits.
- B. Environmental requirements: Comply with applicable VOC and EPA requirements.

1.10 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.11 WARRANTY

- A. Warranty: (Performance Warranty Optional) Provide written warranty signed jointly by applicator, manufacturer and contractor.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: **Zirconia, Inc**, which is located at: 4611 South 134th Place – Suite 240, Tukwila, WA 98168-3202; Tel: 206-219-9236; Fax: 206-247-7931 Email: info@zirconiainc.com; Web: <https://zirconiainc.com/>
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 CERAMIC SURFACE SYSTEM FOR CONCRETE

- A. Product: CeramycShield ; A Ceramic Surface System (CSS) that uses Alumina and Zirconia Silicates to renew and preserve concrete surfaces. This dense ceramic polymer wraps around and chemically bonds to all elements in the concrete, shielding the surface from the environment. CeramycShield is not affected by wet/dry or freeze/thaw cycles, and will not peel, flake, chalk, or delaminate in any manner. It inhibits attack from water, chlorides, carbonation, biological infection, and sulfates that are the main cause of concrete decay.
 - 1. Color: Gray, Light Gray, Tan, Brown, Red
 - 2. Finish: Matte
 - 3. Weight Solids: 80% +/- 2%
 - 4. Coverage [sf/gal]: 200 - 267
 - 5. VOC: <0.408 g/L; 0.003 lb/gal
 - 6. Clean Up: Water
 - 7. Shelf Life: Indefinite, store indoors at <100 °F

The top-layer, QuartzShield, provides a dense inorganic rubber surface that is easy to clean. This surface has highly charged **cationic polymers** at the surface that disallow microbial life. QuartzShield further allows the surface to breath-out water vapor, but disallows liquid water from entering the concrete (a "Gortex-like" effect).

- 1. Color: Clear
- 2. Finish: Clear
- 3. Weight Solids: 10% +/- 2%
- 4. Coverage [sf/gal]: 500 – 800
- 5. VOC: 0.0 g/L; 0.0 lb/gal
- 6. Clean Up: Water
- 7. Shelf Life: Indefinite, store > 32 °F

PART 2 EXECUTION

2.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared, adjoining construction and working conditions have been examined, and any unsatisfactory conditions have been corrected.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Assure surfaces are clean and free of all contaminants, and any film forming curing compounds or sealers.

- D. Existing conditions, prior to installation:
 - 1. Assure concrete has been cured a minimum of 28 days.
 - 2. Assure concrete is clean and free of curing compounds and/or any other sealers.
 - 3. Concrete is free of laitance, grease, oil and contaminants.
- E. Protect concrete from construction activity, staining and other damage.

2.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Protection: Protect adjacent surfaces/areas from damage due to over spray; especially glass and painted surfaces.
- D. Wear OSHA approved safety glasses and PPE when installation work is undertaken.

2.3 INSTALLATION

- A. Apply in accord with manufacturer's instructions:
 - 1. Apply material in a way as to cover the surface without excess buildup.
 - 2. Apply 1 coat only unless otherwise authorized by manufacturer.
 - 3. Meet minimum temperature and humidity requirements for proper curing.
- B. Clean Up:
 - 1. Leftover materials shall be removed from the job site
 - 2. Remove all foreign material from the floor surface and leave broom clean.

2.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION