SECTION 09 96 00

HIGH-PERFORMANCE COATINGS

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\*\* NOTE TO SPECIFIER \*\* Evonik Industries - Protectosil; repellents and coatings.  
This section is based on the products of Evonik Industries - Protectosil, which is located at:2 Turner PlacePiscataway, NJ 08854Toll Free Tel: 800-828-0919Tel: 732-289-1239Email: [request info (atri.rungta@evonik.com)](https://arcat.com/rfi?action=email&company=Evonik%252BIndustries%252B-%252BProtectosil&message=RE%253A%2520Spec%2520Question%2520(09960evo)%253A%2520&coid=31903&spec=09960evo&rep=&fax=)  
Web: <https://silanes.evonik.com/en>   
 [ [Click Here](https://arcat.com/company/evonik-industries-protectosil-31903) ] for additional information.  
Protectosil - your partner in successful building protection. Protectosil is one of the most successful brands in the field of hydrophobization (water repellents), graffiti control, corrosion inhibition (corrosion inhibitor treatment) and surface protection (easy-to-clean). The range of Protectosil products provides the perfect solution for almost every material.

1. GENERAL
   1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Water Repellents:
       1. Clear, penetrating, waterborne, breathable water repellent for use on concrete and masonry. Low-VOC, silane emulsion. (Protectosil AQUA-TRETE 20)
       2. Clear, penetrating, waterborne, breathable water repellent for use on concrete. Low-VOC silane emulsion. (Protectosil AQUA-TRETE 40)
       3. Clear, penetrating, breathable water repellent for use on brick, concrete masonry units and some natural stones. (Protectosil AQUA-TRETE Concentrate)
       4. Penetrating, waterborne, vapor-permeable water repellent for use on concrete, brick, concrete masonry units and some natural stones. Low-VOC, silane/siloxane emulsion. (Protectosil AQUA-TRETE EM)
       5. Clear penetrating water repellent coating applied to exterior concrete, masonry and stone surfaces. (Protectosil AQUA-TRETE SG)
       6. Clear, penetrating, breathable water repellent and consolidant for use on exterior above-grade calcareous stone such as limestone and marble, brick masonry and natural stones. (Protectosil CHEM-TRETE 40D)
       7. Clear penetrating water repellent coating applied to exterior concrete; precast, cast-in-place. (Protectosil CHEM-TRETE 40H)
       8. Clear, penetrating, breathable water repellent for use on exterior above-grade concrete masonry units, brick masonry and most natural stones. (Protectosil CHEM-TRETE PB100)
       9. Clear, penetrating, breathable water repellent for use on concrete, brick, concrete masonry units and some natural stones. (Protectosil CHEM-TRETE PB VOC)
       10. Clear, penetrating, breathable water repellent for use on exterior above-grade concrete, brick masonry, concrete masonry units and some natural stones. (Protectosil CHEM-TRETE 40 VOC)
       11. Clear, penetrating, breathable VOC-compliant surface treatment for use on concrete parking and bridge decks. (Protectosil BHN)
       12. Clear penetrating breathable VOC compliant surface treatment silane treatment with an oil repellent additive. (Protectosil BHN+)
       13. Exterior water repellent coatings for natural stone including calcareous based limestone, travertine and marble as well as siliceous based sandstone, bluestone and granite. (Protectosil Stone Sealer)
    2. Graffiti Protection System:
       1. Clear penetrating water repellent coating applied to brick masonry, brick unit masonry, concrete and stone surfaces for anti-graffiti protection. (Protectosil ANTIGRAFFITI)
    3. Corrosion Control:
       1. Surface applied concrete steel reinforcement corrosion inhibitor. (Protectosil CIT)
    4. Crack Sealer:
       1. Two component, low viscosity methylmethacrylate (MMA) resin for use on horizontal concrete surfaces for concrete repair and rehabilitation of concrete decks and concrete structures. (Protectosil Degadeck CSS)
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete.
    2. Section 03 41 10 - Plant-Precast Structural Concrete\*.
    3. Section 03 45 13 - Faced Architectural Precast Concrete.
    4. Section 03 47 13 - Tilt-Up Concrete.
    5. Section 04 20 00 - Unit Masonry.
    6. Section 04 40 00 - Stone Assemblies.
  1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. ASTM International (ASTM):
       1. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile, Part 7 Water Absorption.
       2. ASTM D6489 - Standard Test Method for Determining the Water Absorption of Hardened Concrete Treated With a Water Repellent Coating.
       3. ASTM E514 - Standard Test Method for Water Penetration and Leakage Through Masonry.
       4. ASTM G53 - Accelerated Weathering" for 2000 hr. (withdrawn 2000)
    2. International Union of Testing and Research Laboratories for Materials and Structures (RILEM):
       1. Test Method II.4 Water Absorption Under Low Pressure (Pipe Method).
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data: Manufacturer's specifications and technical data including the following:
        1. Detailed specification of construction and fabrication.
        2. Manufacturer's installation instructions.
        3. Certified test reports indicating compliance with performance requirements specified herein.
        4. Certification by water repellent manufacturer that product supplied comply with local regulations controlling use of volatile organic compounds (VOC).
        5. Corporate Letter of Compliance for required Product Performance Characteristics.
     3. Quality Control Submittals:
        1. Statement of qualifications.
        2. Statement of compliance with Regulatory Requirements.
        3. Field Quality Control Submittals as specified.
        4. Manufacturer's field reports.
  2. QUALITY ASSURANCE
     1. Manufacturer Qualifications:
        1. 5 years' experience in the actual production of specified product.
        2. Manufacturing facility has achieved ISO 9001 Quality and ISO 14001 Environmental certifications.
     2. Installer Qualifications:
        1. Firm experienced in installation or application of systems similar in complexity to those required for this Project.
        2. Acceptable to or licensed by manufacturer.
        3. Not less than 3 years' experience with systems.
        4. Successfully completed not less than 5 projects using this system.
     3. Regulatory Requirements:
        1. Complies with State and Local regulations concerning AIM (Architectural, Industrial, and Maintenance) coatings regarding VOC (Volatile Organic Content).

\*\* NOTE TO SPECIFIER \*\* Include requirement B on projects listed in AZ, CA, OR, and WA. This requirement may also be useful on projects seeking LEED certification. Delete if not required.

* + - 1. Contains no chemicals listed on the CalProp65 harmful chemicals list.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Pre-Application Testing Project Mockup:
       1. Test water repellent on a mockup.
       2. Comply with installation requirements of this Section.
       3. Inspect mockup for signs of reactions with the surface, streaks, discoloration, insufficient penetration and improper water repellency. Perform uptake test on porous critical surfaces.
  1. PRE-INSTALLATION MEETINGS
     1. Convene minimum two weeks prior to starting work of this section.
  2. DELIVERY, STORAGE, AND HANDLING
     1. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
     2. Storage and Protection: Comply with manufacturer's recommendations.
     3. Handling: Handle materials to avoid damage.
  3. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
     2. Environmental Requirements:

\*\* NOTE TO SPECIFIER \*\* Protectosil CHEM-TRETE 40H, Protectosil CHEM-TRETE PB100, Protectosil CHEM-TRETE PB VOC, Protectosil CHEM-TRETE 40 VOC, Protectosil BHN, Protectosil BHN+, Protectosil CIT, Protectosil Stone Sealer only. Delete if not required.

* + - 1. Maintain ambient temperature above 20 degrees F (minus 7 degrees C) during and 24 hrs after installation.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Maintain ambient temperature above 40 degrees F (4 degrees C) during and 24 hrs after installation.
      2. Do not proceed with application on materials if ice or frost is covering the substrate.
      3. Do not proceed with application if temperature of surface exceeds 100 degree F (38 degrees C).
      4. Do not proceed with the application of materials in rainy conditions or if heavy rain is anticipated within 4 hrs after application.
    1. Sealer Coordination:
       1. Verify compatibility with curing compounds, patching materials, repair mortar, paints, sealants, etc. to be used on concrete surfaces to ensure compatibility with the water repellent before application of repellant.
  1. SEQUENCING
     1. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
  2. WARRANTY

\*\* NOTE TO SPECIFIER \*\* Penetrating sealer products. Delete if not required.

* + 1. The system manufacturer shall furnish the Owner a written single source performance warranty that the Concrete Penetrating Sealer System will be free of defects related to workmanship or material deficiency from a period from the date of completion of the work provided under this section of the specification.

\*\* NOTE TO SPECIFIER \*\* Protectosil AQUA-TRETE EM, Protectosil AQUA-TRETE SG, Protectosil CHEM-TRETE 40D, Protectosil Stone Sealer only. Delete if not required.

* + - 1. Warranty Period: Five years.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Warranty Period: Ten years.
      2. The following performance standards shall be specifically covered under the warranty:

\*\* NOTE TO SPECIFIER \*\* Protectosil AQUA-TRETE 20, Protectosil AQUA-TRETE 40, Protectosil AQUA-TRETE EM for cast and precast concrete, Protectosil CHEM-TRETE 40H, Protectosil CHEM-TRETE 40 VOC for concrete, Protectosil BHN, Protectosil BHN+. Delete if not required.

* + - * 1. Loss of water repellency: When tested in accordance with ASTM D6489, The treated surfaces shall not absorb more than 1 percent water when compared to baseline results immediately after treatment.
        2. Protectosil CHEM-TRETE 40 VOC, Protectosil BHN, Protectosil BHN+ for concrete slabs and decks. Delete if not required.
        3. Chloride Screening: Using ASTM C1152/C1152M-03 procedure the treated concrete shall not allow more than 250 ppm of chloride ions; corrected for baseline levels, to reach the 1 inch (25 mm) level of concrete.

\*\* NOTE TO SPECIFIER \*\* Protectosil AQUA-TRETE Concentrate, Protectosil AQUA-TRETE EM for masonry, Protectosil CHEM-TRETE 40D, Protectosil CHEM-TRETE PB100, Protectosil CHEM-TRETE PB VOC, Protectosil CHEM-TRETE 40 VOC for masonry, Protectosil Stone Sealer. Delete if not required.

* + - * 1. Loss of water repellency: 1.0 mil (.025 mm) per 20 minutes or greater; 70 mph (113 kph) wind driven rain equivalent.
        2. All defective areas shall be retreated by the system manufacturer as determined by the Architect.
        3. The Sealer Manufacturer shall be responsible for providing material to reseal areas of the concrete where sealer effectiveness does not meet the specified limits

\*\* NOTE TO SPECIFIER \*\* Protectosil ANTIGRAFFITI. Delete if not required.

* + 1. The system manufacturer shall furnish the Owner a written single source performance warranty that the Anti-Graffiti Coating System will be free of defects related to workmanship or material deficiency for a period from the date of completion of the work provided under this section.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Warranty Period: Five years.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Warranty Period: Ten years.
      2. The following performance standards shall be specifically covered under the warranty:
         1. The Anti-Graffiti coating will withstand a minimum of 10 cleaning cycles before the need to retreat the substrate.
         2. All defective areas shall be retreated by the system manufacture as determined by the Architect.
         3. The Anti-Graffiti Coating Manufacturer shall be responsible for providing material to reseal areas of the concrete where sealer effectiveness does not meet the specified limits.

\*\* NOTE TO SPECIFIER \*\* Protectosil CIT. Delete if not required.

* + 1. The system manufacturer shall furnish the Owner a written single source performance warranty that the concrete reinforcement corrosion inhibitor will be free of defects relate to workmanship or material deficiency for the period from the date of completion of the work provided under this section of the specification. The following performance standards shall be specifically covered under the warranty:

\*\* NOTE TO SPECIFIER \*\* Delete warranty period option if not required.

* + - 1. Warranty Period: Ten years.
      2. Warranty Period: Twenty years.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Using a device which employs linear polarization with a guard ring; device certified under SHRP, the corrosion current of the treated concrete shall be less than 5.0 micro-Amps per sq cm (58 micro-m per year of cross sectional steel loss) as determined by galvanostatic pulse technique equipment for the life of the warranty period. Monitoring shall be conducted prior to treatment and at years 3, 6 and 10 to verify warranty compliance.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Any areas treated with the inhibitor and determined to have a corrosion induced spall within the warranted period will be repaired at no cost to Owner. Inhibitor manufacturer will pay for repair and retreatment of non-conforming areas.
      2. The Corrosion Inhibitor Manufacturer shall be responsible for providing labor and material to retreat areas of the structure that do not comply with the warranty requirements.

\*\* NOTE TO SPECIFIER \*\* Protectosil Degadeck CSS. Delete if not required.

* + 1. The system manufacturer shall furnish the Owner a written single source performance warranty that the Concrete Penetrating Crack Sealer System will be free of defects related to workmanship or material deficiency for a ten year period from the date of completion of the work provided under this section of the specification.
       1. The following performance standards shall be specifically covered under the warranty:
          1. Loss of water repellency: When tested in accordance with ASTM D6489, The treated surfaces shall not absorb more than 1 percent water when compared to baseline results immediately after treatment.
          2. Chloride Screening: Using ASTM C1152/C1152M-03 procedure the treated concrete shall not allow more than 250 ppm of chloride ions (corrected for baseline levels) to reach the 1 inch (25 mm) level of concrete.
          3. All defective areas shall be retreated by the system manufacture as determined by the Architect. The required written warranty shall be provided by the system manufacturer.
          4. The Crack Sealer Manufacturer shall be responsible for providing labor and material to reseal areas of the parking deck where sealer effectiveness does not meet the specified limits.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: Evonik Industries - Protectosil, which is located at:2 Turner PlacePiscataway, NJ 08854Toll Free Tel: 800-828-0919Tel: 732-289-1239Email: [request info (atri.rungta@evonik.com)](https://arcat.com/rfi?action=email&company=Evonik%252BIndustries%252B-%252BProtectosil&message=RE%253A%2520Spec%2520Question%2520(09960evo)%253A%2520&coid=31903&spec=09960evo&rep=&fax=);Web: <https://silanes.evonik.com/en>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
       1. Provide a Corporate Letter stating the proposed product complies with the requirements for product qualifications and performance, regulatory requirements and warranty provisions.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* 1. WATER REPELLANTS

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: Protectosil AQUA-TRETE 20 as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: Milky white.
          2. Surface Appearance - No change in the surface appearance or texture.
          3. No Change in Surface Friction when comparing treated to untreated.
          4. Active Content: 20 percent alkyltrialkoxysilane/siloxane.
          5. Solvent Content: Water.
          6. NCHRP No. 244:

Series II: Minimum 80 percent reduction in water absorption minimum 84 percent reduction in chloride ion intrusion.

Series IV: Minimum 96 percent reduction in chloride ion intrusion.

* + - * 1. ASTM C642 "Water Absorption of Hardened Concrete" 48 hr water soak:

Treated concrete absorbs less than 0.50 percent.

Control (untreated) concrete absorbs more than 3.5 percent.

* + - * 1. AASHTO T259/260 "90 Day Salt Ponding":

0.0-0.5 inch (0 to 13 mm) depth-93 percent reduction.

0.5-1.0 inch (13 to 25 mm) depth-86 percent reduction.

* + - * 1. ASTM C672 "Deicer Scaling of Concrete" treated sample 0+ after 50 cycles untreated sample 5 after 40 to 50 cycles.
        2. ASTM D6490 "Water Vapor Transmission of Non-Film forming Treatments on Cementitious Panels":

Greater than 90 percent Breathable.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: Protectosil AQUA-TRETE 40 as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: Milk white.
          2. Surface Appearance - No change in the surface appearance or texture.
          3. No Change in Surface Friction when comparing treated to untreated.
          4. Active Content: 40 percent alkyltrialkoxysilane/siloxane.
          5. Solvent Content: Water.
          6. NCHRP No. 244:

Series II: Minimum 85 percent reduction in water absorption minimum 87 percent reduction in chloride ion intrusion.

Series IV: Minimum 98 percent reduction in chloride ion intrusion.

* + - * 1. ASTM C642 "Water Absorption of Hardened Concrete" 48 hr water soak:

Treated concrete absorbs less than 0.50 percent.

Control (untreated) concrete absorbs more than 3.5 percent.

* + - * 1. AASHTO T259/260 "90 Day Salt Ponding":

0.0-0.5 inch (0 to 13 mm) depth-92 percent reduction.

0.5-1.0 inch (13 to 25 mm) depth-95 percent reduction.

1.0-1.5 inch (25 to 38 mm) depth-85 percent reduction.

* + - * 1. ASTM C672 "Deicer Scaling of Concrete":

Treated sample 0 rating after 50 cycles.

Untreated sample 5 after 40 to 50 cycles.

* + - * 1. ASTM D6490 "Water Vapor Transmission of Non-Film forming Treatments on Cementitious Panels":

90 percent Breathable.

* + - * 1. ASTM E303 "Skid Resistance":

Dry Surface: No change.

Wet Surface: No change.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: Protectosil AQUA-TRETE Concentrate as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: Water White.
          2. Active Substance: Alkyltrialkoxysilane.
          3. Active Content: 100 percent.
          4. Solvent: Water.
          5. Surface Appearance: No change in the surface texture.
          6. ASTM E514 "Water Permeance of Masonry":

99 percent reduction in the leakage rate over the control. Control wall shall have a leakage rate of at least 1.6 gal per hr (6.0 L per hr).

* + - * 1. ASTM C140 "Concrete Masonry Units" 24 hr water soak:

90 percent reduction in water absorption. Control shall absorb at least 5 percent water.

* + - * 1. ASTM D6490 "Water Vapor Transmission of Non-film Forming Treatments on Cementitious Panels:

100 percent Breathable.

* + - * 1. Penetration - visual Penetration into CMU: 0.25 inches (6 mm) average.

\*\* NOTE TO SPECIFIER \*\* Brick masonry substrates. Delete if not required.

* + 1. Product: Protectosil AQUA-TRETE EM as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: Milky white.
          2. Surface Appearance - No change in the surface appearance or texture.
          3. No Change in Surface Friction when comparing treated to untreated.
          4. Active Content: 10 percent alkyltrialkoxysilane/siloxane.
          5. Solvent Content: Water.
          6. Surface Appearance - No change in the surface texture.
          7. ASTM D6490 "Moisture Vapor Permeability of Organic Coatings":

Greater than 90 percent water vapor transmission.

* + - * 1. ASTM E514 "Water Permeance of Masonry":

100 percent reduction in the leakage rate over the control.

Control wall shall have a leakage rate of at least 1.4 gal per hr (5.5 L per hr).

* + - * 1. ASTM C67 "Sampling of Testing Brick and Structural Clay Tile, Part 7 Absorption":

24 hr submersion testing: 91 percent effective in reducing moisture intrusion.

\*\* NOTE TO SPECIFIER \*\* Cast and precast concrete substrates. Delete if not required.

* + 1. Product: Protectosil AQUA-TRETE EM as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: Milky white.
          2. Surface Appearance - No change in the surface appearance or texture.
          3. No Change in Surface Friction when comparing treated to untreated.
          4. Active Content: 10 percent alkyltrialkoxysilane/siloxane.
          5. Solvent Content: Water.
          6. Surface Appearance - No change in the surface texture.
          7. ASTM D6490 "Moisture Vapor Permeability of Organic Coatings":

Greater than 90 percent water vapor transmission.

* + - * 1. ASTM C67 "Sampling of Testing Brick and Structural Clay Tile, Part 7 Absorption":

24 hr submersion testing: 91 percent effective in reducing moisture intrusion.

* + - * 1. ASTM C642 "Water Absorption of Concrete":

24 hrs - 0.49 percent.

48 hrs - 0.68 percent.

* + - * 1. ASTM C672 "Deicer Scaling of Concrete":

After 50 Cycles: 0+.

Untreated sample: 5 after 40 to 50 cycles.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: Protectosil AQUA-TRETE SG as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: clear.
          2. Volatile Organic Compound (VOC) Content: less than 25 grams per L.
          3. ASTM D 6578 "Graffiti Resistance":

Cleanability level of 3 after 25 cycles.

* + - * 1. Resistance to Stains before and after accelerated weathering (ASTM G85 & D4587 2000 hrs):

Motor Oil: Excellent.

Transmission fluid: Excellent.

Engine coolant: Excellent.

Ketchup: Excellent.

Alcoholic Beverages: Excellent.

Shallard: Excellent.

Wine: Excellent.

Vegetable oil: Excellent.

* + - * 1. ASTM D2047 "Slip resistance":

Dry Surface: No change from untreated.

Wet Surface: No change from untreated.

* + - * 1. Toxic Fume Emission During Fire - ISO 5659-2: None.
        2. Fire Propagation - UK BS 479 Part 6: Fire Propagation Index less than 4.0.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: ProtectosilCHEM-TRETE 40D as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Product composition:

Minimum 40 percent isobutyltrialkoxy silane and ethyl silicate.

Alcohol carrier.

Contains fungicide.

* + - * 1. Surface Appearance - No change in the surface appearance or texture.
        2. ASTM C 97 "Water Absorption of Natural Stone":

Greater than 80 percent reduction in absorption.

* + - * 1. ASTM C 88 "Loss of Soundness due to Weathering": No loss.
        2. Breathability "Federal Specification SSW -110C":

98.5 percent Moisture Vapor Transmission.

* + - * 1. Penetration - Visual Penetration: 0.20 inches (5 mm) average.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: ProtectosilCHEM-TRETE 40H as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: Water white.
          2. Active Substance: Alkyltrialkoxysilane/Siloxane Mixture.
          3. Active Content: 40 percent.
          4. Solvent: Denatured ethyl alcohol.
          5. Surface Appearance - No change in the surface appearance to texture.
          6. NCHRP No. 244 Series II:

Minimum 87 percent reduction in water absorption.

Minimum 88 percent reduction in chloride ion intrusion.

* + - * 1. NCHRP No. 244 Series IV:

Minimum 97 percent reduction in chloride ion intrusion.

* + - * 1. Alberta DOT type 1b Penetrating Sealer Test:

86 percent reduction in Water Absorption after Abrasion.

* + - * 1. ASTM C672 "Deicer Scaling of Concrete":

Rating of 0+ for treated concrete after 50 cycles.

5 untreated concrete after 30 to 40 cycles.

* + - * 1. AASHTO T259/260 "90 Day Salt Ponding":

0.0 to 0.5 inch (0 to 13 mm) depth. 82 percent reduction.

0.5 to 1.0 inch (13 to 25 mm) depth. 92 percent reduction.

* + - * 1. ASTM E 303 "Surface Friction Testing":

Wet Surface: No change over control.

Dry Surface: No change over control.

* + - * 1. ASTM D 6490 Water Vapor Transmission:

Breathable: 100 percent.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: ProtectosilCHEM-TRETE PB100 as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Surface Appearance - No change in the surface appearance or texture.
          2. ASTM E514 "Water Permeance of Masonry":

100 percent reduction in the leakage rate over the control. Control shall have a leakage rate of at least 1.6 gal per hr (6.0 L per hr).

* + - * 1. ASTM C140 "Concrete Masonry Units" 24 hr water soak:

99.6 percent reduction in water absorption. Control shall absorb at least 5 percent water.

* + - * 1. ASTM D6490 "Water Vapor Transmission of Non-Film Forming Treatments on Cementitious Panels:

100 percent Breathable.

* + - * 1. Penetration - Visual Penetration into CMU: 0.25 inches (6 mm) average.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: ProtectosilCHEM-TRETE PB VOC as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Surface Appearance - No change in the surface appearance or texture.
          2. ASTM E514 "Water Permeance of Masonry":

100 percent reduction in the leakage rate over the control. Control shall have a leakage rate of at least 1.6 gal per hr (6.0 L per hr).

* + - * 1. ASTM C140 "Concrete Masonry Units" 24 hr water soak:

99.6 percent reduction in water absorption. Control shall absorb at least 5 percent water.

* + - * 1. ASTM D6490 "Water Vapor Transmission of Non Film forming Treatments on Cementitious Panels:

Breathable: 100 percent.

* + - * 1. Penetration - Visual Penetration into CMU: 0.25 inches (6 mm) average.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: ProtectosilCHEM-TRETE 40 VOC as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Product shall be greater than 50 percent silane in an alcohol carrier.
          2. Active Substance: Isobutyltrialkoxysilane.
          3. Surface Appearance - No change in the surface appearance or texture.
          4. Shall not leave a residue on non-porous surfaces (ie: windows, aluminum framing, etc.).
          5. ASTM E514 "Water Permeance of Masonry":

100 percent reduction in the leakage rate over the control. Control wall shall have a leakage rate of at least 0.6 gal per hr (2.0 L per hr).

* + - * 1. ASTM C67 "Brick and Structural Clay Tile" Part 7 Water Absorption

98 percent reduction in water absorption.

* + - * 1. ASTM D6490 "Water Vapor Transmission of Non-film forming Treatments on Cementitious Panels":

Breathable: 100 percent.

* + - * 1. Penetration - Visual Penetration into Brick: 0.25 inches (6 mm) average.
    1. Product: ProtectosilCHEM-TRETE 40 VOC as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Product shall be greater than 50 percent silane in an alcohol carrier.
          2. Active Substance: Isobutyltrialkoxysilane.
          3. Surface Appearance: No change in the surface appearance or texture.
          4. NCHRP No. 244:

Series II: Minimum 86 percent reduction in water absorption. Minimum 87 percent reduction in chloride ion intrusion.

Series IV: Minimum 99 percent reduction in chloride ion intrusion.

* + - * 1. Alberta DOT type 1b Penetrating Sealer Test:

84 percent reduction in Water Absorption before Abrasion.

85 percent reduction in Water Absorption after Abrasion.

* + - * 1. ASTM C672 "Deicer Scaling of Concrete":

Rating of 0+ for treated concrete after 60 cycles.

Rating of 5 untreated concrete after 30 to 40 cycles.

* + - * 1. ASTM C642 "Water Absorption of Hardened Concrete" 48 hr water soak".

Treated shall absorb less than 0.50 percent absorption.

Control, untreated, concrete shall absorb more than 3.5 percent.

* + - * 1. ASTM E 303 "Surface Friction Testing":

Wet Surface: No change over control.

Dry Surface: No change over control.

* + - * 1. ASTM D 6490 Water Vapor Transmission:

Breathable: 100 percent.

\*\* NOTE TO SPECIFIER \*\* Impregnation for surface protection against the ingress of water. Supply and application of an impregnation with water repellent function. Protection of mineral surfaces against the ingress of water and water soluble pollutants. Delete if not required.

* + 1. Product: ProtectosilBHN as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Color: Water white.
          2. Treated Surface Appearance: No change in the surface appearance or texture.
          3. No Change in Surface Friction when comparing treated to untreated.
          4. Dry time: 1 hr.
          5. Active Ingredient: 100 percent alkyltrialkoxysilane.
          6. Solvent Content: None.
          7. Dimer or Trimer Content: Less than 0.2 percent.
          8. NCHRP No. 244:

Series II:

Minimum 86 percent reduction in water absorption.

Minimum 88 percent reduction in chloride ion intrusion.

Series IV:

Minimum 99 percent reduction in chloride ion intrusion.

* + - * 1. Alberta DOT type 1b Penetrating Sealer Test

84.6 percent reduction in Water Absorption before Abrasion.

86.1 percent reduction in Water Absorption after Abrasion.

* + - * 1. Alberta DOT type 1c Penetrating Sealer Test:

88.1 percent reduction in Water Absorption after heavy Abrasion.

* + - * 1. Chloride Ion Screening following Accelerated Weathering ASTM G85, D4587, and G53: 100 percent effective.
        2. ASTM D6490 "Water Vapor Transmission of Non-film forming Treatments on Cementitious Panels: 100 percent breathable.

\*\* NOTE TO SPECIFIER \*\* Impregnation for surface protection against the ingress of water. Supply and application of an impregnation with water repellent function. Protection of mineral surfaces against the ingress of water and water soluble pollutants. Delete if not required.

* + 1. Product: ProtectosilBHN+ as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Product shall be greater than 90 percent silane in a solvent carrier.
          2. Treated Surface Appearance: No change in the surface appearance or texture.
          3. NCHRP No. 244:

Series II:

Minimum 86 percent reduction in water absorption.

Minimum 88 percent reduction in chloride ion intrusion.

Series IV:

Minimum 99 percent reduction in chloride ion intrusion.

* + - * 1. ASTM C642 "Water Absorption of Hardened Concrete" 48 hr water soak:

Treated concrete absorbs less than 0.50 percent.

Control, untreated concrete absorbs more than 3.5 percent.

* + - * 1. ASTM C672 "Deicer Scaling of Concrete":

Treated sample 0+ after 60 cycles.

Untreated control sample 5 after 40 to 50 cycles.

* + - * 1. Penetration: 0.20 inches (5 mm) average; on NCHRP No. 244 Concrete.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Product: Protectosil Stone Sealer as manufactured by Evonik Industries.
       1. Product shall comply with the following standards and performance:
          1. Product composition:

Siliconate per silicate blend.

Water carrier.

* + - * 1. Surface Appearance - No change in the surface appearance or texture.
        2. Flash Point: Greater than 200 degree F (93 degrees C).
        3. Density: 8.6 lbs per gal (1 kg per L).
        4. One year shelf life in unopened containers.
        5. Zero VOC.

\*\* NOTE TO SPECIFIER \*\* Permanent system for the protection of mineral substrates from graffiti on the basis of a multifunctional silane system. Water-based, minimum 10 cleaning cycles possible, water vapor permeable impregnation, registered at the BASt (Bundesanstalt fUr StraBenwesen/Federal Highway Research Institute). Delete if not required.

* 1. GRAFFITI PROTECTION SYSTEM
     1. Product: Protectosil ANTIGRAFFITI as manufactured by Evonik Industries.
     2. Regulatory Requirements:
        1. Complies with State and Local regulations concerning Architectural, Industrial, and Maintenance (AIM) coatings regarding Volatile Organic Content (VOC).
           1. Flammability, Smoke Spread and Toxic Fume Emission During Burning (BS 6853).
           2. Toxic gases below IDLH level.
           3. Flame Propagation: Does not propagate flame.
           4. Smoke Emission: No change.

\*\* NOTE TO SPECIFIER \*\* Include requirement B on projects listed in AZ, CA, OR, and WA. This requirement may also be useful on projects seeking LEED certification. Delete if not required.

* + - 1. Contains no chemicals listed on the CalProp65 harmful chemicals list.
    1. Product shall comply with the following standards and performance:
       1. Active Content: Organofluorosiloxane.
       2. Solvent: Water.
       3. VOC Content: less than 25 grams per L.
       4. ASTM D 6578 "Graffiti Resistance": Cleanability level of 3 after 25 cycles.
       5. ASTM D6490 "Water Vapor Transmission of Non-Film Forming Treatments on Cementitious Panels": Breathable: 90 percent.
       6. Surface Appearance: No appreciable difference compared to non-coated surface.
       7. ASTM G53/G85 "Accelerated Weathering" for 2000 hrs:
          1. No change in graffiti resistance after weathering.

\*\* NOTE TO SPECIFIER \*\* Impregnation for steel reinforced concrete as a protection against chloride induced corrosion. Supply and application of an impregnation as corrosion inhibitor. Protection of steel reinforced concrete against chloride induced corrosion. Repassivation of steel rebars after chloride induced corrosion. Delete if not required.

* 1. CORROSION CONTROL
     1. Product: Protectosil CIT as manufactured by Evonik Industries.
     2. Product shall comply with the following standards and performance:
        1. Surface Appearance: No change in the surface appearance or texture.
        2. Will not leave a residue on non-porous surfaces; i.e. windows, aluminum framing, etc.
        3. Color: Slightly amber. Fugitive dye may be added.
        4. Density: 7.3 to 7.4 lbs per gal (0.87 to 0.89 kg per L).
        5. Nitrite content: Less than 1 percent.
        6. Chloride content: Less than 20 ppm.
        7. Material shall reduce total corrosion of heavily corroding concrete rebar by an average of 90 percent, at an internal concrete relative humidity of 75 percent or greater.
        8. Shall reduce corrosion by 90 percent or greater using FHWA RD-98-153 test protocol on crack slab black bars subjected to 48 weeks of cyclic salt water ponding.
        9. Shall increase the resistance of chloride ions using AASHTO T277 "Rapid Determination of the Chloride Permeability of Concrete" by 90 percent or minimum.
        10. Shall reduce corrosion by 80 percent when the presence of chlorides is over 10 lbs per cu yd (5.9 kg per cu m) of concrete at the top level of reinforcing steel.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* 1. CRACK SEALER
     1. Product: Protectosil Degadeck CSS as manufactured by Evonik Industries.
        1. Type: 2 component Methacrylate mixture.
        2. Components:
           1. Liquid Resin: Protectosil Degadeck CSS.
           2. Initiator Powder: Protectosil CSS BPO.
           3. Aggregate: 30 mesh bagged, dried silica sand with a maximum moisture content of 0.5 wt percent.
     2. Product shall comply with the following standards and performance:
        1. Color: Bluish, slightly turbid liquid.
        2. Active Ingredient: 100 percent Methylmethacrylate.
        3. Viscosity: 5 to 15 cps.
        4. Solvent Content: None.
        5. VOC Content: Less than 70 g per L.
        6. ASTM C 579 - Compressive Strength: 7,500 psi (51,711 kPa).
        7. ASTM C 1583 - Direct Tensile Strength: 500 psi (3447 kPa).
        8. ASTM D 638 - Tensile Strength: 3,000 psi (20,684 kPa).
        9. ASTM D 638 - Tensile Elongation: 2.5 percent.
        10. ASTM D 790 - Flexural Strength: 2,000 psi (13,790 kPa).
        11. Cure Time: Less than 2 hrs.

1. EXECUTION
   1. EXAMINATION
      1. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions that may be detrimental to proper or timely completion.

\*\* NOTE TO SPECIFIER \*\* Masonry application. Delete if not required.

* + - 1. Verify masonry joints found to be unsound, hollow, or otherwise defective, have been raked out to a depth of 1/2 inch (13 mm) and pointed with mortar.

\*\* NOTE TO SPECIFIER \*\* Masonry application. Delete if not required.

* + - 1. Verify cracks that exceed 1/64 inch (1.6 mm) wide have been filled with pointing mortar.
    1. Do not proceed until unsatisfactory conditions have been corrected.
  1. PREPARATION
     1. Protection: Install coverings to protect adjacent surfaces.

\*\* NOTE TO SPECIFIER \*\* Concrete floor application. Delete if not required.

* + 1. Surface Preparation:
       1. Surfaces to receive sealer shall be cleaned of dirt, oil, grease, laitance, and other contaminants. Oil, grease and other automotive contaminants shall be removed with degreasers. All other surfaces shall be cleaned by high pressure water; 3000 psi (20.7 MPa). High pressure water is the minimum cleaning that will be accepted, other methods, such as blast-tracking, mobile power scrubbing and sandblasting may be submitted for approval.
       2. Remove dirt, dust and materials that will interfere with the proper and effective application of the penetrating sealer. It is the responsibility of the Contractor to prepare the surfaces of the concrete to a condition acceptable to the Owner.

\*\* NOTE TO SPECIFIER \*\* Elevated slabs and decks application, Delete if not required.

* + - 1. Equipment during floor slab cleaning shall not exceed the height limitation of the facility and shall not exceed a 3,000 lbs (1360 kg) axle load or vehicle gross weight of 6,000 lbs (2721 kg).
      2. Check the compatibility of all caulking, patching, and traffic marking materials to be used with the penetrating sealer.
      3. Sealants, patching materials, and expansion joints shall have been installed and approved by the Architect.
  1. FIELD QUALITY CONTROL

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Spray Test: After water repellent has dried, spray coated surfaces with water.
       1. After surfaces have adequately dried, recoat surfaces that show water absorption.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. RILEM Uptake Test:
       1. Prepare a three feet by three feet area to be sprayed with the water repellent. The area will be determined by the Owner. Apply the water repellent by saturating the surface, working your way from the bottom up.
       2. After allowing five days for the sample to cure, run a RILEM uptake test on the treated area.
       3. Place one tube on the brick and one tube on a mortar joint. Owner shall be present for the application of the water repellent and the test.
       4. Coverage rate used to pass this test section shall be used on entire project.

\*\* NOTE TO SPECIFIER \*\* Anti-graffiti system only. Delete if not required.

* + 1. Alcohol Test: After anti-graffiti coating has dried, spray coated surfaces with isopropyl alcohol.
       1. After surfaces have adequately dried, recoat surfaces that show absorption of the alcohol.

\*\* NOTE TO SPECIFIER \*\* Crack Sealer only: Delete if not required.

* + 1. Bond tests shall be conducted to judge the suitability of concrete substrates.
       1. Crack Sealer shall be applied, allowed to cure, and tested for adhesion in accordance with ASTM D4541. Bond strengths of less than 250 psi (1.7 MPa) or those not exhibiting failure within the concrete shall result in additional preparation and additional bond testing until the required result is attained.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Test Area:
       1. Before sealer application, the following field evaluation shall be done. The cost of the field testing will be the responsibility of the Water Repellent Manufacturer.
       2. Prepare a five by five area to be sprayed with the water repellent. The area will be determined by the Architect. Apply the water repellent at the specified rate to the test area.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. After curing the material for 3 days, remove two 3x3 core samples, and perform ASTM D6489.
    1. Manufacturer's Field Services:
       1. Furnish written certification that surface preparation method and final condition has manufacturer's approval and comply with the warranty.
       2. Furnish results of tests on each type of substrate. Test results shall determine application rate for the entire project.
  1. APPLICATION
     1. Product shall be applied as supplied by the manufacturer without dilution or alteration.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Spray Application; Apply with a low-pressure, 15 psi (103.4 kPa) airless spray equipment with a fan spray coarse nozzle, flooding the surface to obtain uniform coverage unless otherwise recommended by the manufacturer.
       1. Apply at a rate of not less than manufacturer's recommendation or as determined for substrate by test patch data. Provide field tests to determine rate of application that is necessary to meet the performance requirements.
       2. Brush apply water repellent only at locations where overspray would affect adjacent materials and where not practicable for spray application.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Flood Application: Treat horizontal surfaces in a flooding application until the material ponds on the surface. After 10 or 15 minutes sweep, squeegee, or mop any remaining puddles to dry areas.

\*\* NOTE TO SPECIFIER \*\* Protectosil CIT only. Delete if not required.

* + 1. Corrosion inhibitor shall be applied in accordance with the use of either spray, brush, or roller as per manufacturer's recommendations. Corrosion inhibitor shall be applied at a net coverage rate of 75 to 100 sq ft per gal (1.8 to 2.34 sq m per L) in two or three equal coats with a minimum one hr dry time between coats.

\*\* NOTE TO SPECIFIER \*\* Protectosil Degadeck CSS only. Delete if not required.

* + 1. Crack Sealer Application:
       1. Sealer shall be installed according to the Manufacturer's recommendations in accordance with the instructions of the Architect.
       2. Full depth cracks shall be sealed from the underside of the deck as prescribed by the Manufacturer and Architect.
       3. Cracks shall be treated by pouring crack sealer to rejection.
       4. Crack sealer shall be poured onto the deck and evenly distributed over the surface with brooms, brushes, rollers or squeegees.
       5. In areas of dense concrete where crack sealer has not penetrated and where product has accumulated on the surface, silica sand shall be broadcast at a rate not to exceed 3 lbs per 100 sq ft (150 g per sq m) to provide for a suitable non-skid surface until the Crack Sealer is worn off by traffic flow.
    2. Apply at temperature and weather conditions recommended by the manufacturer or written in this specification.
    3. Follow manufacturer's recommendations concerning protection of glass, metal and other non-porous substrates. Contractor will be responsible to clean all surfaces that are contaminated by the water repellent.
    4. Follow manufacturer's recommendation concerning protection of plants, grass and other vegetation. Contractor will be responsible for replacing all plants, grass or vegetation damaged by the water repellent.
  1. CLEANING
     1. As work progresses, clean spillage and overspray from adjacent surfaces using materials and methods as recommended by water repellent manufacturer.
     2. Remove and dispose of all materials used to protect surrounding areas and non-application surfaces, following completion of the work of this section.
     3. Clean site of all unused water repellents, residues, rinse water, wastes, and effluents in accordance with environmental regulations.
     4. Repair, restore, or replace to the satisfaction of the Architect, all materials, landscaping, and non-masonry surfaces damaged by exposure to water repellents.
  2. COMPLETION
     1. Work that does not conform to specified requirements shall be corrected and/or replaced as directed by the Owners Representative at Contractor's expense without extension of time.

END OF SECTION