UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 19 00

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08/23

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USACE / NAVFAC / AFCEC / NASA **UFGS-07 19 00 (August 2023)**

Preparing Activity: NAVFAC **Superseding**
UFGS-07 19 00 (May 2011)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023

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SECTION 07 19 00

WATER REPELLENTS
08/23

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NOTE: This guide specification covers the requirements for the application of water repellent coatings to above grade concrete, concrete masonry, and plaster surfaces.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

****

****

NOTE: Graffiti resistance and glossy surface finish are not obtained with these penetrant-type repellents.

****

****

NOTE: On the drawings, show location of each type of water repellent to be used. Designate by code.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501.2	(2015) Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 259	(2002; R 2017) Standard Method of Test for Resistance of Concrete to Chloride Ion Penetration
AASHTO T 260	(2021) Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials

ASTM INTERNATIONAL (ASTM)

ASTM C140/C140M	(2022c) Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C642	(2021) Standard Test Method for Density, Absorption, and Voids in Hardened Concrete
ASTM D1653	(2013; R 2021) Standard Test Methods for Water Vapor Transmission of Organic Coating Films
ASTM D2369	(2020) Standard Test Method for Volatile Content of Coatings
ASTM D3278	(2021) Standard Test Methods for Flash

	Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM E96/E96M	(2022a; E 2023) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E514/E514M	(2020) Standard Test Method for Water Penetration and Leakage Through Masonry
ASTM G154	(2023) Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants

1.2 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are

[for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Water Repellents

SD-06 Test Reports

Water Absorption

Accelerated Weathering

Resistance to Chloride Ion Penetration

Moisture Vapor Transmission

Water Penetration and Leakage

SD-07 Certificates

Manufacturer's Qualifications

Applicator's Qualifications

Evidence of Acceptable Variation

Warranty

SD-08 Manufacturer's Instructions

Application Instructions

Manufacturer's Safety Data Sheets

1.3 QUALITY ASSURANCE

1.3.1 Qualifications

a. Manufacturer's qualifications: Minimum five years record of successful in-service experience of water repellent treatments manufactured for [concrete,] [concrete masonry,] [plaster] application.

b. Applicator's qualifications: Minimum five years successful experience in projects of similar scope using specified or similar treatment materials and manufacturer's approval for application.

1.3.2 Performance Requirements

a. Water absorption: ASTM C140/C140M. Comparison of treated and untreated specimens.

b. Moisture vapor transmission: ASTM E96/E96M. Comparison of treated and untreated specimens.

c. Water penetration and leakage through masonry: ASTM E514/E514M.

d. Resistance to chloride ion penetration: AASHTO T 259 and AASHTO T 260.

e. Resistance to Accelerated weathering: ASTM G154

1.3.3 Evidence of Acceptable Variation

If a product proposed for use does not conform to requirements of the referenced specification, submit for approval to the Contracting Officer, evidence that the proposed product is either equal to or better than the product specified. Include the following:

a. Identification of the proposed substitution;

b. Reason why the substitution is necessary;

c. A comparative analysis of the specified product and the proposed substitution, including tabulations of the composition of pigment and vehicle;

d. The difference between the specified product and the proposed substitution; and

e. Other information necessary for an accurate comparison of the proposed substitution and the specified product.

1.4 SAMPLE TEST PANEL

The approved Sample Test Panel will serve as the standard of quality for all other water repellent coating work. Do not proceed with application until the sample panel has been approved by the Contracting Officer.

****
NOTE: Specify sample test panels as a part of the work included in Division 03, CONCRETE; Division 04, MASONRY; or in Division 09, FINISHES, as applicable.
****

1.4.1 Preparation of Sample Test Panel

****
NOTE: Insert appropriate Section number and title in the blank below using format per UFC 1-300-02, "Unified Facilities Guide Specifications (UFGS) Format Standard".
****

Prior to commencing work, including bulk purchase and delivery of material, apply water repellent treatment to a minimum 1200 mm 4 feet high by 1200 mm 4 feet long [concrete,] [concrete masonry,] [plaster] test-panel specified in [_____]. Provide a full height expansion joint at mid-panel length. Prepare and seal joint with materials approved for project use.

1.4.1.1 Testing

Similar to AAMA 501.2 hose testing, provide field water testing of water repellent treated surfaces in the presence of the Contracting Officer and the water repellent treatment manufacturer's representative as follows.

a. Apply water repellent to left side of mock-up and allow to cure prior to application of treatment to right side.

b. Twenty days after completion of application of treatment, test mock-up with 16 mm 5/8 inch garden hose, with spray nozzle, located 3 meters 10 feet from wall and aimed upward so water strikes wall at 45-degree downward angle. After water has run continuously for three hours observe back side of mock-up for water penetration and leakage. If leakage is detected, make changes as needed and retest.

c. Coordinate testing procedures and modify project treatment application as required to pass mock-up tests for water penetration and leakage resistance.

1.4.1.2 Approval

Proceed with water repellent treatment work only after completion of field test application and approval of mock-up and tests by the Contracting Officer.

1.4.2 Pre-Installation Meeting

a. Attend pre-installation meeting required prior to commencement of [concrete,] [concrete masonry,] [plaster] installation.

b. Review procedures and coordination required between water repellent treatment work and work of other trades which could affect work to be performed under this section of the work.

c. Convene additional pre-installation meeting prior to water repellent treatment application for coordination with work not previously coordinated including joint sealants.

1.5 REGULATORY REQUIREMENTS

****
NOTE: Include these paragraphs as required by Federal, State, or local jurisdictions.
****

1.5.1 Environmental Protection

****
NOTE: Include the second bracketed option for work in the State of California.
****

In addition to requirements specified in Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS for environmental protection, provide coating materials that conform to the restrictions of the [Local Air Pollution Control jurisdiction] [CALIFORNIA AIR RESOURCES BOARD (CARB) and local Air Pollution Control District regional jurisdiction]. Notify the Contracting Officer of water repellent coating specified herein which fails to conform to the local Air Quality Management District Rules at the location of the Project. In localities where the specified coating is prohibited, the Contracting Officer may direct the substitution of an acceptable coating.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials in original sealed containers, clearly marked with the manufacturer's name, brand name, type of material, batch number, percent solids by weight and volume, and date of manufacturer. Store materials off the ground, in a dry area where the temperature will be not less than 10 degrees C 50 degrees F nor more than 29 degrees C 85 degrees F.

1.7 SAFETY METHODS

Apply coating materials using safety methods and equipment in accordance with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, and the following:

1.7.1 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The coating manufacturer when using solvents or other chemicals. Use impermeable gloves, chemical goggles or face shield, and other recommended protective clothing and equipment to avoid exposure of skin, eyes, and respiratory system. Conduct work in a manner to minimize exposure of building occupants and the general public.

b. 29 CFR 1910.1000.

c. Threshold Limit Values (R) of the American Conference of Governmental Industrial Hygienists.

d. Manufacturer's Safety Data Sheets.

1.8 ENVIRONMENTAL CONDITIONS

1.8.1 Weather and Substrate Conditions

Do not proceed with application of water repellents under any of the following conditions, except with written recommendations of manufacturer.

a. Ambient temperature is less than 4 degrees C 40 degrees F.

b. Substrate faces have cured less than one month.

c. Rain or temperature below 4 degrees C 40 degrees F are predicted for a period of 24 hours before or after treatment.

d. Earlier than three days after surfaces are wet.

e. Substrate is frozen or surface temperature is less than 4 degrees C 40 degrees F and falling.

1.8.2 Moisture Condition

Determine moisture content of substrate meets manufacturer's requirements prior to application of water repellent material.

1.9 SEQUENCING AND SCHEDULING

1.9.1 Masonry Surfaces

Do not start water repellent coating until all joint tooling, pointing and masonry cleaning operations have been completed. Allow masonry to cure for at least 60 days under normal weather conditions before applying water repellent.

1.9.2 Plaster Surfaces

Do not start water repellent coating until all shrinkage and stress cracks are repaired and sound, all surfaces are free of defects and cleaning operations have been completed. Allow plaster to cure for at least 30 days under normal weather conditions before applying water repellent.

1.9.3 Concrete Surfaces

Do not start water repellent coating until all patching, pointing and cleaning operations have been completed and concrete has cured a minimum of 30 days under normal weather conditions.

1.9.4 Sealants

Do not apply water repellents until the sealants for joints adjacent to surfaces receiving water repellent treatment have been installed and cured.

a. Water repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.

b. Provide manufacturers' test results of compatibility.

1.10 INSPECTIONS

Notify the manufacturer's representative a minimum of 72 hours prior to scheduled application of water repellents for field inspection. Inspect surfaces and obtain approval in writing from the manufacturer's representative prior to application of water repellent coating.

1.11 SURFACES TO BE COATED

Coat all exterior [concrete,] [masonry,] [or plaster] surfaces. This includes back faces of parapets, top of walls, edges and returns adjacent to windows and door frames and free-standing walls.

1.12 WARRANTY

Provide a warranty, issued jointly by the manufacturer and the applicator of the water repellent treatment against moisture penetration through the treated structurally sound surface for a period of five years. Warranty to provide the material, labor, and equipment necessary to remedy the problem. At the satisfactory completion of the work, complete the warranty sign, notarize, and submit to the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS

Provide a clear, non-yellowing, deep-penetrating, VOC compliant water repellent solution. Material must not stain or discolor and must produce a mechanical and chemical interlocking bond with the substrate to the depth of the penetration.

2.2 WATER REPELLENTS

****
NOTE: Delete following types not required.
****

2.2.1 Silane, 20 Percent Solids

Penetrating water repellent. A monomeric compound containing approximately 20 percent alkyltrialkoxysilanes with alcohol, mineral spirits, water, and other proprietary solvent carrier.

a. Composition: Modified alkylalkoxysilane.

b. Active alkylalkoxysilane content: ASTM D2369 20 percent by weight, plus or minus 1 percent.

c. Appearance: White, milky liquid.

d. Average depth of penetration: Up to 10 mm 3/8 inch depending on substrate.

e. VOC content: Less than 350 grams per liter.

f. Flash point, ASTM D3278.

g. Specific gravity, at 25 degrees C 78 degrees F: 0.96 to 0.98.

h. Density: .96 to .98 kilograms per liter .0 to 8.2 pounds per gallon.

2.2.2 Silane, 40 Percent Solids

Penetrating water repellent. A monomeric compound containing approximately 40 percent alkyltrialkoxysilanes with alcohol, mineral spirits, or water.

a. Composition: Modified alkylalkoxysilane.

b. Active alkylalkoxysilane content: ASTM D2369 40 percent by weight, plus or minus 1.5 percent.

c. Appearance: White, milky liquid.

d. Average depth of penetration: Up to 10 mm 3/8 inch depending on substrate.

e. VOC content: Less than 350 grams per liter.

f. Flash point, ASTM D3278.

g. Specific gravity, at 25 degrees C 78 degrees F: 0.94 to 0.97.

h. Density: .94 to .97 kilograms per liter 7.8 to 8.1 pounds per gallon.

2.2.3 Silane, 85 Percent Solids or Greater

Penetrating water repellent. A monomeric compound containing 85 percent or greater alkyltrialkoxysilanes with alcohol, mineral spirits, or water.

a. Composition: Modified alkylalkoxysilane.

b. Active alkylalkoxysilane content: ASTM D2369 85 percent by weight, plus or minus 1 percent.

c. Appearance: White, milky liquid.

d. Average depth of penetration: Up to 10 mm 3/8 inch depending on substrate.

e. VOC content: Less than 350 grams per liter.

f. Flash point, ASTM D3278.

g. Specific gravity, at 25 degrees C 78 degrees F: 0.96 to 0.98.

h. Density: .96 to .98 kilograms per liter 8.0 to 8.2 pounds per gallon.

2.2.4 Siloxanes

Penetrating water repellent. Alkylalkoxysiloxanes that are oligomerous with alcohol, ethanol, mineral spirits, or water.

a. Solids by weight: ASTM D2369, 7.5 to 16.0 percent.

b. Volatile Organic Content (VOC) after blending: Less than 175 grams per liter.

c. Density, activated: One kilogram per liter 8.4 pounds per gallon, plus or minus one percent.

d. Flash point, ASTM D3278: Greater than 100 degrees C 212 degrees F.

2.2.5 Low-Solids Acrylic

Water-clear, breathing coating of acrylic resins, water-based, solvent-based, or acrylic emulsions solution containing less than 15 percent solids by volume.

****

NOTE: Below may be used on concrete, exposed aggregate, stucco, masonry, or stone where wet sheen appearance or some darkening of surface is acceptable.

****

2.2.6 High-Solids Acrylic

Water-clear, breathing coating of acrylic resins, water-based, solvent-based, or acrylic emulsions solution containing 15 percent solids

or more by volume.

2.2.7 VOC-Complying Water Repellents

Products certified by the manufacturer that they comply with local regulations controlling use of volatile organic compounds (VOC's).

2.3 PERFORMANCE CRITERIA

2.3.1 Silane, 20 Percent Solids

a. Water absorption test: ASTM C642 and ASTM E514/E514M.

b. Moisture vapor transmission: ASTM D1653, 28.33 perms or 51.61 percent maximum compared to untreated surfaces.

c. Resistance to chloride ion penetration: AASHTO T 259 and AASHTO T 260.

d. Water penetration and leakage through masonry, ASTM E514/E514M percentage reduction of leakage: 97 percent minimum.

e. Resistance to accelerated weathering, ASTM G154 testing 2,500 hours: No loss in repellency.

f. Drying time under normal conditions: Four hours per 24 degrees C 75 degrees F.

2.3.2 Silane, 40 Percent Solids

a. Average depth of penetration: 10 mm 3/8 inches depending on substrate

b. Resistance to chloride ion penetration, AASHTO T 259 and AASHTO T 260.

c. Water absorption test, ASTM E514/E514M: 0.42 percent per 48 hours; 1.2 percent per 50 days.

d. Moisture vapor transmission: ASTM D1653, 28.33 perms or 51.61 percent maximum compared to untreated surfaces.

e. Resistance to accelerated weathering, ASTM G154. Testing 2,500 hours: No loss in repellency.

f. Drying time under normal conditions: Four hours per 24 degrees C 75 degrees F.

2.3.3 Silane, 85 Percent Solids or Greater

a. Average depth of penetration: 10 mm 3/8 inches depending on substrate.

b. Resistance to chloride ion penetration, AASHTO T 259 and AASHTO T 260.

c. Water absorption test, ASTM E514/E514M: 0.42 percent per 48 hours; 1.2 percent per 50 days.

d. Moisture vapor transmission: ASTM D1653, 28.33 perms or 51.61 percent maximum compared to untreated surfaces.

e. Resistance to accelerated weathering, ASTM G154. Testing 2,500 hours: No loss in repellency.

f. Drying time under normal conditions: Four hours per 24 degrees C 75 degrees F.

2.3.4 Siloxanes

a. Dry time for recoat, if necessary: One to two hours depending on weather conditions.

b. Penetration: 10 mm 3/8 inch, depending on substrate.

c. Water penetration and leakage through masonry, ASTM E514/E514M, percentage reduction of leakage: 97.0 percent minimum.

d. Moisture vapor transmission, ASTM E96/E96M: 47.5 perms or 82 percent maximum compared to untreated sample.

e. Resistance to accelerated weathering, ASTM G154. Testing 2,500 hours: No loss in repellency.

f. Resistance to chloride ion penetration, AASHTO T 259 and AASHTO T 260.

PART 3 EXECUTION

3.1 EXAMINATION

Examine [concrete], [plaster], or [masonry] surfaces to be treated to ensure that:

a. All visible cracks, voids or holes have been repaired.

b. All mortar joints in masonry are tight and sound, have not been re-set or misaligned and show no cracks or spalling.

c. Moisture contents of walls does not exceed 15 percent when measured on an electronic moisture register, calibrated for the appropriate substrate.

d. Concrete surfaces are free of form release agents, curing compounds and other compounds that would prevent full penetration of the water repellent material.

Do not start water repellent treatment work until all deficiencies have been corrected, examined, and found acceptable to the Contracting Officer and the water repellent treatment manufacturer. Do not apply treatment to damp, dirty, dusty, or otherwise unsuitable surfaces. Comply with the manufacturer's recommendations for suitability of surface.

3.2 PREPARATION

3.2.1 Surface Preparation

Prepare substrates in accordance with water repellent treatment manufacturer's recommendation. Clean surfaces of dust, dirt, efflorescence, alkaline, and foreign matter detrimental to proper application of water repellent treatment.

3.2.2 Protection

Provide masking or protective covering for materials which could be damaged by water repellent treatment.

****
NOTE: Check manufacturer for items requiring protection.
****

a. Protect glass, glazed products, and prefinished products from contact with water repellent treatment.

b. Protect landscape materials with breathing-type drop cloths; plastic covers are not acceptable.

3.2.3 Compatibility

****
NOTE: Verify requirements below based on compatibility of water repellent treatment and sealants. Use one or both the second and third following paragraphs as required.
****

a. Confirm treatment compatibility with each type of joint sealer within or adjacent to surfaces receiving water repellent treatment in accordance with manufacturer's recommendations.

[b. When recommended by joint sealer manufacturer, apply treatment after application and cure of joint sealers. Coordinate treatment with joint sealers.

][c. Mask surfaces indicated to receive joint sealers which would be adversely affected by water repellent treatment where treatment must be applied prior to application of joint sealers.

]3.3 MIXING

Mix water repellent material thoroughly in accordance with the manufacturer's recommendations. Mix, in quantities required for that day's work, all containers prior to application. Mix each container the same length of time.

3.4 APPLICATION

In strict accordance with the manufacturers written requirements. Do not start application without the manufacturer's representative being present or their written acceptance of the surface to be treated. Submit manufacturer's instructions including preparation, application, recommended equipment to be used, safety measures, and protection of completed application.

3.4.1 Water Repellent Treatment

3.4.1.1 Spray Application

Spray apply water repellent material to exterior [concrete,] [plaster,] [and masonry] surfaces using low-pressure airless spray equipment in

strict accordance with manufacturer's printed application, instructions, and precautions. Maintain copies at the job site. Apply flood coat in an overlapping pattern allowing approximately 200 to 250 mm 8 to 10 inch rundown on the vertical surface. Maintain a wet edge at all overlaps, both vertical and horizontal. Hold gun maximum 450 mm 18 inches from wall.

3.4.1.2 Brush or Roller Application

Brush or roller apply water repellent material only at locations where overspray would affect adjacent materials and where not practical for spray applications.

3.4.1.3 Covered Surfaces

Coat all exterior [concrete,] [plaster,] [or masonry] surfaces including back faces of parapets, tops of walls, edges and returns adjacent to window and door frames, window sills, and free-standing walls.

3.4.1.4 Rate of Application

Apply materials to exterior surfaces at the coverages recommended by the manufacturer and as determined from sample panel test. Increase or decrease application rates depending upon the surface texture and porosity of the substrate to achieve even appearance and total water repellency.

3.4.1.5 Number of Coats

The results of the sample panel test determines the number of coats required to achieve full coverage and protection.

3.4.1.6 Appearance

If unevenness in appearance, lines of work termination or scaffold lines exist, or detectable changes from the approved sample panel occur, the Contracting Officer may require additional treatment at no additional cost to the Government. Apply required additional treatment to a natural break off point.

3.5 CLEANING

Clean all runs, drips, and overspray from adjacent surfaces while the water repellent treatment is still wet in a manner recommended by the manufacturer.

3.6 FIELD QUALITY CONTROL

Do not remove drums containing water repellent material from the job site until completion of all water repellent treatment and until so authorized by the Contracting Officer.

3.6.1 Field Testing

At a time not less than twenty days after completion of the water repellent coating application, subject a representative wall area of the building to the Navy Hose Stream Field Test similar to AAMA 501.2 hose test to simulate rainfall for a period of three hours. Use a minimum 16 mm 5/8 inch diameter hose and a fixed lawn sprinkler spray head which will direct a full flow of water against the wall. Place the sprinkler head so that the water will strike the wall downward at a 45-degree angle to the

wall. If the inside of the wall shows traces of moisture during or following the test, apply another coat of water repellent, at the manufacturer's recommended coverage rate to the entire building. Repeat testing and re-coating process until no moisture shows on the inside wall face. Accomplish required work retesting and re-coating at no additional cost to the Government.

3.6.2 Site Inspection

Inspect treatment in progress by manufacturer's representative to verify compliance with manufacturer instructions and recommendations.

-- End of Section --