
USACE / NAVFAC / AFCEA / NASA UFGS-09 67 23.15 (August 2009)

Preparing Activity: NAVFAC Superseding
 UFGS-09 67 23.15 (August 2008)
 UFGS-09 62 50.10 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2009

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SECTION 09 67 23.15

FUEL RESISTIVE RESINOUS FLOORING, 3-COAT SYSTEM

08/09

NOTE: This guide specification covers the requirements for a three-coat, liquid flooring system with reflective urethane topcoats, slip resistance, and joint work.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

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

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

NOTE: The thin film flooring system is appropriate for use in: aircraft maintenance hangars, equipment maintenance shops, and all other industrial floors where resistance to abrasion and fuel is required. Installation costs: \$2.00 to \$4.50 per 0.1 square meters square foot. Nominal thickness: 0.375 mm 15.0 mils. Can be rejuvenated by replacing urethane topcoats, and non-skid, only. Approximate service life: Urethane top coating with non-skid grit at three or more years. The flooring system is neither conductive nor Electro-Static Dissipative (ESD), however, either formulation is easily designed upon request. This specification is not for use in overcoating existing sound floor coatings.

NOTE: Prior to the flooring systems installation, a concrete condition assessment in accordance with the Naval Facilities Engineering Service Center's (NFESC) Users Guide (UG)-2036-SHR is highly recommended. The condition assessment is designed to identify problem floors and eliminate premature flooring failures produced by: 1) coating concrete with low surface strength, 2) coating concrete with high levels of surface contamination (oils, fuels, fats, waxes, etc.), and 3) coating concrete with a high rate of Moisture Vapor Emission (MVE). The thin film flooring system is suitable for application to: A) "smooth" concrete surface texture, B) concrete with a rate of MVE no more than 169.0 micrograms moisture per second, square meter 3.0 pounds moisture per 24 hours, 1000 square feet (ASTM F 1869), C) concrete with surface strength greater than 1.34 MPa 200 psi (ASTM D 4541), and D) concrete with fuel/oil contamination to a depth no more than 6.25 mm 1/4 inch.

NOTE: If a concrete floor has a rate of Moisture Vapor Emission (MVE) more than 197.0 micrograms moisture per second, square meter 3.5 pounds moisture per 24 hours, 1000 square feet (ASTM F 1869), apply a layered Moisture Reducing System (MRS) prior to the application of the thin film flooring system. The MRS shall be compatible with the submitted flooring system and approved / warranted by the manufacturer of the thin film flooring system. Apply the MRS to shot blasted concrete and reduce the rate of MVE to less than 169.0 micrograms moisture per second, square meter 3.0 pounds moisture per 24 hours, 1000 square feet. MRSs can employ combinations of concrete sealers, specific epoxies, and moisture insensitive grouts, with or without mesh. MRSs are available from the following partial list of vendors: Tennant (800) 553-8033, Stonhard (856) 779-7500, General Polymers (800) 543-7694, Crawford Labs (800) 356-7625, Floor Seal (800) 295-0221. Moisture Vapor Emission Test Kits (MVETK) are available from the following partial list of vendors: Floor Seal (800) 295-0221, Sinak (619)231-1771, General Polymers (800)534-7694, Crawford Labs (800) 356-7625.

NOTE: Include Section 03 01 30.71 CONCRETE REHABILITATION for repair of minor spalls and surface deterioration to depths less than 75 mm 3 inches. Specify epoxy mortar for repairs to depths no more than 50 mm 2 inches. Specify epoxy concrete for repairs to depths from 25

mm 1 inch to 75 mm 3 inches. Contain repairs to depths greater than 25 mm 1 inch in a rectangular geometry with saw cut edges. Finish repairs to resemble surrounding concrete using a stainless steel trowel.

Include Section 32 01 29.61 PARTIAL DEPTH PATCHING FOR RIGID PAVEMENTS for repair of large spalls and severe deterioration to depths from 75 mm 3 inches to 150 mm 6 inches. Specify Portland Cement Concrete (PCC) with less than 0.45 water-cement ratio, light steel trowel finish, and cure using plastic coated burlap. Provide rectangular geometry for repairs with saw cut edges to a nominal repair depth of 150 mm 6 inches. Cure PCC repair for approximately 30 days prior to the application of the flooring system. Do not cure repairs using liquid membrane-forming compounds.

For repair of spalls and severely distressed concrete to depths greater than 150 mm 6 inches, seek material guidance from Section 03 31 00.00 10, CAST-IN-PLACE STRUCTURAL CONCRETE, Section 03 30 00 CAST-IN-PLACE CONCRETE and procedural guidance from the American Concrete Pavement Association (ACPA) Guideline TB-002.02P "Concrete Paving Technology - Guidelines for Full Depth Repair." Contain within repair base a minimum of 50 mm 2 inches of clean, non-reactive concrete sand over a suitable vapor retarder (0.25 mm 10 mils polyethylene sheeting). Finish repairs by light steel trowel and cured using plastic coated burlap. Cure repairs for approximately 30 days, or more, prior to the application of the flooring system. Do not cure repairs using liquid membrane-forming compounds.

Scarify to level any curled and/or settled slab ends with joint surfaces displaying more than 3.2 mm 1/8 inch difference in vertical height. Contain within resulting surfaces a height difference no more than 1.5 mm 1/16 inch and a surface texture equal ICRI 03732 CSP 4.

NOTE: Include Section 03 31 00.00 10, CAST-IN-PLACE STRUCTURAL CONCRETE, Section 03 30 00 CAST-IN-PLACE CONCRETE for new concrete slab construction. Employ measures to control the rate of base, subbase, and subgrade Moisture Vapor Emission (MVE) to total no more than 169.0 micrograms moisture per second, square meter 3.0 pounds moisture per 24 hours, 1000 square feet when measured on the slab's surface (ASTM F 1869). Improper MVE controls have produced numerous premature coating failures. In addition to appropriate subbase drainage, specify a minimum of 25 mm 2 inches of clean, non-reactive concrete sand over no less than 0.25 mm 10 mils of polyethylene sheeting (ASTM F 4397) with sealed lap joints.

Specify concrete mix to be free of both accelerators containing calcium chloride and other sources of chloride ion contamination. Specify two passes of a light power troweled finish and cure using plastic coated burlap or equal method. Do not cure concrete using liquid membrane-forming compounds. Do not specify surface hardeners or dry shake finish (Section 09 97 23 METALLIC TYPE CONDUCTIVE/SPARK RESISTANT CONCRETE FLOOR FINISH). Approximately 60 days following the concrete pour and prior to the installation of the flooring system, test concrete for the rate of MVE and confirm rate is no more than 169.0 micrograms moisture per second, square meter 3.0 pounds moisture per 24 hours, 1000 square feet (ASTM D 1869). Consult ACI 224.3R "Joints in Concrete Construction," ACI 302.1R "Guide for Concrete Floor and Slab Construction," ACI 360R "Design of Slabs on Grade," and other appropriate construction guidance.

NOTE: Where tile is to be removed prior to the application of flooring system, test both tile and mastic for the presence of asbestos. If asbestos is detected, include Section 02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS for removal and disposal.

NOTE: If flooring system is to be applied to warehouse floors with heavy forklift traffic, a semi-flexible joint sealant is required in lieu of the specified flexible sealant. Use a semi-flexible epoxy sealant with approximately 90 percent elongation. Do not use semi-flexible sealants in areas exposed to exterior temperatures.

NOTE: Include Section 01 45 02 NAVFAC QUALITY CONTROL or 01 45 01 USACE QUALITY CONTROL, as applicable.

NOTE: Include Section 01 57 19.00 20 TEMPORARY ENVIRONMENTAL CONTROLS. This section defines fugitive dust, generated waste, hazardous materials, hazardous substance, hazardous waste, solid waste, construction and demolition (CD) debris, and liquid waste, and contains documentation for dangerous waste profile, waste information sheet, waste identification document, waste generation record, landfill disposal form, and hazardous material reporting.

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 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.

ASTM INTERNATIONAL (ASTM)

ASTM C 679	(2003e1; R 2009) Tack-Free Time of Elastomeric Sealants
ASTM C 884/C 884M	(1998; R 2005) Thermal Compatibility between Concrete and Epoxy-Resin Overlay
ASTM D 1308	(2002; R 2007) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 2240	(2005) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D 2370	(1998; R 2002) Tensile Properties of Organic Coatings
ASTM D 2621	(1987; R 2005) Infrared Identification of Vehicle Solids from Solvent-Reducible Paints
ASTM D 2697	(2003; R 2008) Volume Nonvolatile Matter in Clear or Pigmented Coatings
ASTM D 3335	(1985a; R 2009) Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM D 3718	(1985a; R 2005) Low Concentrations of

Chromium in Paint by Atomic Absorption Spectroscopy

ASTM D 3925 (2002) Sampling Liquid Paints and Related Pigmented Coatings

ASTM D 412 (2006) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

ASTM D 4541 (2009) Pull-Off Strength of Coatings Using Portable Adhesion Testers

ASTM D 6237 (2009) Painting Inspectors (Concrete and Masonry Substrates)

ASTM D 638 (2008) Standard Test Method for Tensile Properties of Plastics

ASTM E 11 (2009) Wire Cloth and Sieves for Testing Purposes

ASTM F 1869 (2004) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI)

ICRI 03732 (1997) Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC-TU 2 (1997) Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595 (Rev B; Am 1) Colors Used in Government Procurement

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

29 CFR 1910.1000 Air Contaminants

29 CFR 1910.134 Respiratory Protection

29 CFR 1926.59 Hazard Communication

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation 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.

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" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-04 Samples

Joint Sealant[; G][; G, [_____]]

Thin Film Flooring System[; G][; G, [_____]]

White Aluminum Oxide Non-Skid Grit[; G][; G, [_____]]

SD-06 Test Reports

Joint Sealant[; G][; G, [_____]]

Thin Film Flooring System[; G][; G, [_____]]

Primer[; G][; G, [_____]]

Urethane Topcoat[; G][; G, [_____]]

White Aluminum Oxide Non-Skid Grit[; G][; G, [_____]]

Patch Test Demonstration[; G][; G, [_____]]

Daily Inspection Report[; G][; G, [_____]]

Adhesion Testing[; G][; G, [_____]]

SD-07 Certificates

Work Plan[; G][; G, [_____]]

Flooring System Applicator Qualifications[; G][; G, [_____]]

Joint Sealant[; G][; G, [_____]]

Thin Film Flooring System[; G][; G, [_____]]

Warranty[; G][; G, [_____]]

SD-08 Manufacturer's Instructions

Joint Sealant[; G][; G, [_____]]

Thin Film Flooring System[; G][; G, [_____]]

Water-Based Alkaline Degreaser[; G][; G, [_____]]

SD-11 Closeout Submittals

Inspection Logbook[; G][; G, [_____]]

1.3 QUALITY ASSURANCE

1.3.1 Test Reports

1.3.1.1 Joint Sealant

Submit test results that confirm sealant complies with the requirements of Table 1a. Samples must have been tested within the last three years.

1.3.1.2 Thin Film Flooring System

Submit test results that confirm the thin film flooring system complies with the requirements of Table 1b. Samples must have been tested within the last three years.

1.3.1.3 Primer

Submit test results that confirm the primer complies with the requirements of Table 1c. Samples must have been tested within the last three years.

1.3.1.4 Urethane Topcoat

Submit test results that confirm the urethane topcoat complies with the requirements of Table 1d. Samples must have been tested within the last three years.

1.3.1.5 Daily Inspection Report

Submit one copy of the daily inspection report to the Contracting Officer within 24 hours of the date recorded.

1.3.2 Certificates

1.3.2.1 Work Plan

Submit schedule to complete work within approximately twelve (12) consecutive days. Submit a written plan describing in detail all phases of coating operations. Address work sequencing, surface preparation, flooring system application, recoat and cure time projections, as well as how each step will be controlled, tested, and evaluated. Address safety measures, work scheduling around weather, and record keeping. Assign one supervisor to the job who is to remain at the site throughout all phases of work and who is to act as the contractor's primary point of contact. Identify this person in the submitted schedule.

1.3.2.2 Flooring System Applicator Qualifications

Minimum requirements for the installation contractor are as follows: Completed three or more jobs within the past two years applying the specified materials to concrete surfaces in which the total area exceeds 18,587 square meters 200,000 square feet. Submit documentation listing location of work, point of contact at job site, total square footage of applied materials, listing of both materials and equipment used, and validation from coating manufacturer documenting quality of materials purchased per job for work totaling 18,587 square meters 200,000 square feet within the past two years. In addition to the above requirements, be certified by the material manufacturer(s) to install the submitted coatings and sealant. Submit copy of certificates.

1.3.2.3 Joint Sealant

Submit literature documenting the past performance of the sealant's use in automotive and/or aircraft maintenance shops. Minimum requirements are two or more maintenance shops with joint work totaling 3,048 linear meters 10,000 linear feet where the sealant has performed for two years with less than 1 percent combined sealant failures and defects. List location of shops, total linear feet of sealant applied per shop, shop point of contact, date sealant was applied, and the name of the installed sealant material.

1.3.2.4 Thin Film Flooring System

Submit literature documenting the past performance of the coating system's use in aircraft maintenance shops and over floors with high rates of Moisture Vapor Emission (MVE). Minimum requirements are two or more aircraft maintenance shops totaling 3,160 square meters 34,000 square feet where the coating system has performed for two years with less than 0.05 percent combined premature coating failures, material defects and surface discoloration; no more than 0.03 percent discoloration from aviation chemicals, tire plasticizers, and UV exposure. Provide a minimum of two additional case histories where successful installation occurred on floor slabs with no less than 197.0 micrograms moisture per second, square meter 3.5 pounds moisture per 24 hours, 1000 square feet. List location of shops, total coated area per shop, shop point of contact, date coating system was applied, successful installation to concrete with high MVE, and the names of the installed coating materials.

1.3.2.5 Warranty

Warrantee materials and workmanship for a minimum period of one year

following coating and sealant application. The following terms and conditions form a part of the warranty: If the applied coating system develops either blisters (chemical), checks, softening, or lifting within one year following application, rework each area at contractor's expense. The following conditions are excluded from the warranty: A) concrete cracking, flooring system mirrors cracks in concrete; B) cosmetic imperfections due to scratching and gouging; C) application to metallic concrete finishes ; and D) application to concrete with a rate of Moisture Vapor Emission (MVE) greater than 197.0 micrograms moisture per second, square meter 3.5 pounds moisture per 24 hours, 1000 square feet. If the coating system's adhesion is in question, perform one adhesion test per 9.3 square meters 100 square feet as described in the Article entitled "ADHESION TESTING." To satisfy the warranty, each adhesion test shall produce cohesive failures, concrete removal over 95 percent of each pull-off coupon, and/or adhesion no less than 2.8 MPa 400 psi. Require two additional adhesion tests to confirm results for each area failing to meet adhesion requirements. Within the warranty period, remove to sound material and rework all areas unable to meet adhesion requirements. There shall be zero percent sealant failures within one year. Within the warranty period, remove and rework all sealant material with chemically attacked surfaces and/or lifting from joint walls. Topcoat cracking over sealant is excluded from warranty.

1.3.3 Product Data

1.3.3.1 Joint Sealant

Submit manufacturer's printed instructions to include detailed application procedures, minimum and maximum application temperatures, and curing procedures. In accordance with 29 CFR 1926.59, include Material Safety Data Sheets (MSDS) for the sealant to be used at the job site.

1.3.3.2 Thin Film Flooring System

Submit manufacturer's printed instructions to include detailed mixing, minimum and maximum application temperatures, acceptable atmospheric and/or interior climatic conditions, application procedures, curing procedures, and procedures for maintenance cleaning of flooring system. Provide explicit instructions detailing surface preparation, recoat windows and remedial actions in case recoat windows are missed, and, if applicable, solvent-wiping between coats with acceptable types and grades of solvents. In accordance with 29 CFR 1926.59, include MSDSs for the coatings to be used at the job site.

1.3.3.3 Water-Based Alkaline Degreaser

Submit manufacturer's printed instructions to include detailed mixing, rate of dilution, application procedures, and rinsing procedures. In accordance with 29 CFR 1926.59, include MSDSs for the water-based alkaline degreaser to be used at this job site.

1.4 DELIVERY, STORAGE, AND HANDLING

Store coatings and sealant in spaces with temperatures from 5 degrees C 40 degrees F to 24 degrees C 75 degrees F. Inspect materials on site for damage prior to use. Return to manufacturer packaged materials in dented, rusty, or leaking containers. Conduct testing by manufacture of returned materials with an expired shelf life and if compliant, reissue a shelf life extension.

1.5 COATING HAZARDS

NOTE: Include either Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS or prepare instructions detailing each element of safety for use with this section.

Ensure that employees are trained in all aspects of the safety plan. Follow the coating manufacturer's written safety precautions throughout mixing, application, and curing of coatings. Comply with respiratory protection requirements in 29 CFR 1910.134 and safe levels of airborne contaminants in 29 CFR 1910.1000.

1.6 JOB SITE REFERENCES

Make available to the Contracting Officer at least one copy each of ASTM D 4541, ASTM D 6237, SSPC-TU 2, and ICRI 03732, including replica standards ICRI 03732 CSP 1 through CSP 9, at the job site.

1.7 PATCH TEST DEMONSTRATION

NOTE: This is a very important part of the submittal process. While it is unusual to require a test patch prior to the submitted coating system's approval, this flooring system is unusual in that it is required to provide extended, uninterrupted performance. A demonstration of contractor claims, especially under conditions to be encountered in the specific project, is considered necessary.

If customer dislikes level of non-skid grit, adjustments to the specification can be made. Grit coarser than #60 aluminum oxide is not recommended. On architectural floors, non-skid grit broadcast rates can range from none to approximately half the specified level.

Prior to the submitted flooring system's approval, apply the complete coating system to a 3 meter by 3 meter 10 foot by 10 foot square section of concrete as prepared in accordance with Part 3 "EXECUTION." Within this area, perform three adhesion tests as described in the Article entitled "ADHESION TESTING." If adhesion testing produces cohesive failures within the concrete, no less than 1 mm 40 mils concrete removed over 95 percent of each pull-off coupon, and/or adhesion more than 2.75 MPa 400 psi, patch test adhesion is acceptable. If concrete surface preparation was insufficient, apply an additional coating system patch to properly prepared concrete followed by the above adhesion testing. If adhesion results are unacceptable for both the topcoats and the primer, submit a new coating system manufactured by a different coating vendor. Apply a patch of the new coating system and subject patch to the above requirements for adhesion prior to approval. If customer dislikes non-skid grit application, adjustments to the specifications can be made. Grit coarser than #60 aluminum oxide is not recommended.

PART 2 PRODUCTS

NOTE: The specified materials are not appropriate for use in primary chemical containment, secondary chemical containment, or on floors subjected to spills from concentrated acids, bases, and organic solvents. Consult with the Naval Facilities Engineering Service Center's (NFESC) Paints and Coatings Center of Expertise for alternative coating systems to suit specific Navy needs.

2.1 JOINT SEALANT

Formulate the joint sealant to exhibit the properties as listed in Table Ia.

2.2 THIN FILM FLOORING SYSTEM

A three-coat industrial flooring system consisting of primer and two urethane topcoats. Apply the coating system at a Dry Film Thickness (DFT) ranging from 325 to 500 microns 13 to 20 mils and contain a broadcast of aluminum oxide non-skid grit. Formulate the complete flooring system to exhibit the properties as listed in Table Ib. Additional requirements for primer coat and urethane topcoat are listed in the following sub-paragraphs.

2.2.1 Primer Coat

In addition to the requirements of the thin film flooring system, formulate the primer coat to exhibit the properties as listed in Table Ic.

2.2.2 Urethane Topcoat

In addition to the requirements of the thin film flooring system, formulate the urethane top coat to exhibit the properties as listed in Table Id.

2.3 WHITE ALUMINUM OXIDE NON-SKID GRIT

Size #60, dust free (washed and dry), minimum 99 percent pure, having the following sieve analysis when tested using a 1000 gram 2.2 pound sample (ASTM E 11):

Sieve No. 40	100 percent passing
Sieve No. 50	15-30 percent retained
Sieve No. 60	70-85 percent retained
Sieve No. 70	0-15 percent retained

2.4 PREAPPROVED MATERIALS

Table II contains a listing of vendors with "preapproved materials."

PART 3 EXECUTION

3.1 COATING SAMPLE COLLECTION

The Contracting Officer and QC Manager shall witness all material sampling. Notify the Contracting Officer a minimum of three days in advance of sampling. Obtain liquid samples of each component of primer and topcoat by random selection from sealed containers and in accordance with ASTM D 3925.

Samples may be either individual cans of liquid material or 1.0 liter 1.0 quart quantities of properly mixed, extracted, and sealed liquid material. Identify samples by designated name, specification number, batch number, project contract number, sample date, intended use, and quantity involved. When the applied coating system has met the requirements defined in the Article entitled "ADHESION TESTING," return coating to the installation contractor for proper disposal.

[3.2 TILE AND TILE ADHESIVE REMOVAL

NOTE: Delete "Tile and Tile Adhesive Removal" if concrete is not tiled.

Remove 100 percent of tile employing one or more of the following techniques: chipping, scraping, sanding, scarification, high-pressure water, and various hand tools. Remove 100 percent of the tile adhesive using solvents and power scrubbing. Remove residual contamination using hot potable water under a minimum of 27.6 MPa 4,000 psi. Resulting surfaces shall appear clean and display the gray color of concrete.

[3.3 JOINT MATERIAL REMOVAL, RE-SAW CUTTING, CRACK CHASING

NOTE: Hairline cracks having no more than 3.2 mm 1/8 inch width are typically not repaired. However, cracks greater than 3.2 mm 1/8 inch width can be chased to a minimum depth of 12.5 mm 1/2 inch and sealed using the procedures and materials specified for joints. Cracks more than 18.75 mm 3/4 inch width can be repaired using either epoxy mortar and/or epoxy concrete. Sealed cracks will assist in protecting the subbase against chemical migration.

Remove 100 percent of the existing material in all joints including material bonded to joint walls and base. Rigid material may require the use of saw cutting equipment to remove. Joints may be widened up to 3.2 mm 1/8 inch when re-saw cutting. Chase concrete cracks identified for repair and open to a minimum depth of 12.5 mm 1/2 inch below crack surface with smooth vertical walls.

3.4 DEGREASING

On both coated and uncoated concrete, degrease entire floor by scrubbing using a solution of hot potable water, 49 degrees C 120 degrees F to 77 degrees C 170 degrees F, and a concentrated water-based alkaline degreaser. Perform two complete degreasing cycles on the entire floor surface. Allow solution to soak into surfaces prior to scrubbing and remove using hot potable water under a minimum of 27.6 MPa 4,000 psi. Rinsing is complete when the rinse water appears clear. If the industrial detergent is not biodegradable, collect all rinse water and dispose as hazardous waste. Squeegees and shop vacuums may be used to collect pooling rinse water. Fans may be used to aid drying of floor surfaces.

[3.5 COATING SYSTEM REMOVAL

NOTE: Delete "Coating System Removal" if concrete is uncoated.

Remove 100 percent of the existing coating system employing one or more of the following techniques: shot blasting, chipping, scraping, sanding, scarification, high pressure water blasting, and various hand tools. The use of impact tools such as scabblers may be used to remove unsound epoxy mortar flooring systems. In general, a coating system cannot be completely removed by shot blasting and, to attain 100 percent coating removal, and requires a combination of the above techniques.

13.6 SURFACE PREPARATION

Shot blast entire floor to produce a level of coarseness equal to **ICRI 03732 CSP 3**. Overlap each pass of shot blasting by **6.25 mm 1/4 inches to 12.5 mm 1/2 inches**. Add new shot to shot blasting equipment prior to blasting. Prepare surfaces inaccessible to shot blasting, base of perimeter walls and under secured equipment, using diamond disk grinding and/or light scarification to produce a level of coarseness equal to **ICRI 03732 CSP 2** and/or **ICRI 03732 CSP 4**, respectively. Resulting surfaces shall appear clean and contain the appropriate level of surface coarseness. If the resulting level of cleanliness cannot be determined, place numerous drops of water on surfaces that appear contaminated. If the water drops soak into concrete, the surfaces are free of hydrocarbon contamination (oils, grease, skydrol). If the water drops bead up and do not flatten out, surfaces require additional degreasing as detailed in the Article entitled "DEGREASING." Shot blasting coarse concrete and/or broom finished concrete can produce a level of coarseness equal to **ICRI 03732 CSP 5**: employ a best effort attempt to minimize over shot blasting of coarse concrete. If coarse concrete is encountered, shot blasting to a level of coarseness equal to **ICRI 03732 CSP 5** is acceptable; however, extremely coarse concrete can require resurfacing prior to the flooring system's installation. Sweep, vacuum, and run a high powered magnet over all surfaces to be coated, including joints.

NOTE: At this point in the installation sequence, minor spalls and surface deterioration to depths less than **75 mm 3 inches can be repaired. Use epoxy mortar for repairs to depths no more than **50 mm 2 inches**. Use epoxy concrete for repairs to depths from **25 mm to 75 mm 1 inch to 3 inches**. Finish repairs to depths greater than **25 mm 1 inch** with a rectangular geometry with saw cut edges. Repairs shall be finished to resemble surrounding concrete using a stainless steel trowel. Include Section **03 01 30.71 CONCRETE REHABILITATION** if concrete repairs of this nature are required.**

3.7 JOINT TREATMENT

Use the "Conventional Sealed Joint" as detailed in Figure 1 of **SSPC-TU 2** to seal joints. Employ measures to reduce contamination from equipment and foot traffic. Limit floor access to essential contractor personnel. Confirm joint surfaces are sufficiently clean.

3.7.1 Install Backer Rod

Install a continuous length of round, closed-cell polyethylene backer rod into each joint using a backer rod tool. For 12.5 mm 1/2 inch, 9.4 mm 3/8 inch, and 6.25 mm 1/4 inch wide joints, place backer rod to a depth of 9.4 mm 3/8 inch (depth equals the distance from the concrete's surface to the highest point on the backer rod). For joints greater than or equal to 18.75 mm 3/4 inch width, place backer to a depth of 15.6 mm 5/8 inch below the concrete's surface. Fit backer rod tight between joint walls (30 percent compression). Remove and reinstall all backer rod that is installed using either the incorrect size (loose fit) or at the incorrect depth. Following backer rod installation, apply painter's tape to surfaces adjacent joints to protect from sealant.

3.7.2 Sealant Application

Apply sealant directly into joints using a bulk-calking gun. At room temperature, the resulting sealant application shall exhibit a concave recess between 3.2 mm 1/8 inch to 1.6 mm 1/16 inch below the concrete's surface. Remove and reapply cured sealant remaining either flush or greater. Following sealant application, remove painter's tape and sealant drips on concrete surfaces. Cure sealant a minimum of 24 hours, prior to the application of coatings.

3.8 PRE-APPLICATION TESTING FOR CONTAMINATION

Spot check surfaces for oil/grease contamination using the water break test. At a rate of 5 tests per 95 square meters 1000 square feet, place one to two drops of water onto surfaces and observe for beading. Test all other surfaces that show visible signs of potential contamination. Apply additional degreasing techniques to surfaces displaying water beading in accordance with the Article entitled "DEGREASING."

3.9 COATING APPLICATION

NOTE: Use epoxy primer the same color, either white
or ultra-light gray, as the selected topcoats.
Ultra-light gray is preferred to white.

Vacuum flooring space one additional time prior to coating application.

3.9.1 Primer Application

Apply primer to flooring space at 175 microns 7.0 mils to 375 microns 15.0 mils Dry Film Thickness (DFT). If the prepared concrete resembles an ICRI 03732 CSP 3 surface, apply the primer at a minimum of 175 microns 7.0 mils DFT. If the prepared concrete resembles an ICRI 03732 CSP 5 surface, apply the primer at a maximum of 375 microns 15.0 mils DFT. The previously applied sealant may be lightly coated.

3.9.2 Non-Skid Grit Broadcast

NOTE: Aircraft hangars servicing light aircraft with
weight less than 18,140 kg 40,000 pounds may require
a higher loading of non-skid grit. The additional

grit will assist in towing aircraft under wet conditions; however, the additional grit will decrease coating aesthetics. Up to 450 grams 1 pound per 93 square meters 100 square feet of additional non-skid grit can be required

On either warehouse or architectural floors, considerably less non-skid grit may be appropriate. Broadcast rates can range from none to less than 450 grams 1.0 pound per 93 square meters 1000 square feet.

Broadcast non-skid grit at a rate of 680 grams 1.5 pounds per 9.3 square meters 100 square feet into the second urethane top coat and backroll. Map floor into 55.8 square meter 600 square foot sections where 4080 grams 9.0 pounds of non-skid grit is pre-weighed, placed into clean buckets and used in its entirety per marked 55.8 square meter 600 square foot section.

3.9.3 Application of Topcoats

Apply two coats of urethane topcoat to the epoxy primer and broadcast white aluminum oxide non-skid grit directly into the second urethane topcoat.

3.9.3.1 First Topcoat

Apply a full coat of the urethane topcoat at a spreading rate from 62.5 to 80 microns 2.5 to 3.2 mils Dry Film Thickness (DFT). Stripe coat perimeter edges and around equipment footings. Monitor and record a minimum of one Wet Film Thickness (WFT) reading per 55.8 square meter 600 square feet of floor surface. Sealant is to be lightly coated.

3.9.3.2 Second Topcoat

Apply a second coat of the urethane topcoat at a spreading rate of 62.5 to 80 microns 2.5 to 3.2 mils DFT. Stripe coat perimeter edges and around equipment footings. Monitor and record a minimum of one WFT reading per 55.8 square meters 600 square feet of floor surface prior to broadcasting non-skid grit. When the correct WFT has been applied per 55.8 square meters 600 square feet of area, immediately and evenly broadcast non-skid grit directly into the second topcoat of urethane and backroll in two directions. Test the adhesion of the thin film flooring system in accordance with the Article entitled "ADHESION TESTING."

3.9.3.3 Walkway Stripe and Grounding Rod Markings

Place the walkway stripe and grounding rod markings according to Government drawings, if applicable. When the second topcoat is within its recoat window, apply a walkway stripe of the red/orange urethane topcoat at 75 microns 3.0 mils DFT, completely hiding the top coat, in one coat. If insufficient hiding occurs, apply one additional coat of the walkway stripe. Lightly broadcast non-skid grit into the wet walkway stripe. Use solvent resistant tape to protect the floor coating against stripe coat bleed. A thin clear coat of either epoxy or urethane may be required to prevent stripe coat bleed prior to the full application of the colored stripe coat. Apply grounding rod markings using similar procedures, urethane top coat, and colors and size according to Government drawings.

3.10 CURING

Cure installed materials to display performance equal to manufacturer's product literature. Remove and reapply improperly cured material.

3.11 FIELD TESTS AND INSPECTION

3.11.1 Coating Inspector

NOTE: Insert directly into Section 01 45 02 NAVFAC
QUALITY CONTROL or 01 45 01 USACE QUALITY CONTROL,
as applicable, requirement for NACE Coating
Inspector. See Appendix A for instructions on
modifying Section 01 45 02 NAVFAC
QUALITY CONTROL and 01 45 01 USACE QUALITY CONTROL,
as applicable. The NACE Coating Inspector will act
as QC Specialist.

Consider the Coating Inspector as a QC Specialist, who works for the QC Manager, and be qualified in accordance with Section [01 45 02 NAVFAC QUALITY CONTROL][01 45 01 USACE QUALITY CONTROL]. The Coating Inspector will be present during all field tests, surface preparation, flooring application, initial cure of the flooring system, and during all flooring repair work. The Coating Inspector will provide all tools/equipment necessary to perform field tests and inspection. The Coating Inspector will be responsible for field tests and specified level of inspection.

3.11.2 Inspection

Document weather conditions, job site occurrences, and report conditions and occurrences potentially detrimental to the flooring system. The listed inspection requirements are in addition to the QC inspection and reporting requirements defined in Section [01 45 02 NAVFAC QUALITY CONTROL][01 45 01 USACE QUALITY CONTROL]. Prepare a project reference sheet outlining all requirements, tests, test methods, and evaluation criteria, and hold regular meetings with contractor personnel, including shot blasting operators and applicators, to review requirements/evaluation criteria for upcoming work prior to execution. At the start of coating operations and every 1.0 hour following until daily work is complete, record air temperature, substrate temperature, and relative humidity. Following the application of each coat, inspect surfaces for improperly cured material, blisters, inadequate and/or excessive coating thickness, and other defects. Document each inspection, test, non-compliant area, and location of each non-compliant area. List method of evaluation, evaluation criteria, areas requiring rework, and all other pertinent observations.

3.11.2.1 Daily Inspection Report

Submit to the Contracting Officer one copy of the daily inspection report completed each day when performing work under this Section. Use Appendix X1 "Inspection Checklist" of ASTM D 6237 to monitor daily activity and to assist in preparing the daily inspection report. Note each non-compliant issue and each issue identified for rework in accordance with the QC documentation procedures of Section [01 45 02 NAVFAC QUALITY CONTROL][01 45 01 USACE QUALITY CONTROL]. Use of forms containing entry blocks for all required data is encouraged. The data shall be legible and presented in a professional format. Submit report within 24

hours of the report date.

3.11.2.2 Inspection Logbook

Record all daily activity related to this section in the Inspection Logbook, including the daily inspection reports, as well as all other pertinent observations and information. Use hard or spiral bound book with consecutively numbered pages. Prior to final payment, submit original Inspection Logbook to the Contracting Officer upon completion of project.

3.11.2.3 Inspection Equipment

Use equipment in good condition, operational within its design range, and calibrated as required by the specified standard for use with each device.

3.11.3 Adhesion Testing

Perform a minimum of three adhesion tests in accordance with ASTM D 4541 to the thin film flooring system. Select three random flooring locations spaced a minimum of 6 meters 20 feet between each location. Prior to attaching pull-off coupons, lightly sand flooring surface and attach pull-off coupons containing a grit-blasted anchor profile. Adhere directly to the center of each sanded surface a 18.75 mm 3/4 inch diameter pull-off coupon. When pull-off coupon adhesive has sufficiently cured, score circumference of each pull-off coupon to concrete substrate. Test adhesion and evaluate results. If testing produces cohesive failures within the concrete, no less than 1 mm 40 mils concrete removed over 95 percent of each pull-off coupon, and/or adhesion more than 2.75 MPa 400 psi coating system's adhesion is acceptable. If the above requirements are not satisfied, then perform one adhesion test per 9.3 square meters 100 square feet using the above procedures. Perform two additional tests per non-compliant area to confirm results. Remove to sound material and rework all areas unable to meet adhesion requirements. Repair each adhesion test using a combination of primer, sand-filled epoxy mortar (for deep cohesive failures, if applicable), and two urethane topcoats. Make repairs flush with adjacent coatings and display an equivalent appearance.

3.12 FINAL CLEANUP

Following completion of the work, remove debris, equipment, and materials from the site. Remove temporary connections to Government or contractor furnished water and electrical services. Restore existing facilities in and around the work areas to their original condition.

TABLE I - MATERIALS REQUIREMENTS
TABLE Ia

Test	Minimum Requirement (maximum where indicated)
Sealant System (two-pack: self-leveling)	Polysulfide (Manganese Cure; MnO ₂) or Urethane
Percent Volume Solids	100 percent
Chemical Resistance to JP-8 plus 100 Fuel at 21 degrees C (ASTM D 1308) (see note 1)	48 hours immersion: 2.0 percent (max) weight increase, 5.0 percent (max) volume increase, 2.0 percent (max) weight loss
Chemical Resistance to Motor Oils at 21degrees C (ASTM D 1308) (see note 1)	48 hours immersion: 2.0 percent (max) weight increase 5.0 percent (max) volume increase 2.0 percent (max) weight loss
Chemical Resistance to Skydrols at 21degrees C (ASTM D 1308) (see note 1)	48 hours immersion: 2.0 percent (max) weight increase 5.0 percent (max) volume increase 2.0 percent (max) weight loss
Hardness (ASTM D 2240:Shore A)	20
Tensile Strength (ASTM D 412) (or ASTM D 638)	1.0 MPa
Percent Elongation (ASTM D 412) (or ASTM D 638)	500 percent
Tack Free at 18.3degrees C (ASTM C 679)	12 hours maximum
Adhesion to Concrete	0.96 MPa
Adhesion to Urethane Topcoats (paintable sealant)	0.96 MPa

NOTES:

(1) Immerse and test a minimum of three 50 mm by 12.5 mm by 12.5 mm sections of cured sealant.

TABLE I - MATERIALS REQUIREMENTS
TABLE Ia

Test	Minimum Requirement (maximum where indicated)

Sealant System (two-pack: self-leveling)	Polysulfide (Manganese Cure; MnO ₂) or Urethane
Percent Volume Solids	100 percent
Chemical Resistance to JP-8 plus 100 Fuel at 70 degrees F (ASTM D 1308) (see note 1)	48 hours immersion: 2.0 percent (max) weight increase, 5.0 percent (max) volume increase, 2.0 percent (max) weight loss
Chemical Resistance to Motor Oils at 70 degrees F (ASTM D 1308) (see note 1)	48 hours immersion: 2.0 percent (max) weight increase 5.0 percent (max) volume increase 2.0 percent (max) weight loss
Chemical Resistance to Skydrols at 70 degrees F (ASTM D 1308) (see note 1)	48 hours immersion: 2.0 percent (max) weight increase 5.0 percent (max) volume increase 2.0 percent (max) weight loss
Hardness (ASTM D 2240:Shore A)	20
Tensile Strength (ASTM D 412) (or ASTM D 638)	150 psi
Percent Elongation (ASTM D 412) (or ASTM D 638)	500 percent
Tack Free at 65 degrees F (ASTM C 679)	12 hours maximum
Adhesion to Concrete	140 psi
Adhesion to Urethane Topcoats (paintable sealant)	140 psi

NOTES:

(1) Immerse and test a minimum of three 2 inch by 1/2 inch by 1/2 inch section of cured sealant.

TABLE Ib

Test	Minimum Requirement (maximum where indicated)
Tensile Strength (ASTM D 2370)	4.83 MPa
Percent Elongation (ASTM D 2370)	5.0 percent
Adhesion to Concrete (ASTM D 4541) (see note 1)	2.75 MPa or 100 percent failure in concrete
Thermal Compatibility between Concrete (ASTM C 884/C 884M)	60 ⁰ C
Heat Resistance, continuous exposure	"pass"
Chemical Resistance to JP-8 plus 100 Fuel at 21 degrees C (ASTM D 1308)(see note 2)	48 hours immersion: 2.0 percent (max) weight increase 2.0 percent (max) volume increase 2.0 percent (max) weight loss
Chemical Resistance to Motor Oils at 21 degrees C (ASTM D 1308)(see note 2)	48 hours immersion: 2.0 percent (max) weight increase 2.0 percent (max) volume increase 2.0 percent (max) weight loss
Chemical Resistance to Skydrols at 21 degrees C (ASTM D 1308)(see note 2)	48 hours immersion: 2.0 percent (max) weight increase 2.0 percent (max) volume increase 2.0 percent (max) weight loss
Lead (ASTM D 3335)	0.06 percent (max)
Cadmium (ASTM D 3335)	0.06 percent (max)
Chromium (ASTM D 3718)	0.00 percent

NOTES:

(1) When tested for adhesion, coating system shall display 2.75 MPa adhesion and/or remove no less than 1.0 mm of concrete over 95 percent of each pull-off coupon throughout service.

(2) Immediately following immersion, in addition to the listed requirements, coating system shall be evaluated for blisters, checks, discoloration, softening, and lifting. Coating system shall be visually free of blisters, checks, discoloration, and display both substrate and intercoat adhesion no less than 2.4 MPa (ASTM D 4541).

TABLE Ib

Test	Minimum Requirement (maximum where indicated)
Tensile Strength (ASTM D 2370)	700 psi
Percent Elongation (ASTM D 2370)	5.0 percent
Adhesion to Concrete (ASTM D 4541) (see note 1)	400 psi or 100 percent failure in concrete
Thermal Compatibility between Concrete (ASTM C 884/C 884M)	140 degrees F
Heat Resistance, continuous exposure	"pass"
Chemical Resistance to JP-8 plus 100 Fuel at 70 degrees F (ASTM D 1308)(see note 2)	48 hours immersion: 2.0 percent (max) weight increase 2.0 percent (max) volume increase 2.0 percent (max) weight loss
Chemical Resistance to Motor Oils at 70 degrees F (ASTM D 1308)(see note 2)	48 hours immersion: 2.0 percent (max) weight increase 2.0 percent (max) volume increase 2.0 percent (max) weight loss
Chemical Resistance to Skydrols at 70 degrees F (ASTM D 1308)(see note 2)	48 hours immersion: 2.0 percent (max) weight increase 2.0 percent (max) volume increase 2.0 percent (max) weight loss
Lead (ASTM D 3335)	0.06 percent (max)
Cadmium (ASTM D 3335)	0.06 percent (max)
Chromium (ASTM D 3718)	0.00 percent

NOTES:

(1) When tested for adhesion, coating system shall display 400 psi adhesion and/or remove no less than 40 mils of concrete over 95 percent of each pull-off coupon throughout service.

(2) Immediately following immersion, in addition to the listed requirements, coating system shall be evaluated for blisters, checks, discoloration, softening, and lifting. Coating system shall be visually free of blisters, checks, discoloration, and display both substrate and intercoat adhesion no less than 350 psi (ASTM D 4541).

TABLE Ic

Test	Minimum Requirement (maximum where indicated)
Resin System (ASTM D 2621)	Epoxy (two-pack)
Percent Volume Solids (ASTM D 2697)	85 percent
Color	17925 (white) or 17875 (ultra-light gray)
Hydrolytic Stability (see note 1)	No effect: 30 days immersion in Sodium Hydroxide solution with pH no less than 13.5
Moisture Insensitivity Throughout Service (ASTM F 1869, ASTM D 4541) (see note 2)	No effect: Insensitive to moisture vapor emission at rates no more than 197.0 micrograms moisture/second, square meter
Adhesion to Concrete Throughout Service (ASTM D 4541) (see note 3)	2.75 MPa or 100 percent failure in concrete

NOTES:

(1) Immediately following immersion, primer shall be evaluated for blisters, checks, discoloration, softening, and substrate lifting. Primer shall appear free of blisters, checks and moderate discoloration, and display wet adhesion no less than 2.4 MPa (ASTM D 4541).

(2) During and following application, primer shall remain unaffected by Moisture Vapor Emission (MVE) at rates no more than 197.0 micrograms moisture per second, square meter: primer shall meet the requirements of Note (3). Signs of moisture sensitivity include blisters, softening, lifting, and discoloration (whitening).

(3) When tested for in-situ adhesion, primer shall display 2.75 MPa adhesion and/or remove no less than 1.0 mm of concrete over 95 percent off each pull-off coupon.

TABLE Ic

Test	Minimum Requirement (maximum where indicated)
Resin System (ASTM D 2621)	Epoxy (two-pack)
Percent Volume Solids (ASTM D 2697)	85 percent
Color	17925 (white) or 17875 (ultra-light gray)
Hydrolytic Stability (see note 1)	No effect: 30 days immersion in Sodium Hydroxide solution with pH no less than 13.5
Moisture Insensitivity Throughout Service (ASTM F 1869, ASTM D 4541) (see note 2)	No effect: Insensitive to moisture vapor emission at rates no more than 3.5 pounds moisture/24 hrs, 1000 square feet
Adhesion to Concrete Throughout Service (ASTM D 4541) (see note 3)	400 psi or 100 percent failure in concrete

NOTES:

(1) Immediately following immersion, primer shall be evaluated for blisters, checks, discoloration, softening, and substrate lifting. Primer shall appear free of blisters, checks and moderate discoloration, and display wet adhesion no less than 350 psi (ASTM D 4541).

(2) During and following application, primer shall remain unaffected by Moisture Vapor Emission (MVE) at rates no more than 3.5 pounds moisture per 24 hours, 1000 square feet: primer shall meet the requirements of Note (3). Signs of moisture sensitivity include blisters, softening, lifting, and discoloration (whitening).

(3) When tested for in-situ adhesion, primer shall display 400 psi adhesion and/or remove no less than 40 mils of concrete over 95 percent off each pull-off coupon.

TABLE Id

Test	Minimum Requirement (maximum where indicated)
Resin System (ASTM D 2621)	Aliphatic Urethane (two-pack)
Percent Volume Solids (ASTM D 2697)	51 percent
Topcoat Color (FED-STD-595)	17925 (white) or 17875 (ultra-light gray)
Walkway Stripe Color: Red/Orange, semi-gloss (FED-STD-595)	22197 (red/orange)
Application Thickness per Coat	62.5 microns to 80 microns Dry Film Thickness(DFT)
Hiding Power: Red/Orange	Complete hiding of white coatings at 80 microns DFT(one coat)
Sunlight Resistance	Non-yellowing
Heat Resistance, continuous exposure	60 ⁰ C
Heat Resistance, intermittent exposure	93.3 ⁰ C
Chemical Resistance to JP-8 plus 100 Fuel at 21 ⁰ C (ASTM D 1308) (see note 1)	48 hours immersion: 1.0 percent (max) weight increase 1.0 percent (max) volume increase 1.0 percent (max) weight loss
Chemical Resistance to Motor Oils at 21 ⁰ C (ASTM D 1308)(see note 1)	48 hour immersion: 1.0 percent (max) weight increase 1.0 percent (max) volume increase 1.0 percent (max) weight loss
Chemical Resistance to Skydrols at 21 ⁰ C (ASTM D 1308)(see note 1)	48 hours immersion: 1.0 percent (max) weight increase 1.0 percent (max) volume increase 1.0 percent (max) weight loss

NOTES:

(1) Immediately following immersion, in addition to the listed requirements, urethane topcoat shall be evaluated for blisters, checks, discoloration, softening, and lifting. Urethane topcoat shall be visually free of blisters, checks, and discoloration, and display adhesion no less than 2.4 MPa (ASTM D 4541).

TABLE Id

Test	Minimum Requirement (maximum where indicated)
Resin System (ASTM D 2621)	Aliphatic Urethane (two-pack)
Percent Volume Solids (ASTM D 2697)	51 percent
Topcoat Color (FED-STD-595)	17925 (white) or 17875 (ultra-light gray)
Walkway Stripe Color: Red/Orange, semi-gloss (FED-STD-595)	22197 (red/orange)
Application Thickness per Coat	2.5 mils to 3.2 Dry Film Thickness(DFT)
Hiding Power: Red/Orange	Complete hiding of white coatings at 3.2 mils DFT(one coat)
Sunlight Resistance	Non-yellowing
Heat Resistance, continuous exposure	140 degrees F
Heat Resistance, intermittent exposure	200 degrees F
Chemical Resistance to JP-8 plus 100 Fuel at 70 degrees F (ASTM D 1308)(see note 1)	48 hours immersion: 1.0 percent (max) weight increase 1.0 percent (max) volume increase 1.0 percent (max) weight loss
Chemical Resistance to Motor Oils at 70 degrees F (ASTM D 1308)(see note 1)	48 hour immersion: 1.0 percent (max) weight increase 1.0 percent (max) volume increase 1.0 percent (max) weight loss
Chemical Resistance to Skydrols at 70 degrees F (ASTM D 1308)(see note 1)	48 hours immersion: 1.0 percent (max) weight increase 1.0 percent (max) volume increase 1.0 percent (max) weight loss

NOTES:

(1) Immediately following immersion, in addition to the listed requirements, urethane topcoat shall be evaluated for blisters, checks, discoloration, softening, and lifting. Urethane topcoat shall be visually free of blisters, checks, and discoloration, and display adhesion no less than 350 psi (ASTM D 4541).

TABLE II
PREAPPROVED MATERIALS*

Vendors	Materials	
Polyspec (281) 397-0033	Primer:	300EX
	Topcoat:	Tuffrez 235
	Sealant:	T-2235SL
Tennant (800) 553-8033	Primer:	Eco-MPE (see note 1)
	Topcoat:	VOC-CRU
	Sealant:	N/A (see note 2)
Stonhard (856) 779-7500	Primer:	Standard Primer
	Topcoat:	Stonseal GS6
	Sealant:	Vulkem 245
Crawford Labs (800) 356-7625	Primer:	Florock 4700
	Topcoat:	Florock Super CRU
	Sealant:	N/A (see note 2)
General Polymers (800) 543-7694	Primer:	#3578, Universal Primer
	Topcoat:	#4618, Polyurethane Enamel
	Sealant:	Cor-Seal PS

NOTES:

(*) Other products may meet specification requirements, Up to specification's date of issue, preapproved materials met specification requirements. It is the user's responsibility to confirm preapproved material formulations have not changed and specification requirements will be met.

(1) ECO-CRE primer is to be used on floors with heavy Skydrol use.

(2) Polyspec T-2235SL sealant may be used.

APPENDIX A INSTRUCTIONS FOR MODIFYING SECTION
01 45 02 NAVFAC QUALITY CONTROL and 01 45 01 USACE
QUALITY CONTROL TO ADD NACE INSPECTOR.

A. Modify Section 01 45 02 NAVFAC QUALITY CONTROL
to include NACE Coating Inspector as follows:

1. In the Article entitled "SUBMITTALS," add
submittal requirement "SD-07 Certificates," add
"NACE Coating Inspector; G" and add the following
paragraph below the addition of "NACE Coating
Inspector; G."

Submit documentation confirming each coating
inspector is classified no less than "Intermediate"
Coating Inspector under the National Association of
Corrosion Engineers (NACE) Coating Inspector Program
(NACE CIP) and has successfully completed, as a
minimum, "Session III" of NACE CIP. Include NACE
Coating Inspector identification number, date of
qualification, expiration date, and copy of "Session
III" certificate or copy of "NACE Certified"
certificate. The NACE Coating Inspector shall work
directly for the prime construction contractor and
work as part of the prime's Quality Control (QC)
Organization. Automatically disqualify any NACE
Coating Inspector with prior and/or current business
relations to job site subcontractors, material
suppliers, and equipment suppliers. Submit
documentation confirming NACE Coating Inspectors
have met the aforementioned requirements over the
past two years.

2. Add the following to the Article entitled "QC
Specialists Duties and Qualification:"
under the heading "Qualification/Experience in Area
of Responsibility, add "NACE Coating Inspector;"
under the heading "Area of Responsibility," add
"Surface preparation, flooring system installation,
field tests, and field inspection;" and under the
heading "Frequency" add "Full-time during surface
preparation, flooring system installation, field
tests, and field inspection."

3. Use NACE Coating Inspector on all flooring
projects or, as a minimum, on flooring projects with
greater than 278.7 square meters 3000 square feet.

B. Modify Section 01 45 01 USACE
QUALITY CONTROL to include NACE Coating Inspector as
follows:

Add NACE Coating Inspector to paragraph CQC
PERSONNEL and it's associated Experience Matrix.
The NACE Coating Inspector should be directly
employed by the prime contractor. Use the following

for the Qualifications column:

"Intermediate Coating Inspector under the National
Association of Corrosion Engineers (NACE) Coating
Inspector Training and Certification Program
(NCITCP)"

-- End of Section --