
USACE / NAVFAC / AFCEC / NASA UFGS-09 67 23.14 (August 2016)

Preparing Activity: USACE Superseding
UFGS-09 67 23.14 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2017

SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09 67 23.14

CHEMICAL RESISTANT RESINOUS FLOORING

08/16

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 QUALITY ASSURANCE
 - 1.3.1 Qualifications of Installer
 - 1.3.2 Shop Drawings
- 1.4 CERTIFICATIONS
 - 1.4.1 Indoor Air Quality Certifications
 - 1.4.1.1 Paints and Coatings
- 1.5 DELIVERY, STORAGE, AND HANDLING
- 1.6 ENVIRONMENTAL REQUIREMENTS

PART 2 PRODUCTS

- 2.1 PRODUCT SUSTAINABILITY CRITERIA
 - 2.1.1 Reduce Volatile Organic Compounds (VOC) (LOW-EMITTING MATERIALS) for Products
- 2.2 MATERIALS
 - 2.2.1 Primer
 - 2.2.2 Aggregate
 - 2.2.3 Binder
 - 2.2.4 Fillers
 - 2.2.5 Top Coating
- 2.3 FLOORING SYSTEMS
 - 2.3.1 Latex or Resinous Emulsion Matrix Floor Surfacing
 - 2.3.1.1 Compressive Strength
 - 2.3.1.2 Tensile Strength
 - 2.3.1.3 Flexural Strength
 - 2.3.1.4 Thermal Coefficient of Expansion
 - 2.3.1.5 Bond Strength
 - 2.3.1.6 Flame Spread Index
 - 2.3.1.7 Smoke Developed
 - 2.3.1.8 Abrasion Resistance
 - 2.3.1.9 Moisture Absorption
 - 2.3.2 Epoxy Matrix Floor Surfacing

- 2.3.2.1 Compressive Strength
- 2.3.2.2 Tensile Strength
- 2.3.2.3 Flexural Modulus of Elasticity
- 2.3.2.4 Thermal Coefficient of Expansion
- 2.3.2.5 Shrinkage
- 2.3.2.6 Bond Strength
- 2.3.2.7 Flame Spread Index
- 2.3.2.8 Smoke Deposited
- 2.3.2.9 Abrasion Resistance
- 2.3.2.10 Moisture Absorption
- 2.3.2.11 Chemical Resistance
- 2.3.3 Polyester Matrix Floor Surfacing
 - 2.3.3.1 Compressive Strength
 - 2.3.3.2 Tensile Strength
 - 2.3.3.3 Flexural Modulus of Elasticity
 - 2.3.3.4 Thermal Coefficient of Expansion
 - 2.3.3.5 Shrinkage
 - 2.3.3.6 Bond Strength
 - 2.3.3.7 Flame Spread Index
 - 2.3.3.8 Smoke Deposited
 - 2.3.3.9 Abrasion Resistance
 - 2.3.3.10 Porosity
 - 2.3.3.11 Impact Resistance
 - 2.3.3.12 Fungistatic and Bacteriostatic Resistance
 - 2.3.3.13 Ultraviolet Light Resistance
 - 2.3.3.14 Thermal Shock Resistance
 - 2.3.3.15 Stain Resistance
 - 2.3.3.16 Adhesion
 - 2.3.3.17 Chemical Resistance
- 2.4 CONDUCTIVE SPARKPROOF FLOORING
- 2.5 SEALER AND RESIN
- 2.6 ANTIMICROBIAL
- 2.7 COLOR

PART 3 EXECUTION

- 3.1 SURFACE PREPARATION
 - 3.1.1 Concrete Surfaces
 - 3.1.1.1 Mechanical Cleaning
 - 3.1.1.2 Steam Cleaning
 - 3.1.1.3 Paint Stripping
 - 3.1.1.4 Acid Etching
 - 3.1.1.5 Air Drying
 - 3.1.2 Plywood
 - 3.1.3 Ceramic Tile
 - 3.1.4 Substrate Cracks, Spalls, Joints, and Depressions
- 3.2 MIXING
- 3.3 APPLICATION
 - 3.3.1 Primer
 - 3.3.2 Floor Surfacing
 - 3.3.3 Seal Coat
- 3.4 TESTING
 - 3.4.1 Electrical Resistance
 - 3.4.2 Spark Resistance
- 3.5 PROTECTION

-- End of Section Table of Contents --

USACE / NAVFAC / AFCEC / NASA UFGS-09 67 23.14 (August 2016)

Preparing Activity: USACE Superseding
UFGS-09 67 23.14 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2017

SECTION 09 67 23.14

CHEMICAL RESISTANT RESINOUS FLOORING 08/16

NOTE: This specification covers the requirements for trowelled-on industrial resinous flooring, conductive resinous flooring, and decorative resinous flooring except resinous terrazzo.

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).

PART 1 GENERAL

NOTE: The floor systems covered by this guide specification are primarily intended for use in biological laboratories, in similar areas which are subject to hard wear or spillage of chemicals and require a high degree of cleanliness, and for explosive and ammunition facilities.

These systems are for use over normal weight concrete and will not be used over lightweight concrete. The selection of a floor system for a location where resistance to specific chemical conditions is important should be based upon the ability of the system to withstand required exposure conditions. For example, polyesters are suitable

for use where resistance to detergents is required but should not be used in laboratory or other areas where spillage of sodium hydroxide or similar strong alkaline solution occurs; epoxies should not be used where resistance to oxidizing acids is required or where resistance to temperatures in excess of 54 degrees C 130 degrees F is required. Each job should be evaluated on its own merits considering exposure conditions, costs, flammability of materials, and local experience with the various systems. All provisions relating to the systems not selected will be deleted.

Check other sections of the specifications to ensure:

1. No vermiculite or perlite aggregates in concrete substrates.
2. No curing compounds or sealers on concrete substrates.
3. New concrete receives single trowelled finish; and no burnished finishes.
4. Vapor barrier is provided under all concrete slabs-on-grade.
5. Only exterior grade plywood on new plywood substrates. No interior grade or interior grade with exterior glue. Plywood is nailed with annular ring or spiral nails only.
6. No dimension lumber substrate in new construction; when existing lumber substrates are to be covered, overlay with 50 by 50 mm (2 by 2 inch) mesh hardware cloth.

On the drawings, show:

1. Location of resinous flooring. If more than one type is to be used, key each to location on the drawings.
2. Details of special items such as coved bases, expansion joints, control joints, stairs, and floor drains.
3. Details for grounding of conductive floors.

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.

ASTM INTERNATIONAL (ASTM)

ASTM C307	(2003; R 2012) Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing
ASTM C413	(2011; R 2012) Absorption of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes
ASTM C531	(2000; R 2012) Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing, and Polymer Concretes
ASTM C579	(2001; R 2012) Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
ASTM C580	(2002; R 2012) Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
ASTM C722	(2004; R 2012) Standard Specification for Chemical-Resistant Resin Monolithic Surfacing
ASTM D1308	(2013) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D4060	(2014) Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM E162	(2015b) Surface Flammability of Materials

Using a Radiant Heat Energy Source

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350 Standard Method for the Testing and
Evaluation of Volatile Organic Chemical
Emissions from Indoor Sources using
Environmental Chambers

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 99 (2015; AMD 2016) Health Care Facilities
Code

NATIONAL TERRAZZO AND MOSAIC ASSOCIATION (NTMA)

NTMA Info Guide (2000) Terrazzo Information Guide

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1113 (2004) Architectural Coatings

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

29 CFR 1910 Occupational Safety and Health Standards

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.

The Guide Specification technical editors have
designated 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 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.

Use the "S" classification only in SD-11 Closeout
Submittals. The "S" following a submittal item
indicates that the submittal is required for the

**Sustainability eNotebook to fulfill federally
mandated sustainable requirements in accordance with
Section 01 33 29 SUSTAINABILITY REPORTING.**

**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.] [information only. When used, a designation following the "G"
designation identifies the office that will review the submittal for the
Government.] Submittals with an "S" are for inclusion in the
Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY
REPORTING. Submit the following in accordance with Section 01 33 00
SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Flooring Systems; G[, [_____]]

SD-03 Product Data

Sealer and Resin; G[, [_____]]

Floor Surfacing; G[, [_____]]

Conductive Sparkproof Flooring; G[, [_____]]

Mixing; G[, [_____]]

Certification

SD-04 Samples

Flooring Systems; G[, [_____]]

SD-06 Test Reports

Testing; G[, [_____]]

SD-07 Certificates

Qualifications of Installer; G[, [_____]]

SD-08 Manufacturer's Instructions

Application; G[, [_____]]

SD-10 Operation and Maintenance Data

Flooring Systems; G[, [_____]]

SD-11 Closeout Submittals

Indoor Air Quality for Primer; S

Indoor Air Quality for Top Coating; S

Indoor Air Quality for Sealer And Resin; S

1.3 QUALITY ASSURANCE

1.3.1 Qualifications of Installer

Perform installation by an applicator approved by the manufacturer of the floor surfacing materials. Furnish a written statement from the manufacturer detailing the Qualifications of Installer.

1.3.2 Shop Drawings

Submit drawings indicating the type and layout of the flooring system for approval.

[1.4 CERTIFICATIONS

**NOTE: Include the following section where these
products are used on the interior of the building
(defined as inside of the weatherproofing system).**

1.4.1 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

1.4.1.1 Paints and Coatings

Floor primer, top coating, resin and sealer products used on the interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1113. Provide current product certification documentation from certification body.

]1.5 DELIVERY, STORAGE, AND HANDLING

Deliver the materials to the project site in unopened bags and containers clearly labeled with the name of the manufacturer, type of material, batch number, and date of manufacture. Store materials, other than aggregates, away from fire, sparks, or smoking areas. Maintain the storage area between 10 and 32 degrees C 50 and 90 degrees F.

1.6 ENVIRONMENTAL REQUIREMENTS

Maintain the ambient room and floor temperatures at 18 degrees C 65 degrees F, or above, for a period extending from 48 hours before installation until one week after installation. Cure concrete for at least 28 days and keep it free of water for at least 7 days prior to receiving surfacing in accordance with ASTM D4263. Measure and insure moisture content of wood substrates between 8 and 10 percent prior to application.

PART 2 PRODUCTS

2.1 PRODUCT SUSTAINABILITY CRITERIA

For products in this section, where applicable and to extent allowed by

performance criteria, provide and document the following:

2.1.1 Reduce Volatile Organic Compounds (VOC) (LOW-EMITTING MATERIALS) for Products

Reduced VOC content is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph REDUCE VOLATILE ORGANIC COMPOUNDS (VOC) (LOW-EMITTING MATERIALS). Other products listed in this section may be available with reduced VOC content; identify those products that meet project requirements for reduced VOC content, and provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph REDUCE VOLATILE ORGANIC COMPOUNDS (VOC) (LOW-EMITTING MATERIALS).

2.2 MATERIALS

Provide materials (except aggregate) used in the flooring from a single manufacturer. Furnish and install [trowel applied type epoxy finish of 6 mm 1/4 inch thickness with properties and chemical resistance conforming to the requirements specified in NTMA Info Guide.] [trowel or spray applied [1.6 mm 1/6 inch] [3.17 mm 1/8 inch] [6.35 mm 1/4 inch] thick, epoxy, polyester, or other resinous material conforming to ASTM C722 with [Type A surfacings (chemical resistance and moderate to heavy traffic resistance)] [Type B surfacings (mild chemical resistance and severe thermal shock stability)]] resin-based flooring. Meet the following material requirements:

2.2.1 Primer

Type recommended by the manufacturer to penetrate into the pores of the substrate and bond with the floor surfacing matrix to form a permanent monolithic bond between substrate and surfacing matrix. Provide certification of indoor air quality for primer.

2.2.2 Aggregate

NOTE: Select the desired colors for colored quartz from the following and specify the percentage of each color in the mixture; white, grey, brown, buff, green, and red.

Use first bracketed sentence when industrial resinous and conductive industrial resinous flooring are required (biological laboratories, industrial facilities, clean rooms, laundries, and other areas subject to hard wear or spillage). Use second bracketed sentence when decorative floor is desired and floor is subject to spillage or requires high degree of cleanliness (gang showers, clean rooms, laundries, laboratories, and small kitchens where quarry tile is not economically feasible).

Provide [silica sand, quartz, granite, or other suitable chemical resistant material having a Mohr's hardness of not less than 6.0] [angular, translucent quartz covered with a colored inorganic coating as [indicated] [selected from manufacturer's standard aggregates]] aggregate.

2.2.3 Binder

NOTE: Delete unsuitable matrix or matrices in accordance with the following:

Do not use latex or resin emulsion matrices where maximum resistance to solvents, strong acid or alkaline solutions is required; where high stain resistance is required; where maximum resistance to compressive loads and indentation are required; or where colored quartz decorative aggregate is specified.

Do not use epoxy matrix where resistance to strong oxidizing acid solutions is required; where maximum fire resistance is required; where subject to prolonged temperatures in excess of 54 degrees C 130 degrees F; where frequently exposed to steam or boiling liquids; where white or light colored quartz decorative aggregates are specified or where substrate cannot be thoroughly dried.

Do not use polyester matrix where resistance to strong alkaline solutions is required; where maximum fire resistance is required; where maximum slip resistance is required; where building will be occupied during installation; or where food stuffs will be stored within building during installation.

Provide [synthetic rubber latex or resin emulsion] [thermo-setting epoxy] [or] [medium reactive nonthixotropic modified polyester] binder.

2.2.4 Fillers

If required, provide inert silica, quartz or other hard aggregate material fillers as recommended by the flooring manufacturer. Furnish fillers in the quantity necessary to impart the required color and physical characteristics. Provide a filler containing sufficient fines to obtain an even-textured, nonslip type of surface on the finished topping.

2.2.5 Top Coating

NOTE: Specify clear top coat for decorative aggregate flooring. Top coatings are available in light grey, dark grey, red, blue, tan, brown, dark green, and light green for industrial resinous floors. Conductive resinous floorings are dark grey to black and should be specified with conductive clear top coats only.

Furnish [clear] [[_____] color] coating of type recommended by the manufacturer. Provide certification of indoor air quality for top coating.

2.3 FLOORING SYSTEMS

Submit cured samples of each floor finish or color combination and Data Package 1 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. The complete systems, after curing, must have the following properties when tested in accordance with the test methods listed for each property.

2.3.1 Latex or Resinous Emulsion Matrix Floor Surfacing

NOTE: Resistance to reagents specified in item j. is required to withstand cleaning agents and spillage associated with normal use. Where resistance to specific chemicals associated with laboratories, plating shops, etc., is required, these chemical solutions and concentrations should be added to the lists. Manufacturer's literature should be checked to assure that the matrix is capable of resistance to these chemicals.

2.3.1.1 Compressive Strength

ASTM C579, 31 MPa 4500 psi minimum at 7 days.

2.3.1.2 Tensile Strength

ASTM C307, 4.2 MPa 600 psi minimum at 7 days.

2.3.1.3 Flexural Strength

ASTM C580, 5.6 MPa 800 psi minimum at 7 days.

2.3.1.4 Thermal Coefficient of Expansion

ASTM C531; 5.5×10^{-4} mm per 100 mm 0.01 mil per inch per degree C F maximum.

2.3.1.5 Bond Strength

1.4 MPa 200 psi minimum with 100 percent concrete failure.

2.3.1.6 Flame Spread Index

ASTM E162, 4.0 maximum.

2.3.1.7 Smoke Developed

ASTM E162, 0.4 gm maximum.

2.3.1.8 Abrasion Resistance

ASTM D4060; 30 mg weight loss.

2.3.1.9 Moisture Absorption

ASTM C413; 3.5 percent maximum.

Chemical Resistance

ASTM D1308; no effect when exposed to the following reagents for 7 days:

Acetic Acid: 5 percent solution
Ammonium Hydroxide: 10 percent solution
Citric Acid: 5 percent solution
Coffee
Cola Syrup
Isopropyl Alcohol
Mineral Oil
Sodium Hydroxide: 5 percent solution
Tri-Sodium Phosphate: 5 percent solution
Urea: 6.6 percent solution

2.3.2 Epoxy Matrix Floor Surfacing

NOTE: The first set of figures in brackets for items b. and c. represents epoxy and polyester matrix containing more fillers and extenders and are suitable for most installations. The second set of figures in brackets represents high resin content epoxy and polyester matrices and should be specified only when higher strengths or increased chemical resistance is required.

Resistance to reagents specified in item k. is required to withstand cleaning agents and spillage associated with normal use. Where resistance to specific chemicals associated with laboratories, plating shops, etc., is required, these chemical solutions and concentrations should be added to the lists. Manufacturer's literature should be checked to assure that the matrix is capable of resistance to these chemicals.

2.3.2.1 Compressive Strength

ASTM C579; 64 MPa 10,000 psi minimum at 7 days.

2.3.2.2 Tensile Strength

ASTM C307; [4.2] [10.3] MPa [600] [1500] psi minimum at 7 days.

2.3.2.3 Flexural Modulus of Elasticity

ASTM C580; [1610] [3215] MPa [250,000] [500,000] psi minimum at 7 days.

2.3.2.4 Thermal Coefficient of Expansion

ASTM C531; 22 by 10-4 mm per 100 mm 0.00004 inches per inch per degree C F maximum.

2.3.2.5 Shrinkage

ASTM C531; 0.5 percent maximum.

2.3.2.6 Bond Strength

1.9 MPa 300 psi minimum with 100 percent concrete failure (16 MPa 2500 psi Compressive Strength Concrete).

2.3.2.7 Flame Spread Index

ASTM E162; 25 maximum.

2.3.2.8 Smoke Deposited

ASTM E162; 4 mg maximum.

2.3.2.9 Abrasion Resistance

ASTM D4060; 15 mg maximum weight loss.

2.3.2.10 Moisture Absorption

ASTM C413; 1.0 percent maximum.

2.3.2.11 Chemical Resistance

ASTM D1308; no effect when exposed to the following reagents for 7 days:

Acetic acid: 5 percent solution
Ammonium Hydroxide: 10 percent solution
Citric Acid: 5 percent solution
Coffee
Cola Syrup
Isopropyl Alcohol
Mineral Oil
Sodium Hydroxide: 5 percent solution
Tri-Sodium Phosphate: 5 percent solution
Urea: 6.6 percent solution

2.3.3 Polyester Matrix Floor Surfacing

NOTE: The first set of figures in brackets for items a., b., c., and e. represents epoxy and polyester matrix containing more fillers and extenders and are suitable for most installations. The second set of figures in brackets represents high resin content epoxy and polyester matrices and should be specified only when higher strengths or increased chemical resistance is required.

Resistance to reagents specified in item q. is required to withstand cleaning agents and spillage associated with normal use. Where resistance to specific chemicals associated with laboratories, plating shops, etc., is required, these chemical solutions and concentrations should be added to the lists. Manufacturer's literature should be checked to assure that the matrix is capable of resistance to these chemicals.

2.3.3.1 Compressive Strength

ASTM C579; [51] [64] MPa [8000] [10,000] psi minimum at 7 days.

2.3.3.2 Tensile Strength

ASTM C307; [3.8] [10.3] MPa [600] [1500] psi minimum at 7 days.

2.3.3.3 Flexural Modulus of Elasticity

ASTM C580; [3215] [6430] MPa [500,000] [1,000,000] psi minimum at 7 days.

2.3.3.4 Thermal Coefficient of Expansion

ASTM C531; 22 by 10⁻⁴ mm per 100 mm 0.00004 inches per inch per degree C F maximum.

2.3.3.5 Shrinkage

ASTM C531; [0.6] [1.0] percent maximum.

2.3.3.6 Bond Strength

1.9 MPa 300 psi minimum with 100 percent concrete failure.

2.3.3.7 Flame Spread Index

ASTM E162; 25 maximum.

2.3.3.8 Smoke Deposited

ASTM E162; 4 gm maximum.

2.3.3.9 Abrasion Resistance

ASTM D4060; no more than 0.025 mm 1.0 mil loss of thickness.

2.3.3.10 Porosity

ASTM D4060; no more than 8 percent gain in weight and no evidence of cracking, peeling, blistering, or loss of adhesion.

2.3.3.11 Impact Resistance

ASTM D4060; no evidence of cracking, spalling, or loss of adhesion.

2.3.3.12 Fungistatic and Bacteriostatic Resistance

ASTM D4060; no support for growth of fungus or bacteria.

2.3.3.13 Ultraviolet Light Resistance

ASTM D4060; no evidence of chalking, cracking, peeling, blistering, or loss of adhesion.

2.3.3.14 Thermal Shock Resistance

ASTM D4060; no evidence of cracking, peeling, blistering, spalling, or loss of adhesion.

2.3.3.15 Stain Resistance

ASTM D4060; no permanent staining.

2.3.3.16 Adhesion

ASTM D4060; 90 percent failure of concrete substrate.

2.3.3.17 Chemical Resistance

ASTM D1308; no effect when exposed to the following reagents for 7 days.

Acetic Acid: 5 percent solution
Ammonium Hydroxide: 10 percent solution
Citric Acid: 5 percent solution
Coffee
Cola Syrup
Isopropyl Alcohol
Mineral Oil
Sodium Hydroxide: 5 percent solution
Tri-Sodium Phosphate: 5 percent solution
Urea: 6.6 percent solution

2.4 CONDUCTIVE SPARKPROOF FLOORING

NOTE: Conductive floors will be used at operations where explosives having an electrostatic sensitivity of 0.1 joule or less such as primer, detonator, igniter, and incendiary mixtures are exposed. Conductive floors are also required where the following are performed:

- a. Loose unpacked ammo with electric primers.
- b. Exposed electro-explosive devices.
- c. Electrically initiated items with exposed electric circuitry.
- d. Hazardous materials that could be ignited by static discharge from humans.

Trowel or spray apply conductive sparkproof industrial resin-based flooring [1.6 mm 1/16 inch] [3 mm 1/8 inch] [6 mm 1/4 inch] thick, epoxy, polyester, or other resinous material conforming to ASTM C722 with [Type A surfacings (chemical resistance and moderate to heavy traffic resistance)] [Type B surfacings (mild chemical resistance and severe thermal shock stability)]. Ground conductive flooring and conform to the requirements for conductive flooring of NFPA 99.

2.5 SEALER AND RESIN

Provide a sealer product recommended by the industrial resin-based flooring manufacturer; when applied to the resin topping and dried, it must be nonslip and resistant to staining and suitable for the type application indicated. Provide certificate for Indoor Air Quality for Sealer and Resin.

2.6 ANTIMICROBIAL

NOTE: Include the requirement for this item only on
projects where this additional feature is needed.

Treat industrial resin-based flooring to be resistant to fungi and bacteria.

2.7 COLOR

Provide color [as indicated] [in accordance with Section 09 06 00 SCHEDULES FOR FINISHES] [_____].

PART 3 EXECUTION

3.1 SURFACE PREPARATION

NOTE: Resinous floor systems should not be
installed over existing resilient tile or sheet
flooring. If existing concrete substrates are badly
cracked, crumbling, punky, or deeply contaminated
with oil or fat, a new concrete topping of proper
thickness and strength should be shown and
specified. Wood floors that are poorly supported,
badly worn, splinter, grease or oil soaked should be
renovated prior to application of resinous flooring.

[Completely remove existing resilient flooring and adhesive by scraping.]
[Remove all dirt, dust, debris, and other loose particles by sweeping or
vacuum cleaning.] Protect adjacent surfaces not scheduled to receive the
flooring by masking, or by other means, to maintain these surfaces free of
the flooring material.

[3.1.1 Concrete Surfaces

NOTE: Proper preparation of substrate is essential
for satisfactory performance of resinous floor
systems. Existing concrete floors should be
carefully inspected to determine condition. Based
on inspection, select most suitable surface
treatment:

Surface Condition	Surface Preparation Required
New Concrete	Acid etching and air drying
Old Concrete	
Acid contaminated	Neutralize with hot alkaline cleaner, acid etching, and air drying
Oil, fat or wax contaminated	Mechanical cleaning or steam cleaning

Surface Condition	Surface Preparation Required
Alkali contaminated	Acid etching and air drying
Painted	Mechanical cleaning or paint stripping
Adhesive and asphalt contaminated	Mechanical cleaning
Dust and dirt contaminated	Mechanical cleaning
Form oil, sealer or curing compound contaminated	Mechanical cleaning

NOTE: Select the applicable paragraph(s) from the following:

[3.1.1.1 Mechanical Cleaning

Completely remove dirt, wax, paint, laitance, and [_____] by grinding with a terrazzo machine, sanding with coarse open grid sandpaper, sand blasting, chipping, bush hammering, or wire brushing.

] [3.1.1.2 Steam Cleaning

Completely remove all animal fats, grease, oil, wax, and [_____] using a high pressure steam cleaner equipped with a soap injection system. Scrape the surface to remove any build-up of debris. Then thoroughly saturate the surface with hot caustic solution. Allow the solution to remain on the floor for 15 to 20 minutes. Apply steam, with caustic, over the presoaked area until all contamination is removed. Leach the caustic residue from the surface using one or more applications of steam without caustic. Flush the floor with warm water.

] [3.1.1.3 Paint Stripping

Brush or spray on a paint stripping material that has been demonstrated to effectively remove the paint. Leave the stripping material on the surface until the paint has softened or blistered. Remove paint by scraping, brushing, or wiping. Rinse the surface in accordance with the stripping material manufacturer's recommendations. Avoid strippers containing toxic methylene chloride.

] [3.1.1.4 Acid Etching

Apply a 10 percent solution of muriatic acid at a rate of one L/square meter one quart/each 10 square feet of concrete surface. Allow the solution to stand until it stops bubbling but not less than 5 minutes. Remove the acid and wash the surfaces several times, as required, to remove all traces of the acid. Always dilute acid by pouring into water. Use face shield rubber gloves, and other safety equipment when using acids, alkalis, or solvents.

] [3.1.1.5 Air Drying

After cleaning, allow concrete surface to air dry thoroughly prior to application of surfacing. Blowers or oil free compressed air may be used. Do not use flame-drying methods. Prior to application of surfacing, test

concrete surface for excessive moisture in at least two locations. Place rubber mats at each location with smooth side against concrete and place weight on top of mat to hold in position and ensure contact with concrete. Polyethylene with all edges taped may be used in lieu of mats. After 8 hours remove mat or sheeting and examine floor surface for moisture accumulation. If tests indicate accumulation of moisture at either location, perform additional air drying until additional tests show no moisture accumulation.

]]3.1.2 Plywood

For new plywood substrates, provide exterior grade plywood with exterior grade glue nailed with annular ring or spiral nails. Sand the plywood to remove all latent contaminants. Sweep or vacuum surfaces to remove all sanding debris. Tape joints with 100 mm 4 inch wide glass fiber reinforced tape.

3.1.3 Ceramic Tile

Remove all fats, oils, grease, or soap scum using a caustic solution of one kg one pound of caustic soda to 8.3 L one gallon of water. Allow the solution to stand on the surface for at least one hour then scrub with steel brushes or steel wool. Mop up the caustic solution, neutralize it with a 10 percent muriatic acid solution, and thoroughly rinse the residue from the surface. Test glazed tile a deglazing agent as recommended by the flooring manufacturer and sanded or acid etched to roughen the surface sufficiently to obtain a good bond. Sweep or vacuum surfaces to remove all sanding debris. Use face shield, rubber gloves, and other safety equipment when using acids, alkalis, or solvents.

3.1.4 Substrate Cracks, Spalls, Joints, and Depressions

Fill all cracks, joints, spalls, and other depressions in the substrate with a latex underlayment, as recommended by the manufacturer compatible with the floor surfacing material.

3.2 MIXING

Proportion and mix the floor surfacing components in accordance with the manufacturer's instructions. Submit flooring manufacturer's descriptive data, mixing, proportioning, and installation instructions. Include maintenance literature for resinous flooring.

3.3 APPLICATION

Submit complete instructions for application of flooring system including any precautions or special handling instructions required to comply with OSHA 29 CFR 1910-Subpart Z. Apply primer, floor surfacing, and seal coat in accordance with the manufacturer's recommendations and the following requirements.

3.3.1 Primer

Apply primer uniformly over the entire area to receive floor surfacing using clean rubber squeegees or clean steel trowels. Do not allow primer to collect in depressions. Allow primer to dry thoroughly before the next coat is applied. Reprime porous areas or areas where primer has dried.

3.3.2 Floor Surfacing

NOTE: Specify desired thickness of resinous flooring. Latex and resinous emulsion matrix flooring should be installed 6, 10 and 13 mm 1/4, 3/8, and 1/2 inch thick for light, medium, and heavy duty traffic. Epoxy and polyester matrix flooring should be installed 3, 5 and 6 mm 1/8, 3/16, and 1/4 inch thick for light, medium, and heavy duty traffic.

Use first bracketed option requiring continuous floor installation only if structural floor control joints have been located out of floor area.

Apply mixed surfacing material to provide a finish floor surfacing not less than [_____] mm inch thick. The entire surfacing in any one room or area must be [placed in one continuous operation without use of cold joints or divider strips] [one continuous operation except for placement of divider strips at structural floor control joints or as indicated]. All surfaces must be flush, true to plane and line, and level within 2 mm in one meter 1/4 inch in 10 feet.

3.3.3 Seal Coat

Apply seal coat uniformly covering all surfaces after floor surfacing has cured and as recommended by the supplier.

3.4 TESTING

NOTE: For explosive and ammunition facilities and other facilities requiring conductive sparkproof industrial resinous flooring, edit the following paragraphs. Omit when not required.

Submit reports of tests for conductive sparkproof flooring, including analysis and interpretation of test results. Properly identify each report. Identify and record the test methods used.

3.4.1 Electrical Resistance

Test the flooring between 30 and 45 days after flooring installation is completed, and prior to its use, in accordance with paragraph 12-4.1.3.8(b)(7) of NFPA 99. The resistance of the floor at any one location must be more than 5,000 ohms in areas with 110 volts service, more than 10,000 ohms in areas with 220 volt service, and average less than 1,000,000 ohms and more than 25,000 ohms in all areas. Perform tests using a technician experienced in such work.

3.4.2 Spark Resistance

Test the floor for spark resistance by stroking the floor vigorously with a 300 mm 12 inch hardened steel file in a 914.4 mm 3 foot arc. Perform the test for each 7.43 square meters 80 square feet of floor area. Perform the tests in a darkened space and only when the relative humidity of the atmosphere within the space does not exceed 50 percent. The floor must not

produce a spark when tested under these conditions.

3.5 PROTECTION

Allow surfacing to set for a minimum period of 48 hours before traffic is allowed on the floor. Protect finished flooring from traffic by covering with 13.5 kg 30 pound building paper or other equally effective means until final acceptance of the project.

-- End of Section --