**DESIGN A/E NOTE - GUIDE SPECIFICATION CONVENTIONS**

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**Red: Text updated in 1st quarter. April – June.**

**Strikethrough text and highlighting (not text) in previously issued quarters are deleted. Only 1st quarter highlighted updated text is indicated.**

**Turquoise: Text updated in 2nd quarter. July – September.**

**1st quarter updated text remains highlighted.**

**Pink: Text updated in 3rd quarter. October – December.**

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**Bright Green: Text updated in 4th quarter. January – March.**

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**IMPORTANT: Retain month and year under section title on first page indicating updated Guide Specification Section issue used.**

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SECTION **09 67 23**

RESINOUS FLOORING

(Edited from DeCA June 2022 Design Criteria)

**This Section specifies** certain requirements and procedures pertaining to sustainable resources and construction practices that are to be performed by the Contractor.

**This Section does not specify** requirements for planning and design which are addressed in the DeCA Design Criteria Handbook Division 1 Section 01 33 29, Sustainable Design Reporting, that are the responsibility of the A/E.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

RES-1 - Chemical and thermal-shock resistant urethane mortar flooring.

RES-2 - Primer, trowel-applied epoxy mortar flooring, chemical resistant topcoat.

* + - * 1. Related Sections:

Division 03 Section Cast-In-Place Concrete and Cast-In-Place Concrete Design Criteria for concrete substrates to receive resinous flooring.

Division 07 Section Joint Sealants for sealants installed at joints in resinous flooring systems.

Division 09 Section Common Work Results for Flooring Preparation.

It will be necessary to add a CLIN for “Unit Price for Osmotic Grout” to the Bid Schedule.

* + - 1. UNIT PRICE FOR OSMOTIC PRIMER
				1. Unit Price: Provide a unit price per square foot, with initial bid, for osmotic primer application in the event concrete floor slab moisture tests indicate the need.
				2. Procedures:

Unit price includes all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

Government reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Government's expense, by an independent surveyor acceptable to Contractor.

* + - 1. SUBMITTALS
				1. Product Data: For each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
				2. Sustainable **[LEED]** Submittals:

"Product Data for Credit IEQ 4" Subparagraph below applies to LEED-NC; coordinate with resinous flooring systems selected in Part 2.

Product Data **[for Credit IEQ 4]:** For liquid-applied flooring components, documentation including printed statement of VOC content.

* + - * 1. Samples for Verification: For each resinous flooring system required, 6 inches square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
				2. Submittal List:

 Reference Submittal Item Quantity Action

 1.3A Product Data X R

 1.3B Sustainable **[LEED]** Submittals X I

 1.3C Samples for Verification X R

 X Submit quantity specified in Division 01 Section Administrative Requirements.

 R Review each submittal, mark to indicate action taken, and return.

 I Submittal is for information or record purposes only. No action will be taken.

* + - * 1. Material Certificates: For each resinous flooring component, from manufacturer.
				2. Maintenance Data: For resinous flooring to include in maintenance manuals.
			1. QUALITY ASSURANCE
				1. Installer Qualifications:

Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable to resinous flooring manufacturer. Contractor shall have completed at least five projects of similar size and complexity.

Engage an installer who employs only persons trained and approved by resinous flooring manufacturer for installing resinous flooring systems specified.

* + - * 1. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials from manufacturer of primary materials.
				2. Pre-Installation Conference: Conduct conference at Project site. Comply with requirements in Division 01 Section Administrative Requirements.

Review methods and procedures related to resinous flooring including, but not limited to, the following:

Meet with Contracting Officer’s representative; resinous flooring Installer; resinous flooring system manufacturer's representative; and installers whose work interfaces with or affects resinous flooring, including installers of cold storage rooms regarding effect of temperature change to resinous flooring system upon activation of refrigeration system.

Inspect and discuss condition of substrate and other preparatory work performed by other trades.

Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

* + - * 1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Delivery: Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
				2. Storage: Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.
			2. PROJECT CONDITIONS
				1. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
				2. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.

Provide side lighting focused horizontally across work area during installation to aid installers in eliminating trowel marks.

* + - * 1. Traffic Limitations: Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.
1. PRODUCTS
	* + 1. MANUFACTURERS
				1. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in‑service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.
			2. MATERIALS
				1. VOC Content of Resinous Flooring: Provide resinous flooring systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

Resinous Flooring: 100 g/L.

* + - 1. INDUSTRIAL RESINOUS FLOORING
				1. Resinous Flooring: RES-1 - Chemical and Thermal-Shock Resistant Urethane Mortar Resinous Flooring consisting of a high performance, four-component polyurethane mortar system including urethane-urea binder, pigments, powders and quartz aggregates; sealant and seal coats.

Basis-of-Design Products: Provide the following Stonhard, Inc. component products; contact Jason Maciula (214) 680-2494, jmaciula@stonhard.com:

Stonproof CT5 – crack and joint isolation membrane.

Stondri MVT – osmotic suppression primer (for use as needed where maximum moisture-vapor-emission-rate is greater than 8 lbs of water per 1,000 sq ft of slab in 24 hours per ASTM F 1869 or greater than 96% per ASTM F 2170).

Stonset TG6 – castable urethane grout leveling material (for use as needed in large areas that require greater than 1/2” total depth of leveling material or a pitch is required).

Stonclad UT – four-component, troweled urethane mortar.

Stonkote HT4 (high temp V. 4) – novolac based bisphenol F seal coat.

Stonflex MP7 – two-component, self-leveling, polyurethane sealant.

Color: Brick Red.

Overall System Thickness: 1/4 inch.

Wearing Surface: Light Texture finish.

Base: Integral cove base as indicated.

Federal Agency Approvals: [USDA] [FDA] approved for food-processing environments.

System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

Compressive Strength: 7,700 psi after 7 days per ASTM C 579.

Tensile Strength: 1,000 psi per ASTM C 307.

Flexural Strength: 2,400 psi per ASTM C 580.

Flexural Modulus of Elasticity: 2.6 x 106 psi per ASTM C 580.

Water Absorption: 0.056 percent per ASTM C 413.

Coefficient of Thermal Expansion, Linear: 1.1 x 10-5 in/in C per ASTM C 531.

Impact Resistance: 160 in/lbs per ASTM D-4226.

Abrasion Resistance: 0.05 gm. maximum weight loss per ASTM D 4060, CS-17 Wheel.

Flammability: Self-extinguishing per ASTM D 635. Extent of burning 0.31 inches maximum.

Hardness: 80-84, Shore D per ASTM D 2240.

Bond Strength: Greater than 400 psi, 100 percent concrete failure per ASTM D-4541.

Heat Resistance Limitation: 200 deg F for continuous exposure, 250 deg F for intermediate spills.

Cure Rate allow (at 77 deg F): 6 hours for foot traffic, 24 hours for normal operations.

System Chemical Resistance: As indicated by system designation and components indicated above.

* + - * 1. RES-2 - Trowel-Applied Epoxy Mortar Resinous flooring includes penetrating, moisture tolerant, two-component epoxy primer, a high performance, three-component mortar consisting of epoxy resin, curing agent and selected, graded aggregates blended with inorganic pigments and a two-component, chemical resistant, epoxy coating.

Basis-of-Design Products: Provide the following Stonhard, Inc. component products; contact Jason Maciula (214) 680-2494, jmaciula@stonhard.com:

Stondri MVT – osmotic suppression primer (for use as needed where maximum moisture-vapor-emission-rate is greater than 6 lbs of water per 1,000 sq ft of slab in 24 hours per ASTM F 1869 or greater than 88% per ASTM F 2170).

Stoncrete SL1 – self leveling underlayment material (for use as needed in areas which do not require a pitched floor and require less than 9/16 inch of leveling).

Stonset TG5 – castable epoxy grout leveling material (for use as needed in large areas that require greater than 1/2 inch total depth of leveling material or a pitch is required).

Stonclad GS – three component trowel applied heavy duty epoxy mortar.

Stonkote GS4 – two-component, 100 percent solids, general service, epoxy.

Stonflex MP7 – two-component, self-leveling, polyurethane sealant.

Stonfil OP2 – osmotic resistant grout.

Color: Beechwood.

Total Thickness of Body Coat(s): 1/4 inch.

Wearing Surface: Texture #2 finish.

Base: 4-inch high integral cove base.

Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to standard test methods indicated:

Compressive Strength: 10,000 psi per ASTM C 579.

Tensile Strength: 1,750 psi per ASTM C 307.

Flexural Modulus of Elasticity: 2.0 x 106 psi per ASTM C 580.

Flexural Strength: 4,000 psi per ASTM C 580.

Water Absorption: 0.2 percent per ASTM C 413.

Thermal Coefficient of Linear Expansion: 3.5 x 10-5 in/in-º C per ASTM E 831.

Indentation: No indentation per MIL-D-3134F.

Abrasion Resistance: 0.1 gm maximum weight loss per ASTM D 4060 Taber Abrader CS-17 wheel.

Coefficient of Friction: 0.74 ASTM D 2047 - Neoprene Dry.

Flammability: Self-extinguishing per ASTM D 635 Extent of burning 0.25 inches maximum.

Hardness: 85 - 90, Shore D per ASTM D 2240.

Bond Strength: Greater than 400 psi, 100 percent concrete failure per ASTM D 4541.

Heat Resistance Limitations: 140 deg F for continuous exposure, 200 deg F for intermittent spills.

Cure Rate allow (at 77 deg F): 6 hours for foot traffic, 18 hours for light traffic, 24 hours for normal operations.

1. Chemical Resistance: As indicated by system designation and components indicated above.
	* + 1. ACCESSORIES
				1. Crack and Joint Isolation Membrane: Manufacturer's recommended flexible resin formulation for crack isolation to help prevent substrate cracks from reflecting through RES-2 trowel-applied epoxy mortar flooring system.
				2. Osmotic Resistant Grout: A two-component, high performance moisture suppression primer applied at a nominal thickness of 15 mils.
				3. Patching and Fill Material: Resinous product manufactured by resinous flooring manufacturer and recommended by manufacturer for application indicated.
				4. Joint Sealant: Type manufactured by resinous flooring manufacturer for type of service and joint condition indicated. Match resinous flooring color.
2. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of resinous flooring. Do not proceed with installation until unsatisfactory conditions, including levelness tolerances, have been corrected.
			2. PREPARATION
				1. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

At the juncture of resinous flooring with other floor finishes, saw cut and chase concrete as indicated on drawings for a flush transition of flooring surfaces.

* + - * 1. Refer to Section 09 05 61 Common Work Results for Flooring Preparation for floor slab testing and preparation.
				2. Refer to Paragraph 2.3.A and 2.3.B for product specific moisture remediation requirements.
				3. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminates incompatible with resinous flooring.

Roughen concrete substrates as follows:

Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.

Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.

Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.

Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

Joints and Cracks: Treat nonmoving joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer’s written instructions.

Where RES-1 flooring is installed, saw cut resinous flooring where substrate joints occur and apply joint sealant according to manufacturer's written recommendations.

Where RES-2 flooring is installed apply crack and joint membrane at substrate joints to bridge non-moving joints with resinous flooring. At substrate isolation joints subject to movement, saw cut resinous flooring and apply joint sealant according to manufacturer's written recommendations.

* + - 1. APPLICATION
				1. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.

Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes. Close application area for a minimum of 24 hours

Except where materials are indicated by product manufacturer as self-priming, apply primer over prepared substrate at manufacturer's recommended spreading rate.

Apply troweled or screeded body coat(s) in thickness indicated for flooring system. Hand or power trowel to obtain uniform finish. When cured, sand to remove trowel marks and roughness.

Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended by manufacturer.

Coating/Texture: Remove surface imperfections by lightly abrading and vacuuming the floor surface. Mix coating according to manufacturer’s recommended procedures. Squeegee apply and backroll coating with strict adherence to manufacturer’s installation procedures and coverage rates. Allow coating to cure and apply a second layer of coating according to manufacturer’s recommended procedures.

Integral Cove Base: Apply cove base mix to vertical curb surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners. Appearance and surface texture of curb finish shall match floor finish.

3.4 PROTECTION AND CLEANING

A. Protection: Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

B. Cleaning: Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of final acceptance in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

END OF SECTION