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

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

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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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IF THE HIDDEN GUIDE SPECIFICATION CONVENTIONS DO NOT APPEAR PRECEEDING THIS NOTE, TURN THEM ON AS FOLLOWS.

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SECTION 03 35 43

**POLISHED CONCRETE FLOOR FINISHING FOR NEW CONSTRUCTION**

(DeCA June 2022 Design Criteria)

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Installation of polished concrete floor system for new interior concrete floors by dry grinding, application of concrete densifier, and polishing with various size grit metal-bonded and resin-bonded diamonds to the scheduled specified minimum and local overall gloss values.

~~B. Application of chemical dye, when called for per plans.~~

1.2 RELATED SECTIONS

1. Section 01 30 00 – Administrative Requirements for Submittal Procedures.
2. Section 03 30 00 – Cast-in-Place Concrete.
3. Division 09 – Finishes

1.3 REFERENCES

1. ACI 310 – Guide to Decorative Concrete
2. ASTM D 523 – Standard Test Method for Specular Gloss.
3. ~~Slip Testing – Floor testing to be completed per ASTM D-2047, ANSI B101.1 & B101.3~~

1.4 SUBMITTALS

A. Comply with Section 01 33 00 – Submittal Procedures.

B. Equipment and Product Data:

 1. Provide manufacturer's equipment product data sheets for:

1. Planetary grinder polishing equipment
2. Planetary grinder HEPA dust collection equipment
3. Hand tools
4. Hand tool dust collection equipment
5. Diamond tooling
6. High speed propane burnisher
7. Polyurea pump
8. Joint cutting saw

2. Manufacturer’s chemical and product data sheets for:

1. Liquid reactive surface densifier
2. Liquid stain guard treatment
3. Joint filler

C. Installer’s Certification:

 1. Provide list of 5 completed projects performed with last three years of similar type, size and complexity. Submit project names, addresses, contacts and phone numbers for each project. General Contractor is to validate references and polisher’s capabilities prior to submitting bid.

2. Applicator Qualifications: Submit letter of certification from each of the following manufacturers of products and equipment specified herein, stating that the applicator is a certified applicator of the system and is familiar with proper procedures and installation methods as required by the manufacturer.

1. Planetary grinder system
2. Liquid reactive surface densifier and stain guard treatment
3. Joint filler
4. Pre-Certified Installers
	1. All bidding contractors must complete certification for this project. Below is a list of pre-approved applicators.

|  |  |  |
| --- | --- | --- |
| *Company Name* | *Phone*  | *Contact* |
| American Concrete Concepts Inc | 877-775-0030 | Brent Schmiegelow |
| ~~Applied Flooring USA~~ | ~~517-712-0052~~ |  |
| Ambient Flooring | 201-941-8477 | Tom Stapleton |
| Budget Maintenance Concrete | 610-323-7702 | Bill O’Brian |
| ~~Concrete Floor Systems~~ | ~~303-495-5692~~ |  |
| Concrete Arts | 715-377-0904 | Tom Graf |
| Diama-Shield | 888-730-4075 | Chris Sibley |
| Industrial Applications | 901-794-4334 | Jay Thomason |
| Pacific Decorative Concrete | ~~916-725-9269~~ 888-776-1111 | David Stratton |
| ~~Perfect Polish Inc.~~ | ~~877-917-4463~~ |  |
| ~~Preferred Global~~ | ~~800-317-2450~~ |  |
| Premier Concrete Construction | 603-654-2471 | Eric Traffie |

* 1. \*\*Refer to specifications Division 1 for substitution qualifications. Any potential contractor substitution must have their complete submittal package submitted in writing through a General Contractor a minimum of 10 days prior to bid date to the Contracting Officer for review and approval.

1.5 QUALITY ASSURANCE

1. Regulatory Requirements:

1. Accessibility Requirements: Comply with applicable requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAGs) for Buildings and Facilities; Final Guidelines, revisions, and updates for static coefficient of friction for walkway surfaces.

2. Environmental Requirements: Comply with current Federal and local toxicity and air quality regulations and with Federal requirements on content of lead, mercury, and other heavy metals. Do not use solvents in floor polish products that contribute to air pollution or impact food quality.

1. Manufacturer Qualifications:

1. A firm with a minimum of 5 years experience in manufacturing concrete floor polishing product systems.

2. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.

C. Pre-installation Meeting:

1. General contractor shall schedule and convene a pre-installation meeting at the project site before start of installation of polished concrete floor system.

2. Meeting shall occur only after review and approval of required subcontractor submittals and completion of test panel mock-up, including specified grinding, polishing and dye, joint filling, and specified overall gloss values.

3. Require attendance of parties directly affecting work of this section, including:

1. Contracting Officer
2. Government Authorized Technical Representative
3. Government’s Polishing Consultant
4. General Contractor
5. Polishing Subcontractor including Project Manager and Foreman

4. Meeting agenda to include (but not limited to): Review of existing conditions, surface preparation, system installations, field quality control, protection, environmental requirements, coordination with other work, controls to limit damage from dust and field quality control methods and reporting.

* 1. Unacceptable finishes include blisters, cracking, curling, delamination, surface discoloration, efflorescence, pop outs, scaling, and spalling.

1.6 MOCK-UP

1. Provide benchmark mock-up to verify finish indicated and to demonstrate aesthetic effects and set quality standards for materials and execution, i.e., typical joints, surface finish, color variation (if any), and standard of workmanship.
2. Notify Contracting Officer seven days in advance of date and time when mock-up will be constructed.
3. Provide polished concrete floor finish mock-up, a minimum of 250 square feet, illustrating completed finish including dye, all specified liquid surface treatments and specified gloss levels.
4. Mock-up will include properly installed joint treatment in any color for the purpose of judging workmanship. The specific joint color to be used on the project will be selected based on the color of the completed polished concrete sample.
5. Half of the sample area should include completed stain protection application and half should be without stain protection for testing purposes.
6. The sample should also include edge finishing treatments for the purpose of review per specifications.
7. Locate mock-up where directed by Contracting Officer and Government’s Polishing Consultant.
8. If Government’s Polishing Consultant determines that mock-up does not meet requirements, re-finish floor sample in new location until mock-up is approved.
9. Accepted mock-up will serve as standard to judge quality and workmanship of completed polished concrete floor finish.
10. Accepted mock-up shall remain as part of finished product.

1.7 PROJECT CONDITIONS

A. Sequence application of concrete polishing after completion of other construction activities that would be damaging to the completed polished concrete finish.

B. Close areas to traffic during and after floor application for time period recommended in writing by manufacturer.

PART 2 – PRODUCTS AND EQUIPMENT

2.1 INSTALLATION EQUIPMENT

A. Floor Grinder:

1. Machinery manufacturer will be HTC, SASE, Husqvarna, Concrete Polishing Solutions, ~~Diamatic~~ or PrepMaster.
	1. Type: Multi-orbital, planetary-action, opposing-rotational, 3 or 4 diamond-headed floor grinders.
	2. Weight: 850 pounds or more.
	3. Grinding Pressure: 600 pounds minimum.

B. Dust Extraction System and Pre-Separator for Grinding/Polishing:

1. Heavy-duty industrial HEPA filtration vacuum system, suitable for extracting and containing large quantities of fine concrete dust (minimum 350 CFM air flow) in conjunction with manufacturer recommended pre-separator:
	1. ~~HTC 86D~~
	2. T18000 by Husqvarna
	3. T8600 by Pullman Ermator Inc.
	4. Bull 1250 by SASE Company
	5. Approved equal.

C. Diamond Tooling for Initial Grinding and Preparing Floor for Polishing:

1. Metal Bonded Diamonds
2. Grit Size: 80 and 150.

 \*Reference Section 3.3 C

D. Diamond Tooling for Polishing Concrete:

1. Resin Bonded, Phenolic Diamonds

 a. Grit Size: 100, 200, 400, 800 and 1500 or equivalent.

E. Grinding / Polishing Pads for Edges

 1. Grit Size: 80, 100, 120, 200, 400, 800, 1500 and 3000.

1. Hand Grinder with dust extraction attachment and pads.

F. High speed propane burnisher

 1. Minimum 27 inch head generating pad speeds of 2,500 RPM or higher.

G. Diamond Impregnated Burnisher Pads

 1. Twister Diamond Cleaning System Pads by HTC

 2.Diamond Polishing Pads, by Norton

 3. SpinFlex Diamond Polishing Pads by CPS

2.2 MATERIALS

A. Penetrating Hardener/Densifier: Clear liquid reactive ~~lithium-~~silicate based.

1. Products:
	1. RetroPlate 99 by Advanced Floor Products
	2. ~~Flor-Sil by Diamatic~~
	3. Consolideck LS by Prosoco
	4. ~~FGS Permashine by L&M Construction Chemicals~~
	5. 3D HS Densifier by AmeriPolish
	6. Substitutions by Approval Only.

B. Protective Surface Treatment (Stain Guard)

1. Products:
	1. SR2 Stain Protector by AmeriPolish.
	2. SPR3 by SASE Company
	3. RetroPel by RetroPlate
	4. PETROTEX by Laticrete
	5. Substitutions by Approval Only.
2. ~~Solvent Based dye (where indicated per plans) Color Caramel~~

~~1. AmeriPolish Acetone Solvent Based Dye~~

~~2. Prosoco GemTone Dye (Applied with Acetone ONLY)~~

~~3. Vivid Dye by Laticrete~~

~~4. No Substitutions~~

 D. Joint Filler

1. Products:
	1. SL/65 Polyurea by VersaFlex Inc., in complementary color to match ~~Dyed~~ Polished Concrete
	2. RS65 Polyurea by Metzger/McGuire, in complementary color to match ~~Dyed~~ Polished Concrete
	3. HT-PE65 Polyurea by Hi-Tech Systems, in complementary color to match ~~Dyed~~ Polished Concrete
2. Colors to be matched as closely as possible using a chip set match provided by Government’s Polishing Consultant. Manufacturer to produce product to match this color selection.
3. Pin Hole and Surface Pitting Grout Coat
	1. Products:
		1. ~~RSG, by Diamatic Inc~~
		2. ~~Quick Mender XO, by Versaflex~~
		3. TX3 by Hi-Tech Systems
		4. ~~Pit Grout~~ SRG by Metzger/McGuire
		5. ~~DP Repair Mortar by DecoPrep~~
		6. Approved equal.
	2. Color after application to be reviewed and approved by Contracting Officer or Government’s Polishing Consultant in mock-up.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine floor to receive polished concrete floor system.

B. Notify the Contracting Officer of conditions that would adversely affect installation or subsequent use prior to commencement of polishing.

1. Do not begin surface preparation or installation until conditions are corrected and approved.

3.2 SURFACE PREPARATION

1. Protection: Protect surrounding areas and adjacent surfaces from the following:
	1. Minimal accumulation of dust from grinding and polishing.
	2. Contact with overspray of penetrating hardener/densifier.
	3. Contact with overspray of protective surface treatment (stain guard).
	4. Contact with joint filler.
2. Clean Surfaces: Remove dirt, dust, debris, oil, grease, curing agents, bond breakers, paint, coatings, and other surface contaminants, which could adversely affect installation of polished concrete floor system.
3. Fill concrete joints in accordance with manufacturer’s recommendations.

3.3 INSTALLATION

1. Repair all cracks larger than 1/32” and existing conditions or damage prior to installation of the polished concrete flooring.
2. Install polished concrete floor system in accordance with manufacturer’s instructions at locations indicated on the Drawings.
3. Aggregate Exposure:

1. Fine Aggregate: Mottled salt-and-pepper aggregate exposure.

D. Polished Concrete Floor System:

1. Open Slab Surface:

* 1. To provide a uniform final polish begin grinding with 80-grit metal bond. Expose coarse concrete aggregate when required to reach lows spots within floor surface.
1. Review condition of floor with Contracting Officer or Government’s Polishing Consultant. Obtain approval from Contracting Officer if large coarse aggregate is required to be exposed to correct slab deficiencies. Variations to the precise grinding, densifying, polishing and stain guard application are anticipated, but must be discussed and approved in writing by the Contracting Officer prior to executing the work.
2. Progressive edge grinding will be necessary with ½” of all vertical abutments, including walls, cases, columns, posts and racking systems.
3. Remove metal-bonded diamond scratches by grinding with progressively finer metal-bonded diamonds, up to metal bond 150-grit.
4. Joint filler shall be flush with surface after grinding steps. Additional passes along curled joints may be necessary to even the surfaces and remove joint filler chatter.
5. Apply Densifier:
	1. Apply densifier at a rate of **200 square feet per gallon** to ensure complete acceptance of the densifier product at the recommended step per manufacturer’s recommendations. If dye is called for apply densifier after dye application.
6. ~~Apply Solvent Based Dye:~~
	1. ~~Concrete surfaces shall be dry and properly prepared as described above. Protect surrounding areas from over-spray, run-off and tracking. Divide surfaces into small work sections using wall, joint lines, or other stationary breaks as natural stopping points.~~
	2. ~~Apply initial solvent-based dye application at the coverage rate recommended by the manufacturer and use application equipment described in the manufacturer’s recommendations.~~
	3. ~~Dye and penetrating additive shall be mixed a minimum of three hours prior to application on floor.~~
	4. ~~The standard application timing for the first application is following the completion of the 400 grit resin diamonds.~~
	5. ~~Apply the solvent-based dye to the substrate per Manufacturer’s Instructions.~~
	6. ~~Drying time depends on concrete porosity, wind conditions, temperature, and humidity levels.~~
	7. ~~Apply second application to produce a more consistent appearance. Apply after the first application has dried completely~~
	8. ~~The color of the liquid solvent-based dye is not necessarily indicative of the final color produced on the concrete substrate as the dye is translucent and final color achieved will be influenced by the color of the concrete floor slab onto which the dye is applied.~~
7. Floor Polishing:
	1. Remove 150-grit metal-bonded diamond scratches by grinding with a transitional diamond per manufacturers recommendation
	2. Remove transitional resin-bonded diamond scratches by grinding with 100-grit resin-bonded diamonds.
	3. Remove 100-grit resin-bonded diamond scratches by grinding with 200-grit resin-bonded diamonds.
	4. Remove 200-grit resin-bonded diamond scratches by grinding with 400-grit resin-bonded diamonds.
	5. Remove 400-grit resin-bonded diamond scratches by grinding with 800-grit resin-bonded diamonds.
	6. Remove 800-grit resin-bonded diamond scratches by grinding with 1500-grit resin-bonded diamonds.
8. Apply Stain Guard:
9. Apply in accordance with manufacturer’s published instructions.
10. Apply first coat per manufacturer’s recommendation (DO NOT OVER APPLY).
11. Use applicator pad, pre-wetted with stain guard, to pull material out to create a thin film prior to drying.
12. Remove product completely from areas of over application, as evidenced by surface streaking, and replace with unused stain guard.
13. Apply second coat of stain guard ~~at all high traffic areas identified on the drawings~~ per manufacturer’s instructions.
14. High Speed Burnish:
15. After each application of stain guard is dry, burnish surface.
16. Burnish using approved pads, at a slow movement pace using high speed machine with 400 or 800 grit diamond impregnated pads as required to achieve specified gloss requirements.
17. Burnish with several passes. Make each progressive pass at 90 degrees from previous pass.
18. ~~Burnishing, pad type, and pace of forward movement shall combine to develop a minimum floor surface temperature of 98-degrees F directly below the burnishing pad as continuously measured by the operator during installation.~~

3.4 FIELD QUALITY CONTROL

1. Inspect completed polished concrete floor system with Government’s Representative for compliance and comparison with mock-up. Correct any deficiencies noted.
2. Review procedures with Government Representative to correct unacceptable areas of completed polished concrete floor system.
3. Specular Gloss/Reflectance, ASTM D 523:

* + - 1. Perform polishing and burnishing work necessary to produce a Specified Overall Gloss Value (SOGV) ≥ 50 prior to applying protective surface treatment, SOGV ≥ ~~60~~ 55 after applying protective surface treatment, Minimum Local Gloss Value (MLGV) ≥ 40 after applying protective surface treatment as measured using a Horiba IG-320 60 Degree Gloss Checker.
			2. Gloss shall be considered as a quantitative value that expresses the degree of reflection when light hits the concrete floor surface. Gloss measurements will be taken independent of ambient lighting and will be taken within a sealed measurement window located beneath the test unit.
			3. Collect 12 readings minimum, throw out low and high measurements and average remaining measurements. Average shall exceed SOGV. No single measurement shall be less than MLGV.
1. ~~Slip testing shall be performed on the completed polished concrete flooring. A certified walkway auditor shall use an approved Tribometer to provide DeCA with testing per ASTM D-2047 and ANSI B101.1 and B101.3. Testing to be provided to the Contracting Officer prior to final acceptance of the polished concrete flooring.~~
	1. PROTECTION
		* + 1. Protect completed polished concrete floor system from damage until Substantial Completion.
2. Do not allow vehicle and pedestrian traffic on unprotected floor.
3. Do not allow construction materials, equipment, and tools on unprotected floor.
4. Prohibit parking of vehicles on concrete slab.
5. If construction equipment must be used for application, diaper components that might drip oil, hydraulic fluid, or other liquids.
6. No tire embedments (rocks, nails, screws, etc.) that will scratch or pit slab surface. All lifts on site must use canvas tire bags to prohibit screws and nails from penetrating the rubber tires.
7. Prohibit pipe cutting or threading using machinery on concrete slab.
8. Prohibit temporary placement and storage of steel members on concrete slab.
9. Prohibit acids and acidic detergents from contacting concrete surfaces.
10. Cover concrete floors with drop cloths or use breathable drop cloths during painting. If paint is spilled on concrete floor, remove paint immediately.
11. Protect completed polished concrete surface from standing moisture for 72 hours to prevent re-emulsification of surface treatment prior to cure
	* + - 1. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants that could adversely affect completed polished concrete floor system.
				2. Repair damaged areas of completed polished concrete floor system to satisfaction of Contracting Officer.
				3. Protect finished work until project is turned over to the Government.

END OF SECTION