

**SECTION 03 36 00  
POLISHED CONCRETE FLOOR**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Finishing separate floor toppings, slabs-on-grade, and monolithic floor slab.
- B. Surface treatment with concrete hardener, sealer, and slip resistant coatings.
- C. Polished concrete finish for interior flatwork; polish concrete finishes for precast, vertical cast-in-place, and exterior concrete are specified in the sections for those types.
  - 1. All labor, materials, equipment, and services necessary for the grinding and polishing of concrete floors.
  - 2. Densifying impregnator/sealer and polishing to specified sheen level and aggregate exposure.
  - 3. Concrete must be cured a minimum of 28-days prior to polishing.

**1.2 REFERENCES**

- A. ACI 301 - Structural Concrete for Buildings
- B. ACI 302 - Guide for Concrete Floor and Slab Construction
- C. ASTM C33/C33M, Standard Specification for Concrete Aggregates
- D. ASTM C150/C150M, Standard Specification for Portland Cement
- E. ASTM C779/C779M, Standard Test Method for Abrasion of Horizontal Concrete Surfaces
- F. ASTM C805/C805M, Standard Test Method for Rebound Number of Hardened Concrete
- G. ASTM C1028, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other like Surfaces by the Horizontal Dynamometer Pull Meter Method
- H. ASTM D3960, Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
- I. ASTM E1155 - Standard Test Method for Determining  $F_F$  Floor Flatness and  $F_L$  Floor Levelness Numbers
- J. ASTM E2129, Standard Practice for Data Collection for Sustainability Assessment of Building Products
- K. ASTM G23, Standard Practice for Operating Light Exposure Apparatus (Carbon Arc Type) With and Without Water for Exposure of Nonmetallic Materials

**1.3 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00 Submittals Procedures.
  - 1. Product Data: Provide data on concrete hardener, sealer, and slip resistant treatment, each grinding machine, including all types of grinding heads, dust extraction system, joint filler, concrete densifying impregnator, penetrating sealer, and any other chemicals used in the process, along with compatibilities, and limitations.
  - 2. VOC Data: Submit Green Seal Certification to GS-11 and description of basis for certification.
  - 3. Environmental Date: Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under the work of this section.
  - 4. Submit Applicators qualifications data.
  - 5. Submit polished concrete samples: Three samples 12" x 12" for each type of polished concrete finish required.

**1.4 MAINTENANCE DATA**

- A. Submit under provisions of Section 01 77 00 Contract Closeout.
- B. Maintenance Data: Provide data on maintenance renewal of applied coatings.

- C. Provide maintenance procedures using manufacturer's recommended systems.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301 and ACI 302.
- B. Maintain copies of each document on site.
- C. VOC Content; Determine VOC content of solvent borne, water borne paints and related coatings per EPA method 24 or ASTM D3960.
- D. Work inspected by Certified Applicator;
  - 1. Concrete finish equipment and chemical manufacturer shall certify installer/applicator.
  - 2. Contractor shall provide adequate number of skilled workers thoroughly trained and experienced in the necessary craft.
- E. Pre Installation Conference: Conduct conference at site prior to start of work complying with the requirements of section 01 40 00.
- F. Manufacturers Certification: Provide certification letter from both the equipment and chemical manufacturer stating the installer is a certified applicator and is familiar with proper procedures and installation requirements required by the manufacturer.
- G. Mock-Ups;
  - 1. General Contractor to notify applicator at least 7-days prior to the pour schedule of mock-up.
  - 2. Reserve 100 SF for each color and finish at a location adjacent to floor receiving polish at concrete floor area able to be removed, patched, or placed in location where applied any variation in floor substrate will be corrected prior to being, with another flooring material. Place mock-up floor on the same day and same pour as the floors to receive polish.
  - 3. Install mock-ups to verify selections made under the sample submitted and to demonstrate methods and workmanship proposed for the project.
  - 4. If stand-alone mock-up is required, form shall be clean and free from extraneous substance and be at least 12" x 12" with a level plywood bottom on level ground with unobstructed access on all four sides.
  - 5. Test aggregate to ensure it will accept polish.
  - 6. Include control joints in the mock-up, contractor may saw as soon as the surface is firm enough not to displace any aggregate.
  - 7. Also, include edge conditions in the mock-up.
  - 8. Approved mock-ups may become part of the completed work if accepted by the owner.
- H. Protection: General Contractor shall protect areas receiving polished concrete finish at all times during construction to prevent oils, dirt, metal, excessive water, and any other potentially damaging materials from affecting the finished concrete surface. Protection measures listed below shall start immediately after the concrete slab is poured:
  - 1. All hydraulic powered equipment shall be diapered to avoid staining of concrete.
  - 2. Prohibit all vehicle parking or traffic on finished slab receiving polished finish, if vehicle traffic is necessary; provide drop clothes under the vehicles.
  - 3. Do not use pipe-cutting machines on the slabs receiving polished finish.
  - 4. Do not place steel on the slabs receiving polished finish.
  - 5. Keep all acids and acidic detergents form the slabs receiving polished finish.
  - 6. Painters shall use drop cloths on the slabs receiving polished finish, and if paint does get on the slab, remove the paint immediately.
  - 7. Inform all trades and workers of the slabs requiring protection at all times.
- I. Environmental Limitations:
  - 1. Comply with the manufactures written instructions for substrate temperature, moisture

content, ambient temperature & humidity, ventilation, and other conditions affecting chemical performance.

2. Provide the proper flatness and levelness of the finished concrete slab.
  - a. Floor flatness – minimum rating of 40
  - b. Floor levelness – minimum rating of 30
  - c. Cure time – minimum of 28-days
3. Application of finish system shall take place a minimum of 21-days prior to fixture and trim installation or substantial completion.
4. Close the finish concrete floor area to all traffic during the finish floor application and after application for time as recommended by the manufacturer.

J. Concrete Mix Design:

1. Concrete mixture shall be at least 3500 PSI, non air-entrained.
  - a. Keep any admixtures, plasticizers, slag, fly ash, or anything taking the place of Portland-based cement to a minimum.
  - b. Use Portland cement Type I, conforming to ASTM C150/C150M.
  - c. Keep concrete as cool and moist as possible, with concrete temperature below 85°F to help control cracking.
  - d. Wet cures are most desirable, but if not possible use a penetrating, dissipating, or wax based cure and seal, as recommended by manufacturer.
  - e. Do not use a densifier/hardener material due to grinding of the floor after 6 days.
  - f. The Architect/Engineer shall determine the saw cut patterns, colors, and layout.
  - g. Color loads for integral color shall not be smaller than 3 cubic yards.
  - h. Use one source for cement, aggregate, and pozzolan throughout the job.
    - i) Monitor and control incoming material consistency.
    - ii) Do not use calcium chloride based admixtures.
    - iii) May use non-chloride admixture with the Architect's approval.
  - i. Wash out all drums before loading, keep slumps consistent (maximum of 4), and minimize driver added water maintaining a 0.45 water content ratio.
  - j. Place concrete to achieve as true and smooth surface as possible.
    - i) Mounds or dips are not acceptable.
    - ii) Contractor shall control overall flatness and levelness, including on sloping areas within the permitted tolerances allowed by the specification and ASTM E1155.
  - k. Protect the slab from indentions and footprints during the pour and the curing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products under provisions of Section 01 31 00 Project Management and Coordination.
- B. Deliver materials in manufacturer's packaging including application instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Temporary Lighting: Provide minimum 200 W light source, 8' above the floor surface, for each 425 sq. ft. of floor being finished.
- B. Temporary Heat: Ambient temperature of 50° F (10° C) minimum
- C. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

1.8 COORDINATION

- A. Coordinate work under provisions of Section 01 31 00 Project Management and Coordination.
- B. Coordinate the work with concrete floor placement and concrete floor curing.

## **PART 2 PRODUCTS**

### **2.1 COMPOUNDS - HARDENERS AND SEALERS**

- A. Non-Metallic Hardener: Premixed, dry powder, colored, emery aggregate and abrasion resistant hardener.

### **2.2 SLIP RESISTANT TREATMENT**

- A. Slip Resistant Finish: Aluminum oxide type, color as selected from manufacturer's standard range

### **2.3 POLISHING MATERIALS**

- A. Three-phase 480 Volt generator and step down transformer.
- B. 3-head or 4-head counter rotating variable grinder equal to HTC Superfloor™ approved floor grinder with at least 600 pounds down pressure (Example: HTC 950RX, HTC 800HDX, HTC 800HD, HTC 650HDX, or etc.)
- C. Use a dust extraction system, pre-separator, and squeegee attachments in compliance with project IAQ Management Plan.
  - 1. HTC Superfloor™ Dust extraction system, pre-separator, and squeegee attachments with minimum flow rate of 322 cubic feet per minute such as a HTC 75D.
- D. Grinding Head:
  - 1. Metal bonded 16, 25, 40, 80, 150, and/or 300 grits.
  - 2. Bonded phenolic diamonds 100, 200, 400, 800, 1500, and 3000 grits
- E. Grinding Pads for Edges
  - 1. 40, 60, and 120 grits
  - 2. 100, 200, 400, 800, 1500, and 3000 grits
- F. Hand grinder with dust extraction attachment and pads.
- G. Penetrating liquid sealer hardener densifying impregnator or as specified by construction manager with the following performance criteria:
  - 1. Chemical reactive, waterborne solution of inorganic silicate or silicate materials and propriety components, odorless and colorless, which hardens and densifies concrete surfaces to protect against abrasion, dusting, and absorption of liquids.
- H. Control joint and saw cut filler, two part filler or polyurea as specified by construction manager and approved by architect.
- I. A ready to use penetrating dye or reactive stain that chemically combines with cured concrete to produce permanent variegated or translucent color effects or a hydrolyzed, or a lithium quartz or siliceous materials to create a translucent or marbled color effect.
- J. Graphic design with water based color dye used based on final design and color selection by the Architect.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify site conditions under provisions of Section 01 31 00 Project Management and Coordination.
- B. Verify that floor surfaces are acceptable to receive the work of this section.
  - 1. Installer shall examine and approve concrete substrate for conditions affecting performance of the finished polished concrete slab.
  - 2. General Contractor shall correct any conditions found not in compliance with this section.
  - 3. Architect shall approve the repairs based on the requirements of this section.
  - 4. Provide floor clean of materials and debris.
  - 5. Protect adjacent surfaces as necessary to prevent damage by concrete polishing procedure.

### 3.2 CONCRETE FLOOR POLISHING

- A. Basis of Design is the HTC Superfloor™ system, any other system used shall be pre-approved by the architect.
- B. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.
- C. In areas with floor drains, maintain design floor elevation at walls, slope surfaces uniformly to drains as indicated on plans.
- D. See plans for locations and type of specialized floor finish, color, and treatment in accordance with the design intent; contractor shall coordinate with architect all field samples and installations.
- E. Grind the concrete floor within 2-3 inches of wall with 16, 25, 40, and 80 grit removing construction debris, floor slab imperfections until there is a uniform scratch pattern, and achievement of the desired concrete aggregate exposure.
  - 1. Vacuum the floor thoroughly using a squeegee vacuum attachment.
- F. Apply material approved by the architect for color effects in accordance with the architect's plans, accepted mock-up, and the manufacturers recommended guidelines.
- G. Fill construction joints and cracks with filler products as specified in the manufacturer's instructions colored to match (or contrast) with the concrete color specified by the architect.
- H. Apply densifying impregnator per the manufacturer's recommendations.
  - 1. Cover the entire work area liberally and allow setting as required by manufacturer.
  - 2. Apply again to areas where the densifying impregnator has soaked in and allow setting.
  - 3. Squeegee excess material off the floor.
  - 4. Allow 12 to 24 hours for curing, as required by the manufacturer.
- I. Grind the floor to within 2-3 inches of walls with metal bonded diamond grits of 150 and 300, grinding 90° from each previous grind and removing all the scratches from the previous grit.
  - 1. Vacuum the floor thoroughly after each grind, using a squeegee vacuum attachment.
- J. Grind the edges with 40, 60, and 120 grit grinding pads, removing all scratches from the previous grit.
  - 1. Vacuum the floor thoroughly after each grind, using a squeegee vacuum attachment.
- K. Polish the floor to the desired sheen level with phenolic resin bonded diamond grits of 100, 200, 400, 800, 1500, and 3000, first polishing the edges (if specified) with pads of the same grit, then the field of the floor, removing all scratches from the previous grit.
  - 1. After each polish, clean the floor thoroughly using clean water and an auto scrubber or a mop and wet vacuum.
- L. Apply HTC Superfloor™ Stainguard, buff with Green 300 grit twister pad as necessary.
- M. Upon completion, the work shall be ready for final inspection and acceptance by the architect and owner.

### 3.3 SHEEN

- A. Polished Concrete Level 1:
  - 1. At a distance of 100', the floor will reflect images from side lighting.
- B. Polished Concrete Level 2:
  - 1. At a distance of 30' to 50', the floor will clearly reflect from side and overhead lighting.

### 3.4 EXPOSED AGGREGATE

- A. Exposure rate per architect and owner selection based on approved mock-up.

### 3.5 EDGES

- A. Polish all edges to match the field finish area.

### 3.6 PROTECTION

- A. Protect the floors from damage as required.

### 3.7 TOLERANCES

- A. Measure for  $F_F$  and  $F_L$  tolerances for floors in accordance with ASTM E1155, within 72 hours after slab installation
- B. Finish concrete to achieve the following tolerances:
  - 1. Exposed to View and Foot Traffic (polished concrete):  $F_F$  40 and  $F_L$  35
  - 2. Exposed stained concrete (mechanical, electrical, custodial):  $F_F$  20 and  $F_L$  15
  - 3. Exception: The  $F_L$  levelness tolerances do not apply to any un-shored elevated construction.
  - 4. Correct the slab surface if the actual  $F_F$  or  $F_L$  number for the floor installation measures less than required.
- C. Identify areas requiring corrective work.
  - 1. Correct all defects in the defined traffic floor by grinding or removal and replacement of the defective work.
  - 2. Re-measure corrected areas by the same process.

### 3.8 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality: Provide temporary ventilation as necessary and recommended by the manufacturer to meet the project IAQ requirements.
- B. Waste Management:
  - 1. Coordinate with manufacturer for take-back program.
  - 2. Set aside scrap to be returned to manufacturer for recycling into new product.
  - 3. Close and seal all partially used containers of paint maintaining quality necessary for reuse.

END OF SECTION