SECTION 03 35 43 – polished concrete flooring

1. General
   1. Summary
      1. Surface preparation to provide a polished and hardened concrete surface to a structurally sound concrete surface, exposing aggregate for a terrazzo like finish; includes but is not limited to the following:
         1. Application of clear, colourless, liquid concrete hardener and densifier.
         2. Grind and polish of floor to desired finish.
         3. Application of water-based concrete enhancer.
   2. REFERENCE Standards
      1. American Society for Testing and Materials (ASTM):
         1. ASTM C779-05(2010), Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
         2. ASTM C805-08 Standard Test Method for Rebound Number of Hardened Concrete.
         3. ASTM C1028-07 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method.
         4. ASTM D3278-96(2011) Standard Test Method for Flash Point of Liquids by Small Scale Closed Cup Apparatus.
         5. ASTM D3363-05(2011) Standard Test Method for Film Hardness by Pencil Test.
         6. ASTM E430-11 Standard Test Method for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry.
   3. Administrative Requirements
      1. Pre-Construction Conference: Arrange a site meeting attended by the Contractor, the Subcontractor, the Consultant, materials supplier(s), and other relevant personal as indicated in Section 01 31 13 – Project Coordination, prior to start of work on new concrete slabs, patching of existing concrete slabs and start of application of concrete finish system.
      2. Review environmental regulations, test area procedures, protection of surrounding areas, surface preparation, application, field quality control, final cleaning, and coordination with other work.
      3. Review the following:
         1. Physical requirements of completed concrete slab and Slab finish.
         2. Locations and time of test areas.
         3. Protection of surfaces not scheduled for finish application.
         4. Surface preparation.
         5. Application.
         6. Repair.
         7. Quality control.
         8. Cleaning.
         9. Protection of finish system.
         10. Coordination with other work.
         11. Removal of concrete waste slurry.
   4. Submittals
      1. Provide required information in accordance with Section 01 33 00 – Submittal Procedures.
      2. Action Submittals: Provide the following submittals before starting any work of this Section:
         1. Product Data: Submit product data for each grinding and polishing machine, include information on types of grinding heads, dust extraction, water control and concrete densifier materials.
         2. Samples for Initial Selection: For each finish product specified, two complete sets of color chips representing manufacturer’s full range of available colours.
         3. Samples for Verification Selection: Submit a 305mm x 305mm (12” x 12”) sample indicating polished concrete finish specified in this section.
         4. Submit special concrete finishes manufacturer’s Material Safety Data Sheet (MSDS) and other safety requirements.
   5. Project Closeout Submissions
      1. Operation and Maintenance Data: Submit copies of manufacturers maintenance data sheets in accordance with Section 01 33 00 – Submittal Procedures: Maintenance Manual and Operating Instructions, and as follows:
         1. Provide specific written literature and instructions to Owner personnel concerning the maintenance and replacement of slip resistant treatments.
         2. Provide detailed cleaning and maintenance instructions for floor stain and concrete hardener products and instruct Owner in proper care and maintenance of specified floor finishes, including a complete list of floor care products that will be required for on‑going maintenance, in accordance with Section 01 33 00 – Submittal Procedures.
   6. Quality Assurance
      1. Qualifications: Provide proof of qualifications when requested by Consultant:
         1. Manufacturer / Supplier: Obtain materials from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties.
         2. Installers: Execute Work of this Section using manufacturer approved personnel, skilled in installation of work of this Section, having a minimum of three (3) years proven experience of installations similar in material, design, and extent to that indicated for this Project.
   7. Mock‑Ups
      1. Construct mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution in accordance with Section 01 45 00 – Quality Control for mock-ups and as follows:
         1. Mock-up will consist of an area approximately 100 ft2 in size.
         2. Build mock-up in the location and dimensions as directed by the Owner’s representative.
         3. Consultant will evaluate mock‑ups and may request changes or variation to materials.
         4. Accepted mock‑up will form the standard for remaining polished concrete work but will not form a part of the total work.
      2. Review and acceptance of mock-ups does not constitute approval of deviations from the contract documents contained in mock-ups unless consultant specifically notes such deviations in writing.
   8. DELIVERY, STORAGE AND HANDLING
      1. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
      2. Storage and Handling Requirements:
         1. Store materials in a clean dry area in accordance with manufacturer's instructions.
         2. Protect materials during handling and application to prevent damage or contamination.
         3. Keep products from freezing.
   9. SITE Conditions
      1. Ambient Conditions: Install polished concrete flooring system after completion of work by other Sections is complete; to provide adequate dry, clean, level, and plumb surfaces for installation and adhesion.
         1. Comply with manufacturer’s written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
         2. Concrete Floor Flatness:
            1. For floors designated as main traffic zones, the floor flatness shall meet Class ‘D’ as defined in CSA A23.1 with FF and FL of 45 and 30, respectively.
            2. For all other floor areas, floor flatness shall meet Class ‘C’ in accordance with Table 21 in CSA A23.1.
         3. Temperature: Maintain a minimum temperature of 10 deg C. Do not apply to frozen concrete or when air, surface, or material temperatures are expected to fall below 4 deg C within four hours of expected application.
         4. Temporary Lighting: Minimum 200 W light source, placed 8’ above horizontal concrete surface, for each 425 sq. ft. of concrete being finished.
         5. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer’s instructions.
         6. Area of installation shall be clean and ready for finishing operations, having sufficient water, temporary heat and light, and adequate power and outlets for operation of floor grinding and polishing equipment.
         7. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.
         8. The completed slab will be covered to prevent damage by the other trades during store completion.
      2. Concrete Composition
         1. Concrete must be cured a minimum of 28 days or as directed by the manufacturer prior to application of polished concrete flooring system.
         2. Fly Ash: No more than 20% of the weight of the Portland Cement should be substituted with fly ash. Test concrete surface to ensure that concrete composition is suitable for installation of polished concrete flooring.
2. Products
   1. Manufacturers
      1. Basis-of-Design products are named in this Section; form the basis-of-design materials for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements established by the named products and provided they submit requests a minimum of five (5) days in advance of Bid Closing.
      2. Subject to compliance with requirements, manufacturers and polished concrete floor systems that may be incorporated into the Work are as follows:
         1. CPD Construction Products; Cipadeck High Performance Concrete.
         2. W.R. Meadows of Canada; Induroshine.
         3. Prosoco; Consolideck High Performance Concrete.
         4. Advanced Floor Products; Retro Plate 99.
   2. performance requirements
      1. ADA Coefficient of Friction: Meets or exceeds ADA COF of 0.60 for accessible routes and 0.80 for ramps tested in accordance with ASTM C1028.
      2. Degree of Reflectiveness, as per horizontal test area, tested in accordance with ASTM E430.
      3. Degree of Hardness, as per horizontal test area, tested in accordance with ASTM D3363.
   3. Materials
      1. Equipment for Grinding / Polishing - hand held and walk behind machinery as required for project requirements:
         1. Three-head counter rotating variable speed floor grinding machine, possessing a minimum of 775 lb of head pressure.
         2. Dust extraction system and pre-separator.
         3. Equipment for edge grinding/polishing: Hand grinder with dust extraction equipment.
      2. Equipment for densifying and cleaning floor after grinding/polishing procedure has been performed:
         1. Tennant ride-on auto-scrubber or equivalent with a head pressure of 150 lb.
      3. Diamond grinding segments: Metal bonds: 40, 60, 80 and 150 grit.

SPEC NOTE: Edit the following paragraphs to match the level of finish required, as indicated in para 3.2 floor polishing.

SPEC NOTE: Remove the Grit levels not required on this project.

* + 1. Diamond polishing pads: Resin bonds 100, 200, 400, 800, 1500, and 3000 grit.
    2. Grinding pads for edges: Resin bonds 40, 60, 80, 100, 200, 400, 800, 1500, and 3000 grit.
    3. Concrete Densifier: Liquid surface applied, multi‑component catalytic hydrosilicate solution engineered for penetration up to 6” on single application; and control of integral moisture and moisture migration in new or existing concrete or masonry structures and flatwork; containing no VOC’ s. resistant to chemicals; non‑flammable; colour: clear.
       1. Acceptable materials:
          1. Cipadeck L by CPD Construction Products.
          2. Liqui-Hard by W.R. Meadows of Canada.
          3. Consolideck LS by Prosoco.
    4. Concrete Enhancer: Water-based, synthetic polymer concrete floor enhancer.
       1. Acceptable materials:
          1. Cipadeck Shield by CPD Construction Products.
          2. Bellatrix by W.R. Meadows Bellatrix.
          3. Consolideck LS Guard by Prosoco.
    5. Patching Compound: Manufacturers compatible cementitious compound coloured and textured to match adjacent polished concrete surfaces.
    6. Water: Potable.

1. Execution
   1. Examination
      1. Examine areas to receive polished concrete for defects in existing work that affect proper execution of concrete floor polishing work.
      2. Clean dirt, dust, oil, grease, and other contaminants from surfaces that interfere with penetration or performance of specified product.
      3. Use appropriate concrete cleaners approved by the concrete surface treatment manufacturer where necessary. Rinse thoroughly using pressure water spray to remove cleaner residues.
      4. Repair, patch and fill cracks, voids, defects, and damaged areas in surface as approved by the Consultant, in accordance with manufacturer’s instructions.
      5. Variations in substrate texture and colour will affect final appearance. Correct prior to application of sealer/hardener system and polishing steps.
      6. Proceed with installation only after unsatisfactory conditions have been corrected.
   2. Floor Polishing

SPEC NOTE: The finish determines the grinding and polishing required. select one of the following five (5) paragraphs and delete the others which are not required.

* + 1. Grind and polish floor surface at a rate recommended by the manufacturer to ensure desire finish is achieved.
    2. Polished Concrete Floor Finish Level:
       1. Level 1 Flat Finish – Hazy with little clarity or reflection:
          1. Polish and grind concrete floors using a minimum of 4 grinding steps using progressively finer diamond segments to achieve a 100-grit hazy appearance.
       2. Level 2 Satin Finish – Slight overhead reflection at a distance of 100’:
          1. Polish and grind concrete floors using a minimum of 5 grinding steps using progressively finer diamond segments to achieve a 400 grit, honed appearance.
       3. Level 3 Semi-Polished – Good light reflectivity, with reflection of images from side and overhead lighting at a distance between 30-50’:
          1. Polish and grind concrete floors using a minimum of 6 grinding steps using progressively finer diamond segments to achieve an 800 grit, semi-polished appearance.
       4. Level 4 Gloss Finish – Medium to High Sheen Level with reflection of images overhead and sides:
          1. Polish and grind concrete floors using a minimum of 8 grinding steps using progressively finer diamond segments to achieve a 1500 grit, medium to high sheen appearance.
       5. Level 5 High-Gloss Finish – Mirror-like reflections from side and overhead:
          1. Polish and grind concrete floors using a minimum of 10 grinding steps using progressively finer diamond segments to achieve a 3000 grit, high-gloss mirror appearance.
    3. Fill joints and cracks, surface voids, and pits arising from loss of aggregate that become apparent during the grinding operations with 98% solids tinted urethane hybrid grout in accordance with manufacturer’s instructions before final grinding stage.
    4. Vacuum and squeegee floors after each grinding step; remove construction debris on an ongoing basis; clean floor thoroughly using clean water and auto‑scrubber with a wet vacuum attachment.
  1. Concrete Densifying
     1. Sweep all areas requiring treatment with a fine bristle broom or scrub, hose off with water and let dry, to remove surface dust, dirt, and contamination.
     2. Spray or pour and broom to saturate the surface in accordance with manufacturers recommended application rates using a low-pressure sprayer, soft bristle broom or squeegee.
     3. Apply concrete sealer‑hardener immediately following finishing operation as soon as the surface is firm enough to walk on, before hairline checking, and temperature cracking begin.
     4. Keep surface wet with concrete‑sealer hardener in accordance with manufacturer’s instructions.
     5. Concrete sealer hardener will become slippery; lightly mist the surface with water to reduce slipperiness of materials.
     6. When concrete sealer‑hardener becomes slippery underfoot again, thoroughly flush the entire surface with water and squeegee the surface completely dry to remove surface alkali or treatment residue.
  2. CONCRETE ENHANCER
     1. Apply concrete enhancer 24 hours after installation of concrete densifier, undiluted, according to manufacturer’s instructions.
     2. Spray concrete enhancer using industrial sprayer delivering 1/10th of a gallon per minute.
     3. Uniformly spread concrete enhancer with a micro-fiber applicator, ensuring that the product is not allowed to dry before spreading is complete. Apply a second coat at a 90 deg (right) angle to the first coat, after the first coat is thoroughly dry.
  3. Patching Polished Concrete
     1. Conserve grinding debris from each area for use as a component in patching materials; mix grinding debris with patching compound to achieve colouration and surface appearance similar to adjacent surfaces.
  4. On‑Site Maintenance Instructions
     1. Train Owner’s designated maintenance personnel in the care and upkeep of polished and slip resistant concrete finishes, based on written maintenance instructions provided in accordance with Section 01 33 00 – Submittal Procedures.

END OF SECTION