

SECTION 03 30 00

Formatted Specification for the ULTRAFLOOR® DIAMATIC® Polished Concrete System

PART I – GENERAL

1.01 SUMMARY

- A. This is the recommended concrete specification for ULTRAFLOOR® DIAMATIC® Polished Concrete System
- B. Complete installation details are provided in the DIAMATIC® Technical Brochures available at www.diamaticusa.com.

1.02 SECTION INCLUDES

- A. General recommendations for cast in place concrete to receive a ground and polished finish. Materials and references below are listed to provide a quality concrete floor suitable to receive the specified finish.

1.03 SUBMITTALS

- A. Product Data: Submit Manufacturer's technical literature for each product indicated, specified or required. Include manufacturer's technical data, application instructions, recommendations and MSDS.
- B. Installer Qualifications: Data for company, principal personnel, experience, and training. Provide a letter documenting installer's accreditation and certification compliance, as specified under quality assurance.
- C. Test Reports: Provide field quality control test for all cast in place concrete upon delivery. Testing personnel must be granted full access to the jobsite to conduct any and all required testing.

1.04 QUALITY ASSURANCE

- A. Except where different requirements are specified, comply with the following codes and standards by the California Building Standards Commission, American Concrete Institute (ACI), and ASTM standard testing methods.
 - 1. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials".
 - 2. ACI 304R "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete".
 - 3. ACI 310R-13 "Guide to Decorative Concrete"
 - 4. ACI 302 1R-04 "Guide for Concrete Floor and Slab Construction"
 - 5. ACI 305R "Hot Weather Concreting".
 - 6. ACI 306R "Cold Weather Concreting".
 - 7. ACI 308.1 "Standard Specification for Curing Concrete".

8. ASTM E-1155 "Standard Method for determining floor flatness and floor levelness"

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General: Use ready-mix concrete conforming to ASTM C94 and CBC Section 1905.2, 1905.3 and ACI 318 Section 5.2 and 5.3. No on-job mixed concrete will be allowed.
- B. Cement: ASTM C150, Type II. Temperature delivered at plant not to exceed 150 degrees F. Use only one manufacturer for all cement unless approved by Architect.
- C. Supplemental Cementitious Materials (SCM):
 1. Pozzolan (Fly Ash): ASTM C618 Class F or N. Fly ash is not permitted in mixes receiving integral color additives.
 2. Ground Granulated Blast-Furnace slag: ASTM C-989, Is not permitted without specific approvals.
 3. Allowable maximum 10% Class C fly ash replacement for cement in concrete mixes, not to exceed 15% by volume.
- D. Aggregates:
 1. Fine aggregate: ASTM C33, natural, washed clean sand. Use same sand for all concrete. Comply with gradation limits specified in standard.
 2. Coarse aggregate: ASTM C33. All other aggregate: Limestone or granite. Comply with the following:
 - a. Use only hard, durable material from established sources with proven history of successful use in producing concrete with minimum shrinkage, free from harmful amount of clay, shale, or other deleterious substances in amounts greater than those permitted in ASTM C33.
 - b. Use aggregate containing no thin or elongated pieces. Any piece having a major dimension more than 2-1/2 times the average thickness shall be considered thin or elongated.
 - c. Comply with gradation limits specified in ASTM C33.
 - d. See section 1.5, Submittals, items J and K, for requirements regarding aggregate color in exposed concrete slabs.
- E. Air-entraining Admixture: Shall not be used for any interior slab on ground construction where a power trowel may be used during finishing. A maximum allowable range is 0-3% natural entrapped air.

- F. Water Reducing Admixture: Conform to ASTM C494, Types A or D. High range water reducing admixtures shall not be used unless approved in writing by the Structural Engineer.
- G. Accelerating Admixture: Conform to ASTM C494, Types C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.
- H. Water: Clean, potable, and free of deleterious substances.
- I. Miscellaneous Materials:
 - 1. Curing and sealing compound: ASTM C309, water borne resin based dissipating curing membrane is the only acceptable product. In lieu of a chemical membrane a physical membrane may be used conforming to ASTM C171-07
 - 2. Moisture Vapor Barrier: Polyethylene sheets not less than 10-15 mils thickness and are resistant to decay when tested in accordance with ASTM E154 and meeting the requirements of ASTM E1745, Class A or B. The preferred material is Stego Wrap (15 mil) Vapor Barrier by Stego Industries LLC, and or equal.

2.2 DESIGN & MIXES:

- A. The exact amount of cement, fine and coarse aggregate, and water to be used shall be determined by the design mix. The actual slump used shall not exceed amounts listed in the table. These proportions shall produce concrete of maximum density, minimum shrinkage and required minimum strength. The amount of water used shall be the minimum consistent with the requirements.
- B. A sample load of each of the specified mixes may be poured in the foundation at the earliest possible date to check workability of the concrete. Test cylinders shall be prepared and tested as specified to verify compliance of the concrete with the specifications. All concrete shall develop the specified minimum strength. Adjustments will be made if test results warrant changes.
- C. Basis for mix designs shall be as follows:
 - 1. Compressive strength shall meet the minimum required for the intended use of the floor. The minimum compressive strength shall meet 3500 PSI with 4000 PSI as an acceptable range or 28-30 MPA.
 - 2. Water Cement Ratio: The allowable water cement ratio shall not exceed 0.50; an acceptable range would be from 0.45 to a 0.50. The cement paste produced should be of sufficient quality to hold the aggregates in place during mechanical grinding operations and provide minimal shrinkage and curling during the curing stages.
 - 3. Fly Ash will be limited to 10% by volume or less. No fly ash in the mixture is preferred.
 - 4. No fiber admixtures shall be used in the mixture as specified gloss levels may not be achieved.
 - 5. Slag cements are not permitted.

6. Aggregate graduations shall be consistent with good practices to reduce shrinkage and curling. A well graded mixture will be preferred using quality aggregates meeting ASTM C33. No reactive aggregates shall be used or aggregates known to cause ASR (Alkaline Silica Reaction), including any aggregates or glass particles that are to be seeded into the surface during finishing.
 7. A maximum slump shall not exceed 5 inches. A water reducing admixture may be used to increase the slump to a 6 inch for placement and finishing as long as submitted for approval by the engineer. Any water reducing admixture used must be compatible with all other ingredients in the mix including any coloring admixture. No admixtures containing calcium chloride may be used.
 8. An accelerating admixture may be used as long as it is designated NC or non-chloride. Calcium Chloride is not permitted and should not be used for any architectural concrete installations.
 9. A coloring admixture may be used as long as the pigments meet ASTM C979-10 Pigments for Integrally Colored Concrete. The color shall meet all approvals in advance by means of an approved mock-up panel. The size and scope of the mock-up panel will be designated by the architect.
- D. Measure fine and coarse aggregates separately. The method of measuring aggregates shall be subject to the approval of the testing laboratory and shall be such that all ingredients can be uniformly and accurately controlled and easily checked.
- E. The batching plant shall be equipped with an electric metering device capable of determining moisture content of sand. This device shall be subject to the approval of the testing laboratory.

2.3 PRE CONSTRUCTION CONFERENCE:

- A. A pre-construction meeting shall take place to insure that all parties involved in construction understand the importance of the finished floor requirements.
- B. During this meeting it will be required that the following individuals are in attendance, including;
 1. General contractor
 2. Concrete sub contractor
 3. Ready mix producer
 4. Pumping company
 5. Color manufacturer (if required)
 6. Polishing contractor
 7. Architect or owners representative

8. Testing laboratory
 9. Screed operator (if required)
- C. Topics for discussion may include;
- a. Design mixture
 - b. Placement schedule
 - c. Placement methods
 - d. Tolerances (F-numbers)
 - e. Curing method
 - f. Jointing
 - g. Slab protection / responsibility
 - h. Vapor barrier / type and installation
 - i. Finishing practices / final required finish
 - j. Mock-up approvals
 - k. Site walk through
 - l. Safety

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine units of work to be placed and verify that:
 1. Construction of formwork is complete.
 2. Required reinforcement, inserts, and embedded items are in place.
 3. Vapor barrier has been properly installed and is not damaged.
 4. Areas to receive concrete are free of debris and excess water.
- B. Thoroughly clean all transporting and handling equipment.
- C. Notify Architect and Project Representative at least 48 hours before concrete will be placed.
- D. Ensure availability of sufficient labor personnel, equipment, and materials to place concrete correctly in accordance with schedule.
- E. Provide ACI Certified Flatwork Finishers where required. (or equivalent)

- F. Protect finished surfaces adjacent to areas to receive concrete.
- G. Provide access for concrete trucks and pumping equipment where required.

3.2 MIXING:

- A. In general, provide ready mixed concrete in compliance with the referenced ACI standards and ASTM C94, as modified herein.
- B. Mix all concrete mixed in transit mixer for a period of not less than 10 minutes at a peripheral drum speed of 200 ft. per minute. At least 3 minutes of the mixing period shall be at the job site.
- C. Start the discharge of concrete not more than 30 minutes after the introduction of mixing water. Complete placing of concrete within 60 minutes of the first introduction of water into the mix.
- D. Do not add water to the mix after leaving the plant without the specific approval of the Project Representative or Architect. Upon his approval, water may be added as long as slump does not exceed that specified and the designed water/cement ratio is not exceeded.

3.3 TEMPERATURE CONTROLS:

- A. In general, comply with the following temperature limitations:
 - 1. Maximum temperature of concrete at time of placement: 85 degrees F.
 - 2. Minimum temperature of concrete at time of placement: 50 degrees F.
- B. Should the ambient temperature at time of concrete placement exceed 85 degrees F, or should it be expected to rise above this temperature for the 3 days following placement, submit a program for hot weather concreting as recommended in ACI 305R. Do not place concrete under these conditions unless such a program has been approved by the Structural Engineer. Do not add cement to the mix at a temperature higher than 150 degrees F.
- C. Should the ambient temperature at time of concrete placement be below 50 degrees F or should it be expected to drop below this temperature for the 3 days following placement, submit a program for cold weather concreting as recommended in ACI 306R. Do not place concrete under these conditions unless such a program has been approved by the Structural Engineer. Do not permit concrete to freeze for 7 days following placement.
- D. Keep accurate and detailed records of concrete pour locations, temperatures of air and concrete, and curing methods. Turn records over to Architect at completion of work.
- E. Cure some test cylinders under conditions same as the placed concrete is if so requested by Architect or testing laboratory.

3.4 PLACING - GENERAL:

- A. Keep a record of the time and date of placing all concrete in each portion of the project. Make this record open to the inspection of the Architect at any time.
- B. Carry on concrete placing, once started, as a continuous operation until the section of approved reinforcement, size and shape is completed. Use pour cut offs of approved details and locations.
- C. A proper screeding method or mechanism shall be used to insure the flatness requirements are met. Acceptable methods include the use of a laser screed, a mechanical vibrating screed including a roller or tube screed, a Morrison screed or similar type.
- D. Proper finishing practices shall be used at all times per ACI 302 1R-04.

3.5 TOLERANCES:

- A. Unless otherwise specified herein or is shown on the Drawings, permissible deviations from established lines, grades, and dimensions shall be those specified in ACI 117.
- B. Unless otherwise noted, place slabs to the following tolerance: 1/8 inch in ten (10) feet. The acceptable measurement for the finished floor will be an FF 50 as measured according to ASTM E-1155. Also no more than 1/8-inch maximum deviation above or below the established datum lines.

Flatness	FF = 50 (Average)	FF= 35 (Minimum local)
Levelness	FL = 30 (Average)	FL = 20 (minimum local)
- C. Control joints shall be sawn within 16 hours of placement to a minimum depth of 25% of the slab. Placement and frequency shall be provided by the architect in detailed drawings. Any additional cutting for design purposes may be done at a later time as long as the joints are not required for crack prevention.

3.6 FINISHING:

- A. Finishing shall be in accordance with ACI 302 1R-04 in all areas.
- B. The required finish shall be a smooth trowel finish, not burned.
- C. At the contractors choice he may use float blades or steel blades for the final finish as long as a minimum amount of steel is not left on the surface.
- D. Light fuzz left on the surface would be acceptable as opposed to a burned concrete surface.
- E. If finishing with an integral color admixture the use of water shall be restricted during any and all finishing steps.

3.7 CURING:

- A. The concrete shall be cured in accordance with ACI 308 using an approved method and product for the specific mixture.
- B. DIAMATIC FLOR-CURE™ is the preferred method for ULTRAFLOOR installations. FLOR-CURE™ is waterborne resinous cure that is spray applied per the application instructions for new concrete placements. FLOR-CURE™ meets ASTM C-309.
- C. At no time will a solvent borne acrylic Cure and Seal ASTM C 1315 be used as an approved method as the depth of penetration exceeds that surface area to receive grinding and polishing. Solvent borne material will limit exposure and penetration of densifier, coloring treatments and protection products.
- D. If an integral color admixture has been used then the curing shall be done in accordance with the color manufacturer's written recommendations for curing. DIAMATIC FLOR-CURE™ is also approved for use on integral color.
- E. The curing method and its affects may be demonstrated on the physical mock-up panel before the slab construction if schedule permits.

3.8 PROTECTION OF WORK:

- A. To prevent minor damage from light trade traffic during build out of site, an approved Construction grade flooring protection material for the ULTRAFLOOR® DIAMATIC Polished Concrete System shall be installed.
- B. The covering shall be maintained until the contractor is able to install the ULTRAFLOOR® Finish. After completion of the ULTRAFLOOR® installation the area shall be protected in the same manner until the floor is turned over to the owner.
- C. Prior to and during the installation of the ULTRAFLOOR® finish the floor must be kept free of debris or contaminates that may affect the finished surface. This will include any construction chemicals, adhesives, paints, or other materials that may cause damage to the surface.
- D. All other trades shall be kept off of the floor during the installation of the ULTRAFLOOR® finish.

END OF SECTION