SECTION 03 01 30
MAINTENANCE OF CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract, and other related construction documents such as Division 01 specifications apply to this Section

1.2 SUMMARY

A. This Section includes a single-coat, fast-curing, 100% solids epoxy moisture management system formulated to suppress excessive moisture vapor emissions in new or existing concrete prior to installing ARDEX PC-T™ Polished Concrete Topping component of the ARDEX Polished Concrete System (APCS) using a multi-step dry mechanical process and accessories specified to achieve desired gloss level and sealed with a film forming protective film:

1. ARDEX ARDIFIX™ Two-Part, Low Viscosity Rigid Polyurethane Crack & Joint Repair
2. ARDEX ARDISEAL™ RAPID PLUS Semi-Rigid Joint Sealant
3. ARDEX MC™ Rapid One-Coat Moisture Control System for Concrete to Receive ARDEX Products - For Use as a Fast-Track Primer
4. ARDEX PC-T™ Polished Concrete Topping (Gray, White or Light Gray)
5. Mechanical Diamond Grinding and Polishing Equipment
6. ARDEX Concrete Topping Treatment Chemicals
7. ARDEX PC-60™ Polyurethane Sealer for Stain & Wear Protection
8. Integral and Topical color

B. Related Sections include the following:

1. Section 03 30 00, Cast-In-Place Concrete
2. Section 090561.13, Moisture Vapor Emission Control

1.3 REFERENCES

A. ASTM C109M, Compressive Strength Air-Cure Only

B. ASTM C348, Flexural Strength of Hydraulic-Cement Mortar

C. ASTM F2170, Relative Humidity in Concrete Floor Slabs Using in situ Probes

D. ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

E. ASTM E430, Standard Test Method for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used. Include manufacturer's Safety Data Sheets.

B. Qualification Data: Provide written documentation from the manufacturer confirming that installer meets the qualifications as specified and is eligible for manufacturer's warranty.

C. Maintenance Data: Provide instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under intended use. These instructions should contain precautions against cleaning products and methods that may be detrimental to finishes and performance.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. The ARDEX Polished Concrete System (APCS) consists of a process and products engineered and manufactured by ARDEX Engineered Cements. Any substitutions are not permitted and void warranty.

B. Installer Qualifications:

1. Product(s) for the ARDEX Polished Concrete System must be installed by an approved installer such as an ARDEX Choice Contractor or ARDEX LevelMaster Elite Installer™, qualified to provide the warranty as specified.

2. Installer must be approved in writing by ARDEX and experienced in performing specified work similar in design, products and scope of this project, with a documented track record of successful, in-service performance and with sufficient production capabilities, facilities and personnel to produce specified work.

3. A factory-trained, competent supervisor must be maintained on site during all times during which specified work is performed.

C. Mock-Up: Before performing the work in this section, an on-site mock-up of the ARDEX PC-T™ representative of specified process, surface, finish, color, sealer and joint design/treatments

must be installed for review and approval. These mock-ups should be installed using the same installer personnel who will perform work. Approved mock-ups may become part of completed work, if undisturbed at time of substantial completion.

D. Pre-Installation Conference: Prior to the installation of the ARDEX Finished Surface, an on-site conference shall be conducted to review specification requirements.

1. Required attendees include the Owner, Architect, General Contractor, Subcontractor and ARDEX Representative.

2. The minimum agenda shall include a review of the site conditions, construction documents, schedule, installation procedures, protection procedures and submittals.

E. Warranty:

1. ARDEX MC RAPID: Certified applicator must file a pre-installation checklist with the manufacturer and receive written confirmation of the approval to proceed in order to obtain the extended ARDEX MC™ RAPID Warranty. Upon receipt and approval of the pre-installation checklist, a 25-year ARDEX MC™ RAPID Warranty is available for ARDEX LevelMaster Elite® Installers and a 20-year ARDEX MC™ RAPID Warranty is available for factory-trained installers.

2. APCS Warranty: Provide manufacturer's 10-year ARDEX Polished Concrete System Warranty or 10-year ARDEX LevelMaster Elite® Warranty.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original containers, bearing manufacturer's labels indicating brand name and directions for storage, factory numbered and sealed until ready for installation.

B. Store all materials in a dry, climate-controlled environment at a minimum of 50°F (10°C) and maximum of 85°F (29°C). Protect from direct sunlight.

C. Handle products in accordance with manufacturer's printed recommendations.

1.7 SITE CONDITIONS

A. Observe the basic rules of concrete work. Do not install below 50°F (10°C) or above 85°F (29°C) surface temperature. Install quickly if floor is warm (above 70°F/21°C and up to 85°F/29°C) and follow warm weather precautions available from the ARDEX Technical Service Department (888) 512-7339. Never mix with cement or additives other than ARDEX approved products.

B. Inspect the existing substrate and document unsatisfactory conditions in writing. Verify that surfaces and site conditions are ready to receive work. Correct unacceptable conditions prior to installation of System. Commencement of work constitutes acceptance of substrate conditions.

C. Close areas to traffic during and after the ARDEX PC-T application for a time period recommended by the manufacturer.

PART 2 – PRODUCTS

2.1 MOISTURE VAPOR EMISSION CONTROL

A. One-Coat Moisture Control System for Concrete to Receive ARDEX Underlayments and Toppings

1. Acceptable Products:

ARDEX MC™ RAPID; Manufactured by ARDEX Americas: 400 Ardex Park Drive, Aliquippa, PA, 15001, USA, (724) 203-5000, www.ardexamericas.com

2. Performance and Physical Properties: Meet or exceed the following values for material cured at 70° F+/-3°F (21° C+/-3°C) and 50% +/-5% relative humidity:

a. Application: Manual
b. Material Requirements on CSP 3 Prepared Concrete: Approx. 170 – 190 sq. ft. (16 – 18 m^2) per unit for 14 mils
c. Permeability (ASTM E96): 0.06 perms
d. 14 pH solution (ASTM D1308): No effect
e. Working Time: 20 minutes
f. Pot Life: 20 minutes
g. VOC: 19.9 g/L, A+B, ASTM D2369Walkable: Minimum of 4 hours
h. Prime and Install Underlayment: Minimum 4 hours, maximum 24 hours

2.2 MAINTENANCE OF CAST-IN-PLACE CONCRETE

A. Portland Cement-based Self-Leveling Topping to Suitable to Receive a Mechanical Polish Concrete Process. Acceptable products include:

1. ARDEX PC-T™ Polished Concrete Topping; ARDEX Engineered Cements: 400 ARDEX Park Drive Aliquippa, PA 15001, 1-888-512-7339, www.ardexamericas.com
   a. Water: shall be clean, potable and sufficiently cool (not warmer than 70°F/21°C).

2. Performance and Physical Properties: Meet or exceed the following values for material cured at 70°F (21°C) and 50% +/- 5% relative humidity:

i. Flow Time: 10 minutes
j. Initial Set: Approx. 10 minutes
k. Final Set: Approx. 45 minutes
l. Compressive Strength: 6100 psi (42.06 N/mm^2) at 28 days, ASTM C109M
m. Flexural Strength: 1200 (8.27 N/mm^2) psi at 28 days, ASTM C78
n. VOC: 0

3. Repair materials:

a. If necessary, correct excessive pinholes with ARDEX SD-M™ Designer Floor Finish™. Contact the ARDEX Technical Services department for recommendations.

4. Topical Color

a. Dyes and stains designed for use on cementitious toppings.

5. Integral color

a. Powder or liquid pigments can be utilized for integral pigmentation of ARDEX PC-T. The pigments must be suitable for use with a cementitious product.

2.3 CONCRETE POLISH EQUIPMENT & TOOLING

A. Equipment and Tooling for use as part of the multi-step dry mechanical process and accessories. The below outlines only one scenario for polishing and a variety of Manufacturers of equipment and tooling are acceptable. The final aesthetic result can vary due to equipment, tooling selection and operator. An example of acceptable product characteristics includes:

1. Planetary Grinder and Polisher

a. Large Platform, typically, 32” planetary floor polisher with head pressure of 600 lbs.

b. Tooling
   i. Metal Bonded Diamonds - 60-80 Grit of medium bonded metal
   ii. Transitional Diamonds Ceramic / Flat block resin Bonded - #100 Grit
   iii. Resin Bonded Diamonds - 200, 400 and higher Grit, as needed

2. Micro Polisher – Burnishers

a. Required Tooling: Diamond Impregnated – 400, 800, 1500, 3000 Grit, as needed

3. Other equipment and tooling as necessary for small areas and edge work.

4. Power generator – as needed

5. All grinding and polishing completed with grinder/polisher equipment must be connected to a dust collector.

2.4 CONCRETE TREATMENT CHEMICALS

A. Concrete treatments designed for use in conjunction with the installation of the ARDEX PC-T and the ARDEX Polished Concrete System. Acceptable products include:

1. Treatment Chemicals; ARDEX Engineered Cements: 400 ARDEX Park Drive Aliquippa, PA 15001, 1-888-512-7339, www.ardexamericas.com;

a. Densifier: ARDEX PC 10™ Lithium Hardener for ARDEX PC-T™ Polished Concrete Topping

c. Maintenance recommendations: Contact the ARDEX Technical Services Department for recommendations.

2.5 STAIN AND WEAR PROTECTION

A. Concrete stain and wear protection designed for used in conjunction with the installation of ARDEX PC-T and the ARDEX Polished Concrete System. Acceptable products include:

1. ARDEX PC 60™ Polyurethane Sealer for Stain & Wear Protection

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Verify that existing concrete has cured a minimum of 28 days before installing ARDEX PC-T and meets the requirement of a minimum 3000 psi compressive strength, a minimum 100 pcf density and a minimum 200 psi tensile strength.

C. Conduct pre-installation conference, per Section 1.05 C.

3.2 PREPARATION

A. All concrete subfloors must be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before priming. Mechanically clean if necessary. Acid etching and the use of sweeping compounds and solvents are not acceptable.

B. Mechanical preparation of the surface is required to obtain a minimum ICRI Concrete Surface Profile of 3 (CSP 3).

C. Prior to beginning the installation, the relative humidity within the concrete can be measured (ASTM F2170). No standing water shall be present.

3.3 Crack and Joint Treatment

A. Joint and Crack Preparation: Honor all joints and moving cracks up through the installation, including expansion joints, isolation joints and control joints (saw cuts).

1. All non-moving cracks shall be filled with ARDEX ARDIFIX™ Low Viscosity Rigid Polyurethane Crack & Joint Repair.

3.4 APPLICATION OF ARDEX MC™ RAPID:

A. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

B. Mixing: Comply with manufacturer's printed instructions and the following.

1. Each individual 22 lb. (10 kg) unit contains separate, pre-measured quantities of hardener (Part B) and the resin (Part A). After opening each container, stir the individual components thoroughly before blending. The hardening agent (Part B) is added to the resin (Part A).

2. Pour all of the hardener into the resin portion and stir thoroughly for a minimum of 3 minutes using a low speed drill and an epoxy mixing paddle. Once mixed, pour some of the epoxy back into the hardener container, stir for 10 seconds, and then pour all of the contents back into the resin container. Mix for an additional 30 seconds before applying.

C. Application: Comply with manufacturer's printed instructions and the following.

1. Apply the freshly mixed ARDEX MC™ RAPID at a minimum thickness of 14 mils as specified in the technical data sheet to the prepared concrete surface in a uniform direction with a short-nap paint roller or notched squeegee with back-rolling for smoother surfaces, and a longer nap roller for more uneven substrates. Sand broadcast to refusal while the ARDEX MC RAPID is still in a fresh state.

2. Following the application of MC RAPID and sand broadcast, install the selected ARDEX Topping as outlined in the technical data sheet. ARDEX recommends following all OSHA guidelines when broadcasting sand.

3. It is not necessary to re-test the substrate for moisture emissions prior to installing the coating or floor covering.

3.5 APPLICATION OF ARDEX PC-T™

A. PRIMING

1. Upon removal of all excess sand no additional priming is needed. The sand-broadcast surface of the ARDEX MC RAPID serves as the primer prior to the ARDEX PC-T application.

B. MIX DESIGNS

1. Mixing Ratio: The ARDEX PC-T shall be mixed in 2-bag batches. Mix each bag of the powder with the specified amount of water in an ARDEX T-10 Mixing Drum using an ARDEX T-1 Mixing Paddle and a 1/2” heavy-duty drill (12 mm, min. 650 rpm). Mix thoroughly for 2-3 minutes to obtain a lump-free mixture. Follow written instructions on the ARDEX product technical data sheet.

2. When mixing sanded materials, ARDEX recommends using the ARDEX DUSTFREE™ or a standard “gutter hook” vacuum attachment in combination with a wet/dry (Shop-Vac® style) vacuum and HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust. Contact the ARDEX Technical Service Department for more details on ARDEX products and air quality management.

3. As this product uses several naturally occurring and mined raw materials, shade and/or color variations are to be expected. For this reason, it is strongly recommended to use

product from the same batch or, when this is not possible, mix bags from different batches in a ratio determined by the amounts of each batch available

4. Aggregate mix: For pre-leveling and areas to be installed over 2” (5 cm) thick, well-graded, washed pea gravel may be added to reduce material costs. Mix the powder with water first, and then add from 1 part by volume of aggregate (1/8” to 3/8” [3 to 9.5 mm]). Do not use sand. The addition of aggregate will diminish the workability of the product and a finish layer is required. Allow the first layer to dry for 12 to 16 hours. Complete aggregate installation instructions are available in the ARDEX PC-T Technical Data Sheet.

5. For pump installations contact ARDEX technical department ARDEX Engineered Cements: 400 ARDEX Park Drive Aliquippa, PA 15001, 1-888-512-7339, www.ardexamericas.com

C. COLOR MIX

1. Integral Color: The maximum amount of pigment for powdered pigments is 1.5 % of the total weight of the ARDEX which means 100 lbs. of ARDEX PC-T being mixed can have up to 1.5 lbs. of powered pigments. Liquid pigments use can have a maximum of 4 oz. per 50 lb.-bag of ARDEX PC-T. Generally, saturation of color will occur prior to maximum loads permissible being reached. Integral pigment loading is done at the sole discretion of the specifier / installer and sampling is recommended to include all processing and selected finishing products. Note: Adding integral pigment may reduce or enhance installation characteristics of the ARDEX PC-T. Gloss and clarity levels may be affected.

D. ARDEX PC-T™ INSTALLATION

1. The minimum installation thickness for ARDEX PC-T shall be 3/8” (9 mm). The necessary thickness will vary with jobsite conditions and must be adequate to achieve the desired finish.

2. Pour and spread in place with the ARDEX T-4 Spreader, and then smooth with the ARDEX T-5 Smoother. Contact ARDEX Technical Services if a spike roller is to be used. Wear baseball shoes with non-metallic cleats to avoid leaving marks in the liquid topping.

3. Allow the ARDEX PC-T to cure a minimum of 24 to 72 hours before proceeding with the polishing process. Drying time is a function of jobsite temperature and humidity conditions, as well as the installation thickness.

3.6 POLISHING PROCESS FOR ARDEX PC-T™

A. The ARDEX Polished Concrete System is an engineered and integrated complete installation system requiring adherence to all written recommendations. Dry processing is required, no wet grinding is permitted. Any substitutions from the specified products without manufacturer approval will void the system warranty. Please note the following:

1. Use a dust separator and collection system with HEPA filters connected to the planetary grinder, following the recommendations of the planetary grinder manufacturer.

2. Remove concrete dust using a portable vacuum with HEPA filters 1) between passes with the floor polisher and 2) when polishing disks are changed.

3. PROCESSING (Typical Gloss Reading: 40-65, ASTM E 430). The below are general guidelines. Steps may vary based on equipment, tooling and operator selection to achieve the desired result.

    a. GRIND/POLISH Step #1: 60-80 Grit Metal Bonded Diamonds. Vacuum floor after each grinding/polishing step to remove dust.
    b. GRIND/POLISH Step #2: #100 Grit Transitional, Ceramic / Flat block resin bonded diamonds. Vacuum floor after each grinding/polishing step to remove dust.
    c. GRIND/HONING Step #3: 200 grit Resin Bonded Diamond. Vacuum floor after each grinding/polishing step to remove dust.
    d. Apply ARDEX PC 10, per application instructions at a rate of 400 sq. ft./gal. Allow to dry for 1 hour before beginning the next step.
    e. GRIND/POLISHING Step #4: 400 grit Resin Bonded Diamond. Vacuum floor after each grinding/polishing step to remove dust. Proceed with successively higher grits until gloss level desired.
    f. MICROPOLISH/BURNISH Step #6: Use 400 – 1500 grit pad. Dry, microfiber mop the floor remove all debris.
    h. Apply ARDEX PC 60 as indicated in the technical data sheet. Additional burnish polishing of the applied PC60 will provide a high gloss finish and may proceed after PC installation cures for 12 – 16 hours.

4. The above steps are typical for the processing and installation of ARDEX PC-T. However, additional steps may be required based on site conditions, age of installation and desired finish.

B. EDGEWORK

1. Where needed, polished edge work of ARDEX PC-T shall be done with a handheld or walk behind polishing tool. The edge polishing process will match the corresponding steps outlined above for the desired gloss level. Edge work steps should always precede the corresponding polisher steps.

C. POST INSTALLATION

1. All moving joints and saw cuts shall be filled with ARDEX ARDISEAL™ RAPID PLUS Semi-Rigid Joint Sealant.

3.7 PROTECTION

A. Protect the new ARDEX PC-T from spills and contamination by petroleum, oil, hydraulic fluid, acid and acidic detergents, paint and other liquid dripping from trades and equipment working over these substrates. If construction equipment must be used on these substrates, diaper all components that may drip fluids. Protect surface by installing a temporary, breathable protective floor covering.

B. **Avoid moisture for 72 hours after installation.** Don't permit standing water for this period or place any protective plastic sheeting, rubber matting, rugs or furniture that can prevent proper drying, thereby trapping moisture, which can result in a cloudy effect on the floor.

C. For 48 hours after application: Avoid moisture, standing water, deep cleaning and covering with protective plastic sheeting, mats, rugs or furniture, which may inhibit proper curing. Light pedestrian use may occur after 3 hours. Maximum performance develops in about 72 hours.

3.8 MAINTENANCE

A. IMPORTANT NOTICE: Maintaining the ARDEX Polished Concrete System and adherence to a recommended cleaning schedule will help the floor hold its mechanically polished gloss longer and greatly reduce the absorption of spilled liquids. The treated concrete floor is easily maintained by regular cleaning with the Maintenance/Post Cleaning procedure, accompanied by Micro Polishing. Specific maintenance recommendations shall be provided by the certified installer performing the work of this section. Contact the ARDEX Technical Services Department for recommendations.

B. Newly Installed ARDEX Polished Concrete System

1. The application of a sacrificial wax finish over ARDEX PC 60 is recommended. The use of a sacrificial finish will extend the service life of ARDEX PC 60 as well as provide a wear surface that is easier to maintain. Allow the ARDEX PC 60 to cure a minimum of 1 hour (70°F / 21°C) prior to wax application. The wax should be maintained in accordance with manufacturer recommendations.

2. DO NOT USE cleaners that are acidic or that have citrus (de-limonene) or Butyl compounds. Do not permit standing liquids at any time.

3.9 FIELD QUALITY CONTROL

A. Test Reports: Provide field quality control sheen gloss reading and static coefficient of friction test results conducted as specified and recorded on floor plan diagram confirming compliance with specified performance criteria.

1. Static Coefficient of Friction: A reading of not less than 0.5 for level floor surfaces shall be achieved and documented, as determined by a certified NFSI walkway auditor using the NFSI 101-A quality control test.

2. Gloss readings should be obtained in accordance with ASTM E430, Standard Test Method for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry.

a. Readings shall be taken not less than 10' (3 m) on center in field areas and within 1' (0.3 m) of floor area perimeters. In no case shall a reading be below 2% of the specified minimum sheen.

END OF SECTION