

**ARDEX GUIDE SPECIFICATION
ARDEX CONCRETE MANAGEMENT SYSTEM™ (ACMS)**

Cast-In-Place Concrete to Receive the ARDEX Concrete Management System including ARDEX Self-Leveling Underlayments

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE
WITH ARDEX CONCRETE MANAGEMENT SYSTEM™ – EARLY MC APPLICATION**

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 cast-in-place concrete, formwork, reinforcing, mix design, placement procedures, finishing procedures, concrete management system to include moisture reducing curing compound and leveling course.
- B. Related Sections include the following:
 - 1. Section 03 20 00, Concrete Reinforcing
 - 2. Section 03 40 00, Precast Concrete
 - 3. Section 03 54 00, Hydraulic Cement Underlayment
 - 4. Section 07 26 00, Vapor Retarder
 - 5. Section 09 05 61.13, Moisture Vapor Emission Control
 - 6. Division 09 Flooring Sections

1.3 REFERENCES

- A. ACI 117, Tolerances for Concrete Construction and Materials and Commentary
- B. ACI 301, Specifications for Structural Concrete
- C. ACI 305.1, Specification for Hot Weather Concreting
- D. ACI 306.1, Standard Specification for Cold Weather Concreting
- E. ACI 318, Building Code Requirements for Structural Concrete
- F. ASTM C33 - Standard Specification for Concrete Aggregates
- G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

- H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
- I. ASTM C171 – Standard Specification for Sheet Materials Curing Concrete
- J. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- K. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete
- L. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers

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. Concrete Mixture: As specified in subsection 2.1, submit concrete mix design for each type of concrete specified 21 days minimum prior to use of each mix. Include the following for each mix:
 - 1. Separate sieve analyses of percentages passing and retained for fine and coarse aggregates, including fineness modulus. Include following sieve sizes: 1 inch, 3/4 inch, 1/2 inch, 3/8 inch, No. 4, No. 8, No. 16, No. 30, No. 50, No. 100, and No. 200. For slabs, also provide sieve analysis of percentage retained for combined coarse and fine aggregates.
 - 2. Type of fine aggregate, whether natural or manufactured.
 - 3. Ensure aggregate supplier reports if an aggregate is possibly reactive, based on tests or past service.
 - 4. Ensure aggregate supplier reports if an aggregate can possibly cause pop-outs, “D” cracking, or other disruptions due to moisture gain, freezing, or other mechanisms, based on tests or past service.
 - 5. No admixture to contain more than the specified chloride ions content. Submit certificate of compliance to this requirement.
- C. Certificates & Test reports: Provide for materials
- D. Contractor Certification: Required references and written confirmation that installation contractor has been trained to install the specified moisture mitigation and curing system by the system manufacturer.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

- B. Concrete Subcontractor Qualification: The Concrete Subcontractor responsible for placing and finishing concrete shall include in their bid package to the General Contractor sufficient proof of certification and at least three references of equal size and scope. The concrete finishing subcontractor lead finisher and two additional members of the finishing crew shall be certified under the Concrete Flatwork Finisher Training and Certification Program as granted by the American Concrete Institute.
- C. Pre-Concrete Floor Slab Conference: At least 15 days prior to the start of concrete slab construction, the General Contractor shall conduct a meeting at the project site to review concrete mixture, special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, procedures construction, contraction and isolation joints, vapor-retarder installation, anchor rod and anchorage device installation tolerances, floor and slab flatness and levelness measurement, and installation of the ARDEX Concrete Management System.
 - 1. The contractor shall require responsible representatives of every party concerned with the concrete work to attend the conference, including but not limited to the following:
 - a. General Contractor's Superintendent
 - b. General Contractor's Project Manager
 - c. Laboratory responsible for concrete mix design(s)
 - d. Laboratory responsible for field quality control
 - e. Concrete subcontractor
 - a. Concrete finishing foreman
 - f. Subgrade subcontractor
 - g. Ready-mix concrete producer
 - h. ARDEX Engineered Cements representative

1.6 DELIVERY, STORAGE AND HANDLING

- A. Where required, deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.
- B. Store products in a dry area with temperature maintained between 50° and 85°F (10° and 29°C) and protect from direct sunlight.
- C. Handle products in accordance with manufacturer's printed recommendations.

1.7 PROJECT CONDITIONS

- A. Do not install ARDEX Concrete Management System below 50°F (10°C) surface and air temperatures. These temperatures must also be maintained during and for 48 hours after the installation of products included in this section. Follow cold and hot weather procedures as specified or consult with the technical services department of the material manufacturer.

PART 2 -PRODUCTS

2.1 REINFORCEMENT – Comply with requirements of Section 03 20 00

2.2 CONCRETE MIXTURE

A. Concrete Materials

1. Cement: Cement - ASTM C150, Type I or II - Normal portland type. Use only one brand throughout project.
2. Concrete strength - ASTM C39/39M: 4000 psi
3. Normal Weight Concrete - ASTM C33: 3/4" maximum sized aggregate.
4. Light Weight Concrete – ASTM C330: 3/4" maximum sized aggregate
5. Concrete slump - ASTM C143/143M: 4" +/- 1"
6. Water-to-cement ratio (w/c) - 0.50
7. Fly ash content – 10% maximum

B. Chemical Admixtures

1. ASTM C494/C 494M, Type A - Water Reducing, Type B - Retarding, Type C - Accelerating, Type D - Water Reducing and Retarding, and Type E – Water Reducing and Accelerating.
2. Silicate-based concrete admixtures must not be used in conjunction with ACMS System.
3. Do not entrain air, ASTM C260

C. Water – ASTM C94/94M and potable

D. Adjustment to concrete mix must be approved by testing agency, architect, and ARDEX Engineered Cements.

2.3 CURING

A. Wet Cure: Material that meets the requirements of ASTM C171

B. Liquid Applied Membrane Cure: Material that meets the requirements of ASTM C309

PART 3 – EXECUTION

3.1 CONCRETE MIXTURE

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is chosen, use an independent testing facility acceptable to the Architect or Structural Engineer for preparing and

reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless acceptable to the Architect or Engineer.

- B. Submit written reports to Architect and/or Engineer, as appropriate, of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed.
- C. Design mixes to provide concrete with the properties indicated on the drawings and herein specified.

3.2 PREPARATION

- A. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- B. Refer to Section 03 20 00 – Reinforcement and comply with specifications.
- C. Refer to Section 07 26 00 – Vapor Barrier and comply with specifications.
- D. Comply with requirements in ACI 301 for measuring, mixing, transporting, and placing concrete.
 - 1. Concrete shall be mixed and delivered in accordance with the requirements of ASTM C94.

3.3 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- C. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.
 - 1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement, embedded items and into corners. Maintain reinforcing in proper position during concrete placement.
 - 2. Strike off the concrete to the desired grade.
 - 3. Use wide bull-float or highway straight-edge to smooth and straighten the surface.
 - 4. After bleed water has dissipated, cure slab per section 3.6.
 - 5. Slabs on Metal Deck: Gauge up off the structural steel to provide a slab that is uniformly 1/4" less than design thickness shown on the drawings at the gauge points.

- E. Cold Weather Placing: Comply with provisions of ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing action, or low temperatures.
 - 1. Do not place concrete when temperature is 40°F and falling or when freezing weather is predicted within 24 hours.
 - 2. Do not use calcium chloride, salt, and other agents containing anti-freeze agents or chemical accelerators.
- F. Hot-Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305.1 and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 - 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to the Structural Engineer.

3.4 CONCRETE FINISHING

- A. General: Concrete shall be placed, rough screeded to within ~1/4" of final elevation and bull-floated to straighten.
- B. Tolerances: Concrete flatness and levelness tolerances of the composite system to include underlayment shall meet the requirements set forth in Section 03 54 00, Hydraulic Cement Underlayment

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to the Structural Engineer. For slabs on metal deck, locate construction joint 4' short of girders on column and/or at mid-span of metal deck short of column line. Members framing into columns are to be included in the second placement in the vicinity of the construction joint.
- B. Isolation Joints in Slabs-on-Grade: Install isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
- C. Contraction (Control) Joints in Slabs-on-ground: Joints in floors slabs shall be sawed using the "soff-cut" method as soon as possible after slab finishing as may be safely done without

dislodging aggregate. Install contraction joints in slabs-on-ground to form panels of patterns as shown. Joint depth should be as shown in the drawings. Joints should be cut in slab as soon as possible (a maximum of 12 hours after slab pour) without dislodging aggregate or otherwise damaging the concrete.

3.6 CONCRETE CURING

- A. Cure concrete following guidelines in ACI 308, Guide to Curing Concrete and manufacturer recommendations of curing products. Wet cover cure or membrane cure (ASTM C309-11).

3.7 CONCRETE SURFACE PREPARATION

- A. After a minimum of 3 days of curing, check the surface of the concrete to determine if it is ready to be brush blasted to achieve a minimum Concrete Surface Profile (CSP) 3 to a maximum CSP 5. Where wet curing was performed, remove the cover from the concrete and allow the surface of the concrete to dry.If it is still too soft, recover and wait 24 hours and continue until brush blasting can be done. NOTE: brush blasting is light shot blasting, should be done at a very high rate of speed with very small shot.
- B. Fill control joints in concrete on ground with ARDEX ARDIFIX per manufacturer's written instructions.

3.8 MOISTURE VAPOR EMISSION CONTROL APPLICATION

- A. Refer to section 09 05 61.13 for specification requirements for the installation of the ARDEX MCTM system.
- B. Refer to section 03 54 16 for hydraulic cement-based Self-Leveling Underlayments specification requirements for use with ARDEX Concrete Management SystemTM .

3.9 PROTECTION

- A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, Masonite or other suitable protection course.

END OF SECTION