



SECTION 03 30 00 CAST-IN-PLACE CONCRETE
SECTION 03 31 19 SHRINKAGE-COMPENSATING STRUCTURAL CONCRETE
SECTION 03 33 00 ARCHITECTURAL CONCRETE
SECTION 03 37 00 SPECIALTY PLACED CONCRETE
SECTION 03 38 00 POST-TENSIONED CONCRETE
SECTION 03 41 00 PRECAST STRUCTURAL CONCRETE
SECTION 03 45 00 PRECAST ARCHITECTURAL CONCRETE
SECTION 03 47 00 SITE-CAST CONCRETE
SECTION 03 51 00 CAST ROOF DECKS

(The above were formerly in Section 03300)

[Note to specifier: Delete unnecessary Sections.]

PART I GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions, apply to this section.

1.2 SUMMARY

- A. This section specifies Type K shrinkage-compensating concrete to allow extremely large concrete placements without joints.

1.3 SUBMITTALS

- A. Substitutions:
[Note to specifier: This paragraph should be included in section 01 25 13. It is shown here as a convenience for your review.]
Requests for substitution must be received by Specifier at least 14 days prior to bid opening and shall be accepted only from prime bidders. Request shall include: documentation from an approved independent testing laboratory showing compliance with this specification, record of past performance, list of similar installations, detailed comparison of the qualities of the proposed substitute with the specified product, statement of product costs showing all

savings passed to owner if approved, and certification by the contractor that the proposed substitute is in every significant way equal to or better than the specified product.

- B. Submit 2 copies of product manufacturer's literature and Material Safety Data Sheets (MSDS).
[Note to specifier: Add any other required submissions.]
- C. Submit preliminary mix design to CTS Cement Manufacturing Corp. for review 8 weeks before start of concrete placement.

1.4 QUALITY ASSURANCE

- A. References: Comply with the following unless modified by this specification.
 - 1. ASTM C33-03 Standard Specification for Concrete Aggregates
 - 2. ASTM C94/C94M-03 Standard Specification for Ready-Mixed Concrete
 - 3. ASTM C150-02a Standard Specification for Portland Cement
 - 4. ASTM C806-95 Standard Test Method for Restrained Expansion of Expansive Cement Mortar
 - 5. ASTM C845-96 Standard Specification for Expansive Hydraulic Cement
 - 6. ASTM C878/C878M-03 Standard Test Method for Restrained Expansion of Shrinkage-Compensating Concrete
- B. Packaged materials used to create expansion shall be delivered in original, unopened, undamaged bags that clearly show the manufacturer's name, product name, and batch number.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver cementitious materials to the ready-mix plant in bulk or in packages.
- B. Storage: Store bulk material in clean silos. Store bagged material in a dry area off the ground protected from rain, snow, and other sources of moisture.

PART 2 PRODUCTS

2.1 TYPE K CEMENT

- A. Approved Type K products:
1. Pre-blended KSC Type-K Cement.
 2. KSC Komponent® combined with ASTM C150 Type I, II, or V portland cement at approximately 15% Komponent® and 85% portland cement. The exact percentages will be determined by laboratory testing as described in paragraph 2.1 D. KSC Komponent® and portland cement samples shall be delivered to the laboratory 6 weeks prior to the first concrete placement.
 3. KSC System-K™, consisting of Komponent® and K-Fiber™, used with ASTM C150 Type I, II, or V portland cement at approximately 15% System-K™ and 85% portland cement. The exact percentages will be determined by laboratory testing as described in paragraph 2.1 D. Komponent® , K-Fiber™ and portland cement samples shall be delivered to the laboratory 6 weeks prior to the first concrete placement. [Note to specifier: K-Fiber™ are are small synthetic fibers designed to restrain the expansion of Type K concrete.]
- B. KSC Type-K Cement, KSC Komponent®, or KSC System-K™ shall be manufactured by CTS Cement Manufacturing Corp., 11065 Knott Avenue, Suite A, Cypress, CA, 90630. Phone: 800-929-3030 Website: www.ctscement.com
- C. Material shall meet ASTM C845 (modified) as a Type K cement.
- D. Material shall provide expansion from 0.04% to 0.10% at 7 days when tested in accordance with ASTM C806 by a laboratory approved by CTS Cement Manufacturing Corp. [Note to specifier: Since many laboratories are unfamiliar with the testing required for Type K cement and Type K concrete,

the lab must be approved by CTS.]

- E. Concrete trial batches shall be performed per CTS recommended mix designs. The Type K concrete shall provide expansion from 0.05% to 0.09% at 7 days when tested in accordance with ASTM C878 in a laboratory approved by CTS Cement Manufacturing Corp.

2.2 AGGREGATES

- A. Fine and coarse aggregate shall conform to ASTM C33.

2.3 ADMIXTURES

- A. The acceptability of admixtures will be determined by CTS during the mix design review process. Check with CTS Cement Manufacturing Corp. for experience with a specific admixture.

2.4 WATER

- A. Potable.

2.5 WATER/CEMENT RATIO

- A. See approved concrete mix design.

2.6 SLUMP

- A. See approved concrete mix design.

2.7 REINFORCEMENT

- A. When KSC Type-K Cement or KSC Komponent® is used:
 - 1. [Note to specifier: Rebar, welded wire fabric, or steel fibers provide sufficient restraint for Type K concrete.] For non-structural concrete, steel reinforcing shall have a minimum $p = 0.15\%$.

2. [Note to specifier: For structural concrete, normal structural reinforcement is sufficient to provide required restraint for Type-K concrete.]

B. When KSC System-K™ is used:

1. [Note to specifier: For non-structural concrete, such as slabs on grade, other than minor reinforcement (two #5 bars, 6" from edge) around the perimeter of the slab, double diagonal #5 bars, 4 feet long at re-entrant corners and at penetrations, no additional steel reinforcement is required.]

PART 3 EXECUTION

3.1 PRE-POUR CONFERENCE

- A. Pre-pour conference shall be at least one week prior to the first concrete placement and shall include the specifier, the contractor and his foreman, the concrete supply company, CTS Cement Manufacturing Corp., the testing agency, other applicable trades, and the owner's representative.

3.2 MIXING

- A. Concrete production shall comply with ASTM C94/C94M except where stated herein.
- B. Follow CTS Cement Manufacturing Corp's Recommended Procedures for Batching and Mixing Type-K Concrete.
- C. To avoid cumulative weighing errors of cementitious materials, the KSC Type-K Cement, KSC Komponent, or KSC System-K must be weighed out first or individually.

3.3 FIELD QUALITY ASSURANCE

[Note to specifier: Insert field quality assurance requirements as necessary.]

3.4 PLACEMENT

- A. Concrete temperature at placement must not exceed 90°F. Concrete over 60 minutes old must not have a temperature greater than 80°F.
- B. No concrete shall be placed that is more the 90 minutes old measured from the time of batching.
- C. Concrete temperature at placement must not be less than 55°F and concrete shall be protected from freezing temperatures for 7 days after placement.
- D. Subgrade temperature shall not be less than 40°F at time of placement. Ambient conditions must be 40°F and rising at time of placement.
- E. Normal placement and finishing techniques shall be used. There is little bleed water, so the start of the finishing must be when the concrete has started to set.

3.5 CURING

- A. Start water cure as soon as it can be done without marring the surface. Water cure for 7 days. Surface shall be kept continuously wet. Drying of the surface shall not be allowed. Fog spray, wet burlap, and ponding are acceptable methods.

END OF SECTION