TYPE K CEMENT

Pre-Blended Shrinkage-Compensating Cement

PRODUCT DATASHEET

DESCRIPTION: TYPE K CEMENT (ASTM C845) is a pre-blended hydraulic cement consisting of Komponent® cement additive and Type II portland cement used to create shrinkage-compensating concrete, low shrinkage concrete, and non-shrink grouts. Pre-blended units ensure consistency in cement content mix-to-mix and offer an ideal solution for projects where consistent quality is critical. TYPE K CEMENT is engineered to prevent drying shrinkage cracking by creating controlled expansion during placement and cure that overcomes the inherent shrinkage of portland cement concrete. TYPE K CEMENT reduces permeability, provides up to 60% increased abrasion resistance, prevents slab curling, improves sulfate resistance, and helps maintain dimensional stability. Long-term performance is optimized in traditional cast-in-place and post-tension designs. Design and construction are simplified by maximizing placement sizes, reducing mobilizations, and minimizing or eliminating control joints, waterstops and pour strips. Thinner walls and slabs are also viable.

USES: TYPE K CEMENT is used to create Type K and System-K™ Shrinkage-Compensating Concrete, low shrinkage concrete and non-shrink grouts. It is ideal for use in industrial slabs-on-grade, concrete containment structures, parking structures, bridge decks, topping slabs, composite decks, post-tensioned and chemically pre-stressed structures, architectural concrete, polished concrete, mass elements, underground structures, and other cast-in-place concrete applications. Use in any concrete or grouting application where eliminating shrinkage cracking, reducing control joints, preventing curling and warping, improving sulfate resistance, improving aesthetics, or improving structural behavior is desirable.

ENVIRONMENTAL ADVANTAGES: Use TYPE K CEMENT to reduce the carbon footprint of concrete materials and lower environmental impact of a project. Production of TYPE K CEMENT emits less CO_2 than portland cement. Contact your CTS Engineering Representative for LEED values and environmental information.

APPLICATION: Shrinkage-compensating concrete and other concrete materials made with TYPE K CEMENT are produced by conventional production equipment, incorporation methods, and installation practices. Actual mix designs vary depending on application, regional aggregate characteristics, supplementary cementitious materials, admixtures, and concrete performance requirements. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Do not place concrete if ambient temperatures exceed 90°F (32°C). Ambient conditions must be a minimum of 40°F (4°C) and rising at time of placement. Subgrade temperature must not be less than 40°F (4°C) at time of placement. Concrete temperature at placement must not be less than 55°F (13°C). Protect concrete from freezing temperatures for 7 days after placement. Do not place concrete that is 90 minutes or older measured from the time of initial production. Refer to the Shrinkage-Compensating Concrete Reference Guide for design details and installation considerations. Contact your CTS Engineering representative for project support at 1-800-929-3030.

BATCHING & MIXING: TYPE K CEMENT is added at the concrete batch plant. For mix design guidelines and batching and mixing instructions, refer to the Shrinkage-Compensating Concrete Reference Guide for details.

WATER/CEMENT RATIO: Due to the efficient consumption of mix water in TYPE K CEMENT, water/cement ratios between 0.40 and 0.55 are recommended. Ensure thorough mixing and dispersion throughout the load after all components have been added in the truck. Concrete production must comply with ASTM C94/94M except where otherwise stated in CTS Cement's published literature. For lower water/cement ratio designs, contact your CTS Engineering representative for project support at 1-800-929-3030.

CURING: For general applications, wet cure is required. Refer to the Shrinkage-Compensating Concrete Reference Guide and ACI 223 for additional details.

COLD WEATHER: Environmental and material temperatures below 70°F (21°C) may delay setting time and reduce the rate of strength gain. Lower temperatures will have a more pronounced effect. Thinner sections will be more significantly affected. To compensate for cold temperatures, keep material warm, use heated mix water and follow ACI 306 Procedures for Cold Weather Concreting. When average high and low temperature is

OVERVIEW

Highlights:

- Prevent drying shrinkage cracking and curling
- Reduce control joints by 90-95%
- Increase abrasion resistance up to 60%
- Increase durability and lower permeability
- Improve sulfate resistance
- Protect against corrosion and deterioration
- Increase pour sizes and minimize mobilizations
- Eliminate pour/delay strips
- Minimize long-term stress loss and creep in post-tension designs

Conforms to:

- ASTM C845 - TYPE K
- Use to create Type K Shrinkage-Compensating Concrete (ACI 223)

Tested in accordance with:

ASTM: C845, C806, C878

MasterFormat® 2016

03 01 30	Maintenance of Cast-in-Place Concrete
03 01 50	Maintenance of Cast Decks and Underlayment
03 01 60	Maintenance of Grouting
03 01 70	Maintenance of Mass Concrete
03 31 00	Cast-in-Place Concrete
03 31 19	Shrinkage-Compensating Structural Concrete
03 33 00	Architectural Concrete - Cast-in-Place Concrete
03 37 13	Shotcrete
03 37 16	Pumped Concrete
03 37 19	Pneumatically Placed Concrete
03 47 00	Site-Cast Concrete
03 48 00	Precast Concrete Specialties
03 49 00	Glass-Fiber-Reinforced Concrete
03 53 19	Concrete Overlayment
03 61 00	Cementitious Grouting
03 62 13	Non-Metallic Non-Shrink Grouting
03 64 00	Injection Grouting
03 70 00	Mass Concrete

Manufacturer:

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expected to fall below 40°F (4.4°C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M). Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

WARM WEATHER: Environmental and material temperatures above 70°F (21°C) may speed setting time and increase the rate of strength gain. Higher temperatures will have a more pronounced effect. To compensate for warm temperatures, keep material cool, use chilled mix water and follow ACI 305 Procedures for Hot Weather Concreting.

PACKAGING & AVAILABILITY: TYPE K CEMENT is available in 94 lb (42.7 kg) polyethylene-lined bags and 2000 lb (909 kg) bulk bags. It is also available in bulk tanker trucks and railcars.

SHELF LIFE: TYPE K CEMENT bagged units have a shelf life of 12 months when stored properly in a dry location, protected from moisture, out of direct sunlight, and in an undamaged package. Sealed bulk storage containers extend the shelf life of TYPE K CEMENT up to 2 years when stored properly protected from adverse environmental conditions.

USER RESPONSIBILITY: Before using CTS products, read current technical data sheets, bulletins, product labels and safety data sheets at www.CTScement.com. It is the user's responsibility to review instructions and warnings for any CTS products prior to use.

TECHNICAL SUPPORT: CTS Cement provides contractors, engineers, and project owners with in-house and field technical services on any TYPE K CEMENT application. For detailed information on use and applications of TYPE K CEMENT and shrinkage-compensating cement technology, refer to CTS Cement's Shrinkage-Compensating Concrete Reference Guide.

WARNING: DO NOT BREATHE DUST. AVOID CONTACT WITH SKIN AND EYES. Use material in well-ventilated areas only. Exposure to cement dust may irritate eyes, nose, throat, and the upper respiratory system/lungs. Silica exposure by inhalation may result in the development of lung injuries and pulmonary diseases, including silicosis and lung cancer. Seek medical treatment if you experience difficulty breathing while using this product. The use of a NIOSH/MSHA-approved respirator (P-, N- or R-95) is recommended to minimize inhalation of cement dust. Eat and drink only in dust-free areas to avoid ingesting cement dust. Skin contact with dry material or wet mixtures may result in bodily injury ranging from moderate irritation and thickening/cracking of skin to severe skin damage from chemical burns. If irritation or burning occurs, seek medical treatment. Protect eyes with goggles or safety glasses with side shields. Cover skin with protective clothing. Use chemical resistant gloves and waterproof boots. In case of skin contact with cement dust, immediately wash off dust with soap and water to avoid skin damage. In case of skin contact with wet cement, wash exposed skin areas with cold running water as soon as possible. In case of eye contact with cement dust, flush immediately and repeatedly with clean water, and consult a physician. If wet cement splashes into eyes, rinse eyes with clean water for at least 15 minutes and go to the hospital for further treatment.

Please refer to the SDS and www.CTScement.com for additional safety information regarding this material.

LIMITED WARRANTY: CTS Cement Manufacturing Corp. (CTS) warrants its materials to be of good quality and, at its option, will replace or refund the purchase price of any material proven to be defective within one (1) year from date of purchase. The above remedies shall be the limit of CTS' responsibility. Except for the foregoing, all warranties expressed or implied, including merchantability and fitness for a particular purpose, are excluded. CTS shall not be liable for any consequential, incidental, or special damages arising directly or indirectly from the use of the materials.

⚠ **WARNING**
CANCER and REPRODUCTIVE HARM - www.P65Warnings.ca.gov

TYPICAL PHYSICAL DATA

TYPE K Shrinkage-Compensating Concrete, low shrinkage concrete, and non-shrink grout can be made using pre-blended TYPE K CEMENT or using Komponent® cement additive mixed on site with local portland cement. Listed below are mix design examples using pre-blended TYPE K CEMENT. For mix designs using Komponent cement additive, refer to the Komponent data sheet. For assistance developing project specific mix designs or very low permeability mixes, contact CTS Cement's Engineering or Technical Service team. All mixes should be tested in a lab using methods designed for shrinkage-compensating cements to ensure suitability for the required application.

TYPE K CONCRETE made with TYPE K CEMENT

TYPE K CEMENT	560 lb (254 kg)
Fine aggregate ASTM C33	1800 lb (816.5 kg)
Coarse Aggregate ASTM C33	1095 lb (496.7 kg)
Water	309 lb (140.2 kg)
Hydration Stabilizer ASTM C494	Minimum 2oz/ctw (0.06kg/ctw)
Water Reducer ASTM C494	24 oz (0.68 kg)

Performance

Slump (+/- 1.5") ASTM C143	5.75 in (146mm)
Expansion, 7 days ASTM C878	0.045%
Compressive Strength, 7 days ASTM C39	3400 psi (23.4 MPa)
Compressive Strength, 28 days ASTM C39	4500 psi (31.0 MPa)
Specific Gravity, TYPE K CEMENT	3.13 g/cm^3

NON-SHRINK GROUT made with TYPE K CEMENT

TYPE K CEMENT	946 lb (429 kg)
Fine Aggregate ASTM C33	2640 lb (1197.5 kg)
Water	434 lb (196.9 kg)
Hydration Stabilizer ASTM C494	Minimum 2oz/ctw (0.06kg/ctw)
Water Reducer ASTM C494	24 oz (0.68 kg)

Performance

Expansion, 7 days ASTM C878	0.045%
Compressive Strength, 7 days ASTM C109 Mod.	4800 psi (33.1 MPa)
Compressive Strength, 28 days ASTM C109 Mod.	7250 psi (49.6 MPa)
Specific Gravity, TYPE K CEMENT	3.13 g/cm^3