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HIGH-EFFICIENCY CSA EXPANSIVE AGENT

Shrinkage compensation | Crack control | Watertight concrete | Post-poured strip solution

PRODUCT OVERVIEW

High-Efficiency CSA Expansive Agent is a mineral-based expansive admixture made from calcium sulphoaluminate clinker, calcium oxide and natural anhydrite. It is designed for shrinkage-compensating concrete, waterproof concrete, post-poured strips and other applications where controlled early expansion is required.

When properly proportioned and cured, the product generates controlled expansion during early hydration. Under restraint, this expansion develops slight self-stress in concrete, helping offset drying shrinkage and thermal shrinkage, reduce cracking risk, and improve compactness and watertightness.

KEY BENEFITS

Benefit	Description
Crack Control	Compensates drying and temperature-related shrinkage to reduce cracking risk.
Watertight Concrete	Improves compactness and permeability resistance for underground and waterproof structures.
Low Dosage	Effective performance at typical dosages of 6–8%, with 9–10% for post-poured strips.
Low Alkali	Low alkali content helps reduce the risk of alkali-aggregate reaction.
Low Chloride	Chloride content below 0.05%, suitable for reinforced concrete applications.
Stable Expansion	Expansion generally stabilizes after about 14 days, minimizing adverse effects on later strength.

TYPICAL APPLICATIONS

- Basements, tunnels, metro works, underground waterproofing layers and civil defense structures.
- Rigid self-waterproof concrete roofs, anti-seepage mortar layers and damp-proof mortar layers.
- Post-poured strips, construction joints, large raft foundations and frame-structure joint anchorage.
- Non-shrink grouting between equipment bases and concrete foundations; anchor bolt grouting.
- High-performance concrete products requiring shrinkage compensation or chemical prestressing.

TECHNICAL DATA — GENERAL PHYSICAL PROPERTIES

Item	Typical value / requirement
Appearance	Grey-white powder
Specific gravity	2.8–3.0
Specific surface area	250–400 m²/kg
Recommended dosage	6–8% for shrinkage-compensating concrete; 9–10% for post-poured strips
Curing requirement	Moist curing for not less than 14 days
Temperature limitation	Not recommended for works continuously exposed to temperatures above 80°C

CHEMICAL COMPOSITION — MAIN CONSTITUENTS (%)

Type	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3	TiO_2	Cl^-	Loss on ignition
CSA-I	5.5–7	5–7	1–2	50–52	2–4	24–27	<1	<0.05	6–8
CSA-II	3–5	8–10	0.5–1.5	51–53	2–4	25–28	<1	<0.05	6–8
CSA-III	3–4	9–11	0.5–1.5	56–58	2–4	22–24	<1	<0.05	3–4

Mineral composition: CaO, $CaSO_4$ and calcium sulphoaluminate phase ($3CaO \cdot 3Al_2O_3 \cdot CaSO_4$).

RESTRAINED EXPANSION RATE — STANDARD REQUIREMENT

Type	In water, 7 days	In air, 21 days
CSA-I	≥0.025%	≥-0.020%
CSA-II	≥0.050%	≥-0.010%
CSA-III	≥0.075%	≥0.020%

Tested under standard restrained expansion conditions according to the applicable Chinese standard for concrete expansive agents.

EFFECT ON CEMENT MORTAR STRENGTH

Dosage	7-day compressive strength	28-day compressive strength
7% internal addition	>40.0 MPa	>54.0 MPa
Standard requirement	>20.0 MPa	>40.0 MPa

PACKAGING

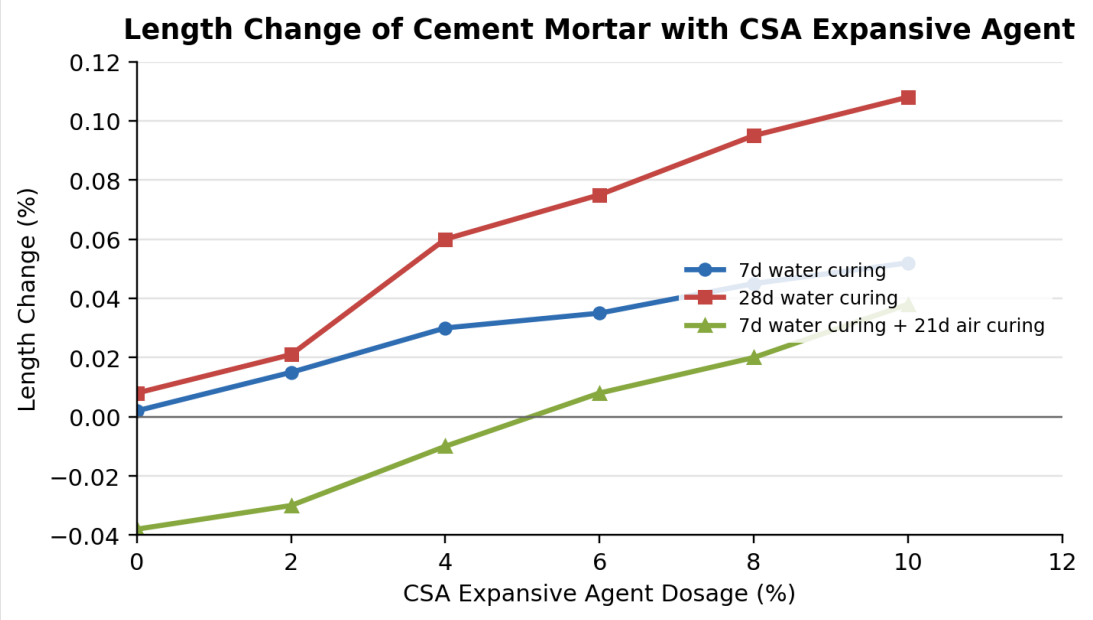
- 25 kg bags
- 1,000 kg jumbo bags / bulk bags

The product should be stored in a dry, covered and well-ventilated place. Protect from moisture and rain. Once opened, the package should be resealed or used as soon as possible.

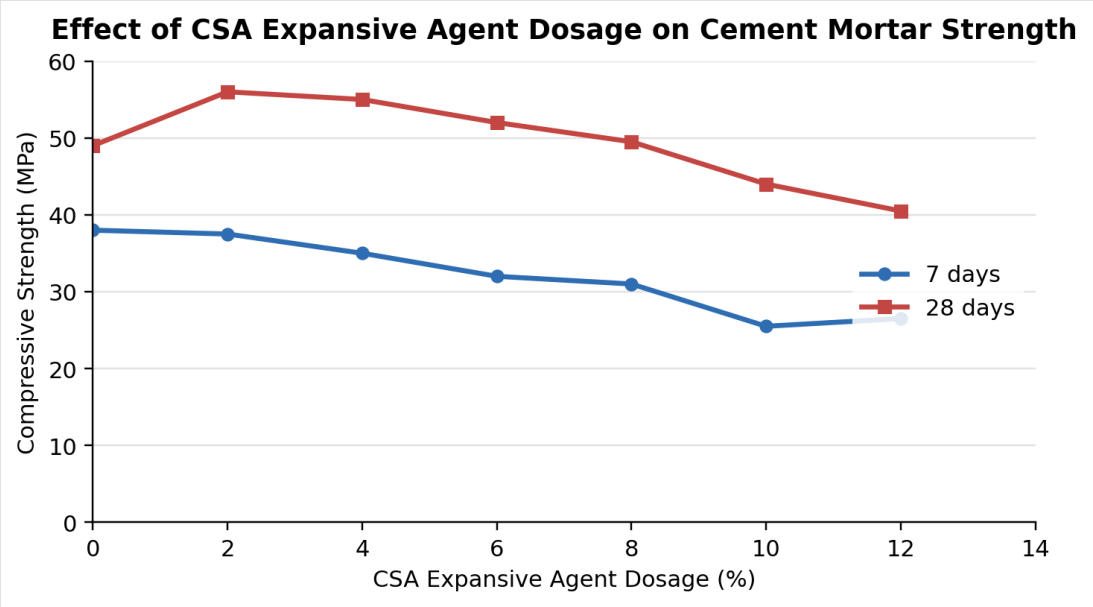
DIRECTIONS FOR USE

- Use with Portland cement or ordinary Portland cement. Dosage shall be verified by trial mix according to concrete grade, restraint condition and performance target.
- The expansive agent should be uniformly mixed with cement, aggregate and water in a mechanical mixer. Mixing time may be slightly longer than normal concrete.
- Maintain sufficient moisture curing. To ensure the development of expansion products and reduce shrinkage cracking, moist curing should be not less than 14 days.
- Store in a dry place. Protect from moisture and rain. Use as soon as possible after opening the package.

TYPICAL PERFORMANCE CURVES



Length change of cement mortar with CSA expansive agent (typical)



Effect of CSA expansive agent dosage on cement mortar strength (typical)

Note: Curves show typical test results for reference. Actual performance may vary depending on cement type, mix design, water-binder ratio, temperature, restraint condition and curing condition.

COMPANY INFORMATION

Item	Information
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Note: The above values are typical product data and standard requirements. Final dosage and performance shall be confirmed by laboratory trial mix and project conditions.