



The Chemical Company

# RHEOCRETE™ CNI

## Corrosion-inhibiting admixture for steel reinforced concrete

### Description

RHEOCRETE CNI is a calcium nitrite based corrosion-inhibiting admixture for steel reinforced concrete.

### Uses

- All RCC Structures including precast/prestressed and post tensioned applications
- Parking garages, bridge decks, marine structures, slabs, floors, foundations, etc..
- RCC structures requiring corrosion protection against chlorides for ground water and marine exposure

### Advantages

- Provides effective corrosion protection against chlorides in concrete.
- Extends the service life of reinforced concrete structures.
- Set acceleration, which may be desirable in cold weather applications.

### Mechanism

In the alkaline environment of concrete, a natural passive ferric oxide layer forms on the surface of embedded reinforcing steel and protects the steel from corrosion. This passive oxide layer may break down in the presence of chlorides and moisture resulting in corrosion of the steel.

RHEOCRETE CNI admixture delays corrosion by re-passivating defects on the steel surface. These defects are ferrous oxide ions that are susceptible to chloride attack. When chloride ions attack the ferrous ions, they combine to create a ferrous chloride complex (rust) and initiate pitting corrosion on the reinforcing steel.

If untreated, chloride ions continue to attack newly exposed ferrous ions and form additional expansive corrosion products leading to staining, cracking and spalling of the concrete.

Nitrite ions contained in RHEOCRETE CNI admixture are effective in preventing ferrous chloride complex formation by reacting with defective ferrous oxide ions prior to chloride attack and reforming the passive layer. Nitrite ions surround the defective ferrous oxide ion and convert it to a more stable ferric ion species less susceptible to corrosion. This oxidation reaction serves to re-passivate the reinforcing steel and re-establish the barrier between the steel and chlorides that initiate corrosion.

RHEOCRETE CNI admixture contains a minimum of 30% active ingredients by mass and meets ASTM C 494 interim requirements for Type C, Accelerating Admixtures.

### Typical Properties

Aspect	: Pale yellow free flowing liquid
Relative density	: 1.215 ± 0.02 at 25°C
Solids, by weight	: > 30 %
pH	: 7 ± 1
Chloride ion content	: < 0.2%

### Specification Clause

The corrosion inhibitor shall be RHEOCRETE CNI, calcium nitrite based, water based, and solvent free formulation. The product shall have effective solids content not less than 30% by weight. The product shall comply with ASTM C494 type C requirements. The product shall have relative density greater than 1.2 and shall be chloride free formulation.

### Compatibility

RHEOCRETE CNI admixture may be used with Portland cements and mineral admixtures approved under ASTM, AASHTO, or CRD specifications. It is compatible with other chemical admixtures, including water reducers, superplasticizers, retarders and air entrainers. Chemical admixtures should be added separately to the concrete to ensure desired results.

### Concrete setting time

Concrete setting times may be accelerated with the use of RHEOCRETE CNI admixture. If desired, a retarding or hydration control admixture may be added to the concrete mixture to offset the acceleration effects of RHEOCRETE CNI admixture. Please contact your local BASF representative for additional information on set-balancing admixtures for concrete.

### Dosage

RHEOCRETE CNI is recommended for use at a rate of 5.0 to 30.0 L/m<sup>3</sup> of concrete, depending upon the severity of the corrosion environment and the anticipated chloride loading of the structure.

RHEOCRETE CNI may be used to offset the potentially corrosive effects of chloride-bearing concrete-making ingredients and in applications where the initial chloride ion content of the concrete may exceed code requirements or other specified chloride limits.

Chloride protection limits for RHEOCRETE CNI are as given in the dosage table. The limits for applications involving the use of chloride-bearing materials are based on a critical chloride-to-nitrite ratio of 0.90 in

accordance with the recommendations of the Federal Highway Administration (FHWA). These limits may also be used in very severe corrosion environments for enhanced protection, if desired. The chloride protection limits given for all other applications, such as parking structures and bridges, are based on critical chloride-to-nitrite ratios that range from 1.20 to 1.50. Please contact your local BASF representative for additional information regarding dosage rates of RHEOCRETE CNI for your application.

RHEOCRETE CNI Dosage L/m <sup>3</sup>	Chloride Protection Limit, kg/m <sup>3</sup>	
	With Chloride-Bearing Materials	All Other Applications
5.0	1.2	---
10.0	2.4	3.6
15.0	3.6	5.9
20.0	4.8	7.7
25.0	6.0	8.9
30.0	7.2	9.5

Alternatively dosage can be computed using the following expression:

$$\text{Dosage (L/m}^3\text{)} = 3.69 \times \frac{\text{anticipated chloride loading (kg/m}^3\text{)}}{\text{Chloride-to-Nitrite ratio}}$$

BASF recommends that steel reinforced concrete structures that will be exposed to chlorides in service should be designed in accordance with ACI 318, ACI 357, CSA, AASHTO or other applicable codes.

The water content of RHEOCRETE CNI admixture is approximately 65% by weight. This water contributes to the consistency of the concrete mixture and the hydration of the cementitious materials. The water contributed by RHEOCRETE CNI should be used in the calculation of the water-to-cementitious material ratio of the concrete.

#### Non-chloride

RHEOCRETE CNI admixture will not initiate or promote corrosion of reinforcing steel embedded in concrete, prestressed concrete or concrete placed on galvanized steel floor and roof Systems. Neither calcium chloride nor any chloride-based ingredients are used in the manufacture of RHEOCRETE CNI.

#### Packaging

RHEOCRETE CNI admixture is available in 250 Kg drums, and by bulk delivery.

#### Storage and Shelf life

RHEOCRETE CNI must be stored where temperatures do not drop below +5°C. If product has frozen, thaw at +5°C or above and completely reconstitute using mild mechanical agitation. Do not use pressurized air for agitation. Store under cover, out of direct sunlight and protect from extremes of temperature.

Shelf life is 12 months when stored as above.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice consult your local BASF representative.

#### Safety precautions

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs (which can also be tainted with vapour until product fully cured or dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek immediate medical attention. Keep away from children and animals. Reseal containers after use. Do not reuse containers for storage of consumable item. For further information refer to the material safety data sheet. MSDS available on demand or on BASF construction chemicals web site.

#### Note

All BASF Technical Data Sheets are updated on regular basis; it is the user's responsibility, to obtain the most recent issue.

Field services where provided, does not constitute supervisory responsibility, for additional information contact your local BASF representative.

#### Disclaimer

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