

# MasterLife<sup>®</sup> CI 30

## Corrosion-Inhibiting Admixture

# MasterLife<sup>®</sup> CI 30S

## Corrosion-Inhibiting Admixture

Formerly Rheocrete CNI\*

### Description

MasterLife CI 30 calcium nitrite based corrosion-inhibiting admixture is used for reinforced concrete. MasterLife CI 30 admixture contains a minimum of 30% active ingredients by mass and meets ASTM C 494/C 494M requirements for Type C, accelerating admixtures.

A set neutral version of MasterLife CI 30 admixture, branded MasterLife CI 30S admixture, is also available.

Both MasterLife CI 30 and MasterLife CI 30S admixtures meet the requirements of ASTM C 1582/C 1582M.

### Applications

Recommended for use in:

- All types of steel reinforced concrete, including precast/prestressed and post-tensioned concrete applications
- Parking garages, bridge decks, marine structures, slabs, floors and other reinforced concrete applications requiring corrosion protection against chlorides from de-icing salts or marine exposure
- Strength-on-demand concrete, such as 4x4 concrete

### Features

- Effective corrosion protection against chlorides in concrete

### Benefits

- Extended service life of reinforced concrete structures
- Set acceleration with MasterLife CI 30 admixture, which may be desirable in cold weather applications
- A more set neutral setting time with MasterLife CI 30S admixture which may be desirable in normal or warmer weather conditions

### Performance Characteristics

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.

The MasterLife CI 30 series of admixtures delays corrosion by repassivating 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 the MasterLife CI 30 series of admixtures are effective in preventing ferrous chloride complex formation by reacting with defective ferrous oxide ions prior to chloride attack and stabilizing 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 repassivate the reinforcing steel and re-establish the barrier between the steel and chlorides that initiate corrosion.

**Concrete Setting Time:** Concrete setting times may be accelerated with the use of MasterLife CI 30 admixture. In most applications a retarding or hydration control admixture must be added to the concrete mixture to offset the acceleration effects of MasterLife CI 30 admixture. Please contact your local sales representative for additional information on the proper choice of retarding admixture for concrete to be treated with MasterLife CI 30 admixture.

Alternatively, MasterLife CI 30S admixture can be used when more set neutral characteristics are desired.

**Guidelines for Use**

**Dosage:** MasterLife CI 30 series of admixtures are recommended for use within a dosage range of 1.0-6.0 gal/yd<sup>3</sup> (5.0-30.0 L/m<sup>3</sup>) of concrete, depending upon the severity of the corrosion environment and the anticipated chloride loading of the structure.

The dosage of MasterLife CI 30 series of admixtures for a given application may be selected from the table below or computed by using the following expression:

$$\text{Dosage (gal/yd}^3\text{)} = 0.441 \times \frac{\text{Anticipated Chloride Loading (lb/yd}^3\text{)}}{\text{Chloride-to-Nitrite Ratio}}$$

$$\text{Dosage (L/m}^3\text{)} = 3.69 \times \frac{\text{Anticipated Chloride Loading (kg/m}^3\text{)}}{\text{Chloride-to-Nitrite Ratio}}$$

MasterLife CI 30 series of admixtures may be used to offset the potentially corrosive effects of chloride-bearing concrete 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 MasterLife CI 30 series of admixtures 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 sales representative for additional information regarding the dosage of MasterLife CI 30 series of admixtures for your application.

**Chloride Protection Limit, lb/yd<sup>3</sup> (kg/m<sup>3</sup>)**

MasterLife CI 30 Series Dosage gal/yd <sup>3</sup> (L/m <sup>3</sup> )	With Chloride-Bearing Materials	All Other Applications
1.0 (5.0)	2.1 (1.2)	-
2.0 (10.0)	4.1 (2.4)	6.0 (3.6)
3.0 (15.0)	6.1 (3.6)	9.9 (5.9)
4.0 (20.0)	8.1 (4.8)	13.0 (7.7)
5.0 (25.0)	10.1 (6.0)	15.0 (8.9)
6.0 (30.0)	12.1 (7.2)	16.0 (9.5)

Master Builders Solutions recommends that steel reinforced concrete structures that will be exposed to chlorides in service should be designed in accordance with ACI 318 (318M), ACI 357R, CSA, AASHTO or other applicable codes and standards.

**Product Notes**

**Corrosivity – Non-Chloride, Non-Corrosive:** MasterLife CI 30 series of admixtures are corrosion-inhibiting admixtures and will neither initiate nor promote corrosion of reinforcing and prestressing steel embedded in concrete, or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of these admixtures.

**Compatibility:** MasterLife CI 30 series of admixtures may be used in combination with any Master Builders Solutions admixture. When used in conjunction with other admixtures, each admixture must be dispensed separately into the concrete mixture.

**CAUTION:** While MasterLife CI 30 series of admixtures and MasterSet DELVO admixture are compatible in the same concrete mixture when added separately, these two admixtures are NOT compatible in the same STORAGE TANK OR CONTAINER, in any ratio, as potentially harmful gas may result from blending the two. Contact a Master Builders Solutions representative if there are any questions regarding admixture storage or admixture compatibility.

**Storage and Handling**

**Storage Temperature:** MasterLife CI 30 series of admixtures can be stored at temperatures between 10 and 100 °F (-12 and 38 °C). If MasterLife CI 30 series of admixtures freeze, they can be fully reconstituted by thawing and mechanical agitation. Do not use pressurized air for agitation.

**Shelf Life:** MasterLife CI 30 series of admixtures have a minimum shelf life of 6 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterLife CI 30 series of admixtures have been exceeded.

**Packaging**

MasterLife CI 30 series of admixtures are available in 55 gal (208 L) drums, 275 gal (1040 L) totes, and by bulk delivery.

**Chemical Composition**

MasterLife CI 30 series of admixtures contains a minimum of 30% calcium nitrite by mass as an active ingredient. MasterLife CI 30 series of admixtures are identical in composition and mechanism to other commercially available 30% calcium nitrite corrosion-inhibiting admixtures; and at equal dosages, provides similar performance and corrosion protection.

The water content of MasterLife CI 30 series of admixtures is approximately 7.3 lb/gal (0.88 kg/L). This water contributes to the consistency of the concrete mixture and the hydration

of the cementitious materials. The water contributed by MasterLife CI 30 series of admixtures should be used in the calculation of the water-to-cementitious materials ratio of the concrete.

## Related Documents

Safety Data Sheets: MasterLife CI 30 admixture and MasterLife CI 30S admixture

## Additional Information

For additional information on the MasterLife CI 30 series of admixtures or their use in developing a concrete mixture with special performance characteristics, contact your local sales representative.

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*Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.*

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