

# MasterLife<sup>®</sup> CRA 007 Crack-Reducing Admixture

## Overview

MasterLife CRA 007 crack-reducing admixture is an innovative liquid chemical admixture that is specifically formulated to reduce the magnitude of drying shrinkage and minimize the potential for cracking in concrete and other cementitious mixtures. Compared to a conventional shrinkage-reducing admixture, MasterLife CRA 007 crack-reducing admixture provides enhanced performance through (i) significant reduction in the

potential for drying shrinkage cracking, and (ii) reduced initial crack widths if cracking does occur. This Technical Bulletin summarizes the ASTM standard test method that can be used to demonstrate the performance attributes of MasterLife CRA 007 admixture. Typical performance data from comparative time-to-cracking evaluations that have been performed are also presented.

## Definitions

**Admixture shrinkage-reducing:** an admixture capable of reducing the drying shrinkage of concrete and minimizing the cracking potential in cementitious systems.

**Admixture crack-reducing:** a special class of shrinkage-reducing admixture that produces a maximum initial crack width of 175  $\mu\text{m}$  in high-performance, crack-prone (HPCP) concrete mixtures tested in accordance with ASTM C 1581.

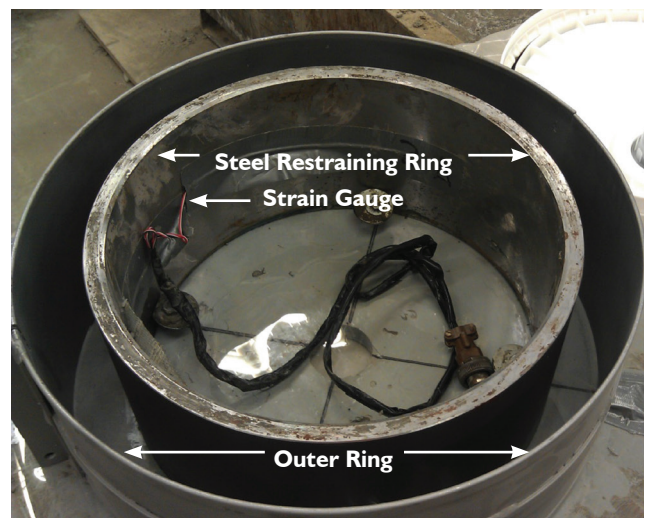
HPCP mix cracks in < 10 days and has an initial crack width of at least 1 mm.

## Applicable Test Method

ASTM C 1581/C 1581M-09 *Standard test Method for Determining Age at Cracking and Induced Tensile Stress Characteristics of Mortar and Concrete Under Restrained Shrinkage*

## Summary of Test Method

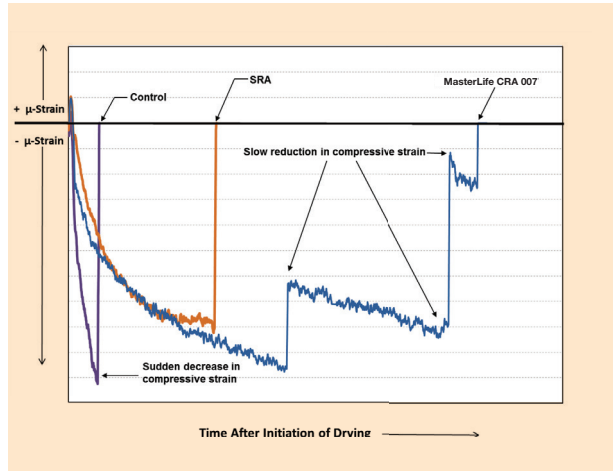
A sample of freshly mixed mortar or concrete is compacted in a circular mold around an instrumented steel ring. The compressive strain developed in the steel ring is caused by restrained shrinkage of the mortar or concrete specimen and is measured from the time of casting. Cracking of the test specimen is indicated by a sudden decrease in the steel ring strain. The age at cracking and the rate of the tensile stress development in the test specimen are indicators of the material's potential to resist cracking under restrained shrinkage.



## Significance and Use

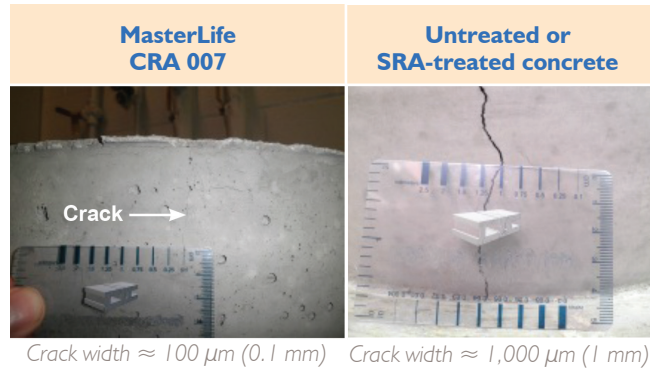
This test method is useful for determining the relative likelihood of early-age cracking of different cementitious mixtures and for aiding in the selection of cement-based materials that are less likely to crack under restrained shrinkage.

This test method can be used to determine the relative effects of material variations on induced tensile stresses and cracking potential. These variations can include, but are not limited to, aggregate source, aggregate gradation, cement type, cement content, water content, supplementary cementitious materials, or chemical admixtures.



## Results

Results from concrete treated with MasterLife CRA 007, as shown below far left, illustrate a slow and controlled reduction in strain, implying an internal stress relief due to micro-cracking prior to failure. Time to failure is defined as the time when either there is complete relief of steel strain or the residual strain is less than 10 micro strain when tested in accordance with ASTM C 1581. As shown in the photos below, hairline cracks with initial width on the order of 100 μm were noted on the ring specimen (picture on the left). By contrast, untreated concrete or concrete treated with a conventional shrinkage-reducing admixture showed visual sign of a large crack.



## About Master Builders Solutions

Master Builders Solutions is a leading global manufacturer of concrete admixtures, as well as other sustainable solutions for the construction industry, focussed on delivering its vision: **Inspiring people to build better**. Master Builders Solutions provides value-added technology and market-leading R&D capabilities to improve the performance of construction materials and

to enable the reduction of CO<sub>2</sub> emissions in the production of concrete. Founded in 1909, Master Builders Solutions has ca. 1,600 employees operating 35 production sites globally, supporting their customers in mastering their building challenges of today – for a decarbonised future.

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