



# BASF Advantage

MasterLife® 300D Crystalline  
Capillary Waterproofing Admixture



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# Watertight Concrete

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## MasterLife® 300D Crystalline Capillary Waterproofing Admixture

### **Watertight Concrete**

Factors to help achieve watertight concrete include proper construction practices and appropriate mix designs. High quality concrete required for watertight applications may include the use of supplementary cementitious materials, a water-reducing admixture (low water:cementitious materials ratio), and MasterLife 300D integral, crystalline-based, permeability-reducing admixture. These materials, in the right proportions and dosage, can work synergistically to lower concrete permeability and provide watertight performance.

### **The BASF Advantage**

BASF works with specifiers, producers and contractors to develop customized mix proportioning solutions using innovative admixtures and award-winning programs such as Green Sense Concrete to achieve the desired performance in concrete. Our project success can be seen firsthand around the world from the highest iconic concrete skyscrapers, dams, nuclear facilities, airports, and commercial buildings to beautiful and functional residential concrete.

### **BASF Advantages over Competitive Waterproofing Suppliers**

- Extensive concrete admixture portfolio
- Advanced concrete mixture optimization expertise
- Certified provider of Environmental Product Declarations and Eco-Efficiency Analysis for concrete
- Vast North American network of concrete field experts and project support
- Global concrete technology research centers
- Innovative concrete technology

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### **Contact**

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# Watertight Concrete Structures

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# Watertight Concrete Structures

## MasterLife 300D Crystalline Capillary Waterproofing Admixture

### Watertight Concrete Structures

Developing a watertight concrete structure is a combination of appropriate design detail, proper construction practices, and high-performance products working together to minimize and eliminate water migration through concrete.

BASF has a portfolio of technologies to help concrete producers, contractors, specifiers, and owners achieve watertight concrete structures. Our complete, reliable and long-lasting system approach includes integral waterproofing admixtures, waterproof coatings, waterproof repair materials, joint sealants, and water stops. In addition, the versatility of our innovative, fast-curing hand and spray-applied waterproofing technologies address the refurbishment and protection needs of a variety of structures.

Crystalline Capillary Integral Waterproofing Admixture - seals hairline cracks and reduces concrete permeability while allowing the concrete to breathe.

Joint Sealants – create a tenacious bond to a variety of substrates to ensure protection and weatherproofing during even the most aggressive conditions.

Deck Membrane and overlay solutions – offer long-lasting protection from harsh environments, weatherproofing and beautifying structures, liquid-applied

### Partnering for Success

BASF's expertise in advanced concrete mixture optimization and concrete repair materials, coatings and sealants is like having a partner in the field to help you solve your biggest concrete waterproofing challenges.

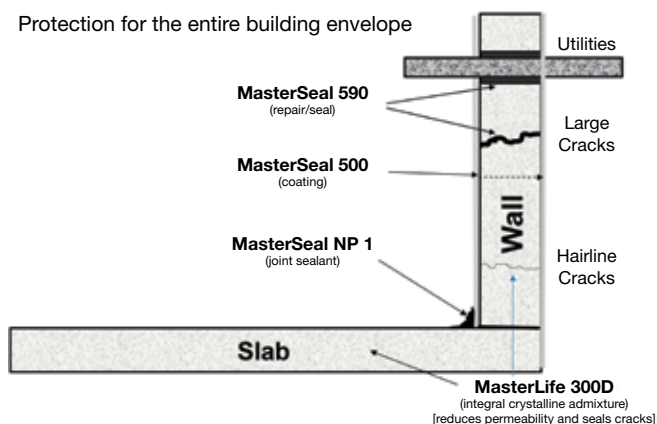
### BASF Waterproofing Package

**MasterLife 300D** – MasterLife 300D admixture is an **integral** crystalline capillary waterproofing admixture for concrete. It is designed for use in above- and below-grade applications.

**MasterSeal 581** – MasterSeal 581 is a portland cement-based **coating** for concrete and masonry that resists both positive and negative hydrostatic pressure.

**MasterSeal 590** – MasterSeal 590 is a one-component, quick-setting, portland-cement-based hydraulic **repair** mortar that instantly stops running water through holes or cracks in concrete or masonry. It expands as it sets to lock into place even under constant water pressure.

**MasterSeal NP 1** – MasterSeal NP 1 is a one-component, high performance, non-priming, gun-grade, elastomeric polyurethane **sealant**. It requires no mixing and typically requires no priming to bond to many materials, including concrete and masonry.



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# Research and Development

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# Research and Development

## MasterLife 300D Crystalline Capillary Waterproofing Admixture

For more than 100 years, BASF has had a culture of innovation focused on improving concrete and concrete admixtures. Concrete research has included experimentation in the zero-gravity conditions of outer space and the ocean floor in the highest tidal zone on planet Earth. Evaluating concrete in the harshest of environments pushes the envelope of concrete performance and provides a complementary research approach to the more traditional methods BASF regularly carries out in the world's largest, private concrete laboratory located in Beachwood, OH. The result is decades of innovation related to concrete rheology, the crystalline structure of the concrete matrix, and other bulk plastic and hardened properites of concrete.

### Testing in Harsh Environments



Water transport through plastic and hardened concrete was evaluated in the highest tidal zone in the world – Bay of Fundy – Treat Island, Eastport, ME.

### Testing in Space



Ettringite crystals and calcium hydroxide platelet images from concrete research in zero gravity was done aboard the space shuttle Endeavour – Mission STS 68.

**MasterLife 300D** crystalline capillary waterproofing admixture was developed by the same team of world-leading concrete admixture scientists from BASF that have delivered other game-changing innovations and industry firsts.

Twenty two different laboratories in the Beachwood, OH facility allow for continuous testing and development of innovative technologies.



### Testing Capabilities Related to Water Transport Through Concrete

- water permeability (pressure method)
- rapid chloride permeability
- chloride diffusion
- freezing and thawing (bulk and surface)
- alkali silica reactivity
- sulfate resistance
- drying shrinkage
- crack resistance
- anti-washout

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# Specification Language

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# Specification Language

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## MasterLife 300D Crystalline Capillary Waterproofing Admixture

### **Permeability-Reducing Admixture:**

- a. Shall be a portland cement-based crystalline capillary waterproofing admixture that reacts in concrete to form non-soluble crystalline hydration products in the capillary pores of the concrete.
- b. Shall meet ASTM C 494/C 494M requirements for Type S, Specific Performance, admixtures and AASHTO M194, the Standard Specification for Chemical Admixtures for Concrete.
- c. Shall show a reduction in permeability of concrete compared to an identical concrete mixture without the admixture, when tested in accordance with CRD-C 48 at a pressure of 200 psi (1.4 MPa) [equivalent to 460 ft (140 m) of head].
- d. Shall reduce or have no penetration of water compared to an identical concrete mixture without the admixture, when tested in accordance with DIN 1048 for a duration of 96 hours.
- e. Shall be certified to NSF/ANSI 61 (when applicable).
- f. Basis-of-Design Product: Subject to compliance with requirements, provide BASF Corporation; MasterLife 300D (Pre-2014: Rheomac 300D) or a comparable product.

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# Certificate of Conformance

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# Certificate of Conformance

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## MasterLife 300D Crystalline Capillary Waterproofing Admixture

This is to certify

- That MasterLife 300D admixture is an integral crystalline capillary waterproofing admixture for concrete; and
- That, MasterLife 300D admixture and Rheomac 300D admixture are the same product having identical composition, differing only in designation; and
- That, MasterLife 300D admixture is also available in a red-pigmented version; and
- That, neither calcium chloride nor any chloride-based ingredient is used in the manufacture of MasterLife 300D admixture; and
- That, MasterLife 300D admixture is certified by NSF to NSF/ANSI Standard 61-Drinking Water System Components-Health Effects, and that it is therefore suitable for use in properly cured concrete structures in contact with potable water; and
- That, MasterLife 300D admixture meets the requirements for a Type S, Specific Performance Admixture specified in ASTM C494/C494M and AASHTO M194, the Standard Specifications for Chemical Admixtures for Concrete.

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# Guide For Developing Watertight Concrete

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# Guide For Developing Watertight Concrete

## MasterLife 300D Crystalline Capillary Waterproofing Admixture

### STEP 1: PROJECT REQUIREMENTS

The first step in developing watertight concrete is determining the performance requirements for the project. Generally, these requirements are outlined in the project specification. It is also important to consult with the producer and contractor prior to the project start so that any delivery challenges or desired plastic properties such as workability and setting time are factored into the mixture development.

### STEP 2: MIX PROPORTIONS

In accordance with the recommendations provided in ACI 318, ACI 350, and ACI 212.3R, BASF recommends the use of MasterLife 300D admixture in good quality concrete with a maximum water-cementitious materials ratio of 0.45 and a minimum compressive strength of 4,000 psi (28 MPa). A baseline starting point may include 600 lb/yd<sup>3</sup> [356 kg/m<sup>3</sup>] cement, a 0.40 maximum water:cementitious materials ratio, and a MasterGlenium series high-range water-reducing admixture for producing a workable, low permeability concrete mixture. In addition, the use of silica fume or other supplementary cementitious materials (SCMs) can be used to further lower concrete permeability.

### STEP 3: ADMIXTURES

MasterLife 300D, an integral, crystalline-based, permeability-reducing admixture is a key component for producing durable, watertight concrete. MasterLife 300D admixture is uniquely formulated to react in concrete, in the presence of moisture, to form additional hydration products and insoluble crystalline products that fill fine pores and seal hairline cracks in concrete.

Cracking is an enemy of concrete allowing water penetration and leakage. A major cause of concrete cracking is drying shrinkage. The use of a shrinkage-reducing or crack-reducing admixture such as MasterLife®

SRA 035 or MasterLife CRA 007 is recommended to reduce drying shrinkage cracking potential. These admixtures can be used singularly or in combination with high-performance synthetic fibers such as MasterFiber® series of fibers to minimize/eliminate cracking, keep cracks tight if they do occur, and reduce the number of joints in a structure.

Steel-reinforcement in concrete can corrode if exposed to moisture, oxygen, and chlorides. Corrosion products expand causing concrete cracking and conditions for potential water leakage. In steel reinforced structures, the use of MasterLife CI 30, or MasterLife CI 222 corrosion-inhibiting admixtures, added during the batching process, are recommended to minimize corrosion cracking potential.

### STEP 4: CONSOLIDATION

Proper consolidation of fresh concrete is an important step to minimize water migration. Poorly consolidated concrete can contain pockets, channels or honeycombing allowing water penetration into and through structures. BASF recommends following ACI 309R-05 Consolidation of Concrete guidelines. In addition, the use of self-consolidating concrete (SCC) is a proven, viable option for challenging placement conditions and highly reinforced structures/elements.

### STEP 5: FRESH CONCRETE AND CURING

The use of an evaporation retarder such as MasterKure® ER 50 and/or MasterFiber microfibers should be used with concrete exposed to high evaporation conditions, to help prevent plastic shrinkage cracking. BASF recommends water/moisture curing, if practicable, or the use of a MasterKure series curing compound to allow concrete to achieve low permeability and its full waterproofing performance potential

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# Batching and Mixing

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## MasterLife 300D Crystalline Capillary Waterproofing Admixture

**Product:** MasterLife 300D admixture is a powder-based ingredient for concrete and is added during the production process.

### Dosage

- The dosage of MasterLife 300D admixture is 2% by mass of cement

Example: Cement content = 600 lb/yd<sup>3</sup> [356 kg/m<sup>3</sup>]

Calculation: 600 lb \* 0.02 = 12 lb/yd<sup>3</sup> [ 356 kg \* 0.02 = 7.1 kg/m<sup>3</sup>]

### Batching

- MasterLife 300D admixture is batched at the concrete production plant in a manner similar to that for cement or other cementitious materials
- It may be batched in either a central or truck mixer
- Follow the procedures outlined in ASTM C 94/C 94M, Standard Specification for Ready-Mixed Concrete, for general batching and mixing instructions for concrete.

### Shreddable Paper Bag Packaging (Standard)

- MasterLife 300D admixture is packaged in shreddable paper bags. The product can be added in one of two ways, a) whole bag along with its contents or b) the bag can be cut open and the contents added. The preferred method of addition is at the discretion of the user. A trial should be performed to ensure adequate mixing and the desired performance is achieved

### Water-Soluble Bag Packaging (Optional)

- MasterLife 300D admixture is also available in a two-stage, water-soluble packaging option
- The product is packaged in a water-soluble inner bag which is then protected by a waterproof exterior bag (plastic) for enhanced storage flexibility
- Instructions: Tear open the outer bag and add the water-soluble bag with contents directly into the concrete; properly dispose of the outer waterproof bag

### Mixing

- Provide at least 5 minutes of mixing after the addition of MasterLife 300D admixture to ensure thorough and uniform distribution of the admixture in the concrete mixture.

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