



# Admix C-Series

Concrete Waterproofing by Crystallization™

*Improving concrete  
performance...  
right from the start*





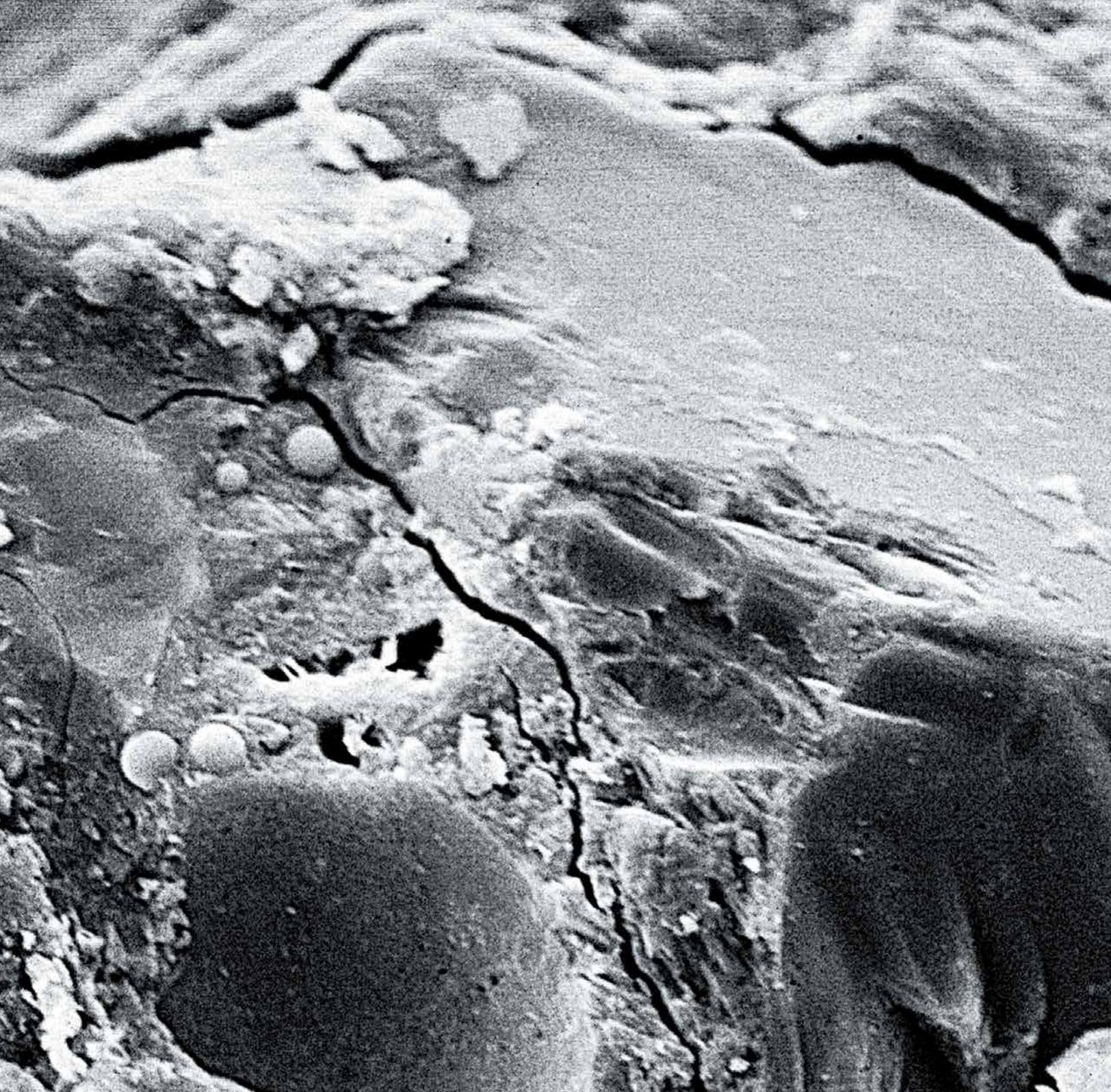
## XYPEX ADMIX

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### Making Waterproofing Part of the Mix

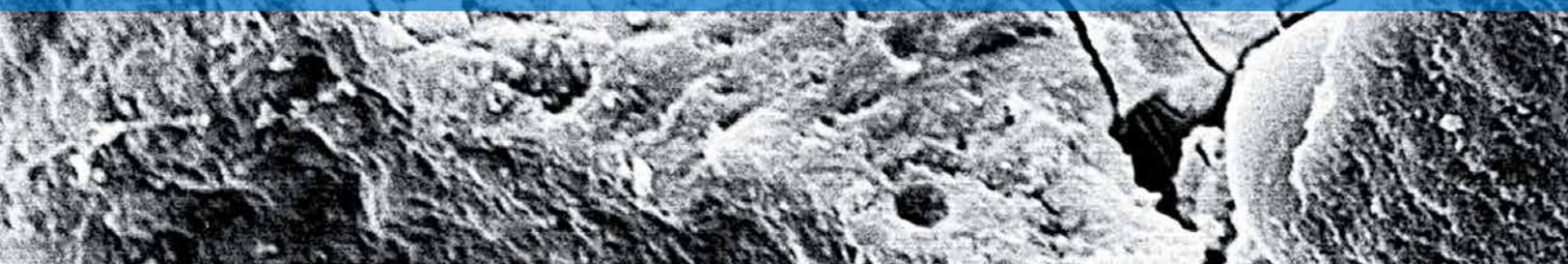
Xypex Admix is blended into the concrete mix at the time of batching to waterproof and protect concrete. Xypex Admix meets the persistent challenges of water, chemicals, and harsh environments before they become problems. Utilizing Xypex's world-renowned crystalline technology, Xypex Admix becomes an integral part of the concrete matrix, sealing the primary paths by which water and aggressive chemicals penetrate, attack, and ultimately threaten the long-term integrity of the concrete structure. Xypex Admix is part of the Xypex Crystalline Concrete Waterproofing and Protection System which also includes Xypex Coatings, Dry Shake and Repair products. Together, these Xypex products provide the flexibility needed to advance a cost-effective *Value-Engineered* concrete waterproofing strategy.





## The Nature of Concrete

Concrete with its multitude of pores, capillaries and cracks is porous, and subject to potential leaks and intrusive liquids of all kinds – a condition around which Xypex Crystalline Technology was designed.



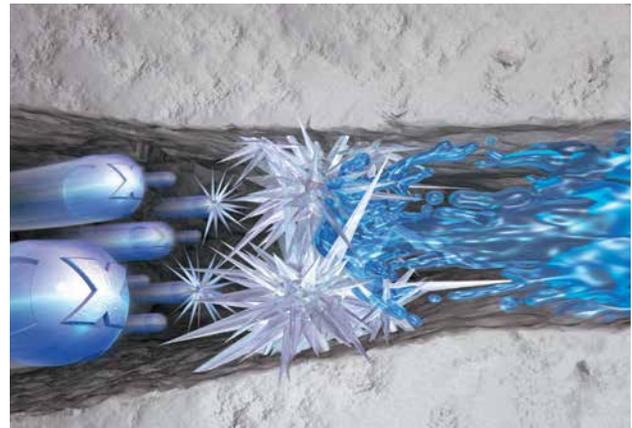
Xypex Crystalline Technology has become the world standard in *Concrete Waterproofing by Crystallization™*, a position fully recognized by architects, engineers, contractors and concrete producers who place a premium on proven quality and reliability.

## Xypex Crystalline Technology – Lifelong Waterproofing and Protection for Concrete Structures

*Xypex Crystalline Technology* utilizes concrete's chemistry, causing an integral reaction that permanently waterproofs and protects the concrete. Designed to work inside the concrete and using water as the catalyst, Xypex's proprietary chemicals react with the natural by-products of cement hydration, generating a non-soluble crystalline formation within the inter-connected pores and other voids in the concrete. In this way, the crystalline formation becomes a permanent, integral part of the concrete matrix itself, preventing the ingress of water and other liquids even under extreme hydrostatic pressure, and providing protection against harsh, aggressive environments.

Controlling permeability means Xypex Admix is an important link to greater durability – the long-term structural integrity, protective capacity and aesthetic qualities of the concrete. Preventing the penetration of aggressive chemicals, Xypex Admix helps protect against problems of reinforcing steel, sulphate attack, acid attack, carbonation and microbial induced corrosion. And, Xypex also offsets deterioration problems caused by freeze-thaw cycles, wetting and drying, and temperature changes.

Xypex Chemical Corporation first coined the phrase "*Concrete Waterproofing by Crystallization*" 50 years ago - a statement and concept that represented a radical departure from traditional surface-reliant barrier products. Pursuing an entirely new path, Xypex developed a unique technology that takes advantage of the natural characteristics of concrete.



### Typical Xypex Admix Applications

- Sewage and Water Treatment Plants
- Foundations
- Precast Components
- Reservoirs
- Secondary Containment Structures
- Tunnels and Subway Systems
- Underground Vaults
- Parking Structures
- Swimming Pools

## Xypex Admix Advantages

Xypex Admix simply has more performance muscle than other products in its field, beginning with the fact that it is present and active throughout the entire concrete matrix from the moment it's poured.

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### **INTEGRAL CRYSTALLINE TECHNOLOGY**

- Xypex crystallization process
- Becomes part of the concrete matrix
- Seals static-cracks up to 0.4 mm
- Permanent

2

### **WIDE PERFORMANCE CAPABILITIES**

- Resists extreme hydrostatic pressure
- Resists chemical attack
- Prevents microbial induced corrosion
- Enhances durability

3

### **QUALITY CONTROL**

- Through independent testing to world standards
- Extensive research and in-house analysis
- Technical support, field analysis and site supervision
- Quality Assurance Management System - ISO 9001

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### **VALUE ENGINEERING**

- Adds flexibility to construction scheduling
- Shortens construction process, saving time and money
- Not subject to climatic restraints
- No adverse effect on mix design
- Easy and less costly to install



All variations of the Admix C-Series contain the equivalent amount of reactive chemicals at their prescribed dosage rates and provide the same waterproofing and durability performance characteristics. Xypex Admix C-Series is available in regular or no-fines grade and is packaged conveniently, including soluble bags for accurate, easy and safe handling during dosing.

Admix C-500 / C-500 NF are formulated to have minimal or no effect on setting time.



Admix C-1000 / C-1000 NF are formulated for mix designs requiring a normal or slightly delayed set.



Admix C-2000 / C-2000 NF are designed for warmer climates and projects requiring a slower hydration rate.





### Better Control

**Better Project Control.** Using Xypex Admix means that the waterproofing chemical are installed at the time of batching concrete. This means that engineers and contractors can exert much better control over the waterproofing production schedule. **Better**

**Cost Control.** Construction schedules can be accelerated and cost savings realized, by eliminating most of the time and labour costs associated with traditional waterproofing methods. **Climate Control.** Hot, cold, wet, or dry, the prevailing climate does not inhibit the installation of Xypex Admix. It's already in the mix. **Xypex Support.** With representatives in over 90 countries, Xypex has first-hand knowledge of local construction procedure, environmental variables, and is readily available to respond to the questions and concerns of our customers.

### Design Friendly & Permanent

Xypex Admix will not adversely affect the strength, slump, air entrainment or workability of the concrete as formulated in the mix design. With Xypex Admix inside, concrete is still handled, placed, finished and cured as usual. **Permanent.** Xypex Admix can be trusted to perform to original specifications throughout the life of the concrete. Even when changing conditions affect the concrete, or hairline cracks develop over time, Xypex Admix will reactivate to protect the structure and prevent water leakage.

### Innovation: Bio-San C500

Xypex closely monitors the feedback from clients and representatives to stay closely attuned to the ever-changing needs of the marketplace. Our recent admix product innovation – Xypex Bio-San C500 - is a case in point. Responding to the issue of microbial induced corrosion (MIC) of concrete in severe sewage conditions, Xypex's new antimicrobial crystalline technology is a unique way of protecting concrete with high levels of hydrogen sulphide - the cause of microbial induced corrosion. No other admixture combines potent antimicrobial properties with Xypex's Crystalline Waterproofing Technology to offer complete protection of concrete sewer and wastewater structures. Xypex Bio-San C500 is recommended for sewer lines with long retention times, sealed or unvented manholes, and areas of high turbulence such as lift stations.



## Installing Xypex Admix

Blended into the mix at time of batching means Xypex Admix is pre-installed in the concrete and conveniently ready to satisfy diverse project requirements and ambient temperature variations. A wide range of application methods are available: **Poured-in-Place** – slabs, footings, walls, in-fill grout; **Shotcrete** – for structural and non-structural building components, including tunnel linings and stabilizing excavations; **Precast** – for manholes, pipes, sump pits, septic tanks. Xypex Admix Red is also available for precast applications requiring admix identification.





## Managing Expectations

Xypex Admix's high performance standards are matched by equally high customer expectations. Proof from both the lab and the field support our unwavering commitment to quality and are our way of managing these expectations.

Xypex Admix has been thoroughly tested in independent labs throughout the world and according to international standards. Permeability, chemical resistance, compressive strength, freeze-thaw durability, potable water and other tests, all concluded positive results.

## PERMEABILITY

### **U.S. Army Corps of Engineers CRD C48, "Permeability of Concrete", Aviles Engineering Corp., Houston, USA**

Two concrete samples containing Xypex Admix and an untreated control sample were tested for water permeability. Both the treated and untreated samples were subjected to a pressure of 150 psi / 1.04 MPa (350 ft. / 106.7 m water head). Results showed moisture and permeated water throughout the untreated sample after 24 hours. However, the Xypex Admix samples showed no leakage, and water penetration of only 1.5 mm / 0.06 inches after 120 hours (5 days).

### **U.S. Army Corps of Engineers CRD C48, "Permeability of Concrete", Setsco Services, Pte Ltd., Singapore**

Six Xypex Admix-treated and six untreated concrete samples were tested for water permeability. Pressure was gradually increased over five days and then maintained at 7 bars (224 ft. / 68.3 m water head) for 10 days. While the six reference samples showed water leakage beginning on the fifth day and increasing throughout the test period, the Xypex Admix samples showed no water leakage at any time during the test.

### **ACCI Water Permeability Test, "Water Permeability of Concrete", Australia Centre of Construction and Innovation, University of New South Wales, Sydney, Australia**

Concrete samples containing Xypex Admix NF at a dosage rate of 0.8% and 1.2% were tested for water permeability against control samples. All the samples were subjected to a pressure of 10 bars (100 meters / 328 ft. water head) for 2 weeks. Water permeability coefficients were calculated and the Xypex Admix treated concrete showed significant reduction in water permeability by up to 93% at a dosage rate of 1.2%.

## COMPRESSIVE STRENGTH

### **ASTM C 39, "Compressive Strength of Cylindrical Concrete Specimens", Kleinfelder Laboratories, San Francisco, USA**

At 28 days, the compressive strength test of the concrete containing Xypex Admix measured 7160 psi / 49.5 MPa as compared to the reference sample at 6460 psi / 44.5 MPa (a 10% increase).

## FREEZE / THAW DURABILITY

### **ASTM C 666, "Freeze/Thaw Durability", Independent Laboratory, Cleveland, USA**

After 300 freeze/thaw cycles, the Xypex Admix-treated samples indicated 94% relative durability.

## POTABLE WATER EXPOSURE

### **NSF 61, "Drinking Water System Component-Health Effects", NSF International, Ann Arbor, USA**

Exposure testing of potable water in contact with Xypex-treated samples indicated no harmful effects.

## CHEMICAL RESISTANCE

### **CSN 73 1326, "Measuring Loss of Surface Due to Sulphate Attack of Concrete Treated with Admix C-1000/Admix C-1000 NF", Betonconsult, Building Materials Testing Laboratory, Prague, Czech Republic**

Concrete specimens treated with Admix C-1000 at 1% and 2%, and Admix C-1000 NF at 0.5% and 1% were cast along with non-treated concrete specimens. The specimens were exposed to a highly concentrated sulphate solution (i.e. 36,000 mg/l) for 4 months and samples were periodically weighed to determine mass loss. The Admix treated samples recorded a mass loss between 5 and 50 g/m<sup>2</sup> and showed no surface deterioration, while the non-treated specimens measured an average mass loss of 4,860 g/m<sup>2</sup> with significant surface deterioration.

### **"Sulfuric Acid Resistance Test", Aviles Engineering Corporation, Houston, USA**

Concrete containing Xypex Admix at different dosage rates including 3% specimens were tested against untreated control samples for sulfuric acid resistance. After immersion in the sulfuric acid, each sample was tested for weight loss on a daily basis until a weight loss of 50% or a definite response trend was obtained. The percentage weight loss of the samples containing Xypex Admix tested significantly lower than the control samples.

### **"Acid Resistance of Mortar Containing Xypex Admix C-1000 NF", Construction and Maintenance Technology Research Center (CONTEC), Sirindhorn International Institute of Technology (SIIT) - Thammasat University, Bangkok, Thailand**

An acid testing regime was part of an extensive program to determine the benefit of the Xypex Admix C-1000 NF dosed at 1% to improve the durability of concrete. Several comparative mixes were utilized in this evaluation, including: a plain Portland cement and a 30% fly ash mix. Cured samples were exposed to 5% H<sub>2</sub>SO<sub>4</sub>; the pH value of this acid solution was 0.25 and never greater than 0.54 pH. In this extremely acidic, corrosive environment, at 12 weeks the Admix samples reduced the weight loss by 48% compared to controls of the cement-only mortar, and 53% in the fly ash specimens.

## SCANNING ELECTRON MICROSCOPY

### **SEM "Microscopic Examination of Crystalline Products in Three Xypex Admix Modified Concrete Mortars", Australian Centre for Construction Innovation, University of New South Wales, Sydney, Australia**

Slag and fly ash blended cement samples were treated with Xypex Admix and examined for evidence of crystalline growth at ages ranging from 8 months to 2 years. Samples were sliced and/or split and examined at magnifications between 500x and 5000x. Characteristic Xypex crystalline growth was observable on all Xypex treated samples, providing evidence of Xypex crystalline reactions with fly ash and slag blended cements.

## CRACK SEALING

### **ASTM C1585 and ASTM C1202, "Evaluation of Self-healing Capability of Self-compacting Concrete Made with Blast-furnace Slag Cements Activated by the Xypex Crystalline Catalyst", Instituto Tecnológico de Aeronautica, Sao Jose dos Campos, Brazil**

Portland, blast furnace slag and slag-modified Portland concrete samples, treated with 2.5% Admix C-500, were evaluated for self-healing capabilities. Microcracks were induced by loading to 90% of ultimate compressive strength. Cracked samples were then immersed in water to trigger self-healing after 28, 56 and 84 days. Strength and ultrasonic pulse velocity tests were used to determine mechanical recovery; sorptivity and rapid chloride permeability were used to evaluate watertightness recovery. Results substantiated the ability of Xypex Admix to provide self-healing of cracked concrete.



SEM-114



## Worldwide Admix Projects

Xypex Admix was used to waterproof and protect multiple areas of THE SHARD, the tallest building in the UK at 309.6 metres (1,016 ft). Construction required the largest continuous concrete pour in UK history.

AIR FORCE ACADEMY, USA



SOUTH DISTRICT WWTP, USA



ESPLANADE THEATRE ON THE BAY, SINGAPORE



PAVLOV ARCHEOLOGICAL PARK, CZECH REPUBLIC



AMOS REX ART MUSEUM, FINLAND



DELHI METRO, INDIA

## Beingthere™ Projects in Over 90 Countries

When Xypex first introduced its unique crystalline concrete waterproofing technology more than 50 years ago, the company knew its potential. This was technology for a wide array of project types – basements, bridges, locks and dams, water treatment plants, power plants and, in general, the infrastructure of cities. It was a product system for varying climatic conditions - hot, cold, wet and dry. Xypex Admix was part of an early product extension strategy, designed to focus primarily on new construction. Its market impact has been extensive, and its use on many of the major projects around the world has proven its value and reliability.

**Beingthere.** Xypex's global presence and commitment to excellence is bolstered by a strong network of licensees, distributors, technical representatives and installers who respond quickly to the needs and expectations of customers and their project concerns.

**Being Green.** Energy efficiency, material selection, minimizing site impact, VOC reduction and extending the service life of the structure are the 'green' benefits that non-toxic Xypex products provide the construction world and the pursuit of environmental sustainability.





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