BIO-SAN® C500

PRECAST & CAST-IN-PLACE CONCRETE

Protection Against Microbial Induced Corrosion

Description

Xypex Bio-San C500 is a uniquely designed admixture for integral, long-term protection of concrete in harsh sewage conditions with high levels of H_2S that cause microbial induced corrosion. Xypex Bio-San C500 contains bio-active mineral solids that become permanently fixed within the cement matrix impairing bio-film formation thus inhibiting the growth of acid causing sewer bacteria such as Thiobacillus due to high concentrations of H_2S. The unique Xypex crystalline technology creates a permanent structure throughout the pores and capillary tracts providing waterproofing and enhanced chemical protection including acid and sulphate resistance. Xypex Bio-San C500 prevents microbial induced corrosion, stops infiltration/exfiltration of water, and provides acid and sulphate resistance, significantly extending the service life of concrete sewage collection systems and waste water infrastructure.

Recommended for:

- Manholes / Sewer Pipes
- Pump Stations
- Lift Stations
- Head Works
- Septic Tanks
- Digesters
- Clarifiers
- Industrial Structures
- Wastewater Structures

Advantages

- Inhibits microbial induced corrosion
- Resists extreme hydrostatic pressure
- Resistant to aggressive chemicals (acids and sulphates)
- Can seal static hairline cracks up to 0.5 mm
- Becomes a permanent, integral part of the substrate and cannot be punctured, damaged or lose adhesion
- Does not contain any VOCs
- Less costly to apply than most other methods
- Added to the concrete at the time of batching and therefore not subject to weather and surface moisture constraints

Dosage Rates

Xypex Bio-San C500:

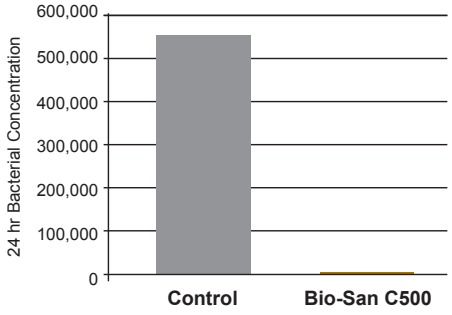
1% by weight of total cementitious content.

Test Data

ANTIMICROBIAL EFFECT

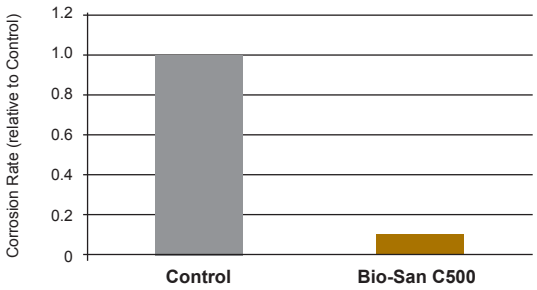
ISO 22196 (Modified) "Evaluation of Antimicrobial Effect of Xypex Bio-San C500 and Corrosion Rate", McGrath Engineering Ltd, North Vancouver, B.C., Canada

Xypex Bio-San C500 was added at 1% dosage rate to Portland cement mortar and compared to untreated control samples for antimicrobial performance. A substantial reduction in the sewer bacteria *Thiobacillus novellus / Starkeya novella* was found indicating a definite antimicrobial effect.



Concrete was cast in 100 x 200 mm cylinders with both control and treated mixes. A wastewater facility was chosen that had elevated H_2S levels and substantial existing MIC corrosion damage. Test samples were suspended in the air space of the tank for 10 years. Exposure trials showed that treated concrete had nine times less concrete mass loss compared to control samples.

Corrosion Rate at 50 ppm H_2S



After exposure of 10 years, the bacterial concentration on the treated samples was minimal, indicating continued antimicrobial action and efficiency.

Packaging

Xypex Bio-San C500 is available in 15 kg (contains 5 x 3kg soluble bags) and 20 kg plastic buckets. For large projects, customised packaging is available.

Storage

Xypex products must be stored dry at a minimum temperature of 7ºC. Shelf life is two years when stored under proper conditions.

Directions for Use

Xypex Bio-San C500 is added to the concrete at the time of batching. It is important to obtain a homogeneous mixture of Xypex Bio-San C500 with the concrete. Do not add dry Xypex Bio-San C500 powder directly to wet mixed concrete as this could cause clumping and thorough dispersion may not occur. The sequence of procedures for addition will vary according to the type of batch plant operation and equipment. Avoid direct contact with other additives during dosing process. The following methods have been used successfully in the past and it is recommended that the local Xypex Representative be consulted about the best method to use. Ensure all mix components are prepared and added in accordance with industry guides in particular supplementary cementitious materials. Due to the varied nature of supplementary and cementitious materials, Xypex recommends trial batching procedures prior to full batching processes

1. ADDITION TO COARSE AGGREGATE BELT Add Xypex Bio-San C500 powder directly to the coarse aggregate conveyor belt manually or through computer controlled mass batching system. Account for worker health and safety issues with moving belts and wind-blown dust issues. This is the most recommended dosing procedure.

2. ADDITION TO CENTRAL MIXER Load the Xypex Bio-San C500 in bulk powder form along with the other components. Mix as per standard batching practices to ensure thorough dispersal of the Xypex Bio-San C500 powder resulting in a homogeneous mixture. Ensure consistent dosing procedures are conducted which align with trial mix procedures. Avoid direct contact with other additives during dosing process. Account for worker safety issues when accessing the equipment.

3. TRUCK ADDITION (AT PLANT) Add Xypex Bio-San C500 in bulk powder form to the drum of the ready-mix truck with a small amount of batch water immediately prior to driving the truck under the batch plant and adding the balance of the materials in accordance with standard concrete batching practices. Allow time for the powder to react and diffuse into the water by spinning the drum prior to adding remaining ingredients. Avoid delays in adding other components and utilise high speed mixing to ensure homogeneity of mix. Ensure consistent dosing procedures are conducted which align with trial mix procedures. Avoid direct contact with other additives during dosing process. Where there may be insufficient water for thorough dispersion of the bulk powder a water slurry can be made with the Xypex Bio-San C500 and added to the truck mixer drum prior to batching. Refer to below procedures.

NOTE:

i. For installations involving pan mixers, the recommended procedure would be to initially add some of the mix water and coarse aggregate to the pan mixer begin mixing and slowly add the Xypex Bio-San C500 powder. Mix until the Xypex Bio-San C500 powder is thoroughly dispersed and forms a slurry, then add the balance of the materials and continue to mix as per normal. Mitigate and limit direct contact with other concrete additives and ensure consistent dosing procedures.

ii. Although not normally recommended, on-site dosing of Xypex Admix may be conducted. The Admix shall be added in slurry form to the concrete mixture in the mixing truck. Mix the slurry with a ratio of 1kg of powder to 1.85kg of clean water in a suitable container with at least twice the volume of the mixture to avoid reaction effects and spillage. Add powder to the water slowly while mixing and ensure suitable number of containers for full dose and load size. Use appropriate mixing equipment to ensure any clumps of powder disperse and all the Admix is hydrated. All water added to the slurry mixture is to be allowed for in the concrete mix design including water needed to remove any residual paste. Add the slurry mixture to the concrete mixer ensuring thorough dispersion occurs. Ensure consistent dosing procedures are conducted which align with trial mix procedures. Avoid direct contact with other additives during the dosing process. Mix the dosed concrete for a minimum of 5 minutes on high speed to fully disperse the admixture.

Should personnel not be experienced in the dosing of Xypex Admix, Xypex recommends that trial mixing be conducted.

iii. Concrete containing the Xypex Bio-San C500 does not preclude the requirement for design of crack control, construction joint detailing, proper placement, consolidation and curing of the concrete and measures for repairing defects such as honeycombing, tie holes, cracks beyond specified limits.

iii. Further guidelines are available that address the use of Xypex Bio-San C500 for a specific situation, (e.g. dry mixes, use of ice in hot ambient conditions, cold-weather concreting, etc.). Consult with the Technical Department of Xypex Australia or your local Xypex Representative for further information.

Setting Time and Strength

The setting time of concrete is affected by the chemical and physical composition of ingredients, temperature of the concrete and climatic conditions. Xypex Bio-San C500 is designed for concrete mix designs where a normal or mildly delayed set is desired. Concrete containing the Xypex Bio-San C500 may develop higher ultimate strengths than plain concrete. Trial mixes should be carried out under project conditions to determine the setting time and strength of the concrete dosed with Xypex Bio-San C500. Concrete should be a minimum of 28 days age prior to placement into service.

Limitations

When incorporating Xypex Bio-San C500, the temperature of the concrete mix should be above 4ºC.

Technical Services

For more instructions, alternative installation methods, or information concerning the compatibility of the Xypex treatment with other products or technologies, contact the Technical Department of Xypex Australia or your local Xypex Representative.

Safe Handling Information

Xypex is alkaline. As a cementitious powder or mixture, Xypex may cause significant skin and eye irritation. Directions for treating these problems are clearly detailed on all Xypex buckets and packaging. The Manufacturer also maintains comprehensive and up-to-date Safety Data Sheets on all its products. Each sheet contains health and safety information for the protection of workers and customers. The Manufacturer recommends you contact Xypex Australia or your local Xypex Technical Representative to obtain copies of Safety Data Sheets prior to product storage or use.

Warranty

The Manufacturer warrants that the products manufactured by it shall be free from material defects and will be consistent with its normal high quality. Should any of the products be proven defective, the liability to the Manufacturer shall be limited to replacement of the product ex factory. The Manufacturer makes no warranty as to merchantability or fitness for a particular purpose and this warranty is in lieu of all other warranties expressed or implied. The user shall determine the suitability of the product for his intended use and assume all risks and liability in connection therewith.

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