MASTER® BUILDERS SOLUTIONS

bluey

BluCem ZeoGlass

ACID RESISTANT SHOTCRETE CONTAINING RECYCLED AGGREGATE

A brand of MBCC GROUP

Bluey Technologies is an industry-leading civil engineering solutions provider, known for our innovative products, extensive knowledge and value-adding services. Bluey manages projects from start to finish, meaning that clients have a partner by their side with decades of experience, an engineering edge and the ability to think outside the box to ensure the job is completed right, every time.

Our operations now span Australia, New Zealand, South East Asia, Europe and the UK.

BluCem ZeoGlass

RECYCLED INORGANIC POLYMER

BluCem ZeoGlass is a one-component cement powder which requires only the addition of water to form an acid resistant, structural shotcrete mortar.

More than 90% of Australia's sewers are lined with concrete, which deteriorates when it comes into contact with gases from acidic sewage. Repair of these sewers is an ongoing challenge for Governments and asset owners as the existing network is ageing and suffering widespread corrosive attack. To solve this problem, we've developed a highly acid resistant concrete, BluCem ZeoGlass which can withstand these aggressive environments. BluCem ZeoGlass gets its name from its unique and innovative ingredients. It's made from 60% recycled materials, including the glass that consumers put in their yellow bin every week, along with a collection of other locally sourced by-products.

BluCem ZeoGlass
PRODUCT INFORMATION

WHAT IS BLUCEM ZEOGLASS?

BluCem ZeoGlass has been developed using a blend of carefully selected recycled glass aggregates combined with our cementitious binder to form a dense, high build, inorganic polymer. This builds depths of several hundred millimetres in one pass with a design life of up to 50 years.

WHERE IS BLUCEM ZEOGLASS USED?

The economical, high-performance product is best utilised in wastewater treatment plants, sewerage treatment plants, chemical plants, culverts, manholes and bund walls.

ADVANTAGES OF USING BLUCEM ZEOGLASS

- Extremely high build in one pass
- Fast application with negligible rebound
- Minimal dust emission
- Easy to hand trowel
- Uses >60% recycled raw materials
- Low drying shrinkage
- High acid resistance
- High compressive and bond strength
- High flexural strength
- 50 year design life in sewers

BluCem ZeoGlass
ACID RESISTANT

More than 90% of Australia's sewers are lined with concrete, which deteriorates when it comes into contact with highly acidic sewage.

When sewage comes into contact with regular concrete, bacteria converts the waste into sulphuric acid, deteriorating the concrete and creating a continuous cycle of decay. This is because regular concrete cannot suppress the metabolism of acid-generating bacteria. One thing can; Calcium.

We've developed an innovative binder system within BluCem ZeoGlass which incorporates Calcium into the mix, greatly reducing the rate of acidic decay.

- Maximum acid resistance
- Inert to corrosion and decay
- No risk of AAR or ASR (shown right)
- Forms an acid resistant coating made from available aluminium

Effect of alkali–silica reaction (ASR) on a sewer

Sewer lined with BluCem ZeoGlass

BluCem ZeoGlass

STRUCTURALLY LOAD BEARING

BluCem ZeoGlass is a highly durable repair mortar, which provides a structural lining, capable of securing fractured rock faces and sewer walls.

Aside from its acid resistance, BluCem ZeoGlass is also highly effective as a structurally load bearing mortar.

This durability is due to the incorporation of Calcium into the structure, making BluCem ZeoGlass one of a small handful of Calcium Aluminosilicate (or CAS) shotcretes in the world.

The incorporation of Calcium in the structure provides further benefits, high compressive and flexural strength, high calcium derived, alkalinity which will ensure the formation of a passive protective iron oxide layer on the surface of embedded steel. This protective layer will act to inhibit corrosion of the steel, making BluCem ZeoGlass inherently unique and structurally load bearing.

- Calcium Aluminosilicate (CAS) with recycled glass aggregate
- High compressive strength
- High flexural strength
- High bond strength
- Extremely high build in one pass.

COMPRESSIVE STRENGTH

- 50MPa @ 24 hours
- 70MPa @ 7 days
- 80MPa @ 28 days
- 90MPa @ 56 days

BluCem ZeoGlass

SUSTAINABLY MANUFACTURED

Stockpiles of used glass, plastic and paper have grown rapidly around the world as governing authorities struggle to find ways to treat and reuse these materials locally.

Because of this, consistent innovation is required to find economic benefits for their usage beyond just the environmental advantages. Understanding that glass is resistant to corrosion when used with the BluCem ZeoGlass formulation, we substituted environmentally damaging mined sands from Australian riverbeds for recycled glass that consumers put in their yellow bin every week.

After three years of trialling various fomulations including several industrial waste products, the structural lining system now includes more than 60% recycled by-products.

RECYCLED MATERIALS

- Recycled glass
- Iron and steel slags
- Fly ash
- Hydrothermal silica deposits
- Clays
- Other silicate containing materials

ENVIRONMENTAL BENEFITS

- 60% recycled by-products
- Reducing Australian glass stockpiles
- Australian made
- 100% compostable cement bags

BluCem ZeoGlass

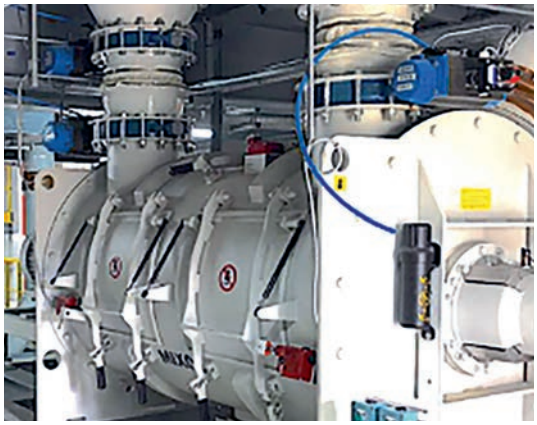
RELIABLE

As cementitious technologies consistently deliver exciting breakthroughs, we're able to develop products that were unimaginable only a decade ago.

To ensure our reputation of quality, all Bluey products undergo extensive long-term testing, before and after the manufacturing process.

The 500+ day testing that BluCem ZeoGlass has undergone adheres to strict Australian and International Standards, providing our partners and with the confidence of reliable and consistent results.

- 500+ day testing in highly aggressive environments
- In-house product development
- Manufactured with pharmaceutical grade systems
- Design life of up to 50 years
- Only sprayed by approved, trained and accredited contractors
- Extensive quality control on each batch
- Long term stability.



BluCem ZeoGlass
TEST PROGRAM

What happens when you bathe BluCem ZeoGlass in acid for 18 months?

In the early approval stage of the BluCem ZeoGlass development process, we teamed up with Sydney Water and The University of Sydney to conduct a test program, to analyse the "leading" sewer lining shotcretes to see how they'd perform next to BluCem ZeoGlass.

These commonly used products consisted of a geopolymer based shotcrete, a calcium aluminate cement and a proprietary acid resistant cement.

The testing, (accelerated age testing), exposed the four products to the same amount of acidity that they would expect to receive in a sewer application over a 30-year period.

In addition to our own in-house testing, two separate test programs have been run now on the products to verify results.

The following images and notes were taken at each respective time interval during laboratory testing.

6 MONTHS EXPOSURE (10 YEARS UNDER STANDARD SEWER CONDITIONS)

GOLDEN BAY

Golden Bay AR Cement is in a very poor condition. Reference pieces are now too exposed to measure length accurately. The prism sides have swollen with material lost to spalling.

KERNEOS

Kerneos CAC started to lose its alumina gel coating; previously evident as a 'surface slime'. Surface now heavily eroded. Prism sides indicate +8% expansion with a +0.02% length change.

GEOSPRAY

Millikan Geospray has lost 22% of its original weight through surface erosion. 12% of the material has been lost from the prism sides.

ZEOGLASS

BluCem ZeoGlass has retained its dimensions.

BluCem ZeoGlass
TEST PROGRAM

12 MONTHS OBSERVATIONS (20 YEARS UNDER STANDARD SEWER CONDITIONS)

GOLDEN BAY

Golden Bay AR Cement lost 25% of its original weight at 1 year. Reference pieces are now loose therefore testing discontinued. The increase in length was +0.081% and it appears much of the swelling and spalling was from the sides of the prism.

KERNEOS

Kerneos CAC, after 12 months of acid exposure, recorded a mean weight loss of 7.43%. This appears to be primarily a loss of alumina gel. Exposed fibres are also evident.

GEOSPRAY

Millikan Geospray recorded a 33.8% weight loss, over the 12 months. Another alarming feature is the -0.61% shrinkage after 12 months acid sulphate cure and a +0.39% expansion under regular water cure over the same period, suggesting a relatively unstable binder. Testing has been discontinued on this sample.

ZEOGLASS

BluCem ZeoGlass shows a slight 1% loss in weight after 12 months in acid cure conditions. A slight gain in weight was noted in the plain water cured sample. Expansion under acid sulphate cure is 0.1% and virtually the same as recorded in plain water cure (0.12%) over the same period. Prisms were in excellent condition and showed no alumina gel dissolution. After 12 months, no changes were observed.

BluCem ZeoGlass
TEST PROGRAM

18 MONTHS OBSERVATIONS (30 YEARS UNDER STANDARD SEWER CONDITIONS)

KERNEOS

Kerneos CAC lost 6.8% weight over the original 28 days age due to loss materials and alumina gel from the surface. Dimension is reduced to 22/23mm square.

ZEOGLASS

BluCem ZeoGlass stabilised in conditions with very little change observed since 12-month measurements. The prism retained original 25/26mm square dimensions.

Golden Bay AR and **Millikan Geospray** testing stopped at 12 months.

We deliver...

- Products developed for civil engineering
- Product technical knowledge
- Site application knowhow
- A collaborative approach
- Economical solutions for large projects

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