

# Chem Concrete Pty Ltd

Manufacturer & Supplier of Concrete Waterproofing Admixtures

ABN: 79 652 759 772

Website: [www.chemconcrete.com.au](http://www.chemconcrete.com.au)

E-mail: [sales@chemconcrete.com.au](mailto:sales@chemconcrete.com.au)

Phone: +61-4-2-388-1091 | +61-4-1-122-9278

Office: 16 Caird Place, Seven Hills, NSW 2147, Australia.

Warehouse: 589 Withers Road, Rouse Hill, NSW 2155, Australia.



## PRODUCT TECHNICAL DATA

### ChemConcrete<sup>WP</sup> Admixture

#### Hybrid Integral Waterproofing Admixture for Concrete

##### • Introduction

ChemConcrete<sup>WP</sup> Admixture is the new generation of integral concrete waterproofing admixtures (called 'hybrid' admixture), which is more reliable, environmentally-friendly, and cost-effective compared to traditional products. This admixture (Patent No. 2023902368) is used to improve the durability of concrete and produce a permanently waterproof concrete for water and liquid retaining structures. This product is classified as non-toxic, environmentally-friendly, and non-hazardous material. ChemConcrete<sup>WP</sup> Admix significantly improves the durability of concrete structures exposed to seawater, chloride, acid, sulphate, rainwater, salt, alkali-silica reaction (ASR), freezing-thawing, efflorescence, static and hydrostatic water pressures, etc. Current waterproofing admixtures in the market normally use only one waterproofing mechanism or agent (i.e., crystalline, hydrophobic, or pore blocking agents). But in ChemConcrete<sup>WP</sup> Admix, different waterproofing agents such as hydrophobing, pore blocking, crystalline or self-healing, and densifying nano-sized chemicals are used to make it the most effective and reliable waterproofing admixtures in the market and increase the confidence of the construction industry in waterproofing admixtures. Concrete treated by this admixture meets the requirements of water absorption and permeability specified in German, UK, and USA standards and guidelines for water-resistant concrete. Use of ChemConcrete<sup>WP</sup> has several benefits over traditional surface coatings and membranes because it does not require regular maintenance, is not vulnerable to deterioration, can be used where it is too complex or impossible to apply surface coatings or membranes, and does not include labour work. As an admixture added to concrete at batching plants (or sometimes to concrete trucks on site), this product saves time and cost and eliminates the ongoing maintenance expenses as well. Independent tests by several companies and universities have also confirmed the exceptional performance of this product compared to traditional products.

##### • Properties

Appearance	White/grey liquid
Unit weight	1.24 g/cm <sup>3</sup>
Chloride ion content	< 0.01%
Solid content	62 ± 1 %
pH	7 to 10

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## • Applications

ChemConcrete<sup>-WP</sup> Admix is used to extend the service life and eliminate the ingress of water in concrete basements, bridge decks, wharves, tunnels, foundations, concrete waterways, swimming pools, parking lots, concrete piles, shotcretes, concrete pavements/pavers, water and OSD tanks, dams, sewer pipes, podium decks, reclaimed land, service environments, trafficable and/or landscaped concrete, concrete pipelines, roofs, balconies, concrete road barriers, concrete kerbs, tunnels, shotcretes, concrete blocks/bricks, and areas where hazardous chemicals (e.g., salt, organic acids, sulphates, and chlorides) may be present.

It is also used in any concrete in maritime environments that needs a long-term and maintenance-free service life such as jetties and wharves, boat ramps, and other similar structures. It can be used in any situation that is damp or wet and where the transfer of moisture, the intake or absorption of water, and the presence of salts, acids, or other corrosive chemicals is unpleasant. This product provides a permanently waterproof concrete under both static and hydrostatic water pressure.

## • Product Performance

### **Water Absorption, Permeability, Strength, Workability, Shrinkage, and Creep**

ChemConcrete<sup>-WP</sup> Admix at a dosage of 2 % - 3% of total cementitious materials by weight (used as water replacement) drastically reduces the water absorption rate and permeability of concrete compared to untreated concrete under both static and hydrostatic water pressure (Table 1).

Compared with untreated concrete with similar amount of cement and workability (slump), ChemConcrete<sup>-WP</sup> improves the compressive, flexural, and tensile strengths of concrete by 14% 11% and 11%, respectively (Table 1). The modulus of elasticity of concrete treated by ChemConcrete<sup>-WP</sup> is 13% higher than that of the equivalent untreated concrete.

ChemConcrete<sup>-WP</sup> Admix also significantly improves the shrinkage, creep properties, abrasion resistance, and visual appearance, and reduces surface defects such as cracks in concrete as proved by tests results.

ChemConcrete<sup>-WP</sup> Admix maintains excellent cohesion within the concrete matrix, and eliminates excessive bleeding or segregation. This product improves the workability/slump of concrete as well.

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Table 1. Effect of ChemConcrete<sup>-WP</sup> Waterproofing Admix on concrete properties (laboratory tests results).

Property	Control concrete	ChemConcrete <sup>-WP</sup>	Reference
Water absorption			ASTM C 642
30 min	2.01 %	0.16 %	
12 h	5.89 %	0.67 %	
24 h	8.63 %	0.98 %	
Water Penetration	13 mm	3 mm	DIN 1048
Initial surface absorption test (ISAT) (ml·m <sup>-2</sup> ·s <sup>-1</sup> )			BS 1881: 2008
10 min	0.51	0.01	
30 min	0.27	0.005	
Compressive strength	42.50 MPa	47.50 MPa	ASTM C39
Flexural strength	5.65 MPa	6.25 MPa	ASTM C78
Slump	150 mm	160mm	ASTM C143

\* For particular concrete mixes and site conditions, it is suggested to evaluate the specific effect of ChemConcrete<sup>-WP</sup> on the properties of concrete through site trials prior to the application.

## Durability

Ingress of water and waterborne contaminants is the main reason responsible for almost all the major physical and chemical degradations of concrete structures and pavements. In general, there is a relatively direct relationship between the durability of concrete and its water absorption rate and permeability. The reduced water absorption and permeability of concrete containing ChemConcrete<sup>-WP</sup> Admix drastically slows down the diffusion of aggressive chemicals into concrete and significantly improves protection against reinforcement corrosion and alkali-silica reaction (ASR). Moreover, ChemConcrete<sup>-WP</sup> significantly improves the durability and service life of concrete exposed to seawater, chloride, acid, sulphate, rainwater, salt, freezing-thawing, and efflorescence. The chloride ion content of the product is below 0.01%. The product also complies with the corrosion behaviour requirements given in BS EN 934-1-2008, Clause 5.1, by testing to BS EN 480-14-2006. This product is effective under both static and hydrostatic water pressure. Cracks in concrete are a common phenomenon due to its relatively low tensile strength. However, the self-healing ability of concrete treated by ChemConcrete<sup>-WP</sup> assists in repairing its micro-

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cracks autogenously. Besides, after 300 freeze-thaw cycles, the concrete samples treated with ChemConcrete<sup>-WP</sup> indicated 97% relative durability. Its low alkali content significantly reduces the ASR and improves the freeze-thaw resistance of concrete. Tests results show that this admixture significantly mitigates the ASR of glass-based concrete as well.

## • Mix and Dosage

ChemConcrete<sup>-WP</sup> Admix is added at a dosage of 2% - 3% of cementitious materials by weight. This admixture in liquid form must be used as water replacement in the mix. Consult with a Technical Staff of Chem Concrete in Sydney office, Australia, to determine the appropriate dosage. Before using in concrete, it should be diluted by adding a portion of the mixing water into the admixture. It is recommended to add this admixture to concrete in batching plant; however, it may also be added to the concrete trucks on site and mixed at a high speed for 5 minutes or until thoroughly dispersed. This admixture in liquid form improves the workability/slump of concrete; therefore, account for the added water in the mix design and slump.

## • Packaging and Storage

ChemConcrete<sup>-WP</sup> in liquid form has a shelf life of 12 months. It should be stored at a temperature between 10 to 25 °C. This admixture is supplied in 15 L buckets and 1000 L drums.

## • Environmental Friendliness

All the ingredients used in the manufacture of ChemConcrete<sup>-WP</sup> are classified as non-toxic, environmentally-friendly, and non-hazardous chemicals with 'no or very low risk to human and environment' based on Australian Industrial Chemicals Introduction Scheme (AICIS). The manufacturing process of this product is also environmentally-friendly with 0% greenhouse gas emissions to the environment. For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any product.

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- **Legal Disclaimer**

The information, and, in particular, the recommendations related to the application and end-use of ChemConcrete<sup>WP</sup> Admixture, are given in good faith based on Chem Concrete team's current knowledge and experience on the product when properly stored, handled, and used in normal conditions in conventional Portland cement concrete in accordance with recommendations provided by Chem Concrete team. In practice, the user of the product must investigate the product's suitability for the intended application and purpose, and Chem Concrete reserves the right to change the properties of its products and update the related technical information. All orders are accepted subject to our current terms of sale and delivery.

\*Under some specific conditions, Chem Concrete may provide performance-based warranties sometimes up to the design life of the projects when ChemConcrete<sup>WP</sup> Admix is used. Please consult this with a technical team member of Chem Concrete in Sydney office, Australia.

