CARBON CONCRETE ADDITIVE



EdenCrete®

TOUGHER STRONGER CONCRETE

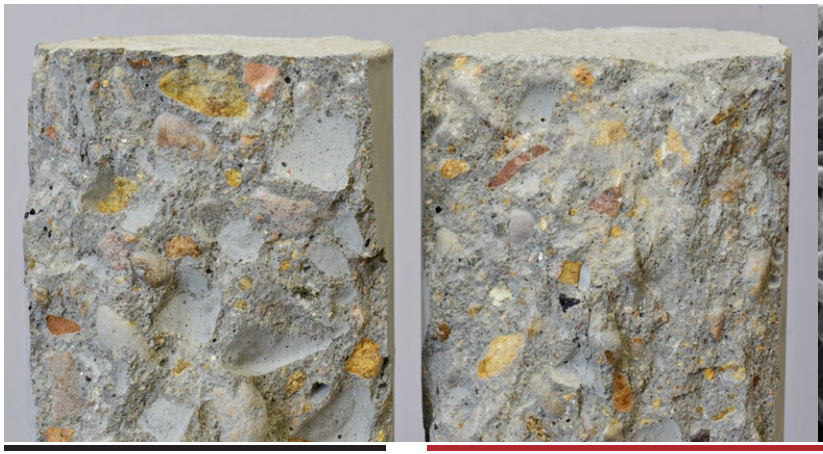
Harness the increased durability of carbon nanotubes for your next concrete pour.

Developed by Eden Innovations LLC, **EdenCrete®** is a carbon nanotube-enriched liquid additive that can elevate concrete structures to new levels of strength and toughness. It can boost surface abrasion resistance and produces extremely low permeability while improving strength properties (i.e., compressive, flexural, and split-tensile) like no other product on the market today.



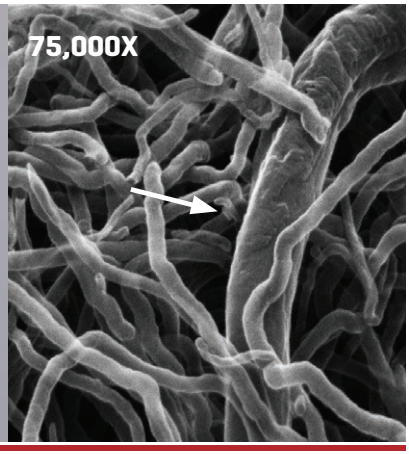
EdenCrete® makes concrete tougher

When added to concrete mixtures, carbon nanotubes in **EdenCrete®** fill in spaces at the nanoscopic level by bonding to hydrated cement particles. When concrete dries, instead of leaving porous openings that would allow water to penetrate or cracks to develop, these nanotubes create millions of flexible, strong carbon bonds throughout the structure. These carbon bonds greatly improve resistance to failure caused by compressive, flexural, tensile, and impact forces, as well as resulting in improved resistance to abrasive wear and crack propagation. All the benefits of **EdenCrete®** work together to make concrete more durable, providing the potential for longer life concrete, subject to the concrete mix design, application and conditions.



Concrete Pullout **without** EdenCrete®
Notice the flat, smooth areas where aggregate has pulled out of the cement paste. The concrete fails before the aggregate.

Concrete Pullout **with** EdenCrete®
Notice the aggregate fractures before the concrete bond fails.



EdenCrete® carbon nanotubes form denser bonds at the molecular level. The arrow is pointing at a carbon nanotube bonded with hydrating cement.

The strength of carbon fiber—now available in concrete.

Carbon nanotubes are nanoscopic cylinders of carbon, barely 1/50,000th the diameter of a human hair, that have revolutionised dozens of industries and thousands of products from aerospace applications to electronics to sporting equipment.

Carbon nanotubes are ounce for ounce 117 times stronger than steel and 30 times stronger than bulletproof Kevlar, yet extremely light. These carbon nanotubes create enhanced bonds at the interfacial transition zone between the cement paste and the aggregate, resulting in superior pullout capacity and greater aggregate fracture when failure is reached. Simply put, the aggregate breaks before the concrete does.

EDENCRETE PRODUCTS

EdenCrete®

Enhances strength and durability, reduces permeability

EdenCrete® is a carbon-enriched, liquid additive which can improve the strength, durability, and ductility of concrete. **EdenCrete®** can enhance the performance of your existing concrete mix design to provide elevated levels of strength and resistance to abrasion, while reducing shrinkage cracking and permeability. Carbon nanotubes used in **EdenCrete®** create enhanced bonds at the interfacial transition zone between the cement paste and the aggregate, resulting in superior pullout capacity and greater aggregate fracture when failure is reached (ie the aggregate breaks before the concrete does).

EdenCrete P_z® - Pozzolanic Mixes

Increases cement efficiency, optimizes pozzolanic mixes

EdenCrete P_z® improves the performance of concrete mixes having high pozzolans (i.e. fly ash, slag, silica fume). Elevated levels of pozzolan replacement can hinder early strength development. **EdenCrete P_z®** is used to reduce this effect and boost hardened properties.

Physical Properties and Dosage Rates Table

Products	Specific Gravity	Dosage (L/m^3)	Physical State	Color
EdenCrete®	1.01 +/- 0.02	2.0L - 10L	Liquid	Black
EdenCrete P_z®	1.15 +/- 0.02	0.125L - 2.5L	Liquid	Black

Note: Dosage is an estimate only, actual dosage should be determined after consulting the TDS or Parchem representative. Laboratory or site trials may be recommended to determine the actual dose rate. For dosages outside of manufacturers recommendations, please contact your Parchem representative.

	EdenCrete®	EdenCrete P_z®
IMPROVES	**IMPROVES**	**IMPROVES**
Abrasion Resistance	✓	—
Compressive Strength	✓	✓
Flexural Strength	✓	✓
Modules of Elasticity	✓	✓
Tensile Strength	✓	✓
REDUCES	**REDUCES**	**REDUCES**
Life-Cost**	✓	✓
Permeability	✓	✓
Cracking	✓	✓
Shrinkage	✓	—
	Enhances Strength and Durability, reduces Permeability.	Increase Cement Efficiency, Optimises Pozzolanic Mixes

- Potential for optimisation of concrete mixes to reduce depth dimensions or steel reinforcement requirements for on ground slab applications.
- Improves concrete durability and resistance to chloride ion attack, thereby reducing the rate of steel reinforcement corrosion initiation in concrete.
- **EdenCrete®** reduces permeability of concrete and therefore has potential to prevent penetration by most chemicals.
- **May promote an increased life and reduction in maintenance life costs. This is subject to the type of concrete mix design, concrete raw materials, application and related conditions.
- Resistant to rapid freezing and thawing

Tested for consistent, reliable results.

EdenCrete® has undergone extensive research and development, laboratory testing, and field trials in different environments and projects around the globe. It has been vetted and designated Allowed for Use by the Georgia Department of Transportation for construction and maintenance projects in Class 24-Hour accelerated strength concrete mix applications and Class B concrete applications.

In collaboration with a leading precast producer in Texas, **EdenCrete®** has also been 'Approved for Use' by the Texas Dept. of Transportation and is now used in prestressed bridge beams and road barriers.

In July 2019 in the USA, the 12 months' NTPEP trials for both EdenCrete® and EdenCrete® Pz were completed successfully, achieving compliance with the AASHTO standards and Table 1 of ASTM C494 for a Type S, specific performance admixture.

This certification opens the way for both products to be added to the Approved (Qualified) Products List of the Department of Transports (DOTs) in every State of the USA, and represents a further major milestone in EdenCrete®'s growing penetration into the huge US infrastructure markets.

EDENCRETE PRODUCTS

EdenCrete® has potential to reduce or replace multiple admixtures

This could be in the form of improvement in fresh and/or hardened properties of concrete, subject to the concrete mix design, application and conditions.

Compatible with most other concrete additives

EdenCrete® can be used in mixes containing most of the various admixture chemistry-types commonly used in the market. Unlike chemical concrete admixtures that can impact the workability, colour, or effectiveness of a mix, **EdenCrete®** in most cases does not require altering formulations or procedures of a mix. It is recommended to conduct laboratory trials prior to mix and use, as concrete mix design, additives used, applications and conditions may vary results.

Excellent workability

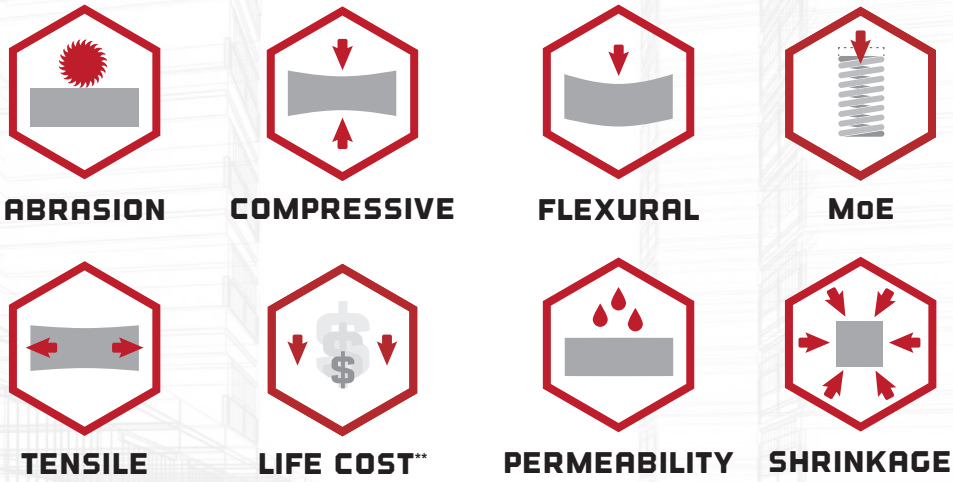
EdenCrete® works with minimal impact on concrete's fresh properties. Unlike synthetic macro fibers or topically applied finishing aids, **EdenCrete®** works on the nano-level without any special finishing requirements or additional labor costs, subject to the type of concrete mix design, concrete raw materials, application and related conditions.

ASTM Testing

All testing on **EdenCrete®** has been conducted by independent, 3rd party test labs, according to the following ASTM Test Standard:

Abarasion Resistance	ASTM C944 & ASTM C779, Proc, A & C
Compressive Strength	ASTM C39
Flexural Strength	ASTM C78
Modulus of Elasticity	ASTM C469
Permeability by RCPT	ASTM C1202
Permeability by Ponding	ASTM C1543
Shrinkage	ASTM C157
Split-Tensile Strength	ASTM C496

POUR IN THE STRENGTH® IN THESE KEY AREAS



* May promote an increased life and reduction in maintenance life costs, subject to the type of concrete mix design, concrete raw materials, application and related conditions.

Application Guidelines

- Ready-to-use liquid additive
- No need for dilution
- No special mixing equipment needed
- Good for hoppers, mixing trucks, or central plant mixers
- When designing concrete, refer to the Technical Data Sheet (TDS) for physical properties and typical dosage rates for all **EdenCrete®** products
- It is possible to exceed the recommended dosages with continued improvement to your concrete. For **EdenCrete®** dosages outside of manufacturers recommendations, please contact your **EdenCrete®** representative

Storage, Handling and Transport

- **EdenCrete®** should be transported and stored at 5˚ to 35˚ Celsius
- Avoid freezing. If **EdenCrete®** freezes, the particles will irreversibly precipitate
- For bulk storage, the additive tank should be constructed of plastic or fiberglass
- The tank must be sealed after adding **EdenCrete®**
- Translucent tank and storage containers should be stored out of direct sunlight
- **EdenCrete®** has a 12 month shelf life from the date of manufacture
- Agitation may be required before use - please refer to the Technical Data Sheet

Safety

- Although **EdenCrete®** is not considered to be a dangerous material to handle, before handling, refer to the corresponding Safety Data Sheet (SDS) for health, safety, and environmental information

Product Code	Description
FC304110-4L	EdenCrete® 4L
FC304110-19L	EdenCrete® 19L
FC304110-200L	EdenCrete® 200L
FC304110-1000L	EdenCrete® 1000L
FC304100-4L	EdenCrete P_z® 4L
FC304100-17L	EdenCrete P_z® 17L
FC304100-200L	EdenCrete P_z® 200L
FC304100-1000L	EdenCrete P_z® 1000L

Get the most out of EdenCrete®. Contact us today.

Our **EdenCrete®** additive specialists look forward to answering your questions about this innovative product. Whether your enquiry relates to a special concrete application, durability and permeability requirements or formulation for optimisation, please contact our **EdenCrete®** team for a free consultation.

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NZ 0800 657 156 concreteplus.co.nz

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