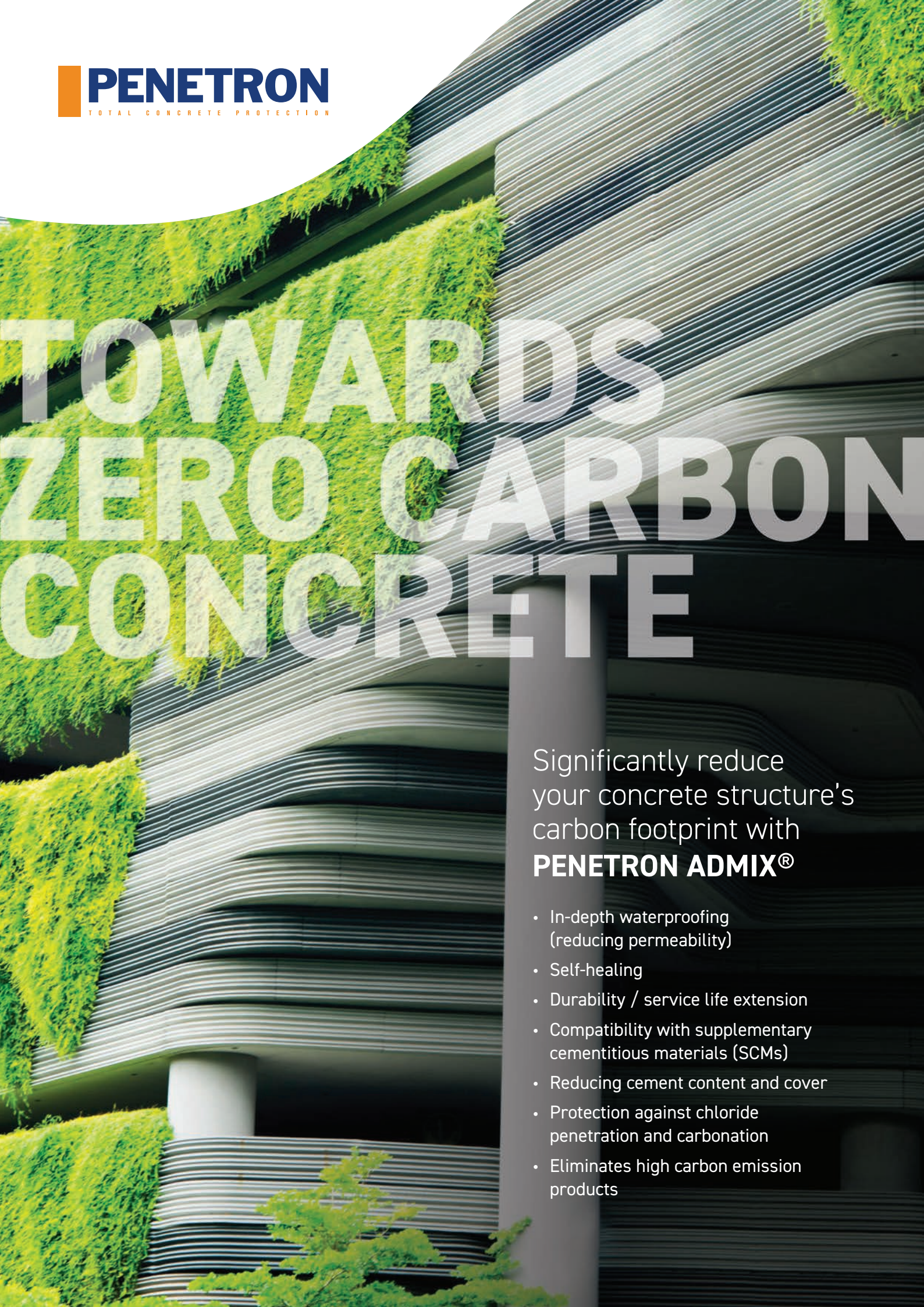
PENETRON

TOTAL CONCRETE PROTECTION

TOWARDS ZERO CARBON CONCRETE

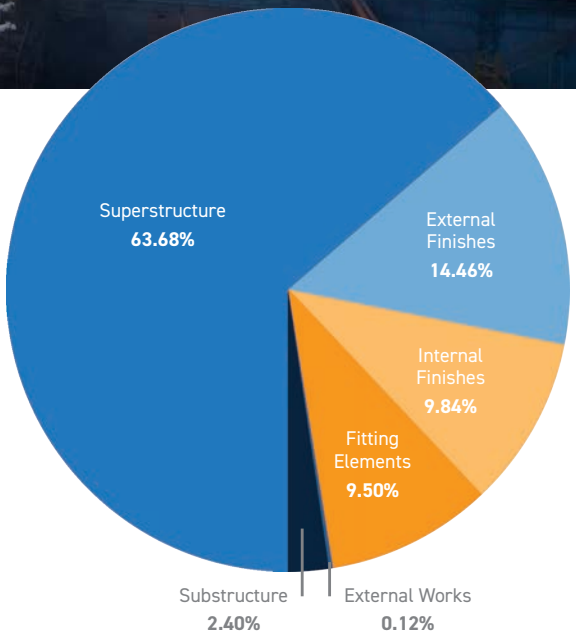


Significantly reduce your concrete structure's carbon footprint with **PENETRON ADMIX®**

- In-depth waterproofing (reducing permeability)
- Self-healing
- Durability / service life extension
- Compatibility with supplementary cementitious materials (SCMs)
- Reducing cement content and cover
- Protection against chloride penetration and carbonation
- Eliminates high carbon emission products

THE EFFECTS OF MAN-MADE GLOBAL WARMING ALREADY IMPACT THE LIVELIHOOD OF MILLIONS OF PEOPLE TODAY.

Impacts of building elements on overall embodied CO_2



As temperatures continue to rise over the next century, natural disasters like floods, hurricanes, droughts, and heat waves will intensify, eventually making parts of our planet uninhabitable.

To limit the global temperature increase to 1.5 degrees Celsius above pre-industrial levels as agreed under the Paris Agreement, the Glasgow Climate Pact (COP26) aims for a 45% reduction in global carbon dioxide emissions by 2030 relative to the 2010 level, and to net zero by mid-century. Even so, the world will likely witness an increase of 2.4°C by 2100.

With a contribution of 8%, the global cement industry is the second-largest producer of CO_2 and thus one of the main focus points of the COP26 climate targets. Recognizing this, Canada, Germany, India, the UAE and the UK have already pledged to attain net zero in the "major public construction" use of concrete and steel by 2050. In line with these goals, 40 global concrete and cement manufacturers under the GCCA are now committed to cutting CO_2 emissions in half by 2030 on the path to achieving net zero by 2050.

Since the concrete structure provides the lion's share (ca. 66%) of a building's embodied carbon, concrete is the most pressing issue to address. As the carbon footprint of water and aggregates is negligible, the carbon footprint of concrete is determined almost entirely by cement (0.93kg CO_2/kg), making it the largest contributor to embodied carbon in the built environment. In addition, cement production also generates high nitrogen oxide (NO_x) and sulphur oxide (SO_x) emissions, which contribute to acid rain, a further deterioration of public health and global climate change.

The time has come for urgent and bold action. **This is how PENETRON can help.**

Industry, architects and engineers alike are now tasked with incorporating low carbon products and sustainable solutions into their projects, and much can be done to that effect;

- Incorporation of supplementary cementitious materials (SCMs) in concrete mixes
- Enabling smart designs to build more with less
- Building durable structures for an extended service life
- Driving the circular economy and recycling of building materials
- Specifying low carbon footprint solutions
- Introducing greener products and decarbonize production

THE GLOBAL 2050 CHALLENGE

A multi-disciplinary challenge to achieve net zero embodied carbon by 2050. Mission alignment with:

CLF Carbon Leadership Forum · SE2050 COMMITTING TO ZERO · architecture 2030 · WORLD GREEN BUILDING COUNCIL

PENETRON ADMIX

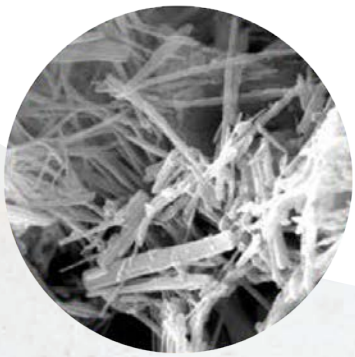
Reducing the carbon footprint of your project

PENETRON ADMIX is a sustainable, crystalline admixture that reduces concrete permeability. By providing comprehensive protection against concrete deterioration caused by chemical attack, corrosion, and freeze-thaw cycles, PENETRON ADMIX extends the service life of concrete structures. Easily mixed in during batching and unaffected by climatic conditions, it helps reduce the overall carbon footprint of concrete mixes and construction projects.

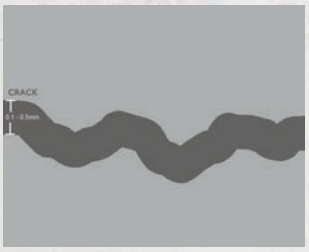
PROVEN. RELIABLE. SUSTAINABLE.

Benefits

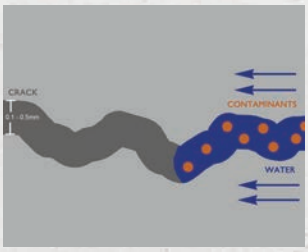
- Reduces carbon footprint of concrete mixes and applications
- Replaces unsustainable waterproofing solutions
- Extends service life of concrete structures
- Provides self-healing capability
- Makes concrete impermeable
- Minimizes any future waterproofing-related maintenance
- Helps maintain or shorten construction schedules
- Increased protection against rebar corrosion and carbonation
- Increased chemical resistance (pH3-11)
- Non-toxic and ideal for potable water applications (NSF-61 certified)
- Sustainable: EPD and GreenGuard Gold approved



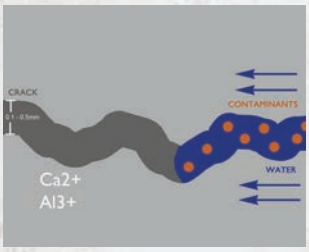
How it Works



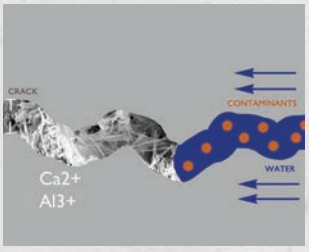
Concrete is porous and consists of microcracks, pores, and capillaries, which typically have a width between 0.1-0.5mm.



Water and water-borne chemicals enter the concrete through the capillary matrix.



When PENETRON ADMIX is added to the concrete, the active ingredients react to generate an insoluble crystal network.



This network seals voids and microcracks against water penetration, even under high hydrostatic pressure.

Water is unable to pass through the crystal formations and the concrete is now impermeable.

PENETRON ADMIX provides a self-healing capability as new hairline cracks that form throughout the life of the concrete are sealed as soon as water enters.

In-Depth Waterproofing and Self-Healing

PENETRON ADMIX provides up to 100% permeability reduction. This maintains the proper alkaline environment necessary to keep the embedded steel passivated and prevent corrosion.

With water being the main cause for concrete deterioration, PENETRON's permanent waterproofing protection largely eliminates the need for maintenance of concrete structures throughout their service life and the carbon footprint that comes with that.

Equally, by enabling self-healing of cracks up to 0.5mm throughout the service life of concrete, preventing water ingress and corrosion, the need for maintenance of concrete structures is largely avoided.

The ICRI Committee 160 notes that the most effective sustainability strategy for concrete and masonry structures is to avoid the need for repairs.

In the UK, the annual cost of repairing reinforced concrete structures near coastal areas is £755 million. Corrosion accounts for 80% of all damage to reinforced concrete structures. In the United States alone, repairing such structures costs an estimated $300 billion annually.

PENETRON ADMIX
seals cracks in as few as 4 days

Before

After

		SLS - P (10%) @ XX years		Maintenance Cycles (50 years service life)		Maintenance Cycles (100 years service life)	
Corrosion by Chloride	Cover (mm)	with PENETRON ADMIX	without PENETRON ADMIX	with PENETRON ADMIX	without PENETRON ADMIX	with PENETRON ADMIX	without PENETRON ADMIX
x	65	>100	30	0	1	0	3
x	60	90	20	0	1	1	3
x	55	50	15	1	2	2	4
x	50	27	9	1	3	3	5

		Deterministic Service Life (years)		Maintenance Cycles (50 years service life)		Maintenance Cycles (100 years service life)	
Corrosion by Carbonation	Cover (mm)	with PENETRON ADMIX	without PENETRON ADMIX	with PENETRON ADMIX	without PENETRON ADMIX	with PENETRON ADMIX	without PENETRON ADMIX
x	20	95	25	0	1	1	3
x	25	>100	40	0	1	0	3
x	30	>100	55	0	0	0	2
x	35	>100	75	0	0	0	1

The table above shows how PENETRON ADMIX-treated concrete designed for 50 or 100 years of service life, requires little or no maintenance – and allows a reduction in concrete cover – despite exposure to corrosion by chlorides or carbonation.

As a result, fewer maintenance cycles compared to conventional concrete reduce the building's maintenance CFP by a minimum of 40% (3 in 5 cycles) and up to 100% (0 in 3 cycles).

Average CFP reduction:
90% on maintenance
for typical projects

Durability/Service Life Extension

A sustainable circular economy optimizes the use of natural resources and energy to minimize CO_2 emissions. Conventional concrete, the second most consumed product in the world, consists of durable natural materials but fails when exposed to aggressive environments, resulting in frequent and costly repairs or replacement. This increases the use and processing of raw materials and energy, which increases CO_2 emissions.

The embodied carbon footprint (CFP) of a building is the sum of :

- (A) CFP of all construction materials (from cradle to gate)
- (B) CFP of all construction operations
- (C) CFP of all maintenance operations
- (D) CFP of demolishing operations and disposal of used materials.

By using a durable concrete mix with self-healing properties, the service life of a structure - defined as the number of years corrosion probability remains at ≤10% - can be extended by 60 years and more. At the end of its intended service life, a building may either stay in service as is, or receive a new façade, M&E upgrades and be re-purposed to serve a similar design life. As a result, (A), (B), (C), and (D) are either dramatically reduced or done away with entirely, effectively providing two structures with the CFP of a single structure.

Resulting CFP reduction: up to 50% and more

Compatible with SCMs

With the global cement and concrete industry committed to Net Zero Carbon by 2050, and cement being the main carbon culprit, the obvious path forward is to reduce cement consumption by using supplementary cementitious materials (SCMs) such as fly ash, blast furnace slag, silica fume, volcanic ash, etc. As these SCMs are by-products of the coal and steel industry, they do not add to the CFP of building projects and add value beyond their binding ability. SCMs are increasingly embraced by the industry and also increasingly in short supply.

PENETRON ADMIX is fully compatible with the use of SCMs. It works equally well with OPC and SCM/OPC mixes, enabling a great reduction in the embodied carbon of the structure.

Reducing Cement Content

PENETRON ADMIX enables the use of a lower grade concrete while achieving the same or better durability. This allows for the use of a lighter, more flexible and yes, cheaper concrete to satisfy the same performance specifications.

Durability tests of concrete under attack from chloride penetration and carbonation were performed, with a maximum CFP value for PENETRON ADMIX of 4.9$kg_{eq}CO_2/m^3$.[1]

The CFP of concrete mixes was adopted from research carried out by the Building Services Research and Information Association (BSRIA) and the University of Bath[1], both in the UK. The research provides a large CFP database for the most common construction materials, including concrete (with and without supplementary cementitious materials) with a range of 28-day compressive strength[2] test results.

[1] Technical report RAA0036A-07 | [2] https://ghgprotocol.org/Third-Party-Databases/Bath-ICE

Protection Against Chloride Migration

Concrete durability can be determined as a function of the chloride migration coefficient and the concrete cover (Fick's 2nd Law of Diffusion).

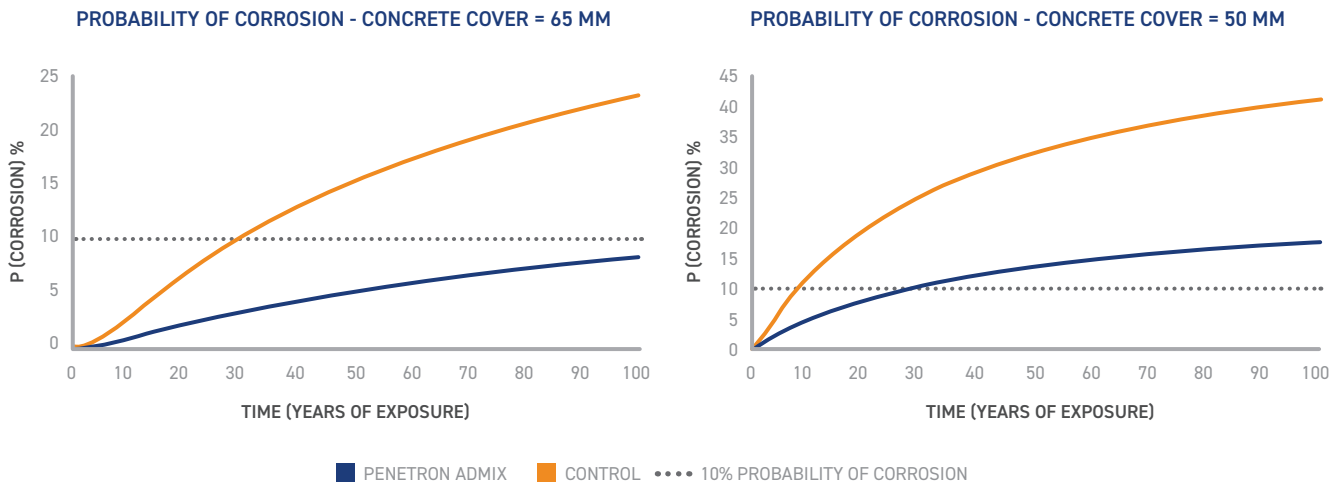
The research cited here shows that PENETRON ADMIX mixed with a low-grade concrete provides better protection against chloride migration than a BS 8500-1 compliant mix with 40kg more cementitious materials, designed for a service life of 50 years.

COMPONENT	MIX A Designated concrete per BS8500-1 (cover = 45mm)	MIX B Low-grade concrete
C32/40 CEM II/B-V (30% FA)	-	**380 kg**
C40/C50 CEM II/B-V (30% FA)	**420 kg**	-
Aggregates 0 - 16 mm	1759 kg	1792 kg
Super Plasticizer	2.52 kg (0.6%)	2.28 kg (0.6%)
Free Water	179 kg	179 kg
PENETRON ADMIX	-	**3.80 kg (1%)**
Free W/C	**0.43**	**0.48**
CFP	**364 kg eq-CO_2/m³**	**324 kg eq-CO_2/m³**

	CHLORIDE MIGRATION COEFFICIENT [*10^{-12} m²/s]	
	MIX A Designated concrete per BS8500-1 (cover = 45mm)	MIX B Low-grade concrete
28 days	8.9	9.5
56 days	8.1	5.1
90 days	4.9	4.5
120 days	3.7	3.1

Further, concrete cover may be reduced significantly with no reduction in the structure's service life due to corrosion induced by chlorides for a low-grade concrete mix containing PENETRON ADMIX.

The results of the simulations comparing the prescribed mix of BS 8500-1 (control mix, prescribed mix) and the mix containing PENETRON ADMIX are reported in the following graphs, with cover thickness varying from the target cover thickness for 100 years (65 mm) to the target cover thickness for 50 years (50 mm) according to BS 8500 for exposure to seawater. The initial chloride content corresponds to a typical harbor structure subjected to saline fog.



For each assigned value of the concrete cover, the service life limit due to corrosion induced by chloride penetration of a low-grade concrete mix containing PENETRON ADMIX is greater than the corresponding higher-grade concrete prescribed by BS 8500-1.[1]

These test results point to a potential 10% reduction in cementitious content, resulting in a lighter, more flexible, and cheaper concrete.[2]

Resulting CFP reduction: 10 %[3]

[1] Technical report RAA0036A-07 | [2] Technical report RAA0036A-07 | [3] MIX A - CFP = 364 kg eq-CO_2/m³ | MIX B - CFP = 320 + (3.80 ÷ 4.00)*4.9 = 324 kg eq-CO_2/m³

Protection Against Carbonation

The role of PENETRON ADMIX in extending the service life of reinforced concrete exposed to carbonation was measured by comparing a low-grade concrete mix containing PENETRON ADMIX with a designated concrete mix (class XC3/XC4) as required by BS 8500-1. The latter is a durable concrete mix with a nominal concrete cover of 30 mm for a service life of 50 years, and contains 35 kg more cementitious materials.

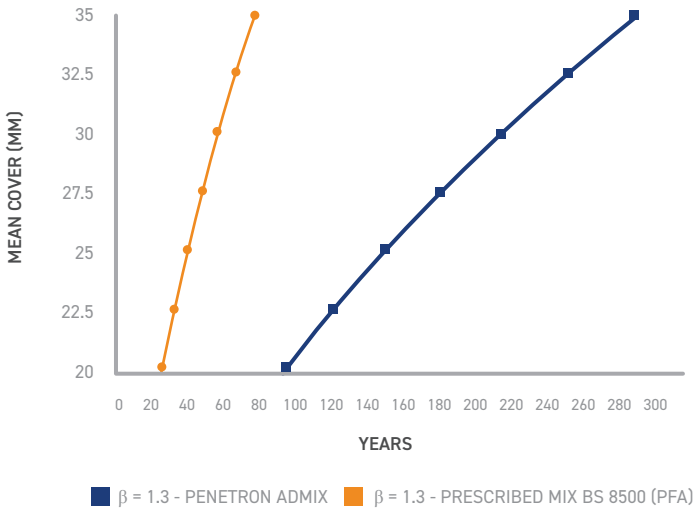
COMPONENT	MIX A Designated concrete per BS8500-1 (cover = 30mm)	MIX B Low-grade concrete
C25/30 CEM I 32.5/42.5 low fineness	-	**315 kg**
C40/50 CEM I 52.5 + 30% Fly Ash	**350 kg**	-
Aggregates 0 - 32 mm	1870 kg	1920 kg
Super Plasticizer	3.5 kg (1%)	3.15 kg (1%)
Free Water	151 kg	151 kg
PENETRON ADMIX	-	**3.15 kg (1%)**
Free W/C	**0.43**	**0.48**
CFP	**364 kg eq-CO2/m³**	**333 kg eq-CO2/m³**

Climatic chamber with prisms for accelerated carbonation (Swiss SIA 262/1-X standard)

The carbonation coefficient (K) values obtained for the two mixes after 90 days confirms that the lower grade concrete with PENETRON ADMIX provides superior protection against carbonation;

DESIGNATED CONCRETE PER BS 8500
K = 1.64 MM/√ YEARS

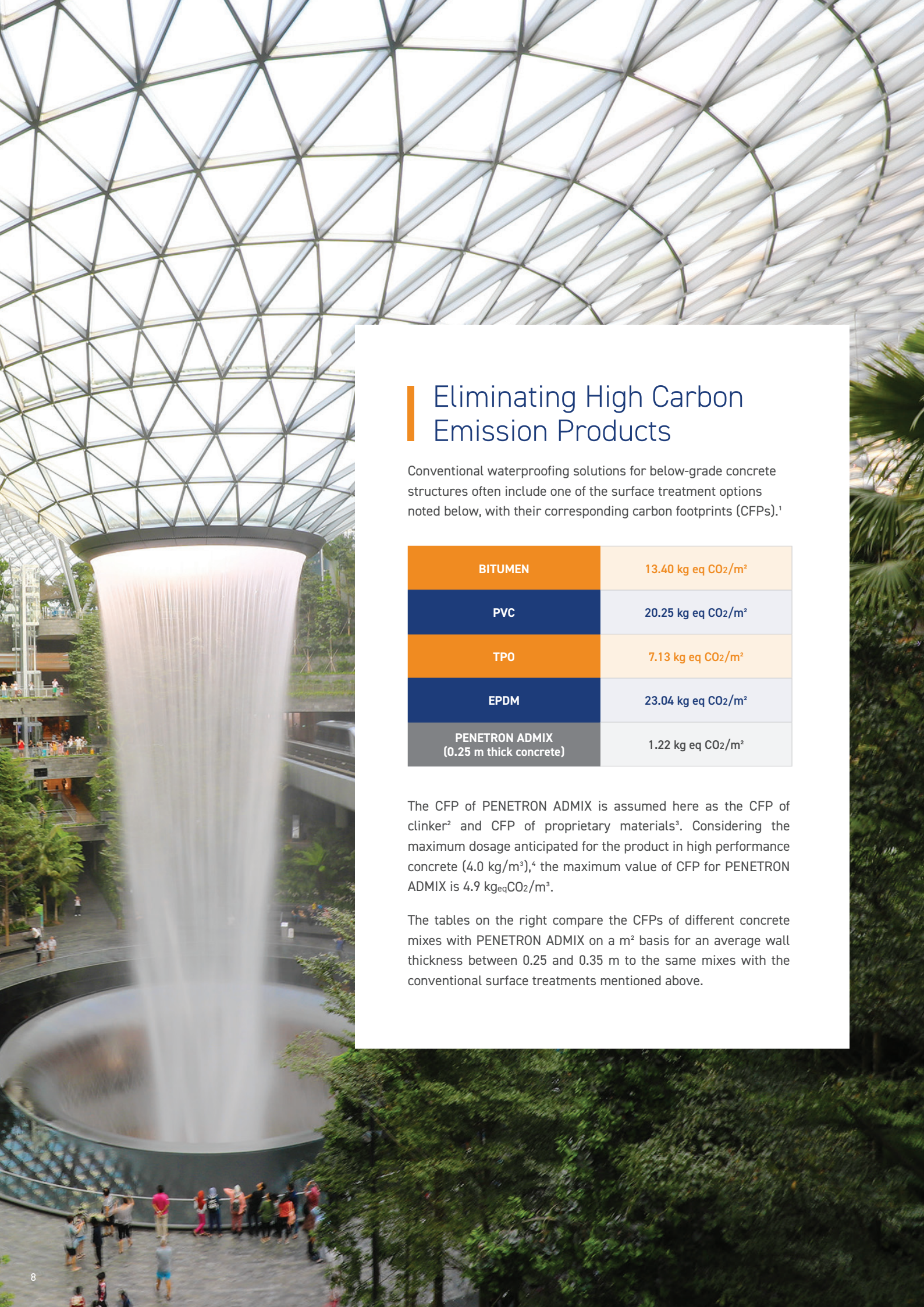
LOWER GRADE CONCRETE WITH PENETRON ADMIX
K = 0.85 MM/√ YEARS



The research results[1] concluded that for each given value of mean concrete cover, the time to reach the service life limit due to corrosion induced by carbonation is many times greater for a low-grade concrete mix containing PENETRON ADMIX than the corresponding higher grade concrete mix prescribed by BS 8500-1. Moreover, this result allows a notable reduction in concrete cover.[2]

Resulting CFP reduction: 10 %[3]

[1] Technical report RAA0036A-07 | [2] Disclaimer : This research was done under laboratory conditions. Project engineers should calculate mixes and concrete cover based on a project's concrete performance requirements. | [3] Calculating CFP of mix A, which is a nominal C40/50 and of mix B, which is a nominal (lower-grade) C25/30; MIX A - HIGHER GRADE - CFP = 364 kg eq-CO_2/m³ | MIX B - LOWER GRADE - CFP = 329 + (3.15 ÷ 4.00)*4.9 = 333 kg eq-CO_2/m³



Eliminating High Carbon Emission Products

Conventional waterproofing solutions for below-grade concrete structures often include one of the surface treatment options noted below, with their corresponding carbon footprints (CFPs).[1]

BITUMEN	13.40 kg eq CO_2/m^2
PVC	20.25 kg eq CO_2/m^2
TPO	7.13 kg eq CO_2/m^2
EPDM	23.04 kg eq CO_2/m^2
PENETRON ADMIX (0.25 m thick concrete)	1.22 kg eq CO_2/m^2

The CFP of PENETRON ADMIX is assumed here as the CFP of clinker[2] and CFP of proprietary materials[3]. Considering the maximum dosage anticipated for the product in high performance concrete (4.0 kg/m³),[4] the maximum value of CFP for PENETRON ADMIX is 4.9 $kg_{eq}CO_2/m^3$.

The tables on the right compare the CFPs of different concrete mixes with PENETRON ADMIX on a m² basis for an average wall thickness between 0.25 and 0.35 m to the same mixes with the conventional surface treatments mentioned above.

CFP REDUCTION: PENETRON VS BITUMEN															
C25/30	0% ggbs	25% ggbs	50% ggbs	C28/35	0% ggbs	25% ggbs	50% ggbs	C32/40	0% ggbs	25% ggbs	50% ggbs	C40/50	0% ggbs	25% ggbs	50% ggbs
0.20	16%	19%	24%	**0.20**	15%	18%	23%	**0.20**	14%	16%	21%	**0.20**	12%	15%	18%
0.25	13%	15%	20%	**0.25**	12%	15%	19%	**0.25**	11%	13%	17%	**0.25**	10%	12%	15%
0.30	11%	13%	17%	**0.30**	10%	12%	16%	**0.30**	9%	11%	14%	**0.30**	8%	10%	13%
0.35	9%	11%	15%	**0.35**	9%	11%	14%	**0.35**	8%	10%	12%	**0.35**	7%	8%	11%
0.40	8%	10%	13%	**0.40**	8%	9%	12%	**0.40**	7%	8%	11%	**0.40**	6%	7%	9%
0.45	7%	9%	11%	**0.45**	7%	8%	11%	**0.45**	6%	7%	9%	**0.45**	5%	6%	8%
0.50	6%	8%	10%	**0.50**	6%	7%	9%	**0.50**	5%	6%	8%	**0.50**	5%	6%	7%

CFP REDUCTION: PENETRON VS PVC															
C25/30	0% ggbs	25% ggbs	50% ggbs	C28/35	0% ggbs	25% ggbs	50% ggbs	C32/40	0% ggbs	25% ggbs	50% ggbs	C40/50	0% ggbs	25% ggbs	50% ggbs
0.20	23%	27%	33%	**0.20**	22%	26%	32%	**0.20**	20%	24%	29%	**0.20**	18%	21%	26%
0.25	19%	22%	28%	**0.25**	18%	21%	27%	**0.25**	17%	20%	24%	**0.25**	15%	17%	22%
0.30	16%	19%	25%	**0.30**	15%	18%	23%	**0.30**	14%	17%	21%	**0.30**	12%	15%	19%
0.35	14%	17%	22%	**0.35**	13%	16%	20%	**0.35**	12%	14%	18%	**0.35**	11%	13%	16%
0.40	12%	15%	19%	**0.40**	12%	14%	18%	**0.40**	11%	13%	16%	**0.40**	9%	11%	14%
0.45	11%	13%	17%	**0.45**	10%	13%	16%	**0.45**	9%	11%	14%	**0.45**	8%	10%	13%
0.50	10%	12%	16%	**0.50**	9%	11%	15%	**0.50**	9%	10%	13%	**0.50**	7%	9%	12%

CFP REDUCTION: PENETRON VS TPO															
C25/30	0% ggbs	25% ggbs	50% ggbs	C28/35	0% ggbs	25% ggbs	50% ggbs	C32/40	0% ggbs	25% ggbs	50% ggbs	C40/50	0% ggbs	25% ggbs	50% ggbs
0.20	8%	10%	14%	**0.20**	8%	10%	13%	**0.20**	7%	9%	11%	**0.20**	6%	8%	10%
0.25	7%	8%	11%	**0.25**	6%	8%	10%	**0.25**	6%	7%	9%	**0.25**	5%	6%	8%
0.30	5%	7%	9%	**0.30**	5%	6%	8%	**0.30**	5%	6%	7%	**0.30**	4%	5%	6%
0.35	4%	6%	7%	**0.35**	4%	5%	7%	**0.35**	4%	5%	6%	**0.35**	3%	4%	5%
0.40	4%	5%	6%	**0.40**	4%	4%	6%	**0.40**	3%	4%	5%	**0.40**	3%	3%	4%
0.45	3%	4%	5%	**0.45**	3%	4%	5%	**0.45**	3%	3%	4%	**0.45**	2%	3%	4%
0.50	3%	3%	5%	**0.50**	3%	3%	4%	**0.50**	2%	3%	4%	**0.50**	2%	3%	3%

CFP REDUCTION: PENETRON VS EPDM															
C25/30	0% ggbs	25% ggbs	50% ggbs	C28/35	0% ggbs	25% ggbs	50% ggbs	C32/40	0% ggbs	25% ggbs	50% ggbs	C40/50	0% ggbs	25% ggbs	50% ggbs
0.20	25%	29%	36%	**0.20**	24%	28%	34%	**0.20**	22%	26%	31%	**0.20**	20%	23%	29%
0.25	21%	25%	31%	**0.25**	20%	23%	29%	**0.25**	18%	22%	27%	**0.25**	16%	19%	24%
0.30	18%	21%	27%	**0.30**	17%	20%	25%	**0.30**	16%	18%	23%	**0.30**	14%	16%	21%
0.35	15%	19%	24%	**0.35**	15%	18%	22%	**0.35**	14%	16%	20%	**0.35**	12%	14%	18%
0.40	14%	17%	21%	**0.40**	13%	16%	20%	**0.40**	12%	14%	18%	**0.40**	11%	13%	16%
0.45	12%	15%	19%	**0.45**	12%	14%	18%	**0.45**	11%	13%	16%	**0.45**	9%	11%	14%
0.50	11%	13%	17%	**0.50**	10%	13%	16%	**0.50**	10%	11%	15%	**0.50**	8%	10%	13%

In summary, the removal of polymer-based, non-sustainable, waterproofing solutions for below-grade structures and replacement with crystalline technology (in combination with SCM used with Portland cement) reduces the carbon footprint per square meter of conventionally waterproofed concrete vs. self-healing concrete by an average of 20%, and up to 27% .

Resulting substructure CFP reduction: 20 %

[1] CFP values are adopted from comparative environmental life cycle impact of waterproofing solutions for flat roofs. Application of the studied solutions in the rehabilitation of military infrastructure (Miriana Gonçalves – MSc's Thesis – Tecnico Lisboa, 2015) | [2] 0.93 kgeqCO_2/kg | [3] 1.514 kgeqCO_2/kg | [4] 1% of 400 kg/m3 of binder | Technical report RAA0036A-07

Accelerating Construction Scheduling

Multiple benefits are derived by avoiding the use of topical waterproofing treatments, especially for basements. A smaller excavation footprint, eliminating the need for waterproofing contractors to apply membranes, and no wait for ideal climatic conditions to install, etc. These factors contribute to optimized construction scheduling and reducing the structure's CFP.

By combining the pouring and waterproofing stages, we can significantly accelerate the construction schedule, save resources and reduce the carbon footprint of the project.

Reducing your CFP with PENETRON ADMIX

Depending on the level of commitment towards achieving net zero carbon concrete by 2050, the following carbon footprint reductions can be achieved with PENETRON ADMIX:

For concrete structures

- Service life extension: 50% CFP reduction
- Reducing cement content: 10% CFP reduction

For different components:

- Maintenance: 90% reduction on maintenance and repair work
- Replacing waterproofing membranes: 20% CFP reduction for underground structures[1]

Unquantified CFP reductions

- Compatibility with a range of SCMs
- Shorter construction schedules

Bottom line: up to 65% CFP reduction for the overall concrete structure

[1] 20% reduction on substructure accounts for 5% on whole structure if basement concrete volume remains equal or greater than 25% of whole structure concrete volume

Winning LEED Certification with PENETRON

PENETRON follows strict environmental guidelines and has been certified for the ISO 14001 environmental standard in the United States.

Penetron products, including PENETRON ADMIX, play a role in helping projects with their credit realization while achieving a range of internationally recognized standards such as Singapore Green Label, EPD, CDPH and GreenGuard Gold.

Here is how Penetron can support your LEED accreditation.

LEED v4 BD+C
(Building Design and Construction)

Sustainable Sites (SS)

SS Credit: Site Development – Protect or restore habitat (up to 2 points)

Less excavation is necessary when using PENETRON ADMIX as the need for space to apply a surface material (e.g. membrane) is eliminated. PENETRON ADMIX is added directly into the concrete.

SS Credit: Heat Island Reduction (up to 2 points)

A PENETRON or PENETRON ADMIX-treated concrete roof slab acts as the base of a roof garden system preventing water penetration through the slab.

Materials and Resources (MR)

MR Credit: Building Life-Cycle Impact Reduction (up to 6 points)

PENETRON products assist in the rehabilitation, waterproofing and protection of existing structures increasing both concrete durability and service life.

MR Credit: Construction and Demolition Waste Management (up to 2 points)

PENETRON products eliminate waste, as they can be recycled together with the concrete after demolition whereas environmentally unfriendly petroleum-based products like membranes go into the landfill or have to be disposed of otherwise. Penetron packaging is fully recyclable.

Indoor Environment Quality (EQ)

EQ Credit: Low-emitting materials (1 point)

Category: Interior paints and coatings applied on site;

Penetron products are certified green products that contain zero VOC.

EQ Credit: Construction Indoor Air Quality Management Plan (1 point)

PENETRON products contain zero VOC and thus will not expose construction workers to any odorous, irritating and/or harmful contaminants.

Innovation (IN)

IN Credit: Innovation (1 point)

Penetron Admix is proven to slow down chloride diffusion and therefore prolongs corrosion of the reinforcement as measured and calculated by the 2nd Fick Law of Diffusion. This results in an extension of the service life of the concrete by up to 60 years in critical environments.

LEED v4 ID+C
(Interior Design and Construction)

Materials and Resources (MR)

MR Credit: Construction and Demolition Waste Management (2 points)

Option 2: Reduction of Total Waste Material;

Penetron products are recycled together with the concrete after demolition whereas environmentally unfriendly petroleum-based products like membranes go into the landfill or have to be disposed of otherwise.

Indoor Environment Quality (EQ)

EQ Credit: Low-emitting materials (1 point)

Category: Interior paints and coatings applied on site;

Penetron products are certified green products that contain zero VOC. Applying Penetron will therefore not negatively affect the air quality on the project in regard to odorous, irritating and/or harmful contaminants.

Innovation (IN)

IN Credit: Innovation (1 point)

Penetron Admix is proven to slow down chloride diffusion and therefore prolongs corrosion of the reinforcement as measured and calculated by the 2nd Fick Law of Diffusion. This results in an extension of the service life of the concrete by up to 60 years in critical environments.

PENETRON

TOTAL CONCRETE PROTECTION

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