



PENETRON[®]
INTEGRAL CAPILLARY CONCRETE WATERPROOFING SYSTEMS

T O T A L C O N C R E T E P R O T E C T I O N[™]



Founded in the late 1970s, PENETRON developed cementitious waterproofing products and additives to create an optimal crystalline technology. Today, the PENETRON system of products is sold around the world in over 60 countries through qualified applicators and distributors.

The know-how and experience gained over the past 40 years has enabled PENETRON to offer a broad range of concrete solutions, including crystalline waterproofing, waterstops and liquid sealers. The PENETRON system has been proven effective on countless major projects worldwide. The technical excellence of the products and a knowledgeable and dependable team of people have made the company the industry leader.

Commitment to quality PENETRON products are manufactured and continually optimized at our development center and production plant in the USA. All our facilities are ISO 9001 and ISO 14001 certified and are backed by our PENETRON product manufacturing warranty. Our commitment to quality is not limited to our Products, but also includes our technical support teams around the world.

The versatility and effectiveness of the Penetron System have been demonstrated across a wide spectrum of critical applications including nuclear reactors, chemical storage facilities and mass transit tunneling projects. The products adhere to the highest standards of environmental and ecological compliance, reflected in the numerous aquarium and reservoir projects in the company's portfolio. At the production level, the exacting quality control process at our state-of-the-art-blending facility has earned us ISO 9001-2000 certification.



Registered Facility





THE PENETRON SYSTEM

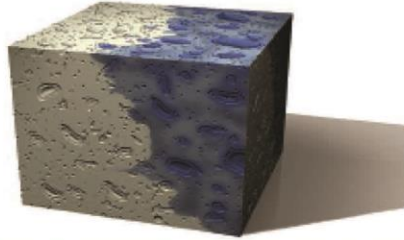
How does Penetron® work

Penetron® Will continue to spread deeper into the structure permanently protecting concrete against water intrusion and chemical attacks.

Penetron® (applied by brush or spray from positive or negative side, by Admix or dry-shake) will penetrate the capillaries, from insoluble crystals and gradually dry out the concrete.

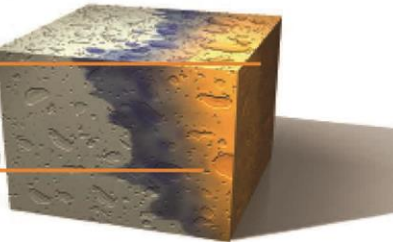
How PENETRON waterproofs concrete

Typical concrete structure with Moisture

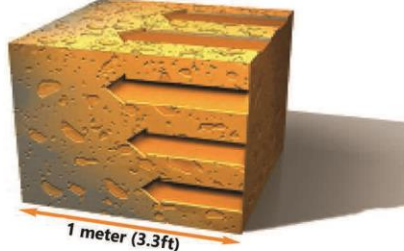


Penetron® may be applied to Positive or Negative surface in a variety of forms.

Penetron
Crystalline Formation Penetrating



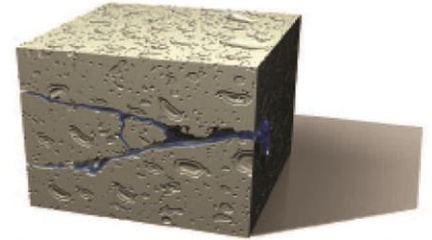
Penetron® penetrates as far as 1 Meter deep, becoming an integral part of concrete.



Penetron® crystals spread throughout the concrete substrate, increasing compressive strength and continuing to protect concrete from intrusion by water or chemicals permanently.

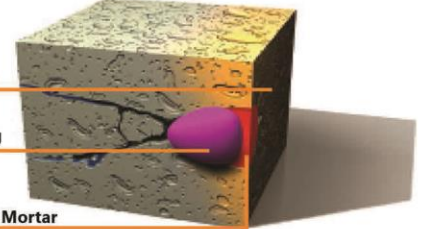
How PENETRON waterproofs a crack

A typical leaking crack



The chemical reaction starts as soon as Penetron is applied to concrete

Penetron
Peneplug



Penetcrete Mortar

Illustration 2 shows a cut-out crack which has been packed with Peneplug and sealed with Penetron.

The chemical reaction starts as soon as Penetron is applied to concrete

Penetron
Peneplug



Penetcrete Mortar

Illustration 3 shows how Penetron not only stops leaks at the plug point, but continues to force crystals deeper into the crack and surrounding concrete, forming a complete seal.

WITNESS PENETRON'S CRACK HEALING ABILITY

BEFORE



AFTER





DESCRIPTION:

Penetron cementitious capillary waterproofing products are for mulations consisting of common cement, quartz sand (of special grade) and multiple activating chemicals that provide the most effective permanent concrete waterproofing

Effectiveness:

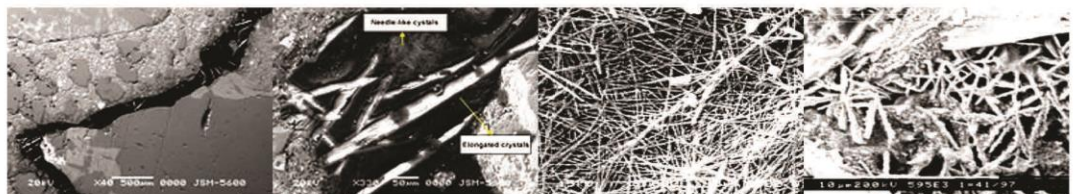
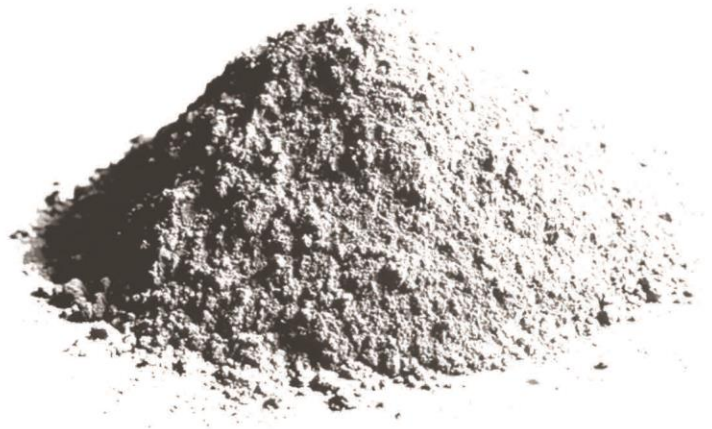
Penetron's waterproofing effect is achieved by the reaction of the various chemical components contained in the solution when combined within the concrete matrix. The compound penetrates deep into the capillary tracts of the concrete by pressure of osmosis and forms crystals that completely seal the capillaries and shrinkage cracks to drive out moisture. The process works with or against the pressure of water. In the absence of moisture, Penetron components lie dormant. Should moisture recur at any time, the chemical action and sealing process repeats itself automatically and advances even more deeply into the concrete. Penetron chemicals will continuously seal and reseal due to their chemical nature. Crystalline growth from capillary waterproofing has been measured as deep as nearly 1 meter from the point of application. Penetron® is 100% compatible with concrete, brick, mortar, and stone.

Uses:

Penetron is recommended for use in any concrete or block structure where it is required to keep water in or out. Penetron should also be applied to concrete or block structure exposed to potential water or chemical attack and thus requiring permanent waterproofing and protection. Its applicability to either the positive side (side exposed to water) or the negative side (side opposite the water) meets all waterproofing requirements.

Benefits:

- Becomes an integral part of the concrete, forming a complete body of strength and durability. Penetron should not be confused with a coating or membrand
- Penetrates deeply and seals concrete's capillary tracts and shrinkage cracks
- Can be applied from either the positive or negative side
- Waterproofing and chemical-resistance properties remain intact even if the surface is damaged
- Completely effective against high hydrostatic head pressure
- More effective overall and less costly than hydrolithic membrane or clay panel systems
- Ease of application, labor-cost effective
- Increases concrete's compressive strength
- Cannot come apart at the seams, tear or puncture
- Does not require protection during backfilling, placement of steel or wire mesh, and other common procedures
- Seals cracks of up to 0.4mm. Does not merely mask or bridge hairline and shrinkage cracks
- Permits concrete to breathe, eliminating water vapor buildup and leaving the concrete completely dry
- Resists chemical attack (PH 3 - 11 constant contact; PH 2 - 12 periodic contact) and provides a wide range of protection from freeze/thaw cycles, aggressive subsoil waters, sea water, carbonates, chlorides, sulfates and nitrates
- Can be applied to moist or green concrete
- Protects reinforcing steel
- Nontoxic
- Approved for potable water use
- No extensive curing times (except in very hot or low-humidity conditions)



TECHNICAL DATA

Penetron Coated Concrete

Water Permeability	(CRD-C-48-73)	After 28 days = $<1.9 \times 10^{-14}$ cm/sec (before treatment 1.8×10^{-11} cm/sec)
Water Permeability under head pressure	(CRD-C-48-73)	Can withstand = >232 PSI (514 ft. head water pressure, or 156.78m) or 1.54 MPa (16 Bar) with no measurable leakage
Compressive Strength	(ASTM C39)	After 28 days = $>6\%$
Freeze/Thaw Cycle Test	(ASTM C-672-76)	50 Cycles - Marked decrease in erosion compared to untreated samples
Chemical Resistance	(ASTM C-267-77)	Resistant to alkaline/acid conditions. pH range 3 - 11 constant contact
Radiation Resistance	(ASTM N69-1967)	No effect from gamma radiation $\Rightarrow 5.76 \times 10^4$ Rads
	(ISO 7031)	No effect from gamma radiation 50 M Rads
Chloride Content	(AASHTO T-260)	Negligible amounts of chlorides are contained in waterproofing substance, Penetron's waterproofing effects are NOT related to chlorides
Nontoxic	(BS 6920: Section 2.5)	PASSES European Union Environmental Lic
	(16 CFR 1500)	PASSES European Union Environmental Lic
Approved for potable water use	U.S. EPA and State of New York DOH	

Crystalline products can be applied in 3 different ways



Admixture



Coating



Dry shake

Step Of Application



Cleaning use a wire brush, broom, blower and high-pressure water blasting of the surface to remove all dirt, paint, bonded mortar and to wet the surface prior to the application of Penetron®



Faulty concrete in the form of cracks, honeycombing, etc. must be chased out and filled flush with Penetron Mortar

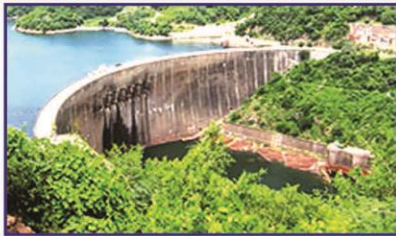


Penetron® can be coated on the wall alternatively with the ratio 1.4-1.7 kg/m² and construction slab applied in one slurry coat or dry sprinkled with the ratio 1.1 kg/m² and trowel applied to fresh concrete before leave to dry



PROJECTS

The Penetron® System has been successfully used in projects in over 60 countries world wide



Project : Kariba Dam
Location : ZIMBABWE
Date : 1960

Description : This magnificent dam was completed in 1960 and was the largest man-made dam ever built. It provides electricity to Zambia and Zimbabwe, damming Africa's fourth largest river (The Zambezi River). It also supports a thriving local fishing industry.



Project : Monterey Bay Aquarium
Location : Monterey, CA, USA
Date : 1982

Description : The Monterey Bay Aquarium is one of the main tourist attractions in the U.S.A. More than 1.7 million people visit the aquarium annually. It was completed in 1982 and is dedicated to conservation of the oceans.



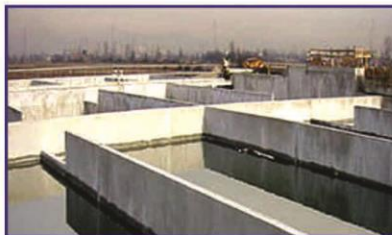
Project : Seabrook Nuclear Power
Location : Seabrook, NH, USA
Date : 1986

Description : Seabrook is a 1,160-megawatt pressurized water nuclear reactor that provide about 7% of the electricity used in the six New England states-enough electricity for about 1,000,000 homes.



Project : Statue of Liberty
Location : New York, USA
Date : 1986

Description : Located in New York Harbor, the Statue of Liberty is one of the most universal symbols of political freedom and democracy. The Statue was extensively restored in time for her spectacular centennial on July 4, 1986.



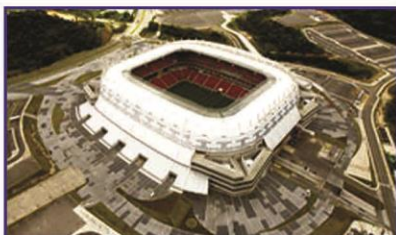
Project : Water Treatment Plant Milan South
Location : Rozzano, ITALY
Date : -

Description : The water quality in Milan, a series of water treatment plants were built. A key part of the project was to drain the water of the Southern Lambro, considered a main source of pollution in the Po River, and solve the impermeability problems in the system.



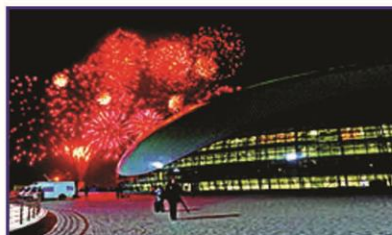
Project : Alice Lane Office Towers
Location : Johannesburg, SOUTH AFRICA
Date : 2010

Description : The 18- storey, energy efficient Alice Lane Office Tower in the prestigious Sandton area, north of Johannesburg features two sculpted towers linked by a vertical atrium. The building's "green" attributes are highlighted by an extensive "green scape" surrounded by reflective ponds and water elements.



Project : Arena Pernambuco
Location : Recife, BRAZIL
Date : 2013

Description : With seating for over 46,000 people, the Arena Pernambuco in Recife (Northeastern Brazil) is used mostly for soccer matches, including the 2014 FIFA World Cup. The area around the stadium includes a university campus, indoor arena, hotel and expansive retail and residential buildings.



Project : Winter Olympics
Location : Sochi, RUSSIA
Date : 2014

Description : The 2014 Winter Olympics was the largest single infrastructure project undertaken in Russian history. Completing a world-class sports venue for almost 3,000 athletes from over 80 countries in less than four years included an incredible range of construction projects.



Project : Cape Quarter
Location : Green point, SOUTH AFRICA
Date : -

Description : The Cape Quarter Shopping Mall in Green Point carefully preserves the original facade fronting Somerset Road in a mix of imported Georgian style architecture combined with the original eastern influence.

For more examples, contact your Penetron® representative or visit www.penetron.com



Project : EXPO 2010 SHANGHAI CHINA

Location : Shanghai, CHINA

Date : 2010

Description : The Expo 2010 Shanghai China was the biggest World Expo to date, with more than 190 countries and 50 international organizations participating; over 73 million people visited the Expo 2010, also an attendance record.



Project : Homeplus

Location : Ansan, SOUTH KOREA

Date : 2011

Description : Homeplus, a Korean discount store retail chain (owned by Tesco) has 113 branches throughout South Korea and is the second largest retailer in the country. This project included a large retail store and parking area on the roof of the building.



Project : "W" Residences at Sentosa Cove

Location : SINGAPORE

Date : 2012

Description : The Residences at "W" Singapore is a luxury development that incorporates retail outlets, a world-class hotel and private condo residences under Starwood's flagship "W" hotels brand.



Project : Grand Hyatt Hotel

Location : Kuala Lumpur, MALAYSIA

Date : 2012

Description : The Grand Hyatt is Kuala Lumpur's newest luxury hotel. This 40-storey building offers 370 rooms and 42 luxury suites with floor-to-ceiling windows and breathtaking panoramic views of Kuala Lumpur.



Project : Gardens By The Bay

Location : SINGAPORE

Date : 2012

Description : The distinctive waterfront gardens in the heart of Marina Bay define Singapore as the world's premier tropical garden city. The Conservatory Complex is an all-weather 'edutainment' space, an architectural icon, a horticultural attraction, and a showcase of sustainable energy technology.

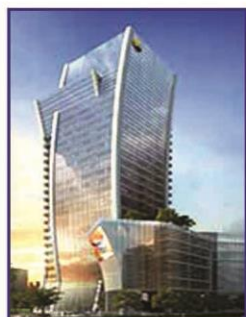


Project : Wind Ratchayothin

Location : Bangkok, THAILAND

Date : 2012

Description : The 37-storey residence features fully fitted and 390 beautifully designed rooms on 3 floors. The Wind Ratchayothin connects you with the surrounding environment while ensuring your privacy, comfort, convenience and offers you world-class facilities in condominium projects.



Project : New Office of The Stock Exchange of Thailand

Location : Bangkok, THAILAND

Date : 2015

Description : The SET's new head office will support business expansion and growing transactions, and will also be a venue for activities about finance and investment held by the SET and its capital market alliances.



Project : A&B Tower

Location : Ho Chi Minh City, VIETNAM

Date : -

Description : A 33-floor office tower with a 3-floor basement car park, the A&B Tower is located in the heart of Ho Chi Minh City's District 1.



Project : MIOT International Hospital

Location : Chennai, INDIA

Date : 2015

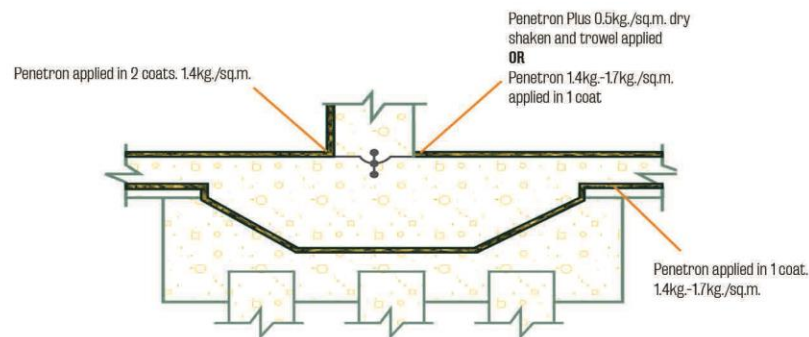
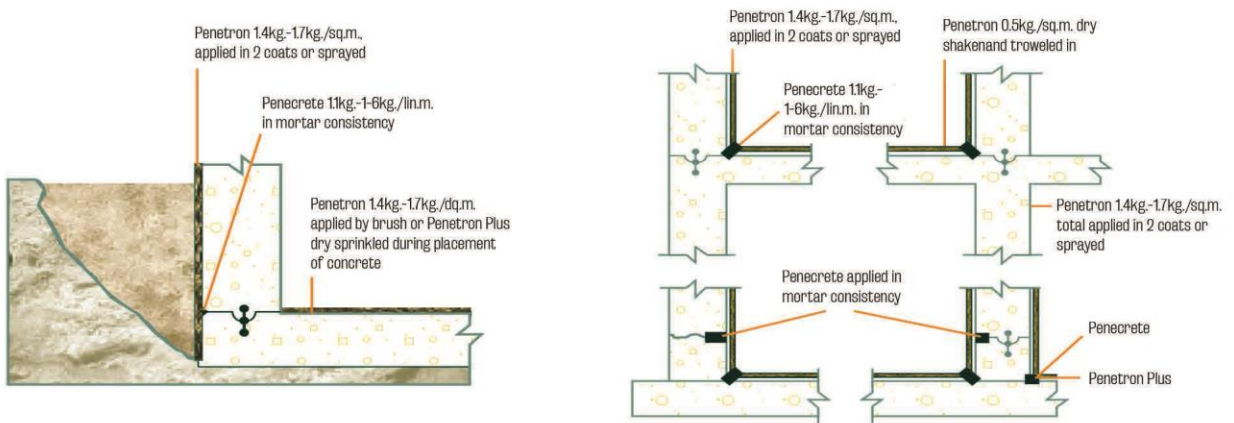
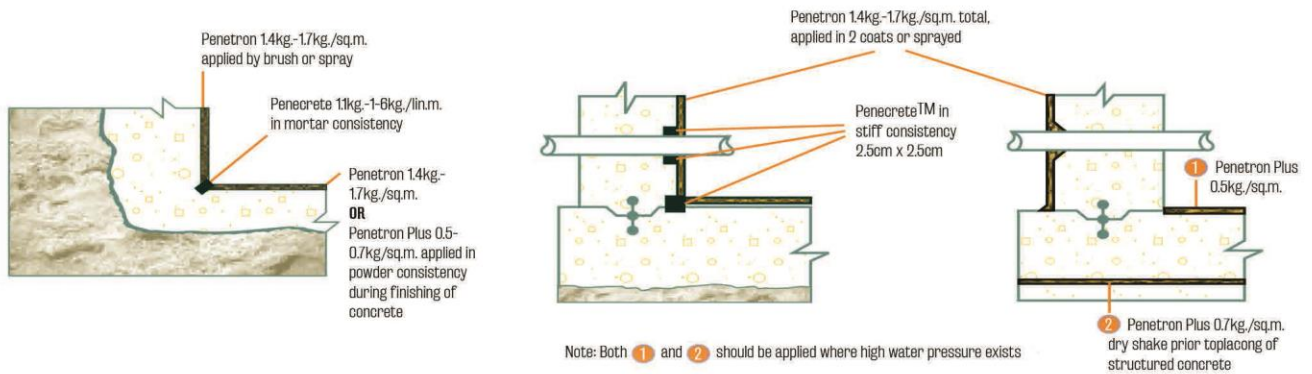
Description : A 1,000-bed facility offering treatment in 63 specialties, the MIOT International Block Hospital serves patients from 129 countries who seek wellness expertise. Extensive and costly electronic medical equipment installed in the basement required special measures during construction to ensure a completely impermeable structure.



WORKING INSTRUCTIONS

Working Instructions

Penetron 1.4kg.-1.6kg./sq.m. applied by vbrush or spray



CAUTION Use rubber gloves during mixing and application. Use goggles during spraying and overhead applications. The effect of Penetron on the skin can be neutralized with a vinegar (household strength) and water solution. PENETRON PRODUCTS ARE NONTOXIC

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