

# Pentens® T-308

## Crystalline Admixture Waterproofing

Waterproofing concrete structure is a universal problem. Indeed, water seepage and dampness, in spite of traditional methods is so widespread that many designers regard it as virtually impossible to achieve truly waterproofed concrete. This mainly is due to the following reasons:

- A. Workable mixes require more water that is necessary for hydration which form capillaries and pores.
- B. During mixing, some air is always entrapped in the concrete.
- C. Chemical combination during the hydration reduces the absolute volume of the cement and water.
- D. Cracks and micro-cracks develop due to thermal stresses, shrinkage, load, etc.

These capillaries, voids and micro-cracks provide pathways for the movements of water leading to problems of seepage, dampness and leakages.

Watertightness of concrete largely depend on the quality of the concrete, irrespective of any external surface treatment. Therefore we recommend effective waterproofing by using integral waterproofing system **Pentens T-308**.

### DESCRIPTION

Pentens T-308 is a dual purpose waterproofing system which helps to waterproof the concrete in two stages namely hydrophobic and crystallization. Pentens T-308 relies on a revolutionary technology that turns porous concrete into an impermeable barrier and provide a powerful defense against water damage and corrosion.

When added to fresh concrete, Pentens T-308 reacts with products of cement hydration process to produce a hydrophobic material which instantly repels external water and drastically reduces water absorption into concrete.

In a long run, under a supersaturation environment inside concrete, Pentens T-308 initiates crystallization process. When this process takes place, millions of needle-like crystals form and fill the naturally occurring capillary pores and microscopic voids within the concrete. Path for harmful moisture and aggressive chemicals are blocked permanently.

Pentens T-308 is added to batches of concrete during the mixing process for new construction projects. The high-growth organic component of the product reacts with water and unhydrated particles in concrete to form millions of needle-like crystals. These crystals grow and migrate through the concrete to fill in hair-thin pores and microscopic voids up to 0.4mm that would otherwise serve as passages for harmful moisture.

Pentens T-308 technology enhances the natural hydration process in concrete, increasing compressive strength over time and dramatically reducing cracking caused by shrinkage. Pentens T-308 is also self-sealing.

### HYDROPHOBIC CHEMISTRY

The hydrophobic effect is the entropy driven force that causes oil to separate from water. Hydrophobic means repellency of water or not water-like. Hydrophobic materials are those which are not ascended directly from water. These materials are mostly oil or silicone based which upon contact will repel water away from its molecular spheres.

### CRYSTALLIZATION GROWTH

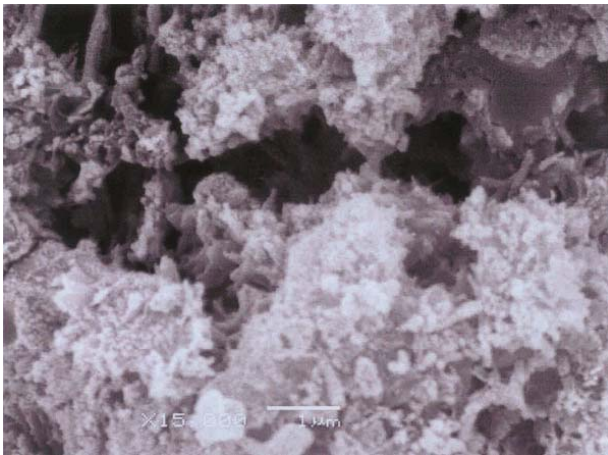
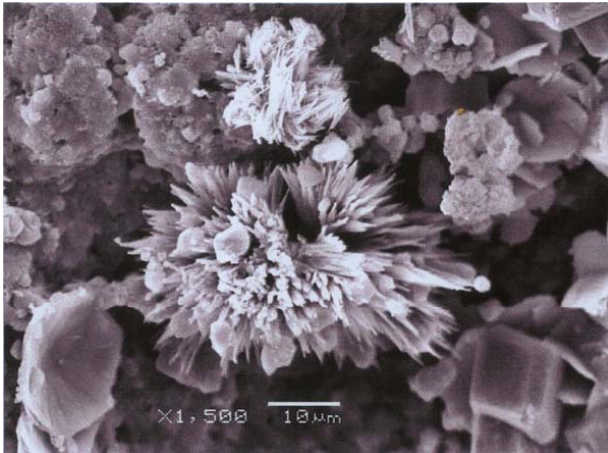
The crystallization process consists of two events: nucleation and crystal growth.

Nucleation is the step where the solute molecules dispersed in the solvent start to gather to create clusters in the nanometer scale (elevating solute concrete in a small region) is to become stable under the current operating conditions. These stable clusters constitute the nuclei. The clusters need to reach a critical size in order to become stable nuclei. Such critical size is dictated by the operating conditions (tempera-ture, supersaturation, irregularities, etc.). It is at the stage of nucleation that the atoms arrange in a defined and periodic manner that defines the crystal structure – note that “crystal structure” is a special term that refers to the internal arrangement of the atoms.

Concrete or cement paste are rich in  $Ca^{2+}$  ions which are known as Calcium Silicate. Hemihydrates (C-S-H). These ions are in theory flocculates to form crystals with the help of a promoter or inhibitor,  $Ca^{2+}$  ions are stable ions and that in cement alone will not form crystals unless is a promoter.

The crystal growth is the subsequent growth of the nuclei that succeed in achieving the critical cluster size. Subsequently, nucleation and growth continue to occur simultaneously while the supersaturation exists. Supersaturation is the driving force of the crystallization, hence the rate of nucleation and growth is driven by the existing supersaturation in the solution. Depending upon the conditions, either nucleation or growth may be predominant over the other, and as a result, crystals with different sizes and shapes are obtained.

Crystallization growth process in concrete is in theory a continuous process which may last between 7-15 years of the concrete age. Therefore in this study, we anticipate that the crystal growth were at its infancy since that preliminary study will only observe the crystal growth up to 28 days of the concrete age.



#### WHY CHOOSE PENTENS T-308

- It comes with a 10 year single warranty!
- It works as a dual purpose waterproofing system; it creates hydrophobic materials instantly and initiates crystal formation in a long run.
- Pentens T-308 is in a grey powder form.
- It provides significant cost saving because it eliminates labor cost for the application process.
- Integral protection for the ENTIRE concrete.
- Permanent protection even if the surface is damaged.
- Protection from any direction.
- Time-Saving.
- Cures internally.
- Heals cracks by crystal formation (up to 0.4mm)
- Low VOC, Non-Toxic

Pentens T-308 is used to waterproof areas as indicated below:

- Basement floors and retaining walls
- Concrete flat roof
- Water retaining / excluding structures
- Lift Pits
- Swimming pool

#### APPLICATION

Trial mix shall be conducted for concrete intended to utilize Pentens T-308, to waterproof a particular concrete structure.

The targeted compressive strength of a latest particular grade of concrete shall be complied with BS 5328:1981, or its latest revision. The use of Pentens T-308 shall be under adequate supervision. For further advice please contact Pentens Technical Department.

#### EFFECTS OF OVERDOSING

An overdose of double the intended dose of Pentens T-308 may result in increased retardation and workability; hence reduce the short-term strength development. Long term strength is unlikely to be affected. Should segregation of concrete occur, due to excessive increase in workability, the concrete shall not be used.

#### SPECIFICATION CLAUSE

All area where specified in the drawing shall be treated with Pentens T-308 Waterproofing System or approved equivalent. The waterproofing system shall be liquid which when added to concrete shall produce a hydrophobic material and initiates crystallization process which shall drastically reduce the water absorption and water permeability when added to fresh concrete or approved equivalent.

All the construction and expansion joints shall be treated with Pentens waterstop or approved equivalent to achieve a Tanking System. For ready mixed Concrete, the supplier must be approved by the consultant Engineer and the cement (OPC) content stated on the ready mixed concrete dockets shall be minimum 300 kg of cement per cubic metre and minimum free water/cement ratio shall not be > 0.05 and maintaining the desired level of strength and workability. There shall be no cement replacement.

All waterproofed concrete should conform to specification for concrete without admixtures. Trial mixes should be carried out to determine the optimum mix design to the satisfaction of all parties concerned.

#### LEXTON COMMERCIAL MARKETING CORPORATION

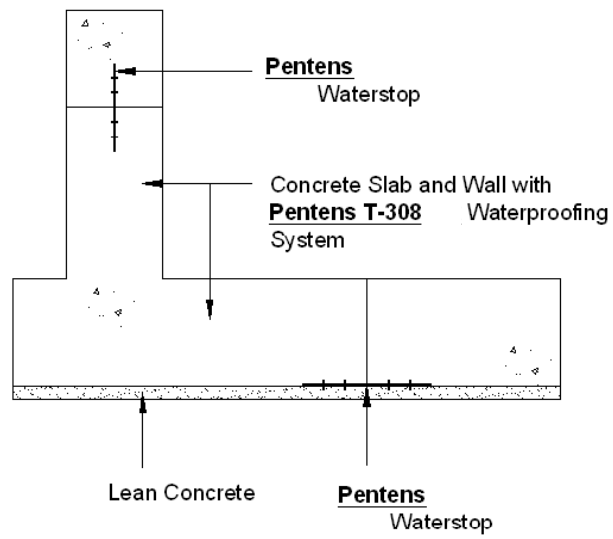
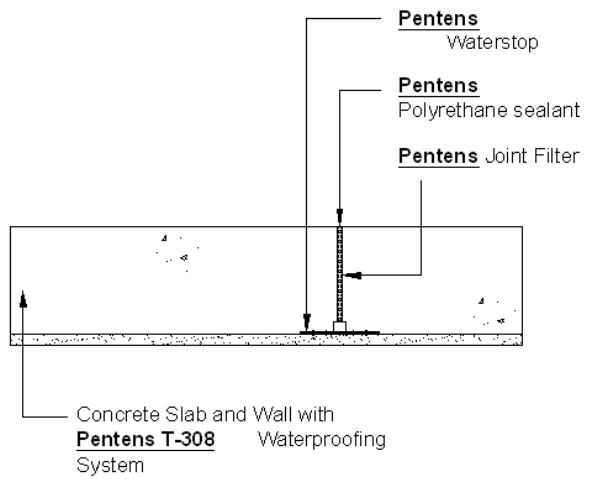
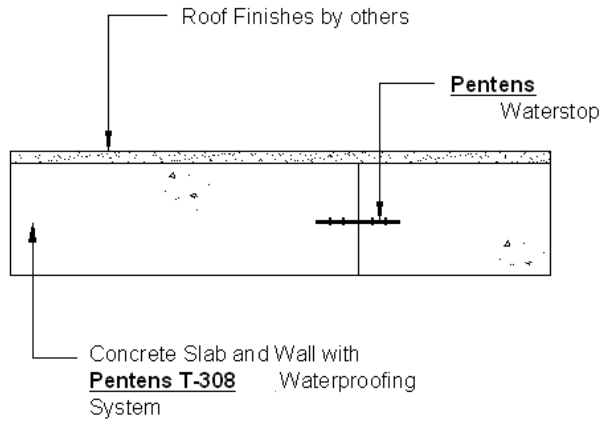
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Product Data Sheet  
**Pentens® T-308**



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