

Convac System – A New Age Solution for Complete Waterproofing & Damp-proofing

Waterproofing of any structure is an essential factor for long-term durability and performance. Structural design and construction are key elements of a project and it demands significant technical attention. Moisture infiltration and humidity can cause severe damage and if excess water is present the impact of the same can be catastrophic at times, it can lead to structural failure or it can become uninhabitable.

The objective of this technical paper is to explore building materials and its characteristics, waterproofing and its implication, types of waterproofing systems available and their limitations. In addition to these, the paper will be introducing CONVAC SYSTEM to the readers.

One of the basic and fundamental requirements of any building is that the structure should remain dry as far as possible. Seepage in building is a very common phenomenon and it is very important to understand the causes and preventive measures to be followed. A well designed building should take the following factors into consideration during planning:

- The properties and behaviour of the building materials used
- The initial and long-term cost implications
- The effect of the environment
- How the materials react with each other

Most of the building materials have pores in their structure in the form of intermolecular spaces; for example concrete, mortar, burnt clay, bricks, etc. They expand on absorbing moisture from atmosphere and shrink on drying.

Building materials absorb water from atmosphere or from some other external source(s); once the structure becomes saturated seepage can occur through the building components like walls, RCC members, roof terrace, plasters, etc. Another major reason of seepage is the porosity of the building materials when buildings are exposed to atmosphere; water is absorbed by the materials gradually and results in seepage through roof terrace and walls exposed to atmosphere.

When considering a waterproofing system to control liquid penetration, it is important to look at two factors that allow for the movement of water. These are hydrostatic pressure and capillarity action.

- Hydrostatic pressure is the pressure coming from the weight of the liquid and its value is directly proportional to the height of the liquid and the density of the liquid. A dense liquid will produce a greater hydrostatic pressure. In scientific terms, hydrostatic pressure increases in proportion to the depth measured from the surface because of the increasing weight of fluid exerting downward force from above.
- Capillarity is the force that results from greater adhesion of a liquid (water) to a solid surface than internal cohesion of the liquid itself and is therefore able to literally rise along vertical surfaces. What does it mean? Basically it means that liquid rises against gravity. The amount of capillary rise is determined by the space between the particles, or if you are looking at tubes, a tube with a smaller diameter will produce a greater rise. When selecting granular materials for drainage, if the space between the aggregates is larger, lesser will be the potential for capillary rise, and also water will drain freely through those spaces.

Dampness in Buildings- Defects As After Effects

Various defects caused by dampness to a building can be summarized as follows:

- It causes efflorescence, which may ultimately result in disintegration of bricks, stones, tiles etc.
- It may result in softening and crumbling of plaster.
- It may cause bleaching and flaking of paint leading to patches.
- It may result in the warping, buckling and rotting of timber.
- It may lead to corrosion of metals.
- It may cause deterioration to electrical fittings and fixtures.
- It promotes growth of termites and fungus.
- It creates unhealthy living condition for the occupants.
- It increases building maintenance cost, which is unplanned.
- Last but not the least it severely affects the aesthetics of the building.

Dampness in Buildings- Sources

The important sources of dampness are:

- Dampness rising through the foundation walls: Moisture from wet ground may rise well above the ground level on account of capillary action.

- Splashing rain water which rebounds after hitting the wall surface.
- Penetration of rain water through unprotected wall tops, parapet, compound walls, etc.
- In case of sloped roofs, rain water may percolate through defective roof covering. In addition faulty eaves course and eave or valley gutters may allow the rain water to descend through the top supporting wall and cause dampness.
- In case of flat roofs, inadequate roof slopes, improper rainwater pipe connections, and defective junction between roof slab and parapet wall may prove to be the source of dampness.

No matter how good the waterproofing system is, one major factor that controls everything is the waterproofing details. This can be from design right through to construction, if the detailing is lacking, water will find its way in.

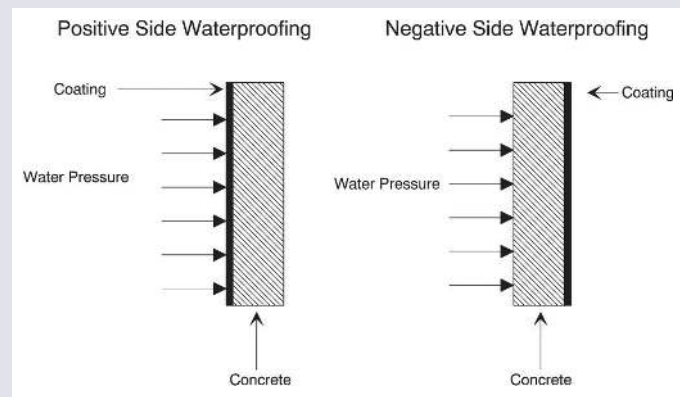
When selecting the correct system, it is very important to differentiate between waterproofing and damp proofing. These terms are sometimes misunderstood and can cause the selection of improper materials when trying to control moisture intrusion.

- Waterproofing is defined as the resistance of the passage of water under hydrostatic head pressure.
- Damp proofing is defined as the resistance of water in the absence of hydrostatic head pressure. Damp proofing materials typically will not bridge cracks in concrete that may occur during the life of a building. It is very important to understand this, as without proper drainage there can be presence of hydrostatic pressure.

Till yesterday there was no single product solution that was suitable for every situation, so selection of a suitable waterproofing system should depend on the requirements of the project. Some common characteristics that should be considered are whether the system is effective against moisture intrusion, be it waterproofing, damp proofing or capillary action. Water will find a way in if there are inconsistencies in the system. It needs to be durable both during and after construction and definitely need to be robust and durable for the life of the structure. Having a premature failure of a waterproofing system can be catastrophic and costly. Ideal waterproofing is a combination of quality product backed by excellent and trained application team.

CONVAC PLUS and CONVAC are an innovative and first of its kind patented product systems, which can act against Waterproofing and Damp Proofing both during and after construction.

As has been mentioned earlier there is no single universal waterproofing system that can work in all situations. It would be great if there was as it would make life very easy. CONVAC and CONVAC PLUS are now available, which, as we claim are complete waterproofing cum damp proofing system. When selecting this system, it is important to understand if the waterproofing system is considered to be on the positive side or negative side waterproofing system. What does that mean? In general, negative side waterproofing means that the waterproofing layer is applied to that side of the construction member, which is opposite to the side that is in direct contact with water. Reverse of the same is positive side waterproofing. It is always advisable to do the waterproofing system from the positive side for better results. Only if the positive side is inaccessible negative side waterproofing is to be done.



CONVAC SYSTEM can be applied on both sides of waterproofing system wherever needed. Hence application scope, suitability and ease of application with CONVAC SYSTEM is more compared to products available in the market.

CONVAC SYSTEM is an innovative solution for concrete and masonry works. This system densifies the concrete or mortar matrix to an optimum level and permeability of liquid water, which carries electrolytes is reduced to practically nil.

Typical Water Proofing system is carried out through the following procedures

- Surface preparation
- Crack treatment
- Product application
- Protection plaster / screed

With the CONVAC SYSTEM we can directly avoid some operations, which saves both cost and time:

- Surface preparation
- Crack treatment

CONSTRUCTION CHEMICALS AND WATERPROOFING

Concrete Test Result

(Unit : kg/m³)

W/C	Cement (UltraTech OPC)	Fly Ash	Sand (Z-II)	CA 10mm	CA 20mm	Water	PCE Based Admixture	CONVAC PLUS	1 Day Compressive Strength	3 Day Compressive Strength	7 Day Compressive Strength	28 Day Compressive Strength
0.4	255	135	692	492	705	190	1.95	0	4.44 mPa	18.67 mPa	20.89 mPa	47.45 mPa
0.4	255	135	692	492	705	190	1.95	1.275	7.11 mPa	24.00 mPa	29.33 mPa	54.00 mPa
% Gain in Compressive Strength with the use of CONVAC PLUS compared to CONTROL MIX									60 %	28.50 %	40.40 %	13.80 %

(All technical data stated herein are based on tests carried out under laboratory condition)

Thus it can be firmly concluded that CONVAC SYSTEM is the ultimate and preferred choice as it gives complete solution, it is cost effective and chances of failure is reduced considerably.

The CONVAC SYSTEM: Waterproofing Additive for Impermeable Mortars and Plasters

CONVAC SYSTEM is a waterproofing additive in semi liquid form for mortars and concretes. It does not modify the setting time, the hardening time but increases the final strength of cement mixtures.

Thanks to its unique and innovative formulation, CONVAC SYSTEM gives hardened mortars and concretes excellent impermeability to beating and counter thrusting water (more than four bars), therefore it is particularly suitable for internal /external plasters and concretes and to make foundations.

CONVAC SYSTEM as an integral waterproofing product: It is possible to waterproof the whole thickness of the concrete, thus shielding it from attack of aggressive and polluted waters and protecting the steel reinforcements of the whole structure.

The foundations of the buildings, which form the walls of basements and garages, do not require any further waterproofing treatment if the concrete is made with the addition of CONVAC SYSTEM. It is important to remember that to ensure good waterproofing, concrete must be properly planned and has a dosage of cement not lower than 300 kg/m³, and then CONVAC SYSTEM becomes highly effective. The intrusion of foreign bodies such as wood, soluble materials, porous materials and loose stones into the concrete may jeopardize the impermeability of the structure.

Unlike many "ready-to-use" products available in the market, CONVAC SYSTEM makes plasters easily applicable to further masonry work and its high adhesive nature lowers rebound loss.

Please note that, after a treatment with silicone solutions it never allows any subsequent treatment, the plasters made with

CONVAC SYSTEM allow any kind of surface treatment without any problems.

Test Results:

TEST NAME	OBSERVATION
Gripping Power With C:S = 1:3 On A Glass Plate (5% Dosage)	After 24 hrs no separation found from the glass plate
Hair Line Crack With Cement Paste	No crack developed in 24 hrs
Test Of Reducing Rebound Loss In Mortar With C:S=1:3 (2% Dosage)	Mortar did not fall in 60 seconds in vertical position
Water Absorption (%)	With 1% dosage of CONVAC PLUS : 0.60% Control : 3.80%
Water Penetration (Avg.) Din 1048	With 2% dosage of CONVAC PLUS : 30 mm Control : 145 mm



Rising Damp Test on Concrete Cube: Rising Damp is almost nil with the use of CONVAC PLUS (dosage of 1% BOWC)



Mr Mrinal Roy,
R&D & QC,
ADO Additives Mfg Pvt. Ltd,
Kolkata

For further details visit <http://atplgroup.in/> or write to atplkolkata@gmail.com