

Ado's Convac System Redefines Repair & Rehabilitation



Repair of concrete structures has been a major focus of attention in recent years worldwide. The ever changing lifestyles of consumer, changing environment and various other factors are driving demand for high quality construction of residential structures and its continuous maintenance. This is leading to growing usage of construction chemicals.

Concrete admixtures account for the majority share in India's construction chemicals market. It has been observed many times that concrete structures have fallen short of their performance expectations. This may be due to structural deficiencies, material deterioration, unanticipated overloading or physical damage. Premature material deterioration can occur when construction specifications are violated or when the facility is exposed to harsh service environment than what was expected during the planning and designing stages. Physical damage can occur from fire, explosion, structural movement, etc. Except in extreme cases, most of the structures require restoration to meet their functional requirements by appropriate repair techniques. The term repair is defined as "to restore the functions of a structure to the 'as-constructed' level when it has degraded over time." On the other hand, retrofitting is defined as "the operation to raise the functions required of a structure, particularly load bearing, to a level higher than the as constructed level." The success of a repair activity depends on the identification of the root cause of the deterioration of the concrete structures. If this cause is properly identified, satisfactory repairs can be done for improving the strength and durability, thus extending the life of a structure. For the construction repair, only improvement of the repair material properties is not enough; we need to consider the whole system consisting of repair materials and also the old concrete. Selection of concrete repair materials is based on evaluation of damage type, type of materials to be used for repair and local conditions. The concrete repairing material must be compatible with the concrete being repaired. The selection of concrete repair materials should be based on following properties:

- Bond with concrete
- Strength development of material with concrete
- Corrosion resistance property of the material
- Coefficient of thermal expansion of the material
- Stress development at interface
- Durability of such concrete repair material, etc.

At the initial stages, any structure deteriorates slowly due to cyclic temperature variations, overloading, physical causes and

aggressive chemical attack due to the environment, etc. Later on, if not paid due attention, this rate of deterioration is rapid and fails to meet the functional requirement of its designed service life. Amongst the various causes of deterioration of a building, rising dampness is one of the most critical factors. It is a perennial and ubiquitous problem of a structure. Rising dampness was identified and reported for both heritage structures and masonry buildings all over the world.

Rising damp occurs when groundwater flows into the base of a construction and is allowed to rise through the pore structure, i.e. the upward vertical flow of water through a permeable wall structure. The materials used conventionally in the construction of masonry wall are all porous to a varied extent. So it contains a certain volume of air. Porosity is defined as the ratio of volume of air divided by the total volume, which is always less than unity. These air pockets are often connected to one another through a network of pores so liquid can pass through the system. Some of the values of porosity are:

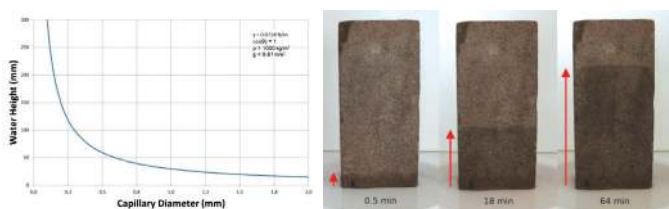
	Porosity
General purpose brick	0.35
Sand lime brick	0.30
Lime render	0.30
Sand stone	0.05 – 0.20
Cement render	0.20
Cement Mortar (Sand : Cement :: 3:1)	0.17
Granite	0.02

For example the porosity of cement mortar is 0.17, which means that 17% of the volume taken up by air and 83% by solid material. Water has a strong affinity to the pores and the presence of small capillaries brings about the rise of water into the internal structure. Water is drawn up into the material by the force of capillarity. Height of water or capillary (denoted as h) is governed by the following equation:

$$h = \frac{2\gamma \cos\theta}{r\rho g}$$

where γ = surface tension, θ = contact angle, r = capillary radius, ρ = liquid density, g = gravity

This equation describes the relationship of pore size and the rising height of water. In case of water, it has been found that when the pore size is 0.10 mm then the rise is 14 cm but when the size is 0.01 mm then the rise can be 1.4 m. The pore size in the bricks and mortar can be as small as 0.001 mm so there is a significant potential for rising damp.



This moisture, which rises as a result of capillary suction evaporates from either face of the wall (inside or outside), allows for more to be drawn from below. The situation is made much worse if there are appreciable quantities of soluble salts present; as now the rising damp will carry salts up into the masonry structure from where the damp evaporates. Now the salts are left behind and can often be seen as a white efflorescence on the wall surface. To prevent rising damp, it is a normal practice to build an impermeable barrier at the base of the wall just above the ground level to prevent moisture from moving to any part of the building. This is known as damp proof course (DPC). An effective damp proofing material should have the following properties:

- It should be impervious.
- It should be strong and durable, and should be capable of withstanding both dead as well as live loads without damage.
- It should be dimensionally stable.

The Convac System

Waterproofing Additive for Impermeable Mortars and Plasters

Convac System is a waterproofing additive in a 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, the Convac System gives hardened mortars and concretes excellent impermeability to beat and counter thrusting water (more than four bars). Therefore, it is particularly suitable for internal / external plasters and concretes and to make foundations. As It is an integral waterproofing product, it is possible to waterproof the whole thickness of the concrete, thus shielding it from an attack of aggressive and polluted waters and protecting steel reinforcements of the entire structure. The foundations of the buildings, which form the walls of basements and garages, do not require any further waterproof treatment if the concrete is made with the addition of Convac System.

It is important to remember that to ensure good waterproofing, the concrete must be properly planned and its dosage should not be lower than 300 kg/m³. It is then that the 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. Note: Usually after a treatment with silicone solutions, no subsequent treatment is allowed, but plasters done 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

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

In interactions with clients living near coastal areas, we have seen that there is a need – gap between the client requirements and available products for fighting dampness. We are glad that now we can satisfy our clients with Convac System not only for combating dampness like a vaccine for construction but also as a next generation integral waterproofing solution for new construction in the coastal India as well as other parts. Convac System is available in two variants viz. Convac Plus Powered by PPS for new construction and Convac Powered by PPS for repairing works. Convac is a great Cement Property Enhancer and is guaranteed that it is first of its kind product in Indian market. There is no single integral waterproofing compound available in the market until now which can claim to be 100% waterproof. Convac Plus provides 100% water proofing & damp proofing property to any construction. This is not just our product claim, but our commitment to the people of India. The Convac System is the ultimate and the preferred choice as it gives complete solution, it is cost effective and chances of failure are reduced considerably. I confidently recommend Convac Plus and Convac are an innovative and first of its kind patented product system that act against waterproofing and damp proofing both during and after construction.



Sanjib Parial
Managing Director
Ado Additives Mfg Pvt. Ltd.
Email: sanjibparial@adochemicals.com
Website: www.adochemicals.com