



PROsystem

Beat Damp with the PROsystem Solution from Damp Protect

www.dampprotect.com.au

THE PROBLEM OF DAMP

Introduction

Damp is a problem found in the walls of many buildings, particularly those built before the use of protective membranes in the foundations.

Damp is one of the main causes of building deterioration, particularly in older constructions. The presence of water in the walls can lead to significant problems:

- reduced thermal performance and a consequent increase in heating requirements
- appearance of marks and mould on the walls and detachment of plasterwork in more serious cases
- as time goes on, wall structures can suffer damage that is very difficult to repair.

The Importance of Identification

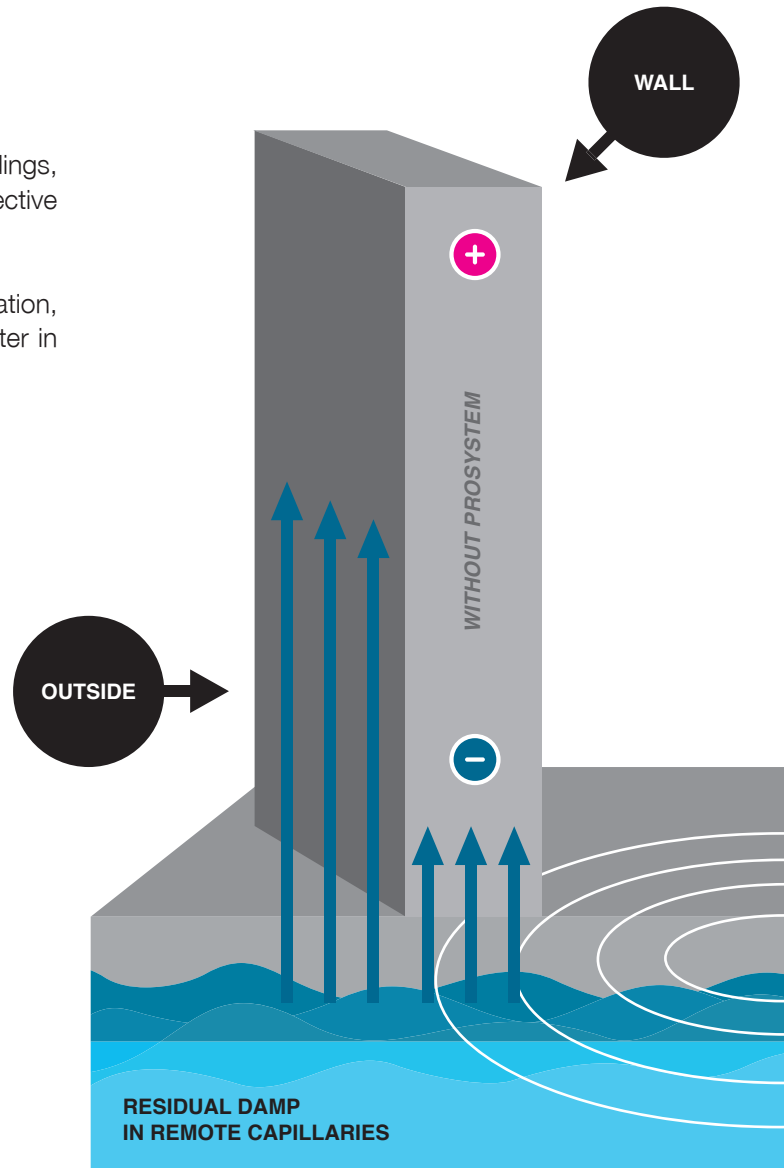
For the reasons explained above, it is best to deal with damp problems as soon as they appear. Correct identification of the issue is equally critical, allowing the root causes to be pinpointed.

- First of all, basic information regarding the building should be compiled: from locating plumbing connections, guttering and drains to identifying the presence of ground water.
- This is followed by a visual inspection, carried out with the help of an expert. During this phase, the presence of damp is carefully mapped, attempting to understand how long the problem has existed and under what conditions, etc.

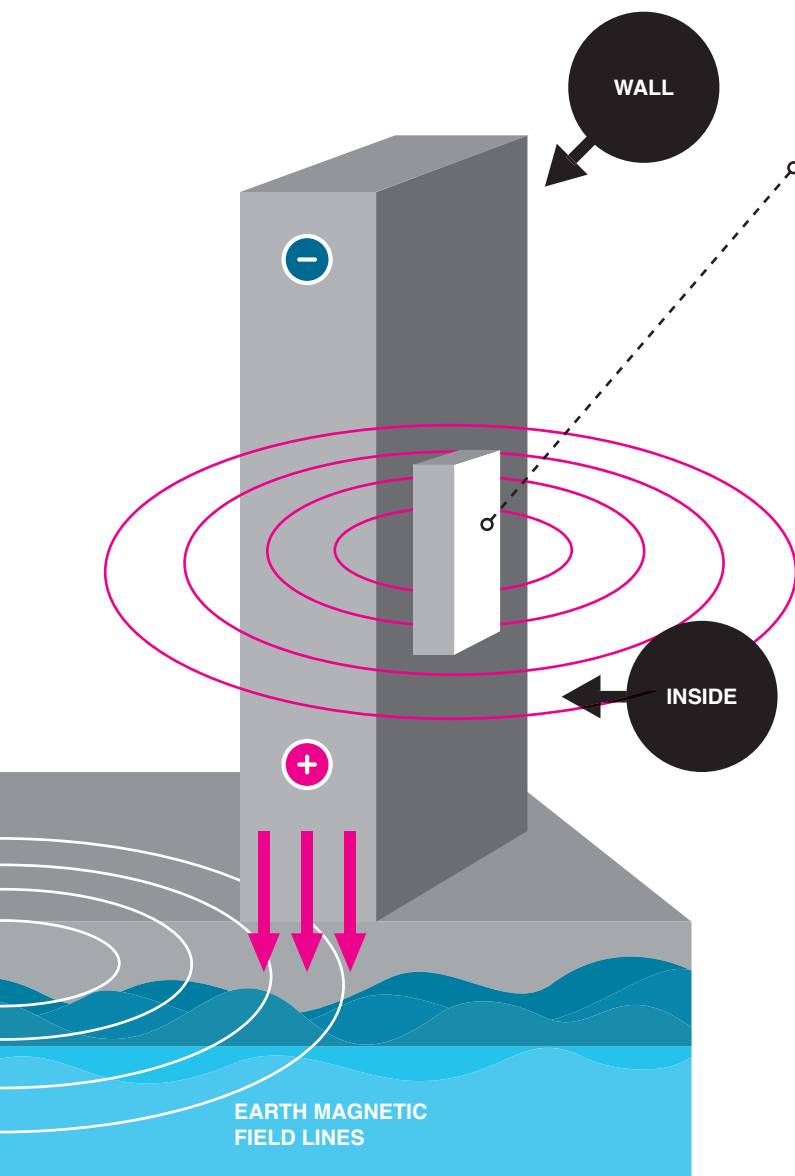
At this point, the expert will be able to establish which of the four main types of damp are behind the damage (atmospheric humidity, condensation, rain penetration and rising damp) and what the solutions are.

Rising Damp:

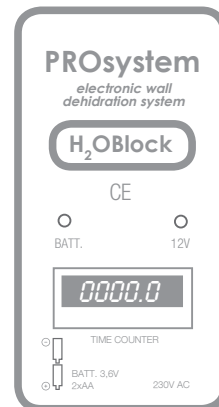
This is one of the most common problems and also one of the most difficult to eradicate. It is caused by the transmission of water via capillary action with a process similar to osmosis.



This leads to water and dissolved salts rising up through the walls. In addition to negative aesthetic impacts, this type of damp not only causes deterioration of the walls themselves (swelling and disintegration of plasterwork and mortar joints, formation of mould, corrosion of bricks, etc.) with associated effects on mechanical performance, but also creates bad odours and health risks for inhabitants due to the formation of mould. This is the most dangerous type of damp because it is self-sustaining, with water rising via capillary action from a constant source. Due to the physical nature of the phenomenon, the whole body of the material is affected and it can lead to early degrading of the structure if underestimated.



PROsystem



Damp in Walls

Rising damp due to capillary action is caused by the attraction of water to porous materials. A newly built wall is completely uniform within. More specifically, the positive and negative electrical charges present in all solids are uniformly distributed through the mass of the wall.

Considering that water is itself polarised, becoming an electrical conductor when it contains salt ions, acids and bases, and that the microstructure of the constituent materials (bricks, tuff, mortar, etc.) feature microcapillaries, the base of a wall standing in water acts as a solid soaked in an electrolyte solution.

In the capillaries, which are small channels with dimen-

sions in the order of mm^2 , absorption occurs at the interphase of dissolved substances which, as they are charged ions, create an electrical field. More specifically, as the construction materials are inert solids (silica, quartz, carbonates and similar) the positive charges (cations) progressively accumulate on the surface of the aforementioned capillaries, while the negative charges (anions) are able to move in relation to these.

The water absorbed by the walls contains mineral salts (nitrates, sulphates and chlorides) and other substances contained in the earth below, causing the typical characteristics on the surface of the wall as water evaporates on contact with the air, including: marks, rings, flaking of paint, mould generating unpleasant odours, efflorescence and detachment of plasterwork.

The filtration of salts through walls and crystallisation within them makes the structure even more hygroscopic. For a clearer idea, consider that just eight grams of salt can absorb one litre of water.

Generally, capillary rising damp occurs until the point at which the evaporation rate is equal to the absorption rate of the wall.

Problems of this type are found predominantly in buildings surrounded by ground water (the earth is directly in contact with the external wall) in old buildings with very absorbent mortar, and particularly in cellars and basements. This is why these rooms often feel significantly cooler than upper floors.

Electroosmosis

This consists of the formation of a weak electromagnetic field between the wall and the earth and represents a modern solution to rising damp successfully implemented by PROsystem. Implementation times are in the order of a few hours for installation and commissioning of the equipment.

BEAT DAMP WITH THE PROSYSTEM SOLUTION

Operating principle:

The generally porous nature of the wall material itself causes the process of rising damp in porous and permeable materials (leading to efflorescence, marks and general deterioration). This process is governed by Jurin's law:

$$h_{max} = 2\tau \cos\alpha / r\rho g$$

where

- h_{max} is the maximum liquid height in an ideal capillary with radius r ,
- τ is the surface tension of the water;
- α is the contact angle of the liquid on the solid surface;
- ρ is the density of the liquid;
- g is the gravitational acceleration.

This relationship can be simplified to $h_{max} = K/r$, where the constant K contains the characteristics of the liquid and its interaction with the solid surface. Considering that in the case of 0 water, the relationship can be approximately expressed $h_{max} = 15/r$, which provides h_{max} in metres, if the value of r is introduced in μm .

Obviously, the force acting directly against the rising damp is gravity: it has been calculated that the theoretical equilibrium between upward and downward forces is reached when water rises to a height of 15 metres. This does not occur in practice in walls because a state of dynamic equilibrium is reached between the flow of water rising (potential difference against force of gravity) and the surface evaporation, due to which

the maximum height reached by rising damp is usually only a few metres. This is determined, in addition to the characteristics of the air around the wall, also by the microstructure of the material itself (volume of porosity, average dimensions of holes and their distribution), as well as by whether or not the wall is plastered.)

The PROsystem dehumidification solution exploits the fact that rising water present in a wall is actually an electrolyte solution with various dissolved salts. Therefore, in addition to capillary forces, electrokinetic phenomena are also acting within the wall. These create an increasing spontaneous potential difference over time between the surface of the solid and the mobile liquid mass and, more specifically, a positive electrical field is generated at the foot of the wall (in contact with the water) and a negative field above (the evaporation zone). Inside the wall, the electrical charges are no longer uniformly distributed, but are distributed as shown in the diagram.

The PROsystem dehumidification system essentially exploits the fact that between the damp wall in contact with the earth and the dryer wall higher up, a spontaneous electrical potential difference is generated, due to the rising capillary action of the water.

In fact, the cations present in the electrolyte solution such as H_3O^+ , Na^+ , K^+ , Mg^+ , and Ca^{++} , etc. move upwards and towards the evaporation zone (inside) where the salt ions, with a lack of water and in the presence of O_2 and CO_2 , are reprecipitated as oxides and carbonates (marks, efflorescence, etc.).

It is important to remember that the positive electrical field is found at the point of water entry and the negative field in the evaporation zone. It is clear that the point of entry is fixed and constant, whilst the evaporation zone can vary on the basis of the amount of water present in the surrounding earth, both due to ground water fluctuations and precipitation. This can also influence the "push" of the water, i.e. the degree of percolation through the wall.

An electrical field is therefore present which is generated electrostatically by the polarisation spontaneously established in the wall due to the process of rising damp itself. On the basis of the fundamental laws of electrostatics, the **PROsystem** method opposes rising damp by inverting the polarity, thus reversing the phenomenon. This effect does not decrease over time and acts constantly in proportion to the process of rising water, re-establishing the “natural” humidity levels of the wall.

The **PROsystem** method not only uses electrostatic induction to beat rising damp, but also uses very-low-frequency electromagnetic induction, opposing the variation in polarisation of the liquid in the capillaries with variations in the fluid-dynamic state in the capillaries, which is determined under changing system conditions.

Theoretical principle

“If a body of water is transferred to a porous rock-like substance, a potential difference is generated which can be measured in millivolts.”

The physical phenomenon in practice

If you place a brick in a container of water the water rises up due to capillary action. The rising water produces an electrical field which can be measured in millivolts.

In the same way, a wall built on water-rich ground will become damp due to capillary action. A natural, measurable electrical field is generated.

Exploiting the physical phenomenon

The **PROsystem** solution generates an electrostatic and electromagnetic field greater than and in opposition to that occurring naturally, meaning that rising capillary action is first halted and then inverted.

The water contained in the wall returns to ground through the same pores in which it rose.

The **PROsystem** solution is pollution free, entirely reversible, extremely flexible, functions perfectly also on basement walls, and self-adjusts on the basis of wall dampness levels. Because the solution acting as a vehicle for the current generated is water/salt, the process self-adjusts as the electrical field governing the movement of water is automatically distributed throughout

the entire wall, including columns, cornices, recesses and projections.

The entire wall is dried in an identical manner.

The **PROsystem** electronic dehydration solution has been successfully used in practical tests over the last ten years in the following sectors:

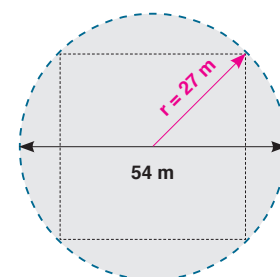
- Historic buildings
- Architectural renovation
- Conservation of monuments
- Dehumidification of civil and industrial structures
- Prevention in new builds
- Buildings in areas prone to flooding

The **PROsystem** dehydration solution is based on stabilisation of electrical voltages which circulate within the penetrating electrical field of the damp.

The **PROsystem** solution transmits electromagnetic impulses that produce a natural barrier to damp in the parts of the wall affected, without the need for structural work. The result: the wall dries quickly and permanently.

Models available

The **PROsystem** dehydration solution is currently available with four different devices capable of protecting environments with an 11 to 67-metre range.



The electronic equipment requires a standard 220V socket (phase+neutral+earth).

Certifications



ADVANTAGES



NO BUILDING WORK REQUIRED:

The **PROsystem** dehydration solution does not require building work on the existing walls to be protected.

COST SAVINGS:

The costs of investing in this solution are far lower than the comparative costs required for alternative measures which require structural demolition and rebuilding work.

COMPREHENSIVE PROTECTION:

The **PROsystem** dehydration solution is effective in any type of structure: external, internal or dividing walls.

NATURAL SOLUTION:

The **PROsystem** dehydration solution does not require the use of chemical or synthetic substances.

HEALTH:

The **PROsystem** dehydration solution improves the air quality in the building in question.

FLEXIBILITY:

The **PROsystem** dehydration solution is designed to be carefully adapted to the specific requirements of the materials involved.

ADVANCED TECHNOLOGY:

Device featuring control panel with status indications. In case of power outage, the device switches to battery power and this is indicated via an automatic status light. No setting or maintenance is required.

EFFECTIVENESS:

The **PROsystem** dehydration solution has been in use by trade professionals for many years because it is extremely effective and undeniably good value, and now it is also available for use in the residential sector.

RELIABILITY:




The tried and tested technology used by the **PROsystem** solution guarantees completely effective resolution of all rising damp problems.

Type	Range	Area	Dimensions	Weight	Energy consumption
PROsystem HS-11	11 m	Approx. 400 m ²	150x80x64 mm	0,410 Kg-0,470 Kg	Max. 4.5 W/h
PROsystem HS-17	17 m	Approx. 900 m ²	150x80x64 mm	0,410 Kg-0,470 Kg	Max. 4.9 W/h
PROsystem HS-27	27 m	Approx. 2300 m ²	150x80x64 mm	0,410 Kg-0,470 Kg	Max. 5.8 W/h
PROsystem HS-67	67 m	Approx. 14100 m ²	150x80x64 mm	0,410 Kg-0,470 Kg	Max. 6.8 W/h

230 V AC/12 V DC Batteries: 2 x 1.5/UM-2 Alkaline

CONFORMITY

The manufacturer declares that the equipment is compliant with European safety standards, specifically:

	EN50081-1	Generic emission standard Part. 1 - Residual commercial and light industry
	EN50082-1	Generic immunity standard Part. 1 - Residual commercial and light industry
	CE marking	EC Conformity marking

RESEARCH

The **PROsystem** research team is always at the cutting edge in terms of processing data received from the various system users, thus allowing improvements and specific measures for even the most demanding and unique damp-resolution requirements. Both national and international clients have constant access to our quick, and highly qualified technical-assistance.

WARRANTY

The manufacturer guarantees the product for 3 (three) years. The warranty covers the equipment for all damage due to manufacturing/installation defects, or hidden defects in the component materials. The warranty is void in the case of tampering, serious negligence during use or damage due to natural disaster, fire or flooding of the building.



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