

A copy of an extract on breathable paint published on linkedin on the 26<sup>th</sup> January by Cornish Lime Company our partner in Beeck Paint distribution in the UK

## **What are breathable paints?**

For building physics we class a breathable paint as a material that will allow the water vapour to permeate, travel or transfer through itself. The basic premise of a truly breathable paint is its ability to allow water vapour to evaporate from the surface and not prevent this transfer to be slowed or stopped entirely.

Great, we have defined a breathable paint in its basic form, but we are still left with a serious issue; a lot of paints on today's market state to be breathable, how do we know what is best? How breathable are they? As they state they are breathable does this mean safe to breathe or they allow moisture to pass through them?

There is no defined European Standard as to what constitutes breathability and there are at least 8 different ways to measure the breathability of a material.

Until the industry adopts a defined standard this will always be an issue, however when it comes to paint the most accepted and adopted standard is SD Value, it helps that it is probably the easiest to understand, interpret and compare.

SD Value is a German method, although it is used throughout Europe, and it stands for steam diffusion or air layer equivalence. It is a measure of how much of a barrier a paint coating is to water vapour and how easily the vapour can pass through this barrier, it is measured in meters. The lower the SD Value means that more moisture is able to pass through, the higher the SD Value, the lower the moisture transfer.

A truly breathable paint should have an SD Value ranging from 0.01 to 0.5. This equates to moisture having to travel 1cm to 50cm to pass through the paint, meaning it has very little resistance and can pass freely without being slowed or stopped. Conventional masonry paints will likely have an SD Value of 1 or above. This equates to moisture having to travel through the equivalent of 1 metre of air to escape.

The vast majority of paints can technically be classed as "breathable", as they will eventually allow some moisture to escape. However, it is the rate of transfer or the distance which constitutes a truly breathable paint.

If you were to look at one of our paints you will always be able to find the SD Value and this is regardless of the brand, in fact if you look at competitors' products they usually always state the SD Value of their paints, because they know they are offering a truly breathable paint. However, if you were to look at a conventional emulsion or masonry paint that states it is breathable, there is no SD Value to be seen, this can usually be taken as a clear sign that this paint will not allow for the free passage of moisture, otherwise the SD Value would be there. Most "breathable" paints that do not state their SD Value usually fall in the class of the first definition of breathability; they are suitable to be breathed, meaning they won't

necessarily harm us, or they are technically breathable, but simply won't allow high levels of moisture to transfer freely.

## **Why use breathable paints for historic buildings?**

Older buildings are fairly simple in construction, they usually comprise of thick and solid walls, with no cavity. The result of this construction method means that moisture will always be, in some form, present within the building fabric. The original material used to create these buildings were relatively simple too; they were softer than the host material (i.e. Stone) and they allowed moisture to escape and not become trapped.

Damp is commonly found in older buildings. Up until recently it was (and unfortunately by some it still is) believed that the only way to eradicate this issue was to waterproof the entire building with a waterproof coating such as modern masonry paint or by injecting damp proof courses with the aim to stop water penetrating the building. Whilst this offered a temporary solution it was and is still not the answer, with the majority of these applications ultimately failing.

One of the main reasons for this failure is that a building can undergo significant movement, both structurally and thermally. Once a crack appears water can penetrate the crack and be held within the wall behind the non-breathable or waterproof coating, which can include cement and paint. A secondary issue with cracking is during the winter or colder months, as water freezes it has an expansion rate of roughly 9% per freeze. As this freeze and thaw cycle is repeated when we reach certain temperatures, the cracks are able to increase and widen in size, which allows further water to ingress with no means of escape.

A build-up of moisture can lead to damp within the walls which may cause 'blistering' and 'bubbling' of the paint where the water is trying to escape, this is referred to as hydraulic pressure. In more serious cases the render may be 'blown' or forced off by the pressure of the trapped water.

Water that is trapped within a wall can lead to serious deterioration of the building fabric. Any non-breathable paint applied to the building will act like a film around its surface. If you imagine wrapping your walls and ceilings in cling film, this will stop the moisture from going in and out but will trap it and the water will build up within the surface. This is where the term "film-forming" paint comes from as it seals the building and stops the building from breathing and allowing moisture out of the walls.

The reason that modern paints such as emulsions and masonry paints are classified as film forming is due to the chemicals that are used, which create a plastic like layer, enabling them to sit on the surface of a wall or ceiling.

This leads us back to the issue with defining breathable paints: You can wrap your face in cling film and poke a hole where your mouth is, you can still breathe, but you aren't going to live very long.

To put it simply, the most appropriate paint for historic fabric is one that has a low SD Value.

## **Why use breathable paint for contemporary and new build construction?**

Paints are everywhere, both internally and externally. Most modern paints are comprised of pigments, binders and solvents, however the majority of these components are derived from petrochemicals. The use of petrochemicals has a negative impact on both our health and environment. The use of crude oil to create these materials can lead to the creation of harmful toxic waste.

In 1989 the World Health Organisation reported that painting is an occupation that is classified as carcinogenic due to the extensive use of chemicals that are contained within paints. Further studies have shown the indoor air environment can be 10 times more polluted than the external environment, which is again caused by the extensive chemical additions found in materials such as modern paint. We spend up to 80% of our lives inside buildings, where up to 90% of the internal surface can be covered in some form of petrochemical coating. Due to the chemical additions contained within these paints they become very wasteful, in some cases these materials can produce up to 10 times their weight in waste. In the UK 385 million tonne of paint is sold yearly. A further issue is that the chemical additions make recycling the paint very difficult, with the majority of discarded paint being sent to landfill.

We only stock naturally produced paints, that have minimal to no chemical additions depending on the type and brand. This allows us to supply paints that have no detrimental impact on the environment, the applicator or the end user.

For example, the Aglaia range of paints are made using renewable and recycled crop sources, where all of the manufacturing waste goes to a community composting facility, Aglaia is a truly sustainable paint. Unlike modern petrochemical based paints which produce toxic waste during their manufacture and once applied release dangerous and volatile organic compounds (VOCs) that can have an adverse impact on our health. Aglaia natural paints are non-carcinogenic and do not encourage allergic reactions as they contain no synthetic chemicals, which also reduces dust build up.

Breathable paints are often seen as something that are only suitable for older building, this is not the case. Breathability is also an important factor within modern buildings. By using a breathable paint internally, you can help regulate the internal environment and air quality. Breathable paints can absorb moisture and release it again, meaning when humidity is high the paint can take moisture from the air and release it back when the humidity drops, which helps maintain a healthy environment and acts like a natural dehumidifier.

## **Types of breathable paints?**

We offer all types of paints for both internal and external applications. The most commonly known is [Limewash](#) which consists of burnt limestone and water. When applied to a porous wall it soaks in, absorbs CO2 and reverts back to limestone. Limewash makes a superb internal and external coating and can be coloured using Pigments.

As a derivative of limewash we also supply [Lime Paint](#) which comes in a powder form ready to mix with water. Lime paint can be supplied in 19 different colours and although it contains around 3% acrylic to aid dusting and adhesion it still retains a low Sd value and is highly suited to lime rendered buildings both internal and external.

Beeck Mineral Silicate Paints were developed at the end of the 19th century and, as with limewash, the mineral paints soak into the background and bond to it. Where they differ is that limewash generally bonds to the calcium in the background whereas mineral paints form a strong chemical bond with the silica sand in the stone or render.

It is well known what a strong and stable element silica is and it has been widely used in building due to these attributes. This silica bond makes the paints far more durable than limewash or lime paint, leaving the paint attached to the substrate. The way the paint bonds to the surface also gives it extreme durability as the chemical bond achieved means that it cannot be stripped by paint strippers.

Externally the Beeck Mineral Paints contain a hydrophobe, which repels water from the surface, without having any impact on the breathability of the coating, which adds further protection for the underlying surface.

Mineral paints also offer much greater longevity compared to limewash and lime paint due to the bond with the surface, they are also non-flammable along with many other benefits depending on what type of mineral paint that is used. They can be mixed to over 300 colours.

Aglaiia Natural Breathable Paints are manufactured from plant extracts and contain no harmful VOC's. These can be applied internally just like a "normal" emulsion paint and are suitable for lime rendered as well as cement rendered walls. Aglaia Breathable Paints are manufactured from only natural ingredients making them environmentally friendly. They use only renewable sources and no petro-chemicals (synthetics), this means they are friendly to people with allergies. Due to their natural makeup they also do not attract dust build up on the surfaces and can be cleaned with water.