

TECHNICAL INFORMATION SHEET

Some background information on contamination to buildings from algae, moulds etc.

It is not always possible to explain the growth that occurs onto render which generally causes either a green or black discolouration. Sometimes one part of the façade has discolorations and another part of the same façade does not. For an organism to grow in a certain environment, different requirements such as abiotic (physical and chemical) and biotic (biological) factors have to be fulfilled. Suitable conditions for growth of organisms on façades require certain ranges in temperature and a high moisture level (Relative Humidity) which could be caused by rainfall or morning condensation. In addition the surface structure, render finish used, nutrient availability, pH value, building position, climate conditions, the weather etc. might all be influencing factors too. Different organisms have different demands on these factors and it is a complex interaction of these different factors that decides if an organism can grow in a certain environment.

ORGANISMS

There are several organisms that present themselves on buildings which cause the unwanted aesthetic effect to the façade of the building. These are classed as microbial contaminants and it is useful to get a brief appreciation of each.

Green Algae are the higher form of plant life. There are thousands of different variations and it can exist on land, in fresh water and sea water. Algae is classed as aero-terrestrial as it spreads through windborne spores and colonizes in a biofilm on any hard surface; once established it will grow organically. It is relatively easy to kill, but will typically re-establish itself in a matter of months in areas which are susceptible to its growth.

Like most plants, Green Algae require water and light to grow. However it does not like too much sunlight and rarely grows on South-facing walls. It's most favoured conditions are damp shaded areas, close to trees and with a limited airflow preferably in a natural hollow. In these conditions it can grow rapidly (within two years). It is most commonly found to occur on North and West facing walls.

It can be seen on everything from road signs to benches, decking, awnings and paths. It favours horizontal surfaces because moisture will naturally sit on these, but will grow on vertical ones too.

Black Algae is the emerging name for a cyanobacterium called Gloeo Capsa Magma. It is often mistaken for pollution, but can be distinguished because of growth patterns which are unlike the surface damage of pollution, for instance growth frequently follows the path of the nutrients and can be seen to follow the path of water.

Black Algae is much slower to grow than green algae and will generally take several years before it begins to emerge. Once it does however it is very difficult to remove and requires either a hot water cleaning such as DOFF steam cleaning or a highly caustic wash because although they might be dead the organisms are highly pigmented and cling very tightly to their substrate. It is a relative newcomer to the UK and we believe is beginning to grow in the more microbially hospitable environmental conditions, see below.

Lichens are another ancient plant form which has adapted itself to survive in a myriad of specialist climate situations. They have two parts: a fungus and a partner organism which is either green algae or a cyanobacteria. They can be extremely resilient and survive in highly specialist situations.

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As will have been noted there are some common threads running through the organisms described; they generally prefer damp, shaded conditions and spread on the wind through spores. Render can be susceptible to microbial growth because its pitted surface will hold rainwater and morning dew longer than a smooth surface and the unevenness will make it easier for microbes to cling to it. Well insulated render systems tend to attract more morning dew, with thin coat systems being more susceptible due to the easier rate the increased relative humidity (e.g. condensation) can form on the surface of the render and they will dry more slowly than uninsulated render systems because of the greater heat loss through the latter.

Condensation on walls takes place when the temperature of the wall surface is so much lower than the air temperature that the air reaches the dew point, releasing the excess vapour as liquid water (fog, dew). This process is only significant when a façade is cooled by nocturnal clear-sky radiation that can lower the temperature of a façade significantly.

Night condensation is a common phenomenon on thin or insulated objects that are exposed to the night-sky e.g. bicycle saddles, car roofs, and steel sheet roofs. It will never be as strong on walls as these are not as exposed to the sky, but it may be more common on well insulated façades than we think, as it is often not clearly visible. You have to touch the surface to see that it is covered with water.

For night condensation to appear on a wall, several factors are needed:

- The wall should be well insulated.
- The thermally heavy layer outside the thermal insulation should be thin.
- The wall should not have been heated during the day.
- The air temperature should be lowered during the night so that the relative humidity of the air is increased.
- The sky has to be clear and cold.

Similar conditions are also created when the building has received prolonged heavy rainfall, which in its own right is not an issue but in the winter months the walls do not always have a chance to dry out fully.

Mineral finishes are considered more absorbent than organic materials (acrylic/silicone finishes) which are generally more hydrophobic so that the water will form droplets on the surfaces more easily.

CHANGES IN AIR QUALITY (Source: DEFRA 2013 report on Air Pollution in the UK).

Atmospheric pollution in the UK is changing with many harmful components reducing. Of particular relevance is a significant reduction of lead residues previously produced by petrol used in cars.

Lead is a natural biocide and used to be used in the coatings industry to prevent microbial growth before it was banned for health considerations. The reduction in atmospheric lead means surfaces are less 'rich' in lead and organo-lead and is likely to be helping both green and black algae to grow.

In addition, the reduction in Sulphur Dioxide has been just as marked as the reduction in lead.

“The main source of Sulphur Dioxide is fossil fuel combustion. SO₂ emissions in the UK have decreased substantially since 1990, due to reductions in the use of coal, gas and oil, and also the reductions in the sulphur content of fuel oils and DERV (diesel fuel used for road vehicles).”

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CLIMATE CHANGE (Source: Met Office)

The case in favour of climate change is becoming progressively stronger.

Higher temperatures

Scientific research shows that the climate - that is, the average temperature of the planet's surface - has risen by 0.89 °C from 1901 to 2012. Compared with climate change patterns throughout Earth's history, the rate of temperature rise since the Industrial Revolution is extremely high.

Changing rainfall

There have been observed changes in precipitation, but not all areas have data over long periods. Rainfall has increased in the mid-latitudes of the northern hemisphere since the beginning of the 20th century. In the UK, 4 of the 5 wettest years have occurred this century and the winter of 2013/14 has already set the record for the wettest on record. There are also changes between seasons; the UK's summer rainfall is decreasing on average, while winter rainfall is increasing.

SUMMARY

Climate changes, the changes for the better in atmospheric pollution and our need to make our buildings more energy efficient does go some way to explaining why buildings appear to be suffering more widespread algae attacks in recent years.

REMEDIAL WORKS

The render system will continue to fulfil its principal role of protecting and keeping the building dry. Where a surface has been affected by mould or algae staining, Parex can offer some cleaning solutions.

As a manufacturer, Parex continually strive to combat differing conditions which can affect the render finish. Parex can offer a water based coating that can be applied to the surface of the render which creates a water shedding effect on the render surface. For guidance and support, please contact Parex.

For additional information or other Technical Information Sheets, please visit our Web site link http://www.parex.co.uk/Render_Systems/Technical_Information_Sheets_and_FAQs

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