TB - 27
Technical Bulletin

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Identification of fungus in the field and recommendations for its removal

Introduction

The purpose of this Technical Bulletin is to provide insight to the occurrence, characterisation, identification and cleaning of fungus. A variety of building materials are susceptible to fungal growth, however, the information provided in this Technical Bulletin relates primarily to COLORBOND® prepainted steel.

It has been estimated that for a given cubic metre of the air around us there may be as many as 10,000 fungal spores present[1,2]. These spores constantly settle on surfaces of all descriptions. Although most spores are washed off by rainfall, when a particular environment or micro-environment is present, certain species may adhere and proliferate to form colonies which can lead to visible darkening of the surface in question.

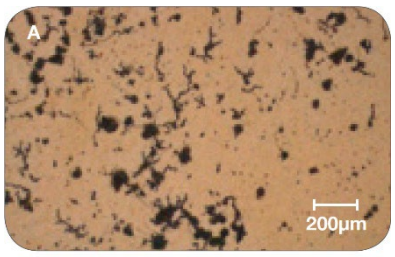
Occurrence

Fungal growth has been observed on a variety of building materials, including COLORBOND® steel, in many tropical and temperate areas of Australia and overseas. Fungal growth occurs where the prevailing 'local environment' or an isolated 'micro-environment' are conducive i.e. when moisture, heat, humidity and nutrients are present in the right balance. Examples of conducive micro-environments in a roofing context include the ridge-capping, areas surrounding bathroom vents or other sources of moisture and nutrients.

COLORBOND® steel is no more prone to fungal growth and discolouration than any other building material. For example, roof tiles, painted wood, PVC pipes, powder coated handrails and glass or polycarbonate skylights are also prone to fungal growth and discolouration. As such, where fungal staining is observed on COLORBOND® steel installations, neighbouring structures and fences will typically also show similar effects of infestation. In cases where the local environment is particularly favourable, lichens may also be occasionally seen, usually across the entire roofing surface. Figure 1 provides an example of lichenous growth on a tile roof.

Figure 1. An example of lichenous growth across the surface of a tiled roof

Figure 2. A close up of a) fungal and b) lichenous growth



Characteristics

Areas affected by fungus may be divided into several basic types based on organism and distribution. Organisms visible on roofs can be broadly divided into fungus and lichen (a symbiosis of fungi and algae). While fungus is generally black, lichen appears green and often leafy. See Figure 2.

Table 1. Guidelines for dilution of different strength bleaches to achieve a 2% sodium hypochlorite solution

% Sodium hypochlorite or % available chlorine in bleach (by weight)	Dilution to give 1L of 2% sodium hypochlorite solution	
	Bleach	Water
10%	200mL	800mL
5%	400mL	600mL
4%	500mL	500mL
3%	670mL	330mL
2%	No dilution required	

NOTE: 1% = 10 grams of sodium hypochlorite per 1 litre of water.

Distribution may take 3 main forms:

1. Isolated growth

Heavy areas of fungal infestation on a building are often seen around the ridge-capping. See Figure 3.

It is believed that this 'ridge cap' effect is due to the favourable micro-environment for fungal growth which exists in this area because of moisture and/or nutrients leaving the roof cavity at the junction of the ridge capping and the roofing sheets.

2. Spotty growth

Organic material may be present as overall clumps or dots spread across the roof. This often manifests as patches of lichen. See Figure 4.

3. Uniform coverage

It is also possible for growth to not be isolated to any specific area but to cover the entire roof area. Such growth is normal on any outdoor structure where the local environment is conducive. When very heavy growth of this type occurs on lighter coloured roofs, the overall colour and appearance may be altered. See Figure 5.

Figure 3. Roof made from COLORBOND® steel showing isolated fungal growth near the ridge capping

Figure 4. Roof made from COLORBOND® steel showing spotty lichen and fungus growth spread across the structure

Figure 5. Roof made from COLORBOND® steel showing uniform coverage of fungus

Identification

The information provided in the Characteristics section above provides a useful initial means of identification of fungus.

It is then recommended that a spot test with sodium hypochlorite solution be carried out. The most convenient source of sodium hypochlorite is household bleach. The bleach should be as fresh as possible and the hypochlorite/available chlorine concentration should preferably be above 3%. Care should always be taken when handling the solution as it is alkaline. Rubber gloves should be worn and always follow the manufacturer's safety instructions. Any tested areas should be thoroughly rinsed with fresh potable water afterwards.

To test, apply a drop of the bleach solution to a suspected area, mark the extent of the drop unobtrusively with a coloured pencil* or chalk and wait a few minutes. If fungus is present, the dark material will be destroyed by the bleach and a clean drop area will result.

Please note that this is NOT a foolproof test for identifying fungus as the bleach can also affect organisms such as algae and bleachable organic matter. However, it is a valuable test because it will distinguish between fungus and normal inorganic dirt, which will not be bleached.

** Do not use black 'lead'/graphite pencil for marking, for more information refer:*

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Cleaning

To clean a COLORBOND® steel roof it is recommended that the roof be washed down with a 2% sodium hypochlorite solution. The sodium hypochlorite solution can be made up from commercially available bleaches. To assist in making up the solution, Table 1 shows the dilution required for different strength bleaches to give a 2% solution.

The bleach should be applied with a soft bristle broom, left for 3-5 minutes, and then washed off with copious amounts of fresh potable water. A small amount of non-ionic detergent, such as dishwashing detergent, may be added to the bleach if necessary to improve wetting.

It is IMPORTANT to note that the use of higher than recommended concentrations of sodium hypochlorite solution and/or extended contact times or the use of commercially available fungicides may be detrimental to the long term performance of COLORBOND® steel products.

Care MUST be taken when using hypochlorite solution to avoid any solution being washed into water tanks.

As the fungal growth is a natural occurrence on COLORBOND® steel, cleaning remains the responsibility of the owner.

References

1. J. Fröhlich-Nowoisky, D. A. Pickersgill, V. R. Després and U. Pöschl *'High diversity of fungi in air particulate matter' Proceedings of the National Academy of Sciences*, 2009, 106, pp. 12814 – 12819.
2. W. Elbert, P. E. Taylor, M. O. Andreae, and U. Pöschl *'Contribution of fungi to primary biogenic aerosols in the atmosphere: wet and dry discharged spores, carbohydrates, and inorganic ions'* Atmospheric Chemistry and Physics, 2007, 7, pp. 4569 – 4588.

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