

Swarf staining of steel profiles

INTRODUCTION

Swarf is the term given to the steel debris arising from cutting or piercing operations when using friction saws, abrasive discs, drills etc., on steel roofing and walling products. Whilst comprising mostly fine steel particles mixed with abrasive media, in this context swarf may also be taken to include any other discarded steel objects such as rivet shanks, nails, screws and nuts, which may come in contact with coated products; ie, COLORBOND® prepainted steel, ZINCALUME® aluminium/zinc/magnesium alloy coated steel and galvanised steel.

Swarf particles, if left on the surface, will corrode and cause rust stains which will detract from the finished appearance of a product. These stains are often mistaken for early deterioration of the roofing and walling itself.

Fresh swarf stains are characterised by small red-brown coloured areas with a central dark spot (the remains of the steel particles). The surface will feel like sandpaper, and the particle may be lifted with a fingernail. An old swarf stain will appear as a localised red-brown stain, the steel particle having corroded away, and the surface will be smoother.

Prevention of swarf staining is the responsibility of the installer and it is strongly suggested that the recommendations contained in this bulletin are followed.

Generally, swarf particles come in contact with coated steel sheet products in three ways.

1. Loose particles left after cutting, drilling and riveting operations;
2. Hot swarf particles from disc cutting or drilling operations which may adhere to the finished surface; and
3. Loose particles which may be trodden into or become embedded in the surface film of prepainted and resin coated products.

PREVENTION

Cutting

BlueScope Steel recommends the use of cold cutting saws, with an appropriate tungsten blade, as it generates larger and cooler particles than abrasive discs.

Where possible, cutting should be minimised by using factory supplied cut-to-length sheets. For complex (eg curved) cuts, such as those associated with roof penetrations, BlueScope Steel recommends the use of powered hand shears.

Sheets cut on site should, where practicable, be cut on the ground, with the exterior colour finish of prepainted sheet facing down

Care should be taken to ensure hot swarf does not come into contact with nearby COLORBOND® steel sheets.

DO NOT cut over the top of other coated products, where debris may fall onto other sheets.

Where cutting must be carried out near sheets already installed, the area around the cut must be masked and the stream of hot particles directed away from completed work.

Note:

This method may produce a burr, which must be removed prior to fixing

Drilling

The area around the hole should be masked to shield the product from hot swarf.

Clean Up

The roof should be swept, rinsed, vacuumed or blown progressively to remove loose particles. Maximum care should be taken when attempting to detach swarf that has become stuck; this can be done, but do not attempt any action that is likely to remove the paint or metallic coating. Any damage to these coatings may lead to reduced life of the material.

When sweeping or rinsing into a gutter, clean out the gutter before leaving the job in order to prevent premature corrosion. On completion of the job, conduct a final rinse or sweep down to ensure that all swarf particles are removed.

Inspection of the job should be made after two weeks when rain or condensation will have caused any remaining swarf to rust. This will highlight affected areas for rectification (see figure 1 below for example) *TREAT AS FOR REPAIR.*

Many swarf staining problems arise not only from installers, but also from following trades working in the vicinity. Architects, builders and project managers need to be aware of this possibility, and warn contractors accordingly.



Figure 1 Swarf staining

EFFECT ON PERFORMANCE

The effect of swarf staining itself on COLORBOND® steel products is generally aesthetic, and may not be detrimental to the performance of the product. On prepainted surfaces, red oxides of iron are normally inert substances and do not attack the prepainted finish; the stain is merely absorbed by the prepainted finish. Red oxides of iron are insoluble in water, and the stain will take considerable time to weather away naturally.

The product life will be severely affected where attached swarf particles have penetrated the prefinished film and are in contact with the protective metallic coating, although, this generally only occurs in severe cases.

On metallic coatings, accelerated corrosion can occur over a small area as the zinc in the metallic coating sacrifices itself to prevent oxidation of both the swarf and, if allowed to continue, exposed areas of the steel base. Removal of swarf in the first place is a far better alternative to the repair of damage.

REPAIR

Metallic-Coated Steel Sheet

Brush the surface with a stiff bristle (not metallic wire) brush to dislodge particles which must then be completely removed, not just swept into the guttering. Wire brushing will mar the appearance of the sheet if brushing is not followed by painting. If the metallic coating is severely damaged by swarf corrosion, the affected area should be replaced, or over-painted following the recommendations contained in [Technical Bulletin TB-2](#) *Overpainting and Restoration of Exterior BlueScope Steel Products*.

STEEL WOOL MUST NOT BE USED

as it breaks-up and becomes swarf itself.

It must be noted that acidic products must not be used with ZINCALUME® steel or galvanised steel as excessive staining and corrosion will occur due to the acid.

Prepainted Steel Sheet

Mild Staining

Clean the surface by washing with a mild household detergent and fresh potable water in proportions as recommended by the detergent manufacturer, then rinse well with fresh potable water.

Severe Staining

1. Clean the surface by washing with a mild household detergent and fresh potable water in proportions as recommended by the detergent manufacturer, then rinse well with water.
2. Remove the corrosion product by using a stiff nylon brush and rinsing completely. More heavily affected areas may need a light rub with a Scotch-Brite® pad (not steel wool). Abrasive papers should only be used if repainting is to be conducted.

Care must be taken not to cause excessive damage to the paint film.
3. Finally, should steps 1 & 2 above prove to be ineffective, treat affected areas with a rag soaked in a solvent based metal cleaner, such as METAPHOS AR67 (AMERON Paints), DEOXIDINE (PPG Ltd), or similar. Rinse thoroughly after treatment with potable water, as residual acid

at the cut edge of the sheeting will cause accelerated corrosion of the metallic coating.

Very Severe or Extensive Staining

In these cases, where aesthetic factors are important, either replacement or overpainting may be the most appropriate solution. For advice on overpainting, refer to [Technical Bulletin TB-2](#) *Overpainting and Restoration of Exterior BlueScope Steel Products*.

As air drying paints will weather more rapidly, and in a different manner to prepainted roofing and walling products, the whole visible area should be repainted.

If swarf particles are over-painted, rust bleed-through is likely to occur, therefore all swarf particles should be removed.

It should be noted that all of the above remedial actions will not restore the product to its original state. Therefore it is critical to ensure that the occurrence of swarf is avoided. In the event that swarf is produced, it should be removed.

RELATED BLUESCOPE STEEL TECHNICAL BULLETINS

[Technical Bulletin TB-2](#)

Overpainting and Restoration of Exterior BlueScope Steel Products

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