



ENHANCING METAL ELEMENT DURABILITY

Metal building elements may deteriorate more quickly without regular washing, so what should designers consider when incorporating metal building elements in their designs and what maintenance advice should they give clients?

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Dust, dirt, salt spray, mosses and lichens all need to be regularly removed or metal roofs and wall claddings may corrode or become pitted or discoloured, powder-coated aluminium joinery may be subject to chalking (an aesthetic issue) and window and door components can become stiff or seize up. Atmospheric contaminants in severe marine, geothermal or industrial areas can increase this corrosion risk.

Metal deterioration may also be caused by the incompatibility of adjacent materials such as another metal or timber that is acidic (cedar) or contains a copper preservative. Copper-based preservatives may be highly corrosive to metals when damp. Some timbers such as western red cedar contain natural acidic resins that will also cause corrosion.

Some areas miss rain washing

Rain naturally washes many parts of a building, particularly the roof and wall claddings. However, some areas may be sheltered such as:

- the top of walls and windows protected by eaves
- a lower roof section or windows protected by an overhanging roof
- walls under a porch, veranda or a wide overhang.

These areas require at least annual manual washing to keep them clean and should be designed so they can be reached without requiring scaffolding.

Designer's role starts with material selection

Designers should consider corrosion and maintenance issues in designs. Before selecting



Figure 1: The lack of eaves means that the wall will be rain-washed but the weathertightness risk that has to be designed for is higher.

a particular metal and finish, consider the corrosion level of the metal, the corrosion risk it will be subject to and the compatibility with adjacent materials.

Designing to facilitate natural rain washing and to ensure all parts of the building exterior are accessible for maintenance and cleaning can directly enhance the durability of the building materials.

Designers also have a responsibility to ensure that the building owner is aware of maintenance requirements. A building maintenance manual that can be passed on to subsequent owners should be supplied on completion of a building project.

Regular washing needed

Maintenance primarily involves annual or 6-monthly washing to remove the build-up of dust and dirt, atmospheric salts or moss growth, which can all contribute to deterioration of metal building elements. Washing should be by hosing (not waterblasting) and brushing as required with a soft bristle brush. A mild detergent may be used if necessary but the cladding must be thoroughly rinsed afterwards, particularly parts of the building that are not rain washed.

METAL ROOFS

Roofs are generally cleaned by rain washing, but some areas, such as where a section of roof is protected by an overhanging gable or a low-pitched roof with minimal run-off, may not be adequately washed by rain. These areas will require regular cleaning and should be designed to be easily accessible.

Metal roofing elements such as internal metal gutters and outlets and the underside of metal gutters and fascias must also be designed to allow for cleaning.

Disconnect downpipes before cleaning if the roof is used to collect drinking water. The recommended frequency for cleaning roofs is shown in Table 1.

METAL WALL CLADDINGS

Metal wall claddings may be pre-painted or unpainted profiled sheet metal or aluminium, proprietary aluminium weatherboards in a range of profiles and with a choice of anodised and powder-coated finishes, or copper or zinc sheet claddings joined using a variety of seamed finishes.

Wall claddings are likely to have more areas than a roof that are not rain washed, such as at the top where the wall is protected by the eaves and in porches and other recessed areas. →

Table 1: Recommended cleaning frequency for roofs.

Material	Zones B and C ¹	Zone D and specific engineering design ^{1 2}
Painted zinc/aluminium alloy-coated or galvanised steel, unpainted aluminium, stainless steel	Annually	6 monthly, increased to 3 monthly for very severe environments
Unpainted zinc/aluminium alloy-coated or galvanised steel	6 monthly (unpainted galvanised steel not recommended in moderate environments)	Use not recommended

Note 1: Classifications according to NZS 3604:2011, Section 4.

Note 2: Includes microclimate conditions as described in NZS 3604:2011 4.2.4, e.g. industrial and corrosive atmospheres, chemical and fertiliser contamination and geothermal regions.

All metal wall claddings should be washed at least once a year or according to the manufacturer's recommendations. Washing should be more frequent in severe environments (see Table 1).

ALUMINIUM JOINERY

Aluminium joinery should be cleaned every 6 months or 3-monthly in severe marine or geothermal environments. Dirt and other deposits on powder-coated aluminium frames should first be removed with a damp cloth or sponge to reduce the risk of scratching the surface. Washing of both powder-coated and anodised frames can be using warm water with a mild detergent. Thoroughly rinse the joinery with clean water afterwards. Do not use solvent cleaners on powder-coated aluminium joinery.

Window and door hardware should not be overlooked as they also require maintenance. Friction stays become stiff, particularly if the windows are not often opened. A light spray lubricant can be applied to the stay joints, followed by opening and closing the window several times to remove stiffness. Hinges, cylinders and locks may also require lubrication with a light spray lubricant or graphite powder to keep them running smoothly.

The rollers and wheels of sliding and bifold doors and windows should be vacuumed regularly to keep them clean and free of dust and dirt. A silicone spray can be used to keep rollers and wheels running smoothly in tracks.

Drain holes should be checked and cleared of any dust or debris.

METAL FIXINGS AND FASTENINGS

NZS 3604:2011 Section 4.4 defines exposure zones, sets out durability requirements for steel



Figure 2: Aluminium weatherboard wall cladding. The top of the wall will not be rain washed and will require cleaning.



Figure 3: Moss growth on painted profiled metal cladding due to lack of cleaning.



Figure 4: More severe red and white rust corrosion on the underside of a metal gutter where it has not been rain washed or cleaned.

fixings and fastenings with regard to exposure zones and also gives minimum requirements for steel fixings with ACQ and CuAz-treated timbers, which have higher levels of copper than CCA treated timber.

However, a recently completed BRANZ study found that, in addition to ACQ and CuAz-treated timbers contributing to an accelerated corrosion rate of mild steel and galvanised steel fastenings, under some circumstances (depending on level and type of treatment), the corrosion rate was significantly higher for galvanised steel than for mild steel. The same study found that stainless steel fastenings performed well under the same conditions.

The report raises concern that zinc-coated metal fastenings are likely to be used in preference to mild steel fastenings in H3.2 and H4-treated timbers and that metal fixings have not been adequately differentiated for durability and the corrosiveness of timber treatments according to the current New Zealand Building Code compliance documents.

It recommends that 304 and 316 grade stainless steel or durable equivalents such as silicon bronze be used for structural components and connections in ACQ and CuAz-treated timbers (i.e. H3.2 and higher) to meet the 50-year durability requirement. ❖