

What could cause a paint failure?

A paint failure either during or after application is bad news for all concerned. It can be costly, both in time and expense. It can also harm the reputation of the contractor, the specifiers and the paint manufacturer, plus it will likely be a huge inconvenience for the property owner and occupants.

There are many factors that could contribute to causing a paint failure. We have worked with top industry personnel to determine what these causes are and how they can be avoided.

A majority of premature paint failures can be attributed to one of the following reasons:

- *The wrong product is specified for the substrate or exposure.*
- *Insufficient or improper surface preparation.*
- *Ignoring the environmental conditions before, during and after application.*

However, there are many other reasons that should not be overlooked for example:

- *Top coat applied before the undercoat is dry.*
- *Top coat unable to bond to a glossy surface.*
- *Excessive coats of paint.*
- *Limited paint flexibility; possibly as a result of excessive coating thickness.*
- *An excessively thick coat that prevents the under coat from drying properly*
- *A hard, ridged coating (e.g. alkyd enamel) over a soft, flexible coating (e.g. latex)*
- *Excessively high temperature during application causing rapid curing*
- *Hard coating applied to soft or uncured primer*
- *Moisture causing expansion of substrate*
- *Over-spreading and over-thinning of the applied coating*
- *Low quality, high pigmented paint*
- *Indoor paint used on exterior substrates*
- *Use of epoxy paint in direct sunlight*

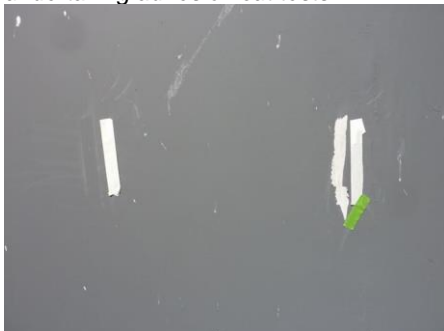
Carrying out failure analysis is part of most coatings inspectors' day to day practices. Below we showcase an actual paint failure that occurred on a recently re-coated building. This shows what a negative impact a failure can have and the importance of getting the job done right first time!

A site visit / inspection was carried out by a qualified inspector, the focus of the inspection was to check the adhesion of the previously painted exterior concrete tilt-up wall surfaces.

The re-painting of the tilt-up concrete surfaces was completed in late summer the year prior. Two colors were applied, a very dark grey and a cream color.

Specifications called for the concrete surfaces to be power washed before any recoating, then primed with a W.B. Alkali Resistant Primer, followed finally by 2 coats of an exterior flat latex.

Upon initial observation the inspector noted that a number of areas on the upper concrete surface dark grey panels were exhibiting some paint delamination. Concrete panels exhibiting small adhesion problems were then checked by undertaking adhesion cut tests.



Adhesion cut tests were performed over a patched area and non-patched area at the same time.

- Adhesion cut tests over non-patched concrete revealed an adhesion level of "5A" = no peeling or removal. (Red arrow)
- Adhesion cut test on patched area: "0A" = no adhesion. Dust under the film. (Blue Arrow)

It became apparent that the coating on any patched and ground areas had no adhesion. The paint peeled easily back from the patches. The back of the peeled back coating revealed a large amount of concrete dust that was loose and had been painted over.

The Inspector then carried out similar adhesion tests on the light colored concrete panels, to rule out a paint selection failure. As it turned out the results were indeed the same as on the dark concrete walls. Paint was again removed easily down to bare concrete on the patched areas and had good adhesion over the non-patched concrete.

Conclusions and Recommendations:

The Inspector concluded that adhesion levels of the paint finish on the patched areas was very poor to non-existent and that all areas exhibiting poor adhesion showed excessive amounts of concrete dust under the film. He also added that there were no signs of any "Alkali Burning" of the paint", plus no flaking or discoloration of the applied coating was found.

The result of the tests proved that the lack of adhesion on and around the patched areas was directly attributed to the amounts of loose concrete dust left on the surface before paint application. The dust should have been removed when the wall surfaces had been power washed, and the patched areas should have been checked for dust residue before any paint was applied.

In conclusion: Incomplete cleaning attributed to the lack of adhesion and eventual coating failure.

The inspector recommended the following steps be taken to correct this situation:

1. *An area should be chosen as a mock-up.*
2. *Set up and power wash some sections of the dark concrete using high pressure and a turbo nozzle. Concentrate on the patched areas. This should remove any loose paint and any remaining concrete dust.*
3. *After, "feather edge" (power disc sand) the transitions between the bare patches and the remaining paint.*
4. *Spot prime all bare concrete with MPI #3 – W.B. Alkali Resistant Primer.*
5. *Topcoat the primed area with MPI #10 – Exterior Flat latex.*
6. *Finish coat entire area with MPI #10 – Exterior Flat Latex.*

Had the specification been followed correctly, a qualified inspector been involved from the start of the project and had care been taken to make sure preparation work was carried out sufficiently in the first place, this costly failure would likely not have occurred.