

POWDER COATING QUALITY: WHAT TO ASK AND LOOK FOR AND SOME BASIC TESTS?

1.0 PURPOSE

We often get asked by customers “what steps can we take when purchasing powder coated fencing”, “what should we look for when trying to assess the quality of powder coating” and “what are some basic tests we can get done”?

We have developed this document to assist answer these questions.

2.0 REFERENCE DOCUMENTS

1. Australian Standard “[AS4506:2005 Metal finishing - Thermoset powder coatings](#)”.
2. Bluedog document “Risk Register: Powder coated tubular fencing”.
3. Bluedog document “Material quality risks with powder coated tubular fencing and gates”.

3.0 RECOMMENDED STEPS

Steps to take before purchasing the product

We recommend taking the following steps to reduce the risk of having buying a product that has a poor service life:

1. Ask the supplier to provide data sheets on the powder manufacturer they use and whether they offer any warranty on the coating.
2. Ask to see a sample of the suppliers finished powder coated product.
3. Ask the supplier if they have supplied any materials in a location nearby that you can have a look at.
4. Ask the supplier for an outline of their powder coating process.
5. Ask the supplier if they powder coat the materials in-house or if they outsource to a third party.
6. Ask if the supplier has any external quality assurance accreditation of their powder coating systems.
7. Ask if the supplier operates a metal pretreatment and powder coating system that complies with AS4506.
8. Ask the supplier to provide test results for [Neutral Salt Spray](#) (NSS) adhesion.
9. Specify that materials are to comply with AS4506 in the purchase order?
10. Ask the supplier to provide a recent NSS test certificate when the product is supplied.

Steps to take when the materials are supplied

1. Inspect the product closely and look for evidence of the following (see example images below):
 - **Light coating** (too little powder applied) identified by being able to see the pre-galvanised steel under the coating.
 - **Heavy coating** (too much powder) identified as ripples or 'runs' in the coating.
 - **Blistering** (the film lifting from the metal surface) the powder film. Sometimes called the 'orange peel' effect because the surface of the film is similar to the skin of an orange.
 - **Delamination** (failure of adhesion of the film to the metal surface).
 - **Pin-holing** (a series of small holes in the film).
 - **Differences** in the coating quality and color/ gloss level. For example, there may be a difference between level panels (that may be imported) compared to raked panels and gates (that may be locally made).
2. Ask the supplier for any coating warranty details.
3. Use a micrometer to test the film thickness of the powder.
4. If you have access to a Stanley knife or sharp blade, do a simple [cross hatch test](#) per AS4506 (see images below) to test the curing and adhesion of the powder film.
5. If you have access to [MEK solvent](#), do a basic [MEK rub test](#) per AS4506 to test the curing of the powder (see images below).
6. Take a sample of the product and have it tested in a Neutral Salt Spray (NSS) test chamber. This the best test to gauge the expected service life of the powder coating.



This image shows the white rag after a light rub laterally across the face of the tube of product powder coated by Bluedog (15 cycles). This result indicates the coating passes the MEK solvent rub test per AS4506.

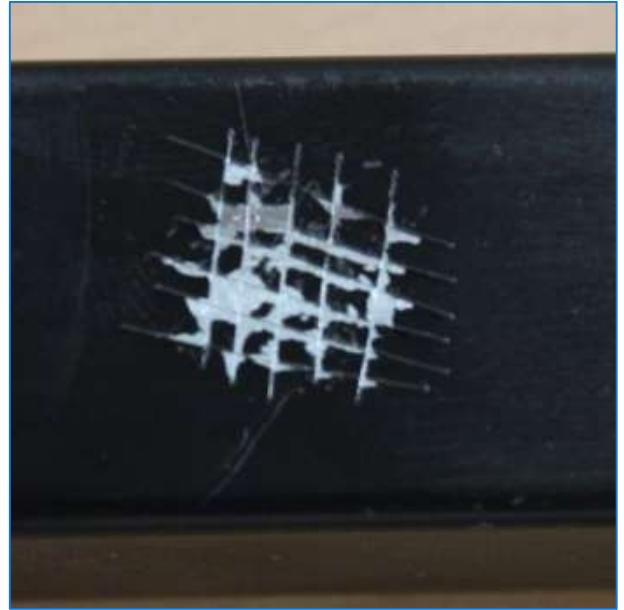


This image shows the white rag after a light rub laterally across the surface of the tube (10 cycles). The presence of extensive coating on the rag indicates a failure of the coating to pass the MEK solvent rub test per AS4506.

This indicates poor quality powder, poor metal pretreatment and under cure of the powder. Under cure means the mechanical and corrosion protection qualities of the coating are compromised. Image of 'new' fence.



This image shows the cross hatch test of product powder coated by Bluedog. A tool/ blade creates a cross hatch on the powder surface. The powder sections should adhere when flicked with the edge of the blade. The lack of delamination of the square hatches indicates the coating passes the cross hatch test under AS4506.



This image shows the cross hatch test of product powder coated in the market. The delamination of the square hatches indicates the coating fails to meet the cross hatch test under AS4506. Image of 'new' fence.



This image shows a Bluedog sample tube after Neutral Salt Spray (NSS) adhesion test at 1000 hours. There is less than 2mm of under cut (delamination) off the scribe indicates the coating passes the NSS test under AS4506.



This image shows a sample tube after Neutral Salt Spray (NSS) adhesion test at 1000 hours. There is significant under cut (delamination) off the scribe indicates the coating fails the NSS test under AS4506 at 1000 hours.



An example of the powder application being too 'heavy'. This powder film will be under cured and as a result the proper mechanical properties of the film will not have been achieved. The film will be 'soft' and will readily delaminate.



An example of the powder film delaminating as a result of poor metal pretreatment and under cure. This image was taken less than 1 month after installation of the fence.



An example of blistering of the powder coating or the 'orange peel' effect a result of poor quality metal surface preparation on an imported panel. This image was taken less than 18 months after installation of the fence.



An example of delamination (failure) of the powder film. This is likely a result of contaminants or oxidation (white rust) on the surface of the steel before coating. This image was taken less than 18 months after installation of the fence.



An example of delamination of the powder film. This image was taken less than 18 months after installation of the fence.



An example of 'pin holing' most likely a result of low quality powders and/ or poor pretreatment and cleaning of the steel surface before coating. This image was taken less than 18 months after installation of the fence.



An example of the result of using low quality powder and insufficient coating thickness. The coating has severely faded. The coating has offered little barrier corrosion protection of the steel resulting in aggressive corrosion. This image was taken less than 24 months after installation of the fence.



A close up of image (left) showing failure of the powder coating at 24 months. The film has severely faded and lost its barrier corrosion protection qualities.