

# C-Coat Applicator Training Manual

## 1 INTRODUCTION

C-Coat thermal insulation coatings are high-end thin-film paint insulation systems. They get their extreme efficiency for very small thicknesses by using a range of fillers that reflect heat, limit the volume through which the heat can flow, and extend the heat flow path (normal insulation just extends the heat flow path). One of the main constituents is the vacuum-filled ceramic beads which act like tiny little double-glazed windows, but with more heat reflection and slower transfer.

This training manual takes you through the techniques, tips and tricks for the application of the coating to different substrates. Whilst we endeavour to cover as much detail as would be needed to apply the product successfully, it is up to the applicator to be aware of site specific constraints, and to be on the lookout for potential issues.

## Contents

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>2</b>	<b>SAFETY</b>	<b>3</b>
2.1	PERSONAL SAFETY REQUIREMENTS	3
<b>3</b>	<b>STANDARDS</b>	<b>3</b>
<b>4</b>	<b>MACHINE SETUP</b>	<b>4</b>
4.1	MACHINE TYPE	4
<b>5</b>	<b>SURFACE PREPERATION</b>	<b>5</b>
5.1	REGULAR CARBON STEEL	5
5.2	STAINLESS STEEL & ALUMINIUM	5
5.3	CONCRETE & MASONRY	5
5.4	COLOURBOND	6
5.5	WOOD	6
5.6	PLASTIC (E.G. PVC, ACRYLLIC, HDPE)	6
<b>6</b>	<b>APPLICATION UP TO 90°C SURFACE TEMP</b>	<b>6</b>
6.1	MATERIAL RECEIPT	6
6.2	COATING APPLICATION	6
6.3	FINISHED SYSTEM	8
6.4	REPAIRS	8
6.5	QUALITY ASSURANCE	9
6.6	NOTES AND CLARIFICATIONS	9
<b>7</b>	<b>APPLICATION UP TO 150°C SURFACE TEMP</b>	<b>9</b>
7.1	GENERAL	9
7.2	COATING APPLICATION	9
<b>8</b>	<b>PROTECTION</b>	<b>10</b>
<b>9</b>	<b>DISCLAIMER</b>	<b>10</b>



## 2 SAFETY

Standard coating prep, application, clean-up and maintenance safety measures are required when using C-Coat. It is a non-hazardous, non-dangerous goods product. But as with any paint, you need to prevent any eye contact, ingestion or inhalation.

All equipment should be grounded and sources of ignition removed from the worksite.

All product, including wash water, abrasive media and solvents shall be prevented from entering the environment.

### 2.1 PERSONAL SAFETY REQUIREMENTS

Observe the site HSEQ policy at all times and obey all written and verbal instructions from site supervisors and representatives.

Wear all PPE at all times including Safety glasses, Boots, Gloves and Masks as required. SDS's for all products are available and must be posted during application work.

When preparing and applying coatings and chemical materials all PPE must be worn including Gloves, safety glasses and protective masks appropriate to the product being used and the proximity to the product. When using high pressure plural component spray equipment, all personnel working in the application area must wear double filter breathers with OSHA ratings.

## 3 STANDARDS

The following standards are most commonly applicable when applying C-Coat.

- AS1627      Metal Finishing – preparation and pre-treatment of surfaces
  - Part 1 – Removal of oil, grease and related contamination
  - Part 4 – Abrasive blast cleaning
  - Part 9 – Pictorial surface preparation standards for painting steel surfaces
- AS/NZS2312      Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings.
- AS3894      Site testing of protective coatings
  - Part 1 – Non-conductive coatings – Continuity Testing – High Voltage ('brush') method.
  - Part 2 – Non-conductive coatings – Continuity Testing – Wet sponge method.
  - Part 3 – Determination of dry film thickness
  - Part 5 – Determination of surface profile
  - Part 6 – Determination of residual contaminants
  - Part 7 – Determination of surface temperatures

## 4 MACHINE SETUP

### 4.1 MACHINE TYPE

The smallest machine that will successfully pump C-Coat is the Graco Ultra Max II 795 or equivalent. The main issue is the ability to pick up a relatively thick product, because the working pressures are only 500-1200psi. The pickup is the key. Recommended setup is;

Graco 795 Ultra Max II or better

Silver Plus Gun or bigger (bigger fluid paths)

9.5mm hose, length to suit

A 4.8mm diameter whip hose is OK, but the shorter the better, and if you can avoid it, even better.

30 mesh machine filter or no filter (60 mesh will clog and burst)

No gun filter

Shortest pickup possible. The leg in the attached is ideal, longer, flexible arrangements tend to be too long to pick up the paint from the bucket unless you are using a large NXT machine.

Recommended tips are the LTX tips from 0.017 to 0.037", with a fan size to suit.



Other machines can be used, as long as they can pick up and suitably spray the product. Airless is required.

**The maximum allowable pressure is 1200psi, any higher and the microspheres could burst. Not that you should need it that high, because we tend to find 500-800psi works great for most applications.**



## 5 SURFACE PREPERATION

It is worth remembering that C-Coat is a relatively soft coating. It will generally fail in cohesion rather than adhesion. However, it is still important to maximise the adhesion the same as any coating, because adhesion helps prevent peeling and corrosion of the substrate. The following describes the ways we recommend for maximising adhesion on different substrates in an efficient manner.

All weld splatter, sharp corners and rough welds shall be removed prior to coating. These defects can minimise the thickness of the C-Coat in those areas and lead to corrosion at a later stage.

In all cases, we recommend ensuring that the surface shall be clean of all dust, oil, grease and other contaminates that may affect the adhesion of the coating system. A black (UV) light should be used to inspect for oil/grease during/after washing. If grease or oil contamination is present, clean using one of the nominated methods in AS1627 Part 1 (High pressure mixed with alkaline degreaser recommended).

Surface salts must be kept to a maximum of 50 mg/m<sup>2</sup> measured using one of the techniques nominated in AS3894.6.

The same surface cleanliness shall be maintained between each coat.

### 5.1 REGULAR CARBON STEEL

C-Coat can be applied over lightly rusted substrates (no loose, flaky rust), but we recommend removing the corrosion as much as possible, because otherwise you will get rust bleed-through. Hence, by default, you should aim for a minimum S2 cleanliness and a surface profile of 25 microns minimum.

If the desired cleanliness can not be achieved, remove as much loose rust, grease and other contaminants, then apply a rust converting/surface tolerant primer.

### 5.2 STAINLESS STEEL & ALUMINIUM

C-Coat can be applied to stainless steel or aluminium with appropriate preparation. After cleaning, we recommend abrading with a whip blast, or sanding the surface with 60-100 grit media. Clean the surface with a solvent soaked rag after sanding/abrasion.

Etch primers such as Dulux's Precision Maximum Strength Adhesion Primer can be used to give reasonable adhesion with minimal surface prep, but whenever using a primer, be careful to match it to the substrate temps that the coating will be subject to during installation or operation.

### 5.3 CONCRETE & MASONRY

Ideally, concrete/masonry should be ground or shot blasted to a CSP-1 or 2 profile to remove the laitance and any curing compounds on the surface (residual curing compounds are the most common cause of concrete coating failure). However, it can sometimes be applied to off-form concrete finishes. This will depend on the abuse that is likely, and the quality of the concrete. If in doubt, do a trial area. Do not acid-etch concrete.

In some cases, concrete can be dry and porous and can suck the moisture out of the coating, causing it to go powdery on the surface. There are a few ways to overcome this – seal the concrete first with Glasson Group's Wonderbond or similar (which also acts as a primer), or dampen the surface first with water (this is dangerous if you do it at the wrong time of day or too much water is in the substrate), or apply 2 mist coats of C-Coat mixed approximately 1:1 with water by volume, prior to starting the main coating layers.

## 5.4 COLOURBOND

We recommend treating Colourbond the same as Section 5.2.

## 5.5 WOOD

Wood should not be polished, but lightly roughened to open up the surface. Once open, it should be treated the same as concrete (Section 5.3). Although it should be noted that the wood can be even more porous than concrete, so the risk to the coating becoming powdery is greater. In which case, increasing the sealer coats may be required. We strongly recommend testing an area prior to full application.

## 5.6 PLASTIC (E.G. PVC, ACRYLLIC, HDPE)

Roughen the plastic using 60-100 grit media, or a whip blast and clean. Beyond that, the adhesion will depend on the primer used. For PVC, C-Coat primer has been used, but dedicated plastic primers are recommended.

# 6 APPLICATION UP TO 90°C SURFACE TEMP

## 6.1 MATERIAL RECEIPT

Upon receipt of any material on site, a record shall be kept of date/time of receipt, batch numbers and manufacturing date. Containers shall be checked for damage and any damage shall be reported to the freight company/supplier immediately.

## 6.2 COATING APPLICATION

### 6.2.1 Mixing

The product should be thoroughly mixed before use, and keep mixing during use to avoid skinning. Mixing with a jiffy mixer for 4-6min at 200-400 RPM is recommended. The mixed product should be consistent in texture and feel. It is almost the consistency of whipped cream when properly mixed, with no lumps. Different products have different consistency as follows;

Façade – Thinner than the others when thoroughly mixed, like partially whipped cream. Can still separate when sitting for long periods. Generally has a lower wet film build than the others because it is thinner.

Standard – generally the thickest product. Like whipped cream when properly mixed. Has the best wet film build and hang-up properties.

High Temp – Similar to standard, but not as good wet film build. Can be clumpier and take longer to mix depending on amount of separation (due to the changes in the binder).

T600 – Closer to Façade in consistency when properly mixed (like partially whipped cream), can take longer to mix, similar to High Temp.

Keep both primer and full-strength versions mixed during application and avoid skinning.

### 6.2.2 Filtering

In some cases, temperatures less than 10°C during transport can freeze the water in the solution, causing the binder to cure into clumps. The product can also cure and dry out if the air is too hot and too dry during storage causing clumps and flakes. This can cause blockages in the gun.

If there is any risk concern that this has occurred, we recommend filtering the product through a bucket strainer/filter prior to spray application (roller and brush doesn't require this). If your gun is blocking regularly, then this is most likely the cause.

A 30 mesh machine filter can also help prevent any tip blockages without hindering the product flow. 60 mesh filters will clog and blow out.

### 6.2.3 Primer

A specific C-Coat primer may be required for certain projects; in which case follow the application instructions for that primer.

For concrete and other porous surfaces, we recommend wetting the surface, or better yet, sealing the surface before C-Coat primer application using Wonderbond or other suitable concrete sealer/primer/bonder.

Stripe coat corners and detail areas before priming the full area.

### 6.2.4 Main Coat

No more than 5% by volume of water should be added to improve viscosity (Façade should not need anything). The number of coats required may need to increase due to the associated decrease in attainable dry film thickness per coat.

Stripe coat corners and detail areas before coating the full area, at every coat.

The main C-Coat layer shall be built up in 500 micron nominal DFT layers (625 micron WFT) to desired final thickness. Some products may require thinner coats depending on orientation of the surface, application method (spray, brush or roller) and thinning rate. C-CoatFaçade and the high-temp and T600 versions may need 2-3 separate builds to give the 500microns, these can be separated by about 1hr or more (if the first pass is surface dry) but still done in one day.

We recommend a minimum of one coat of 500microns for any application (250 absolute minimum for Façade if reflection is the main method of thermal protection), even then this may be a little opaque still (from an aesthetic viewpoint).

Allow a minimum of 12 hours between coats (at 25°C surface temp and 50% humidity).

Coats that are too thick can result in alligator cracking as the coating dries and pulls away at the surface while the coating closer to the substrate is still drying out. See below image for extreme example. Minor cracking can be over-coated to repair it.



At elevated substrate temperatures (45-90°C) monitor drying times and condition of the applied coating during application. Additional water may be useful to prevent the coating drying too quickly.

#### 6.2.4.1 Airless Spray

Airless spray application generally gives the most consistent surface finish and is normally quickest.

Build up each coat with a cross-hatch spray pattern. Building more than 750 microns WFT (un-diluted) in one coat can lead to sagging and cracking of the coating upon drying. If watered down the allowable thickness will reduce accordingly.

#### 6.2.4.2 Roller

Texture rollers (see example image below) tend to be the best choice for building thickness in minimal passes with a roller. Other long nap rollers may be used as well, but more coats are likely to be required to build the desired final thickness.

Some variants (C-Coat façade in particular) are easier to roll and brush than others, but may require more coats to build the desired thickness.

Watering down the product by up to 5% by volume can help with application by long nap roller.



#### 6.2.4.3 Paint Brush

When using a paint brush, relatively thick layers can be applied by using ample amounts on the paint brush and a light brush stroke. A more consistent finish is possible when using C-Coat thinned down with around 10-20% water. However, this will take longer to dry and may need more coats to achieve the desired thickness.

#### 6.2.5 Topcoat

In some cases (e.g. high chemical exposure, or where a harder coat or colour is required) a topcoat may be used. In general, acrylic or polyurethane topcoats are recommended for compatibility. Topcoats should be applied after allowing a minimum 24hrs, preferably 48 hours for drying of the finished C-Coat but this will depend on their sensitivity to moisture for substrate temperatures of not more than 150°C

Topcoats should be chosen to be able to withstand the expected temp of the C-Coat surface.

### 6.3 FINISHED SYSTEM

The finished coating system shall be free from pinholes, blisters and holidays.

The final average Dry Film Thickness of the system shall be greater than or equal to the specified DFT, with no single reading less than 90% of the specified DFT.

A minimum of 0.5mm DFT is recommended.

### 6.4 REPAIRS

If repairs are required they should be conducted immediately following the final inspection by the following method;

1. Cut out the defect back to sound material
2. Clean contamination from the repair area.

3. Re-coat the affected area to restore the minimum thickness.

Repairs are subject to the same QA checks and environmental constraints as the regular works.

## 6.5 QUALITY ASSURANCE

### 6.5.1 Environmental conditions

Prior to surface preparation, primer application, prior to C-Coat application and after application, atmospheric and substrate conditions shall be monitored and recorded on, at minimum, a daily QA/ITP document.

Ambient air temperature ( $T_a$  °C) - Ambient temperature should be higher than 10°C for primer in particular.

Relative Humidity (RH %) – RH should be lower than  $\leq 85$  % for primer (polyurea may be pushed to 90-95% as long as the substrate is more than 5°C above the dew point temperature).

Substrate temperature ( $T_s$  °C) –  $T_s$  shall be  $\geq 3$ °C of Dew Point temperature generally. An alarm should be set to warn when  $T_s$  is falling and comes within 5°C of the dew point temperature and more regular monitoring conducted. Measurement shall be conducted in accordance with AS3894 Part 7.

Dew point temperature ( $T_d$  °C) -  $T_d$  shall be calculated from the Dew Point chart or Dew point tables with the Ambient temperature & Relative humidity readings. It is the temperature at which condensation occurs over the substrate.

### 6.5.2 Measurement of DFT

Wet film thickness should be monitored with a standard wet film thickness comb. Dry Film Thickness shall be measured using an appropriate dry film thickness gauge, in accordance with AS3894 Part 3.

### 6.5.3 Holiday Detection

In corrosion sensitive environments, the coating shall be inspected for holidays using wet sponge or HV brush methods as per AS3894 Part 1 or 2, depending on thickness.

### 6.5.4 Final Visual Inspection & Documentation

Final visual inspection shall be completed by the application supervisor and the customer shall be invited to inspect each batch prior to dispatch.

## 6.6 NOTES AND CLARIFICATIONS

All QA/ITP documentation should be assumed to be made available to the material supplier or principal at their request. If you go in with this attitude, you will save yourself a lot of headaches later.

# 7 APPLICATION UP TO 150°C SUBSTRATE TEMPERATURES

## 7.1 GENERAL

The same application methods can be used as surface temps up to 90°C, with the following differences.

## 7.2 COATING APPLICATION

### 7.2.1 Primer

When applying C-COAT Primer to hot surfaces apply using brush or roller in thin coatings. The hot surface will cause pitting. Continue applying thin coatings until pitting stop. Once the pitting stops the C-COAT insulating coating can be applied. Applying on hot surfaces may reduce coverage and even more so on vertical surfaces.

### 7.2.2 Main Coating

To prevent the coating from drying too quickly, once the primer stops bubbling during application, it is recommended to dilute the coating by 5-10% to ensure the coating doesn't dry too quickly. After the first 5-10% diluted layer, full concentration c-coat can be applied thereafter with airless spray gun .

## 8 PROTECTION

The C-Coat products have some resistance to oils, mild solvents and minor abrasion, but if they are to be placed into harsh environments they need to be protected by a resistant topcoat.

When transporting C-Coat coated products, ensure plenty of padding at support points if it is required to support the item on a coated surface.

Movement at pipe supports can be countered by the application of a protective coating at the support point.

If damage occurs, it is easily repaired on site using brush, roller or spray.

## 9 DISCLAIMER

The information provided herein, especially recommendations for the usage and the application of our products, is based upon our knowledge and experience. Due to different materials and equipment used, as well as varying working conditions and environments beyond our control we recommend carrying out trials or having experienced applicators/technical support persons provide specific project advice with regard to the required products, processes and applications. This data sheet is provided free of charge and we do not accept any liability with regard to the above information or with regard to any verbal recommendation, except for cases where we are liable of gross negligence or false intention.

**If there are any questions while on site, please email to: [info@C-COAT.com.au](mailto:info@C-COAT.com.au)**