TECHNICAL ADVICE

# Measuring Dry Film Thickness of Powder Coatings

DGL INTERNATIONAL
Powder Coatings


dglpowders.com

The DGL Tech Advice Series provides information, hints, tips and links to further advice for key processes involved in the preparation, application and after care maintenance of powder coating projects.

This Tech Advice document describes and details the importance of measuring the dry film thickness of powder coatings whilst providing some basic advice and instruction for conducting the testing.


## What is dry film thickness (DFT)?

Dry film thickness (DFT) is the thickness of a coating as measured above the substrate. This can consist of a single layer or multiple layers. DFT measures the total (not the individual layers). DFT is measured on cured powder coatings at ambient temperature.

## Why measure dry film thickness?

Powder coatings are designed to perform their intended function when applied within a specified thickness range.

Achieving film thickness levels within the specification will ensure the coating meets:

- ✓ **The desired look:** colour, gloss and surface profile.
- ✓ **The requirements for performance:** Adhesion, flexibility, impact resistance and hardness of the coating etc.
- ✓ **Industry standards:** International standards for quality e.g. AAMA and AS3715.
- ✓ **Warranty requirements:** DFT specification is integral to gain a DGL Alumi Shield warranty.
- ✓ **Process control and efficiency targets**: Avoiding reworking product and customer returns due to finishing defects.

## How do you measure dry film thickness?

The most common way to measure powder dry film thickness is with the use of electronic DFT gauges. They are hand-held, easy-to-operate, and relatively low-cost. They employ magnetic, eddy current, or ultrasonic principles depending upon the coating substrate (metal).

For reasons of simplicity, versatility, accuracy, and record keeping, electronic DFT instruments are a popular choice for both large and small powder coating operations. They use a magnetic principle when measuring on steel and an eddy-current principle on the other metals, sometimes combined into one instrument. Measurement results are displayed on an easy-to-read liquid crystal display (LCD). A wide selection of probes are available to access unusual part shapes or to accurately measure very thin or very thick coating systems.

Make sure you obtain a model that lets you measure on the metals that you are coating – be aware some are limited to steel whilst others will measure steel and non-ferrous metals like aluminium, zinc copper and brass.

The units of measure are predominantly micro-meters (µm). This is very small: 1µm – 1/1000 of a mm. A common range of DFT is 50 – 100µm for powder coatings.

## Industry standards information

This technical advice document was developed in accordance with AS 3894.3 and SSPC-PA2.

| | AS 3894.3 | SSPC-PA 2 |
|---|---|---|
| Standard Reference | Site testing of protective coatings - Determination of dry film thickness | Procedure for Determining Conformance to Dry Coating Thickness Requirements |

Copies of the standards referenced in this document are available via Australian or New Zealand Standards websites.

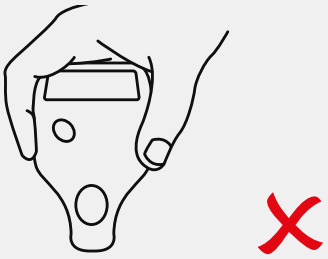
**standards.org.au** | **standards.govt.nz**

# Hints and tips for conducting dry film thickness testing

## How to hold the gauge for accurate readings

For best practice use the thumb and forefinger to hold the neck of the gauge. Apply the probe perpendicular to the coated surface and hold it in place while the measurement is taken. Lift away from the surface and repeat as per the required number of tests for the coated area (see below guidance).

If using a sliding probe, then ensure the probe settles perpendicular to the surface; and for best results, grip the sliding probe sleeve with your fingers low to the surface. Failure to do so may result in inaccurate readings.

| DO | DO NOT |
|---|---|
|  |  |

## How many readings are required?

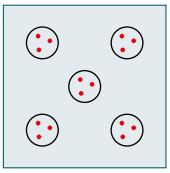
The number of readings is calculated by the total area of the powder coatings in accordance with AS 3894.3 & SSPC-PA2.

| Total area of powder coating | Number of tests |
|---|---|
| <10m$^2$ | 5 random spot measurements. |
| 10–100m$^2$ | 15 random spot measurements required. |
| >100m$^2$ | 15 random spot checks plus 5 additional random spot checks per 100m$^2$. |

## Random spot measurement method

The example below illustrates an area of less than 10m$^2$ with a minimum of 3 DFT readings within 5 random spots.

The method involves spot measurements which are the average of three or at least three readings made within a 4cm diameter circle.



- Red dot = 1 individual reading.
- Each black circle = 1 spot measurement: The average of 3 individual readings within each 4cm diameter circle is calculated and recorded (SSPC-PA2).

# Application checklist

| Prior to conducting your testing, please ensure: |
|---|
| ✓ You have the correct probes for measuring DFT on ferrous or non-ferrous substrates. |
| ✓ The gauge has been calibrated and verified (with the supplier – typically annually). |
| ✓ The probe tip is clean and in good condition. |
| ✓ You have zero calibrated and calibrated using appropriate thickness shim? |
| ✓ The coated surface to be measured is clean and free from debris. |
| ✓ The temperature of the coated metal is ambient before taking measurement. |
| ✓ The measurement is taken perpendicular to the surface. |

Refer to the supplier manual of your DFT gauge for further information.

## Advice line

Our dedicated consultants can help simplify the specification process, saving you time and money by providing the right coating advice for your project visit

**dglpowders.com/contact-us**

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