Technical Bulletin

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DRY FILM THICKNESS

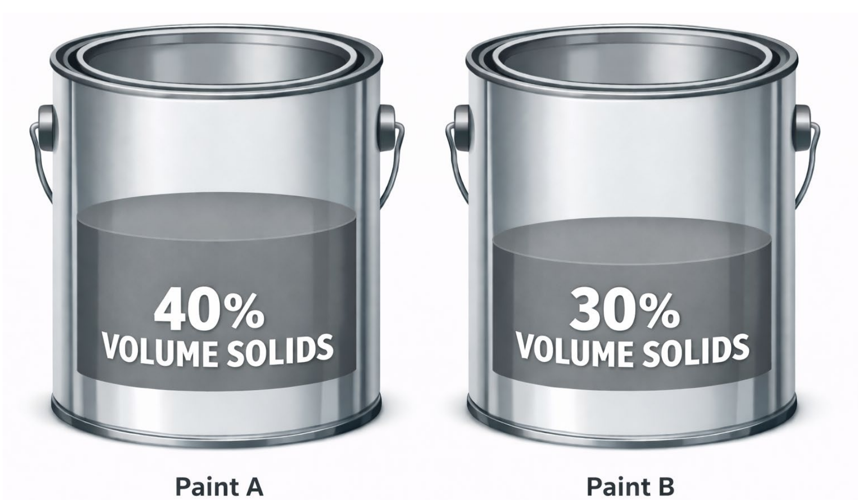
Dry Film Thickness (DFT) is a key application parameter that directly impacts coating performance, durability, permeability, and overall service life. DFT is measured in mils (1 mil = 0.001 inch). Achieving the specified DFT helps ensure the coating performs as intended, while both under-application and over-application can cause the final paint properties to deviate from the expected results.

The required DFT is dictated by the intended performance of the coating system, including but not limited to:

- Aesthetic appearance (e.g., color development, sheen uniformity, and hiding)
- Corrosion protection (e.g., steel and other metal substrates)
- Moisture resistance and waterproofing
- Durability and service life expectations

How Volume Solids Relate to Film Thickness and Coverage

Volume Solids (%) represent the portion of the applied wet coating that remains on the surface after solvent and water evaporation. It is a key input for estimating dry film thickness (DFT) from a measured wet film thickness (WFT), since higher volume solids generally produce more DFT for the same WFT. Because volume solids directly affects how much “film build” you get per coat, it also influences durability, barrier properties, and the number of coats required to meet a specified thickness. Coverage, also referred to as spread rate, is the area a given amount of paint can coat at the recommended film thickness, typically expressed as square feet per gallon (sq ft/gal). In practice, actual coverage varies with substrate porosity, surface profile, application method, and applicator technique, so actual (practical) spread rates are often lower than theoretical values. When coverage is stretched beyond the recommended spread rate, the coating is applied too thin, which can reduce hide, compromise performance, and increase the likelihood of premature failure.



Applied Scenarios

DFT Calculation: DFT (mils) = WFT (mils) x Volume Solids (as a decimal)

Example 1: When coatings are applied at the same wet film thickness, the higher volume solids paint builds a thicker dry film, which can improve hiding and film performance. If both paints are applied at 4 mils WFT, the DFT calculation yields:

Paint A:	4 mils (WFT)	×	0.40 (Volume Solids)	=	1.6 mils (DFT)
Paint B:	4 mils (WFT)	×	0.30 (Volume Solids)	=	1.2 mils (DFT)

$$\textbf{Theoretical Coverage (sq ft/gal)} = \left(\frac{1604 \times \text{Volume Solids (as a decimal)}}{\text{DFT (mils)}} \right)$$

Example 2: When aiming for the same dry film thickness, higher volume solids paint typically delivers greater coverage (higher spread rate) because more of the applied wet film remains on the surface after drying. If the target DFT is 1.5 mils, the coverage calculation yields:

Paint A:	[1604	×	0.40 (Volume Solids)]	÷	1.5 mils (DFT)	=	535 sq ft/gal
Paint B:	[1604	×	0.30 (Volume Solids)]	÷	1.5 mils (DFT)	=	428 sq ft/gal

Relationship Between DFT and Permeability

Dry Film Thickness directly influences a coating's permeability and water vapor transmission (WVT). Permeability refers to how easily water or water vapor can pass through a dried paint film. A coating with low permeability resists moisture movement, while a more permeable coating allows moisture to pass through more readily. Water Vapor Transmission describes the rate at which water vapor moves through a coating over a given time. It is a measure of how "breathable" a coating is and helps indicate how well moisture vapor can escape from a substrate without becoming trapped. In general, thicker films are less permeable, which helps limit the passage of liquid water and water vapor through the coating. However, excessively thick films can also trap moisture within the substrate, particularly on masonry or concrete.

Maintaining the proper DFT balance is essential: the coating must be thick enough to resist moisture intrusion, while still allowing trapped moisture to escape and reducing the risk of blistering or other substrate damage.

Importance of Multiple Coats to Achieve Total DFT

Achieving the specified total DFT is typically best done with multiple coats rather than one heavy application. For example, if the target total DFT is 4 mils, applying two coats at 2 mils DFT each is generally preferred over applying a single 4 mil DFT coat.

Building film thickness in multiple coats promotes more uniform film formation, reduces the likelihood of sagging, cracking, or solvent entrapment, and improves adhesion between layers. It also delivers more consistent protection and a more uniform appearance, helping the coating system perform as intended throughout its service life.

Key Takeaways

Applying a coating outside the specified DFT range can significantly affect performance. Thin DFT (under-application) can reduce corrosion and moisture protection, lead to poor hiding and an uneven appearance, increase permeability, shorten service life, and potentially result in non-compliance with project specifications and warranty requirements. Thick DFT (over-application) can extend dry and cure times and may cause defects such as sagging, wrinkling, or mud cracking. Excessive film build can also increase the likelihood of surfactant leaching, since thicker films dry more slowly (especially in cool or humid conditions) allowing water-soluble additives more time to migrate to the surface. It can also trap solvent or water, increasing the risk of blistering, reducing flexibility and adhesion, and driving up material usage and overall project cost.

Best practices to help ensure the coating performs as intended include measuring Wet Film Thickness (WFT) during application (Figure 1), verifying DFT after curing, applying within manufacturer-recommended ranges, and achieving total DFT through multiple coats.

Figure 1

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2020 E. Orangethorpe Avenue • Fullerton, CA 92831
(714) 680-3800 | www.vistapaint.com