

Understanding ‘volume solids’ – “what’s left after the paint dries”

Understanding Volume Solids provides many benefits:

- It allows you to compare the true cost of different paints.
- It allows you to predict how much paint must be applied to obtain adequate coverage.
- It allows you to control the quality of the paint job.
- It allows you to avoid production delays.

To understand Volume Solids it is helpful to know what type of ingredients are used to make paint. Paint consists of four types of ingredients:



Additives that enhance characteristics of the paint – Examples, driers, defoamers, adhesion promoters, UV inhibitors....



A liquid that reduces the viscosity of the resin & pigment to provide a 'vehicle' to make application possible- Examples, water, xylol, mineral spirits, MEK...



Solid particles that provide color, opacity, strength, corrosion protection, etc. – Examples, titanium dioxide, calcium carbonate, talc, iron oxide,



The 'glue-like' material that turns from a liquid to a solid to form a film. Examples – alkyds, urethanes, acrylics, epoxies, vinyls.

Understanding that "Volume Solids" is what remains after paint dries.

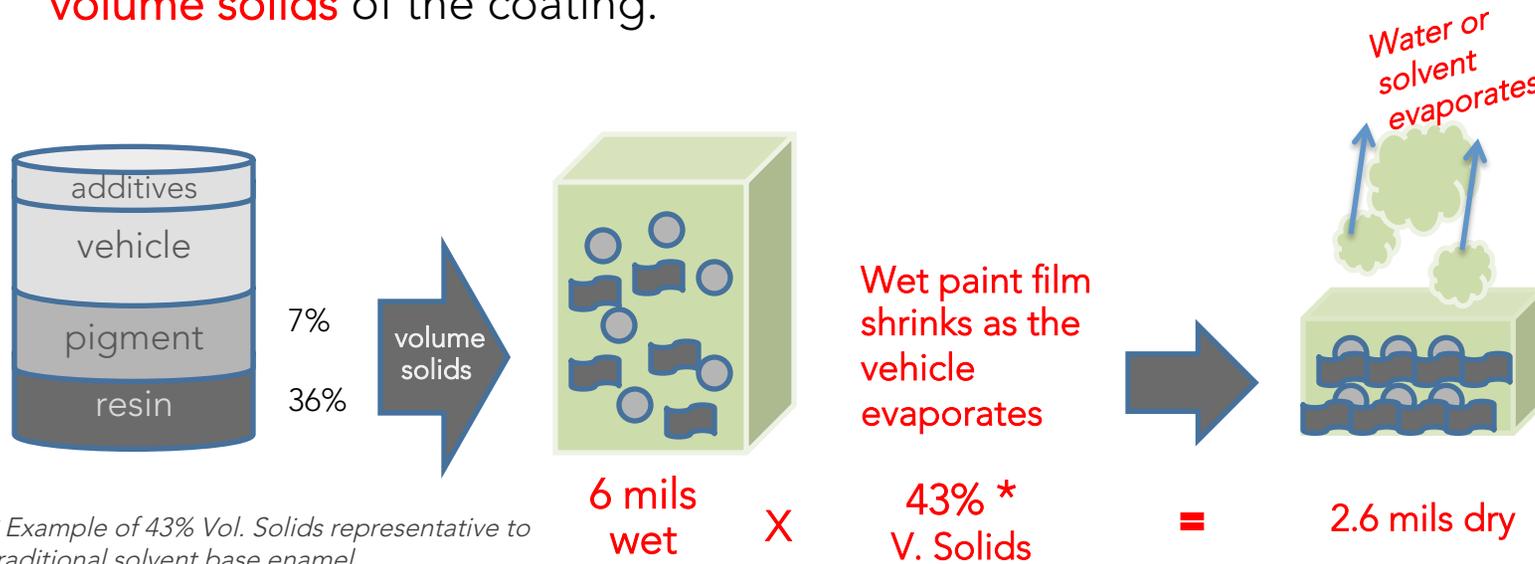
The combination of PIGMENT and RESIN equals the VOLUME SOLIDS, i.e. *what's left after the paint dries.*



In this example, the volume solids = 43% (7% pigment + 36% resin)

The amount of **volume solids** determines how thick the paint layer will be after it has dried.

As the **vehicle** (water or solvent) evaporates, transforming the coating from wet to dry, the coating layer shrinks in **direct proportion** to the **volume solids** of the coating.



Measuring Wet-Film-Thickness (WFT) to predict the Dry-Film-Thickness (DFT)

If you know the Volume Solids of the coating, you can use a Wet-Film-Thickness gauge to predict the Dry-Film-Thickness.



The amount of paint applied can be measured using a wet film thickness gauge.

Note – Thinning the paint reduces the volume solids. The volume solids must be recalculated based on the volume of thinner added to a known volume of paint.



The gauge is placed into the wet paint. The highest point where the paint touches the gauge indicates the thickness of the wet paint.



The gauge is removed from the wet paint and inspected. The highest number tooth with paint indicates the thickness of the wet paint.

Paint touched 11 mils

$$\begin{aligned}
 &.011'' \text{ WFT} \\
 &\times \underline{43\% \text{ Vol. Solids}} \\
 &= .0047'' \text{ DFT}
 \end{aligned}$$

Multiplying the WFT by the Volume Solids of the coating predicts the film thickness after the paint dries.

The thickness of a coating can be measured after it dries using a electronic Dry-Film-Thickness gauge. Different types of gauges are used depending on the type of substrate – ferrous metal, aluminum, concrete, etc.

QC	The service life of the coating depends on proper coating film thickness.
Production	Over application slows drying of the paint which slows production.
Cost	Applying more paint than is necessary is adding unnecessary costs.

Electronic film thickness gauges measure the Dry-Film-Thickness of a coating.



ASTM E376 - 11 Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods

<http://www.astm.org/Standards/E376.htm>

For more information contact CARBIT, info@carbit.com, 312-280-2300

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1. Paint consists of additives, a vehicle (thinner), pigment and binder (resin).
2. The pigment and binder form the **volume solids** of the dry paint film after the vehicle and some additives evaporate.
3. **The volume solids form what is left after the paint dries.**
4. Typical **volume solids** are 30 – 45% of the paint volume.
5. Thinning a paint reduces the volume solids.
6. Knowing the volume solids of a paint allows you to use a Wet-Film-Thickness Gauge to predict the thickness of paint after it has dried.
7. Adding thinner reduces volume solids.
8. The Dry-Film-Thickness (DFT) equals the Wet-Film-Thickness (WFT) multiplied by the Volume Solids.
9. The thickness of paint after it has dried can be measured using a Dry-Film-Thickness gauge
10. There are different types of Dry-Film-Thickness gauges and the most popular works only when the paint is applied to a metal substrate.