



HAA (TGIC Free) vs TGIC Polyester Powder Coatings

Background

There are many names associated with the innovative, alternative cross-linking chemistry for polyester resins such as Primid, Non-TGIC, TGIC Free, and HAA. From a chemistry nomenclature standpoint, HAA stands for beta hydroxyalkyl amide (HAA). The development of this alternative cross-linker was driven by the European Union in the early 1990s and the classification of TGIC as a Category 2 mutagen. This classification restricted the sales of TGIC chemistry in that region and was the primary driver for the development and growth of HAA as a cross-linker. HAA is now widely used in all parts of the world as an alternative to TGIC for cross-linking polyester resins in powder coatings.

From a US perspective, the EPA has TGIC on their watch list, but there are other chemicals that are being targeted ahead of TGIC. Most recently in 2020 the EPA took another look and made the decision not to change the classification for TGIC at this time. They are planning on revisiting their watch list again in 2022.

Application of HAA/Primid Powders

From an application and performance standpoint, HAA has progressed greatly, and to a large extent, it is equal to or better than its TGIC counterpart. The primary benefits HAA users see are enhanced transfer efficiencies, better edge, and corner coverage. Companies that apply HAA products see up to 20% improvement in transfer efficiencies, more uniform film builds across the part, and better Faraday cage penetration. From a spray to waste standpoint, they typically experience at least a 10% reduction in over-all powder usage compared to a TGIC alternative. Excessive film thickness > 5 mils may have the potential for some out gassing (micro porosity) in the cured film.

The table below is a comparison of the application and performance properties of TGIC and HAA powder coatings.

Properties	TGIC Powder	HAA/Primid Powder
Resin	Polyester (Standard or Super Durable)	Polyester (Standard or Super Durable)
Cure Range	Equivalent	Equivalent
Film Thickness	2 - 5+ mils	2 - 5 mils
Gloss Range	30 - 90+%	40 - 90+% (Low gloss textures available)
Flow/Leveling	Very Good	Very Good
Hardness	Very Good (H-2H)	Very Good (H-2H)
Application & Transfer Efficiency	Very Good	Excellent
Exterior Durability (gloss & color)	Very Good to Excellent	Very Good to Excellent
Flexibility	Excellent	Excellent
Overbake Stability	Very Good	Very Good
Abrasion Resistance	Good	Good
Impact Resistance	Excellent	Excellent
Corrosion	Very Good	Very Good
Chemical	Good	Good
Shelf Life Stability	Very Good	Excellent