FORREST
Technical Coatings

POWDER PRODUCT GUIDE

FORREST Technical Coatings
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Custom Formulation

FORREST Technical Coatings has manufactured custom colors and formulations for many companies over the years. If your project calls for one of these powders we have formulated in the past, we can offer to produce new powder for your company in a batch as small as 100 pounds. If you have a new custom color or your project demands a special formulation for performance, then we can create this new product in a minimum production run quantity that is based upon the specific product.

We have matched Federal Standard, RAL, NCS and Pantone (PMS) colors for our customers. We utilize a computer color matching system to ensure the quality and consistency of your color. For OEM manufacturers and automated coating lines, we can fine tune products to meet your application and performance requirements. We have developed aerosol touch-up paint for many powder coats, including custom color matches. Certain special effects, metallic coats, and specialty products cannot be matched with aerosol touch-up. Please contact us for more information.

We work with our customers to manage lead times and inventory to have an efficient supply of powder to match your needs.

Special Effects

Metallic, Anodized & Clear Coats

Metallic

106-0530	Silver Screen Polyester	
106-0110	Copper Vein Polyester	
106-0130	Silver Vein Polyester	
619-0113	Vintage Copper	
619-2016	Vintage Silver	
619-2090	Metallic Black	

Special Effects

107-0330	Anodized Red	*Special order*
107-0430	Anodized Blue	*Special order*

Clear Coats

107-0021	Flat Clear	3 - 5% gloss @ 60°
106-0050	Satin Clear	20 - 30% gloss @ 60°
106-0010	Gloss Clear	85 - 90% gloss @ 60°

*** Sales note:** FORREST Technical Coatings manufactures powder for customers all over the world. With the capability to make coatings in a wide range of chemistries with varying performance, color and finish characteristics we are challenged to stock everything we make. For both custom and standard products please contact our order desk for accurate lead times for shipments.

Interior and Functional Powders

EPOXY: 019-SERIES

FORREST Epoxy powder coatings offer excellent chemical resistance and physical properties. The finish can range from flat to full gloss. The powder demonstrates good surface flow over a range of film thicknesses. While these systems have excellent solvent and salt spray resistance, the appearance will be degraded by exposure to direct sunlight.

Some common uses include irrigation pipe, medical devices, appliances, industrial machinery, storage drums and tanks.

EPOXY-POLYESTER HYBRID: 029-SERIES

FORREST Epoxy-Polyester Hybrid powder coatings are cross-linked to provide chemical resistance and flexibility. They may be smooth or textured with flat to full gloss. Our hybrid systems are tough, flexible, and are formulated to have good application properties. While Hybrids have good solvent and salt spray resistance, their appearance will be degraded by exposure to direct sunlight.

Some common uses are office furniture, appliances, medical devices, electronics housings, store displays, pallet racking, tools, decorative items and primers.

	Epoxy	Epoxy-Polyester Hybrid
Bake Time	8 to 10 minutes	8 to 10 minutes
Substrate Temperature	400°F / 204°C	400°F / 204°C
Specific Gravity	1.3 to 2.0 varies with color	1.3 to 2.0 varies with color
Theoretical coverage at 1 mil	96 ft² to 148 ft² per pound	96 ft² to 148 ft² per pound
Film build between	1.0 and 6.0 mils	1.0 and 6.0 mils

Exterior Durable Powders

POLYESTER TGIC: 106-SERIES

FORREST Polyester TGIC systems have excellent exterior performance and toughness. They may be applied over a large range of film thicknesses, and may be smooth or textured with a 20-95% gloss. This is a durable, UV resistant, protective coating for interior and exterior use.

TGIC FREE POLYESTER: 108-SERIES

FORREST TGIC Free Polyester systems can be formulated from flat to full gloss in an exterior durable coating for general industrial metal finishing. Decorative textured finishes are also available. This is a durable, UV resistant, lower curing temperature protective coating for interior and exterior use.

POLYURETHANE: 044-SERIES

FORREST Polyurethane Polyester powder coatings are durable finishes for interior or exterior applications. They offer superior flow and appearance, and may be formulated in a full range of textures and gloss.

	Polyester TGIC	TGIC-Free Polyester	Polyurethane
Bake Time	8 to 10 minutes	10 minutes	10 to 15 minutes
Substrate Temperature	400°F / 204°C	356°F / 180°C	400°F / 204°C
Specific Gravity	1.2 to 2.0 varies with color	1.3 to 2.0 varies with color	1.2 to 2.0 varies with color
Theoretical coverage at 1 mil	96 ft² to 148 ft² per pound	96 ft² to 148 ft² per pound	96 ft² to 148 ft² per pound
Film build between	1.0 and 6.0 mils	1.0 and 4.5 mils	1.0 and 3.0 mils

Some common uses are lighting, fencing, pallet racks, window frames, bicycles, automotive parts and truck wheels, as well as tools, sporting goods, patio furniture and architectural railing. Common uses are generally the same as polyester TGIC with the advantages of smooth flow, thin film application and a complete range of gloss.

Super Durable Powders

POLYESTER TGIC: 406-SERIES

FORREST Super Durable Polyester TGIC powder meets AAMA 2604-05 standards with excellent exterior performance and toughness. They may be applied over a large range of film thicknesses, and may be smooth or textured with a 20-95% gloss. This is a durable, UV resistant, protective coating for architectural and aluminum substrates.

TGIC FREE POLYESTER: 408-SERIES

FORREST Super Durable TGIC Free Polyester powder meets current environmental requirements in Europe. This chemistry provides added advantages in over-bake stability in the cure process. The coating meets AAMA 2604-05 standards with excellent exterior performance and toughness. The coating may be applied over a large range of film thicknesses, and may be smooth or textured with a 20-95% gloss. This is a durable, UV resistant, protective coating for architectural and aluminum substrates.

	Polyester TGIC		TGIC Free Polyester	
Bake Time	10 minutes	25 minutes	8 minutes	25 minutes
Substrate Temperature	400°F / 204°C	360°F / 182°C	400°F / 204°C	320°F / 160°C
Specific Gravity	1.2 to 2.0 varies with color		1.2 to 2.0 varies with color	
Theoretical coverage at 1 mil	148 ft² to 96 ft² per pound		148 ft² to 96 ft² per pound	
Film build between	1.0 and 6.0 mils		1.0 and 6.0 mils	

Low-Energy Cure Powders

Low cure powders can reduce energy consumption and increase production output through shorter oven dwell times and increased line speeds. They can also reduce capital (ovens) and labor (overtime) costs associated by increasing production efficiency. FORREST low cure powder coatings are offered in Polyester, Urethane, and Epoxy chemistries.

These powders can be used to coat substrates other than metal, including MDF Plywood and some high density heat-tolerant plastics.

	Polyester 306-Series		Urethane 344-Series		Epoxy 319-Series
Bake Time	10 minutes	25 minutes[1]	10 minutes	15 minutes[1]	20 minutes[1]
Substrate Temperature	325°F 163°C	290°F 143°C	320°F 160°C	284°F 140°C	248°F 120°C
Specific Gravity	1.3 to 1.9 varies with color		1.2 to 2.0 varies with color		1.2 to 2.0 varies with color
Theoretical coverage at 1 mil	120 ft² to 150 ft² per pound		120 ft² to 150 ft² per pound		120 ft² to 130 ft² per pound
Film build between	1.5 and 3.0 mils		1.5 and 3.5 mils		1.8 and 3.0 mils
Target film thickness	2.5 mils		2.5 mils		2.5 mils

[1] *Tested on light gauge panels in a fast, high air-flow oven. Additional time or higher temperature may be required to bring heavier substrates to cure temperatures. Lower gloss formulations require higher minimum cure temperatures.*

Powder Primers

FORREST Epoxy-Polyester Hybrid cross-linked primers provide excellent barrier protection for critical applications. They apply with good flow and flexibility at a range of film thicknesses, provide good chemical resistance, and pass a 1000 hr. salt spray test with excellent results. The conductive properties of this powder also allow better penetration of faraday cage areas and allow parts to be grounded for electrostatic topcoat application. When combined with good pretreatment and a polyester topcoat, these primers make a very functional protective finish.

FORREST Anti-Gassing Primer offers an extended gel time that prevents the defects normally associated with substrate out-gassing. This product is used primarily on castings, and it may be used in combination with other preheating techniques for even better results. Please contact our sales department for more information.

Formulations and colors:

Epoxy / Polyester Hybrid Steel Gray [8642]	Epoxy / Polyester Hybrid Anti Gassing Gray [9027]
Epoxy / Polyester Hybrid Off-White [1640]	Epoxy / Polyester Hybrid Anti Gassing Steel Gray [8643]
Epoxy / Polyester Hybrid Black [2640]	Epoxy Anti Gassing Gray [9391]

Off-white is recommended for use under any light colored topcoat when hide is an issue.

Bake Time	10 minutes	15 minutes
Substrate Temperature	400°F / 204°C	375°F / 191°C
Specific Gravity	1.2 to 2.0 varies with color	
Theoretical coverage at 1 mil	117 ft² per pound	
Film build between	1.5 and 3.0 mils	
Target film thickness	2.0 mils	

ESD Powders

EPOXY-POLYESTER HYBRID: 729-SERIES

FORREST ESD Powder Coats are used in applications where in-service static build up is a problem. These electrostatic dissipative systems provide excellent film quality, leveling and flow. The measured surface resistance is in the static dissipative range of 10^4 to 10^{11} ohms at 100 volts for most of our ESD coatings. We have formulated and offer ESD coatings with a tighter dissipative range of 10^8 to 10^9 ohms at 100 volts.

Bake Time	10 minutes	15 minutes
Substrate Temperature	400°F / 204°C	375°F / 191°C
Specific Gravity	1.2 to 2.0 varies with color	
Theoretical coverage at 1 mil	148 ft² to 96 ft² per pound	
Film build between	1.5 and 3.0 mils	
Target film thickness	2.0 mils	

Heat Resistant Powders

With more than 35 years of experience in high temperature coatings, FORREST is your best choice for high temperature technology in powder coating. Many companies in the hearth and barbeque industry are familiar with our global brand of coatings: **Stove Bright®**

Our powders are formulated to maintain their color and hardness after extended exposure to operating temperatures. We offer a wide variety of colors in these special powders. Formulas are available for barbeques, gas fireplaces, heating appliances, industrial lighting, exhaust and other applications.

MEDIUM HEAT RESISTANCE

	Polyester: 607-Series	Epoxy Hybrid: 619-Series
Peak temp up to	**450°F / 232°C**	**550°F / 288°C**
In-service temp up to	**350°F / 177°C**	**400°F / 204°C**
Appearance	Flat to Full Gloss; Smooth or Texture	Low Gloss; Smooth or Slight Texture
Bake Time	10 to 15 minutes	10 minutes
Substrate Temp	400°F / 204°C	400°F / 204°C
Specific Gravity	1.4 to 2.0	1.3 to 2.0
Theoretical coverage	96 ft² to 139 ft² per pound	96 ft² to 148 ft² per pound
Film-build between	2.0 and 3.0 mils	1.0 and 3.0 mils
Recommended film	2.5 mils	1.8 mils

The 607-Series powder coats are best used on metal surfaces that do not see operating temperatures above 350°F. The 607-Series powder has excellent exterior performance with UV resistance. Use on electric patio grills or exterior panels on furnaces.

The 619-Series powder coats have been used on smokers and grills. The epoxy hybrid chemistry provides a durable coat resistant to food grease. The coating weathers well for exterior use and comes in a variety of colors and finishes. The 619-Series is not recommended for coating the fire box on charcoal, wood chip or pellet smokers.

MEDIUM-HIGH HEAT RESISTANCE

	673-Series	630-Series
Peak temp up to	**600°F/ 316°C**	**1000°F / 538°C**
In-service temp up to	**550°F / 288°C**	**800°F / 427°C**
Appearance	Flat to Full Gloss ; Smooth or Texture	Low Gloss ; Smooth or Slight Texture
Bake Time	15 minutes	15 minutes
Substrate Temp	400°F / 204°C	400°F / 204°C
Specific Gravity	1.35 to 1.95	1.8 to 2.05
Theoretical coverage	96 ft² to 143 ft² per pound	96 ft² per pound
Film-build between	1.8 and 3.2 mils	0.8 and 2.8 mils
Recommended film	2.0 mils	1.8 mils

The 673-Series powder coat system has been used on smokers and barbeque grills. This advanced chemistry provides a durable coat resistance to food grease. The coating weathers well for exterior use and comes in a variety of colors and finishes. The High Gloss finish provides a very attractive alternative to expensive baked on enamel or porcelain finishes that can be applied by powder coat contractors all over the world. The 673-Series is not recommended for coating the fire box on charcoal, wood chip or pellet smokers. Lighter colors in the 673 Series have excellent color retention to operating temperatures of 450°F (232°C), and will show discoloration at higher temperatures.

The 630-Series powder coats provide an environmentally friendly high heat resistant coating for use around the world. The 630-1123 Bright White has performed without yellowing on surfaces reaching 450°F (232°C). The 630-Series coatings in Black retain gloss and color to 800°F (427°C), including finishes with texture. The product can be used anywhere you need heat resistance, including exterior applications such as gas lamps and patio fire pits. This coating can provide an attractive finish for any gas heating unit or pellet stove, but is not intended for the firebox on charcoal or wood barbeques

Heat Resistant Powders

FORREST has delivered liquid high temperature coatings for wood stoves and stove pipe for more than 35 years. These liquid coatings are used around the world in the demanding hearth appliance industry. FORREST developed the best choice for high temperature technology in powder coating because our hearth customers demanded it. Our powders are formulated to maintain their color and hardness after extended exposure at high operating temperatures. We offer a wide variety of colors in these temperature resistant powders.

HIGH HEAT RESISTANCE

	654-Series	**653-Series**
Peak temp up to	**1000°F**	**1200°F**
In-service temp up to	**850°F**	**1000°F**
Appearance	Flat to Low Gloss (30% @ 60°) Smooth or Texture	Flat to Low Gloss (30% @ 60°) Smooth or Slight Texture
Bake Time	15 minutes	20 minutes
Substrate Temp	400°F / 204°C	450°F / 232°C
Specific Gravity	1.9 to 2.0	1.9 to 2.0
Theoretical coverage	96 ft² per pound	96 ft² per pound
Film-build between	1.8 and 3.0 mils	1.0 and 3.0 mils
Recommended film	2.0 mils	1.8 mils

Sampling of Standard Heat Resistant Powder Coatings:

619-0113 Vintage Copper	630-1123 Bright White	630-9822 Granite	653-7007 Forest Green
619-2004 Black Texture	654-8183 Brushed Bronze	630-0064 Silver Texture	653-2900 30% Gloss Black
619-2090 Metallic Black	630-3066 S/G Dark Red	654-2162 Satin Black	653-0199 Muffler Silver
673-2701 Gloss Black	630-2275 L/G Black Texture	654-2903 Charcoal	653-2199 Muffler Black
673-4062 Aero Blue	654-2975 New Muffler Black	654-0239 Sienna	654-2904 Metallic Black

Sampling of Heat Resistant Powder Coatings in Custom Colors:

619-2038 Iron Age	673-0117 New Copper Vein	630-3059 Burgundy	653-3042 Dark Brick
619-2219 Raven Black	653-4043 Illumination Blue	630-5115 Brownstone	630-3069 RAL 3000 Red
619-8401 Brushed Bronze	653-8116 Rusty Multi Spec	630-6009 Orange	630-1056 Crème

Over the last ten years the FORREST Technical Coatings chemists have worked on various formulas of temperature resistant products. The 654-Series high temperature resistant powder has new chemistry for the strictest of environmental regulations in Europe and other locales. In addition, the 654-Series powders can provide a smooth finish that was previously difficult to achieve. The 654 Series powder coats are available in several finishes in Black as well as an assortment of earth tone colors.

The 653-Series powders are proven formulations for a wide variety of heat resistant needs. These powders have been used on stove pipe, fireplace fronts, and fire boxes for more than a decade. The 653-Series product line has been improved over the years to provide a durable finish for fire pits and other outdoor applications. These coatings have been used on exhaust headers on restored and custom vehicles around the country.

PRODUCT DATA SHEET
FORREST MUFFLER COATINGS
High Performance Powder Coating

GENERAL INFORMATION

This powder coating is designed for optimum performance in harsh environments, such as automotive exhaust and other high temperature applications. It has superior heat and corrosion resistance and has been tested to the specifications of automotive and other equipment manufacturers. This product has achieved a standard of performance never before available in a powder coating.

Benefits

- Heat resistance to 1200 °F (649°C)
- Corrosion resistance performance tests for automotive, snowmobile, motorcycle, ATV and truck applications

Muffler Coating Application & Cure:

Bake Time	20 minutes
Substrate Temperature	450°F / 232°C
Specific Gravity	2.0 to 2.2
Theoretical coverage at 1 mil	93 ft² per pound
Film build between	1.5 and 2.5 mils
Target film thickness	2.0 mils

MUFFLER COAT PERFORMANCE TESTING

Pre-Heat Resistance Performance		**Test Method**
Salt Spray	240+ hours	ASTM B117/D1654
Humidity	240+ hours	ASTM D2247
Adhesion	5 B	ASTM D3359
Pencil Hardness	> 3 H	ASTM D3363
Int. gloss @ 60°	12 - 18	ASTM D523
Heat Resistance Performance		
Steel	PASS	RES 178800
Thermal Shock	PASS	RES 178801
Cyclic Temperature	4 cycles PASS	RES 175062
Post Heat Resistance Performance		
24 Hours at 775°F: Salt Spray	> 500 hours	RES 178802
24 hours at 1000°F: Salt Spray	> 1000 hours	Internal test

NOTE: Various manufacturers provide their own test bed to qualify coatings for exhaust systems. FORREST Muffler Coatings have passed several of these test beds. We would be happy to provide detailed test results upon request.

The 653-2199 Muffler Black and 653-0199 Muffler Silver are the standard of exhaust systems powder coats. Proven over ten years of service, these coatings pass even the severest tests. The addition of the 654-2975 New Muffler Black and 654-0175 New Muffler Silver provide a complete line of muffler coatings for any exhaust system application.

High Temperature Series Guide

630, 653 & 654 Series High Temp Powder Coatings

These are high performance coatings and they have many properties that are different from standard epoxy and polyester powder coatings. Extra attention to proper pretreatment, application and curing is required to ensure good performance. We recommend thoroughly testing this material on your substrate with your application procedure before using.

Metal Types: These coatings are generally appropriate for steel and Type I aluminized steel. Various grades of substrate are available, and some substrates have their own temperature limits. The user should test the coating using their substrate and pretreatment method before production use. In accelerated salt fog testing, performance varies with formulas, application, and substrate. For outdoor use, aluminum or aluminized steel is highly recommended.

Pre-treatment: High temperature coatings require cleaner substrates to create good adhesion. Proper pretreatment is essential to the performance of these coatings, and the goal of the following recommendations is to provide a clean, dry surface for the powder to bond to.

> **Chemical Pretreatment:** Alkaline cleaner under high pressure followed by thorough de-ionized water rinse. Force dry and coat as soon as possible to avoid excessive rust. FORREST **does not recommend phosphate on steel substrates** because powder coaters have seen phosphate layers fail at high temperatures. We do not recommend using any pretreatment method that leaves a coating or sealer on the surface. Several other cleaners including Alumiprep 33 from Henkel have been used in the laboratory with good results. Again, the user should test the coating using their substrate and pretreatment method before production use. Keep records of application procedures including pretreatment, coating thickness, cure times and cure temperatures.
>
> **Mechanical Pretreatment:** Clean abrasive media blast to a profile of 0.5 mils is **highly recommended.** This provides both a clean surface and a good profile that promotes coating adhesion. After blasting any dust can be removed with air. Do not hand wipe with any solution after blasting.
>
> **Pretreatment Precautions:** Hand wiping with any kind of solvent or thinner will impair adhesion and lead to coating failure. Use only pressurized alkaline cleaning systems or abrasive media blasting. Phosphate treated steel and some other pretreatments have their own temperature limits and are not suitable for high temperature applications.

Fluidization: This type of material is highly electro-statically active. During transit, vibration may cause small, very soft electrostatic agglomerations of powder. Some users have described the appearance as “lumpy.” This is normal and is easily corrected by conditioning the powder prior to use. Filter the powder through a clean, grounded screen with a coarse mesh (such as window screen material). Then fluidize the material for several minutes before spraying. If the agglomerations are difficult to disperse, it is likely that the material has gotten too hot in transit or storage and has sintered. In many cases, especially with textured finishes, this is easily corrected. Again, condition the powder by sifting through a grounded screen and discard the larger agglomerations.

We recommend a fluidizing hopper. This material may not feed as well through a box feeder, and a vibratory shaker could cause the powder to pack down and become clumpy.

High Temperature Series Guide

630, 653 & 654 Series High Temp Powder Coatings

APPLICATION: Use electrostatic application to room temperature substrate at 1.0 to 3.0 mils. Apply to target mil thickness per product data sheet. Reduced voltage will help ensure film thickness uniformity. 50kv has been used in the laboratory with good results. Because silicone resins have lower melting points than some other powders, we recommend an application area temperature of no more than 75°F (24°C).

> **Avoid:** Thicker applications are not recommended as they can cause out-gassing and adhesion problems. Preheating the substrate will make it very difficult to apply the proper film thickness.

CURING: Some silicone powder coatings require more energy to fully cure. Without a full cure, the film will have less flexibility and be prone to cracking, chipping and corrosion.

Carefully observe the minimum cure cycle recommended on the technical data sheet. The combination of the minimum cure temperature with the minimum cycle period is required for the powder to cure. Some applications will achieve better cure results with increased time and temperature. These are high heat resistant coatings, so there is no chance of over baking them at 450°F or even higher substrate temperatures.

CLEANUP: Some poorly formulated silicone powder coatings have created a persistent myth that all silicone powders are terribly contaminating. We estimate that the potential for contamination with these coatings is similar to using a high flow urethane. We recommend a good cleanup immediately after use. It is also a good idea to test for compatibility with other products and then plan to run a textured coating immediately after. We have not had reports of cross contamination from applicators.

Clean up with cold water only. Warm water will only melt the powder and make it more difficult to remove.

STORAGE: Silicone products are more temperature sensitive to heat and humidity than standard powder chemistries. They should be stored and used at temperatures below 75°F (24°C). Recommended shelf life after receipt is six months under carefully controlled conditions. Shelf life can be extended with storage at or below 70°F (21°C).

SHIPPING: Because our Heat Resistant Powder Coatings are sensitive to ambient air temperatures, we have established a shipping policy to ensure product quality. From May 15 through October 15 we will ship high temp powder via over-night shipment or via protective freight carrier for large quantities. We review weather conditions and provide an option to our customers to choose less expensive shipping methods, but only with the understanding of the risk to the quality of the product delivered.

Troubleshooting: The most common causes of coating failure are inadequate pretreatment and/or curing. When fully cured on clean substrate, these coatings will provide excellent performance up to rated temperatures. Higher gloss coatings may lose some gloss at the top end of their temperature range. For applications at the top end of the temperature range, we recommend starting with a low gloss or flat finish to minimize appearance changes.

COMPANY PROFILE

FORREST Paint Company was established in 1973 in Eugene, Oregon. Now doing business as FORREST Technical Coatings our mission remains to be the most responsive and innovative supplier of specialty coatings in each market we serve. Our customer base includes original equipment manufacturers, distributors, and contractors; regionally, nationally, and internationally. We offer a variety of liquid and powder coatings; with the ability to custom formulate products to meet our customer's needs in a timely manner.

FORREST Technical Coatings is a pro-active, ecologically responsible, manufacturing company. We are a leader in high performance coatings for use on wood, metal, plastics, and other substrates. We have established a global reputation with the Stove Bright® high temperature line, and we currently serve customers on five continents through more than twelve warehouses worldwide. Our unique experience in high temperature systems enables FORREST to be on the cutting edge of liquid and powder heat-resistant coating technology.

FORREST Technical Coatings offers extensive technical support to our customers. Our lab staff includes chemists and technicians, providing quality control, application advice and dynamic research and development. The laboratory consists of specialists in metal, wood, and powder coatings. Liquid products include: UV Cured, Water Reducible, Low VOC, Low HAPS, Epoxies, Urethanes, High Temperature coatings, Primers and Alkyd Enamel Systems, and many other products engineered for specific applications. Our powder coatings line includes standard chemistries as well as category leading new technologies.

We pride ourselves on compliance with ***all*** regulations concerning safety, labeling, and environmental laws. FORREST has demonstrated a record of leadership in these areas, and will continue to be at the forefront of environmental stewardship.

Quality – Service – Innovation

FORREST
Technical Coatings

www.forrestpowder.com

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