

VENATOR



ULTRAMARINE pigments



Welcome to Venator

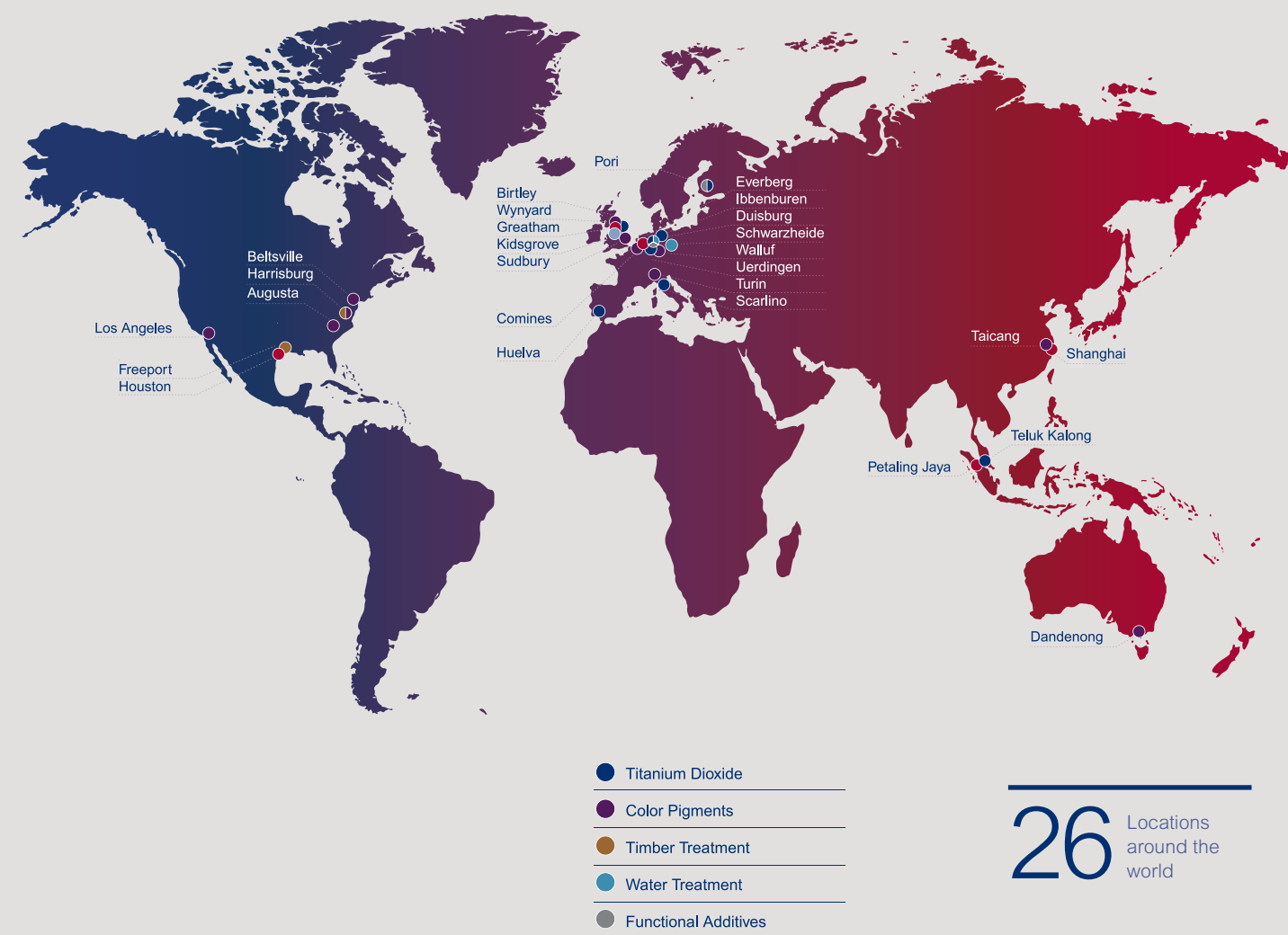
Venator is a leading chemical company focused on the development and manufacture of titanium dioxide pigments and performance additives; including color pigments, water and timber treatment chemicals, that improve the quality of life for consumers everywhere.

We have the broadest product portfolio in the industry and have built up our leading position in specialty titanium dioxide pigments and differentiated performance additives over many years by satisfying the exacting standards of our customers.

Our products are used as intelligent ingredients in thousands of everyday items including paints, plastics, cosmetics, paper, pharmaceuticals, inks, catalysts, concrete, building materials and in water purification. Our skilled team of world class experts provide dedicated advice and technical expertise to support our unrivalled product portfolio.

Operating from 26 locations worldwide, our comprehensive collection of chemistries closely reflects the needs of our customers.

Our portfolio includes titanium dioxide (TiO₂) pigments, color pigments, functional inorganic additives, eco products and water and timber treatment chemicals.



26 Locations
around the
world

A unique color

ULTRAMARINE pigments

ULTRAMARINES occupy a unique position in the world of color, making it impossible to achieve an exact match by blending together other pigment types.

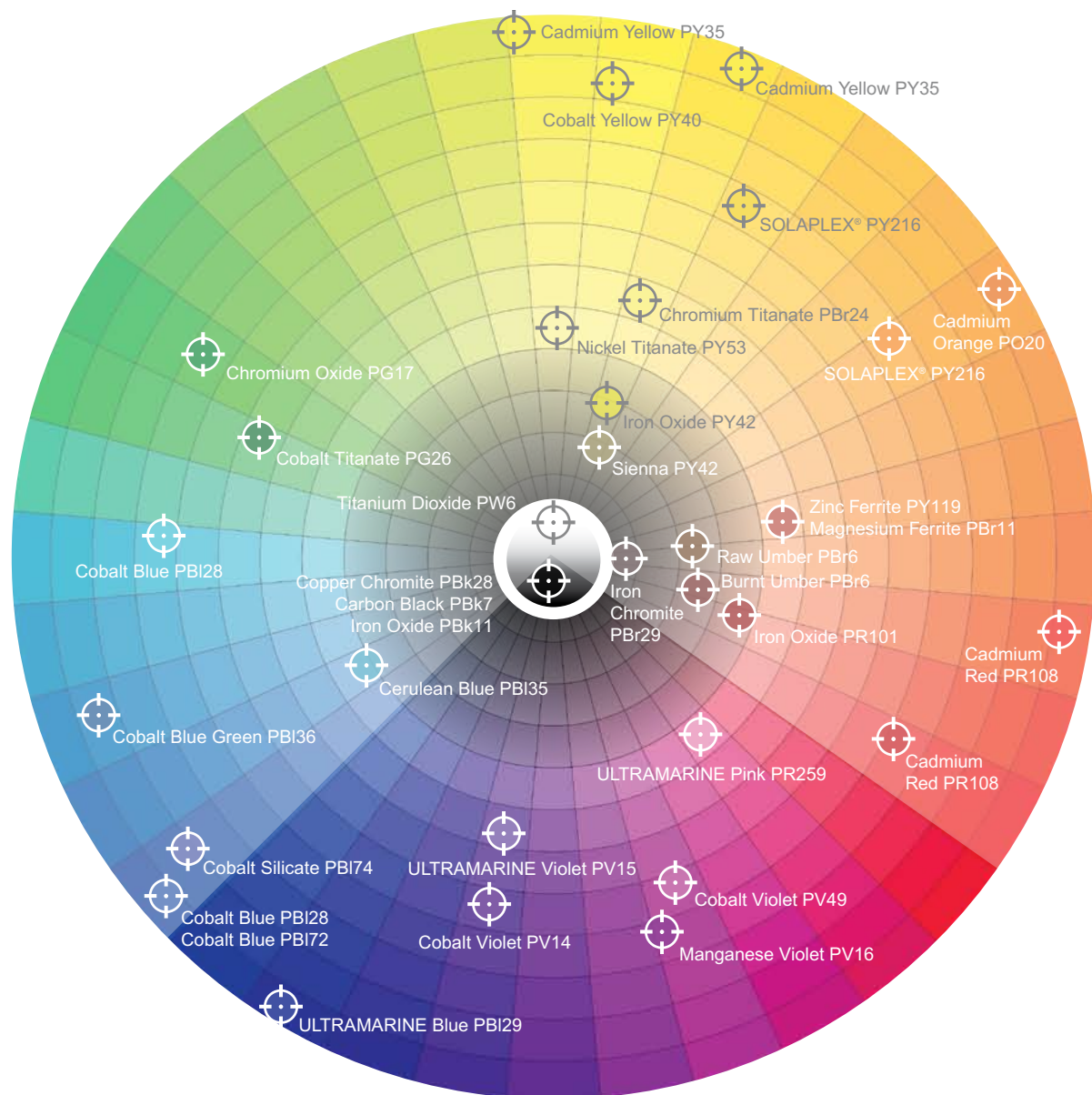
ULTRAMARINE blue pigment was originally made by grinding lapis lazuli rock into powder. It was long considered the finest and most expensive blue pigment and was revered by Renaissance painters. It wasn't until the 19th century that its synthetic equivalent was invented. This cost effective alternative offers a more vivid and consistent blue than its natural counterpart. Venator is proud to continue the tradition of manufacturing high quality, affordable ULTRAMARINE pigments to help our customers achieve their precise color and application needs.

Applications and markets

Venator ULTRAMARINE pigments can be used in a wide variety of applications. They are ideal for use in both mass tone and tinted colors.

ULTRAMARINE	Plastics & Rubber	Coatings	Inks & Paper	Cosmetics	Artists' Colors	Building Products	Laundry & Detergents
BLUE	●	●	●	●	●	▲	●
VIOLET	●	●	●	●	●		
PINK	▲	▲		●			

● Recommended ▲ Possible use



Color index chemistries within this color wheel are for illustrative purposes only and should not be used as accurate color space representations.

ULTRAMARINE for plastics

Venator offers a comprehensive range of ULTRAMARINE pigments for use in the most common types of polymers. Our product portfolio is comprised of blue, violet and pink shades featuring different performance characteristics to satisfy the demands of specialized plastics producers.

Our product portfolio:

Premier - Color Consistency: The outstanding feature of our Premier range is its tight color specification. A ΔE color tolerance of 0.50 maximum enables a colorist to confidently deliver a repeatable color match time after time.

Premier D - Dry Grades: Our Premier D pigments are passed through a multi-stage vacuum drying process that efficiently removes volatiles. The ULTRAMARINE moisture content is reduced to $<0.05\%$ and the pigment is sealed in special packaging to ensure it stays dry. The process also extracts any trace sulfur levels that may be present in the pigment. This helps to eliminate odors that are sometimes generated in high temperature and fast cycle time plastics processes.

Premier F - Fine Particle Size: Standard ULTRAMARINES contain a small proportion of oversized particles. Passing them through a special process removes these producing a very narrow particle size distribution. Our Premier F pigments are perfectly suited for use in dispersion critical fiber applications or also in engineering polymers to improve impact and tensile performance.

Prestige - Wax Treated: Our Prestige products are incorporated into a low molecular weight carrier resin to produce a clean, free flowing and easy to disperse colorant. A selection of resins are available to ensure complete compatibility in polyolefins, PVC and styrenics.

ULTRAMARINE - a pigment that keeps its color

Pigment	Heat Stability	Light Stability
BLUE	$>350^{\circ}\text{C}$	7 - 8 BWS
VIOLET	$>260^{\circ}\text{C}$	7 - 8 BWS
PINK	$>220^{\circ}\text{C}$	7 - 8 BWS

Benefits and features:

- ▶ Vibrant, clean colors
- ▶ Non-toxic
- ▶ Worldwide food contact plastics approval
- ▶ Easy to disperse
- ▶ Non-migratory
- ▶ Non-warping in polyolefins
- ▶ Excellent durability
- ▶ Heat stability
- ▶ Lightfastness



ULTRAMARINE for coatings



The unique properties of ULTRAMARINE pigments makes them ideally suited for inclusion in a wide array of paint systems and power coatings, in both the industrial and household sectors.

Being transparent in clear resin, ULTRAMARINE is an excellent colorant for clear lacquers applied over polished metal, aluminum flake and pearlescent base coats. It can also be easily opacified by substituting up to 5% titanium dioxide.

ULTRAMARINE pigments are also use extensively in the color correction of white paints, where its inclusion makes whites appear cleaner and less yellow.

Benefits and features:

- ▶ High chromacity
- ▶ High transparency
- ▶ Easy to disperse
- ▶ Combines well with effect pigments
- ▶ Ideal for color correction
- ▶ Heat stability
- ▶ Lightfastness
- ▶ Environmentally friendly



ULTRAMARINE blue compared to other blue pigment chemistries

Property	ULTRAMARINE Blue	Copper Phthalocyanine Blue	Indanthrone Blue
Chroma	•••	•	••
Redness	•••	•	••
Transparency	•••	••	••
Tone	Neutral side tone	Red side tone	Purple side tone

••• = best/redest • = worst/greenest

Safe for specialty applications

Venator ULTRAMARINE blue, violet and pink pigments can be used with confidence in many applications. Some of the most important regulations they comply with are highlighted below:

Food Contact Plastics

Venator ULTRAMARINE pigments meet the purity requirements of the US Food and Drug Administration (FDA) and European positive lists.

- ▶ **FDA, CFR Title 21, Part 178.3297**
- ▶ **Council of Europe Resolution AP(89)1**

Cosmetics and Soap

Complies with global legislation for cosmetic applications including use in the most sensitive areas such as contact with mucous membranes.**

- ▶ **FDA, CFR Title 21, Part 73.2725**
- ▶ **EU, Regulation (EC) 1223/2009**

Artist Colors, Toys and Scholastic Paints

Satisfies the low trace metal requirements for childrens toys and artists' colors including the stringent requirements for scholastics paints.

- ▶ **ASTM F 963-11**
- ▶ **EN71 Part 3***



ULTRAMARINE for color correction

When added in small amounts, ULTRAMARINE pigments counteract the inherent yellowish tint of plastics, paints and others materials.

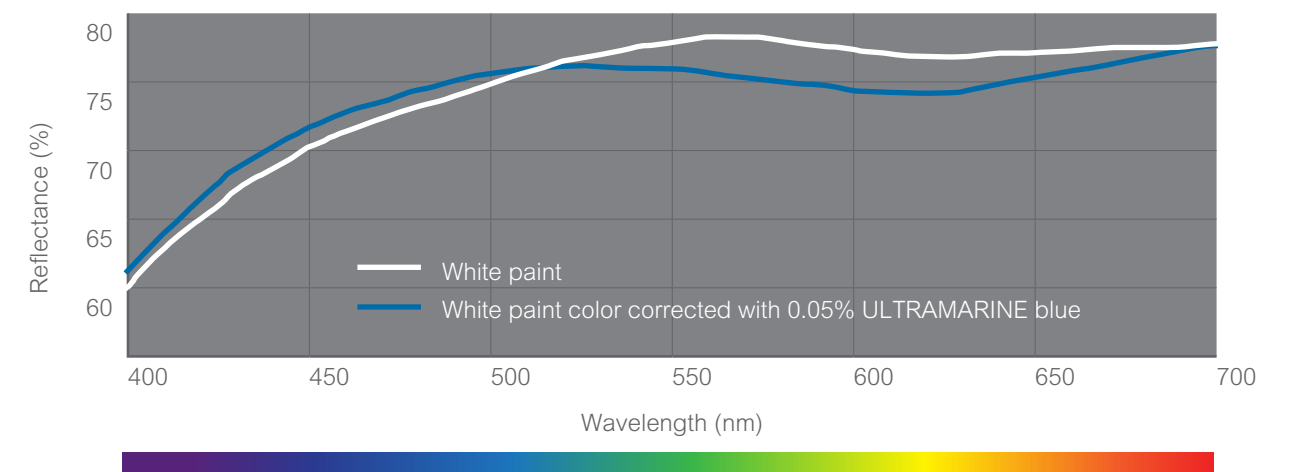
- ▶ ULTRAMARINE blue is extensively used to make "cool" whites as well as enhancing the "jetness" of black
- ▶ ULTRAMARINE violet pigments enable formulators to produce "warmer" tones
- ▶ ULTRAMARINE blues and violets work well in combination to produce neutral shades making products look cleaner and brighter

Benefits and features:

- ▶ Cleaner whites and greys
- ▶ Darker blacks
- ▶ Range of subtle tints
- ▶ Precise shade control
- ▶ Easy to disperse
- ▶ Excellent heat and light stability



ULTRAMARINE: making paints whiter than white



The inclusion of a small quantity of Venator ULTRAMARINE blue helps a white paint appear newer, fresher and more clean. It does this by reflecting back more blue light from the visible light spectrum whilst absorbing the undesirable yellow and green wavelengths.

* Possible uses, tested in finished article. ** Acid resistant grades recommended.

Acid resistant ULTRAMARINE

ULTRAMARINE pigments are used in a wide range of applications including plastics, coatings and cosmetics. Occasionally, the pigment may come into contact with acids, either during processing or in the finished article. Selecting a resistant grade of ultramarine is important to maintain the color fastness of the pigment.

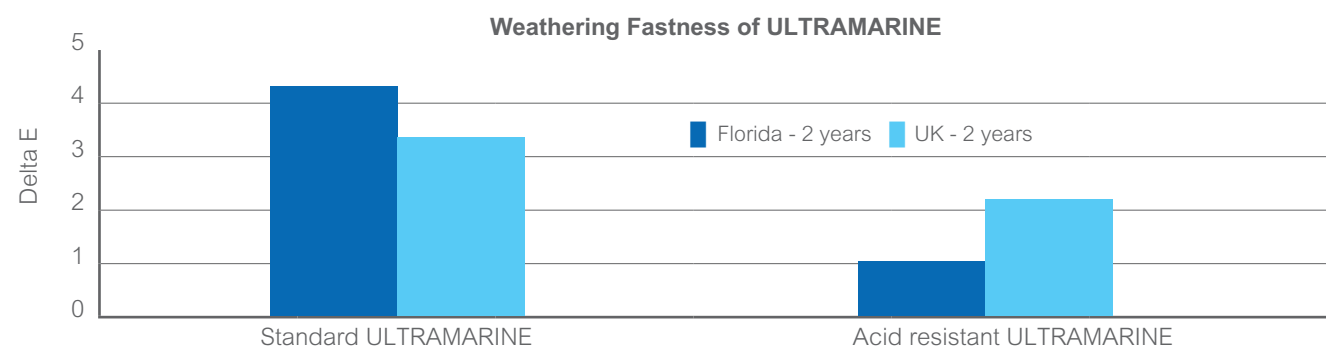
Examples of where an acid resisting grade may be required include:

- ▶ Plastics or coatings intended for outdoor use which may come into contact with acid rain
- ▶ Plastics intended to contain acidic products, for example, fruit juices or carbonated water
- ▶ Ultramarines used to color PVC which may release acidic decomposition products during processing
- ▶ Cosmetics which may come into contact with acidic bodily fluids, for example, mascara
- ▶ Coloring of paper which is sized with aluminium sulfate
- ▶ Children's paints, which if accidentally ingested would come into contact with stomach acid

Improved weathering

When standard ultramarines face long-term exterior exposure, acid rain can cause decomposition of the pigments. The resulting color change may vary in severity depending on the protection afforded by the particular resin system.

Venator recommends selecting acid resisting grades for applications involving long term exterior exposure. Numerous weathering trials have been conducted in various systems, all of which confirm the superior fastness of acid resisting grades when compared to standard pigments.



ULTRAMARINE product range

We recognize that the plastics industry is constantly looking to provide innovative solutions for their customers. We have a range of products that offer new and exciting benefits for masterbatch producers, compounders and converters.

Color Space	General Purpose	Premier	Premier D Dried	Prestige Wax Coated	Premier F Fine Particle Size
GREEN SHADE BLUES		XSG			
	02	GS	DGS	GS	
	03	GM			
RED SHADE BLUES		XSR			FXSR
	05	RX	DRX	RX	FRX
	06				
	07	RS	DRS		
	08	RM	DRM	RM	
	09				
ACID RESISTANT BLUES	16				
	17				
	54	AR		AR	
VIOLETS	59	XAR			
		VSB			
	11	VX			
		VSR			
	12	VU		VU	VUB
PINK	13	VB			
	19	PX			

Product compliance and technical support

ULTRAMARINE pigments are not classified as hazardous and meet the increasing number of environmental regulations throughout the world.

Safety

We are committed to continuously improving our safety performance by promoting a strong Zero Harm culture that requires a high level of employee involvement and empowerment.

Environmental

Environmental stewardship is one of Venator's guiding principles, harnessing state-of-the-art, innovative technologies and skill sets to help deliver minimal impact on the environment. Our production facilities are certified to international Health, Safety, Environmental and Quality standards.

Technical Service

At Venator, quality and value are taken as read. Whatever your color formulation and handling challenges, we are ideally placed to help you meet them.

Located at our technical service laboratories our experienced team of chemists and technicians is on hand to:

- ▶ Provide on-going technical support
- ▶ Formulate industry and customized colors
- ▶ Match new shades
- ▶ Explore new formulations

Compliance

	Indirect Food Contact		Toys	Cosmetics	Medical	Environmental	Packaging
	AP (89)1	FDA 21 FR 178.3297	EN71 Part 3	ASTM F 963-11	FDA 21 CFR 73.2725	EU Pharmacopoeia 1997 - Chapter 3.1	RoHS / WEEE / CONEG
BLUE	✓	✓	✓*	✓	✓	✓**	✓
VIOLET	✓	✓	✓*	✓	✓		✓
PINK	✓	✓	✓*	✓	✓		✓

* Possible use, tested in finished article. **Acid resistant grades recommended.

VENATOR

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