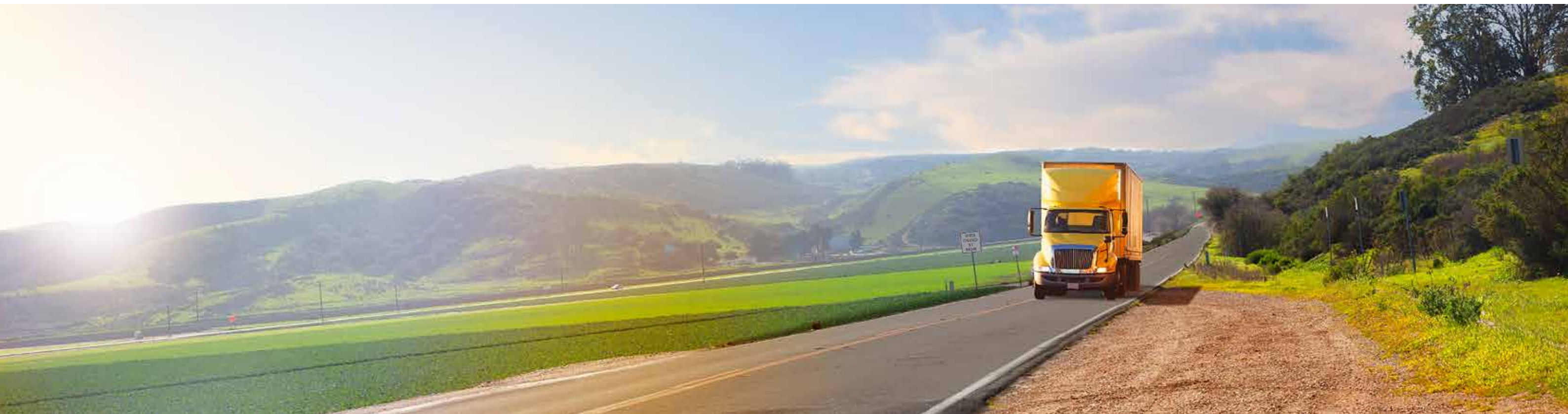




High-performance lead-free alternative

TICO®

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COMPETENCE IN COLOR



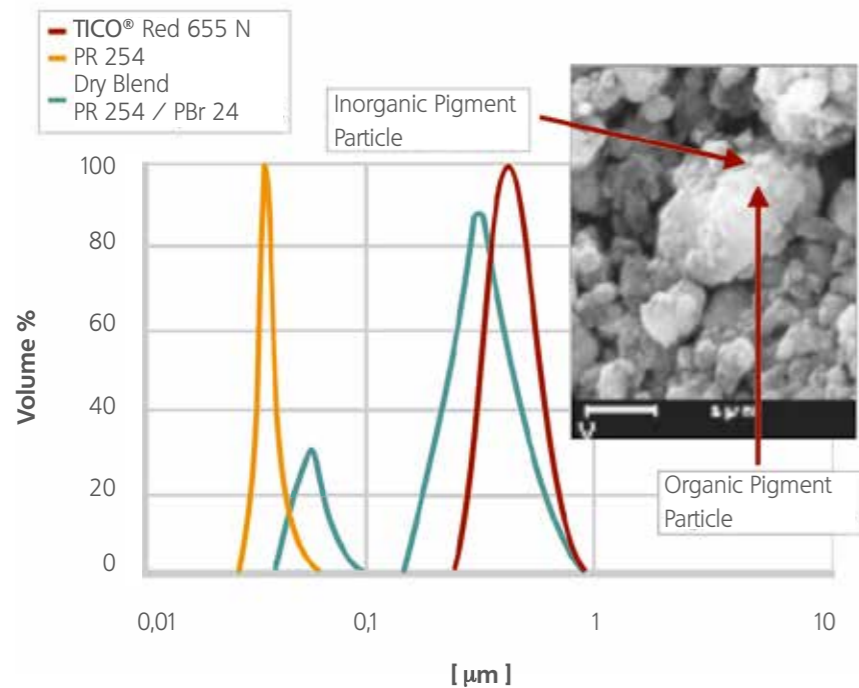
The idea behind TICO®

TICO®s are a new class of high-performance yellow, orange and red pigment preparations.

These titanium based colorants exhibit maximum gloss, opacity, strength and durability, which cannot be achieved with today's well established blends between organic High-Performance Pigments and white/yellow titanium or bismuth vanadate pigments.

TICO® stands for Titanium Color made by a proprietary co-finishing process to attach the organic colorants to the surface of titanium carrier pigments.

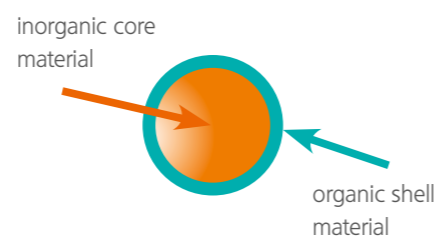
As a result TICO®s develop full color saturation and high gloss, low dusting properties and are easy to disperse.



Monomodal particle size distribution of TICO® Red 655 N

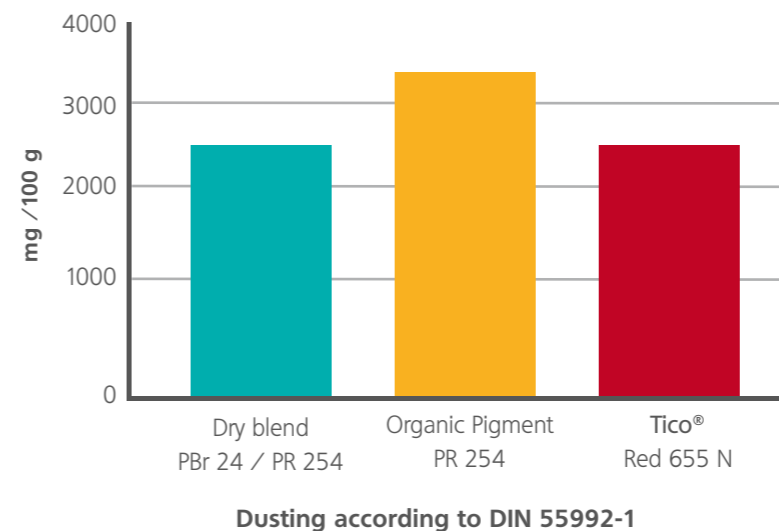
Pigment morphology

TICO® hybrid pigments are a combination of a specially micronized complex inorganic color pigmentary core particle and a pre-dispersed organic colorant attached to the surface of the core particle.



Regulations

The regulatory affairs sheet with detailed informations on compliant regulations of TICO® hybrid pigments is available on request.



Outstanding processing characteristics

High-performance organics and inorganic pigments differ significantly with respect to their surface characteristics and their specific weights.

The new technology resolves this problem by its hybrid morphology. TICO® preparations exhibit a significantly reduced dusting during its handling which is the best basis for a perfect manufacturing hygiene.

Due to the pre-dispersed state of its components the TICO® technology also allows significantly shorter grinding times more comparable to that of pure inorganic pigments and less risk for overgrinding and color shift. In comparison to straight blends also the oil absorption can be greatly decreased allowing for high pigment loading in colorant pastes.

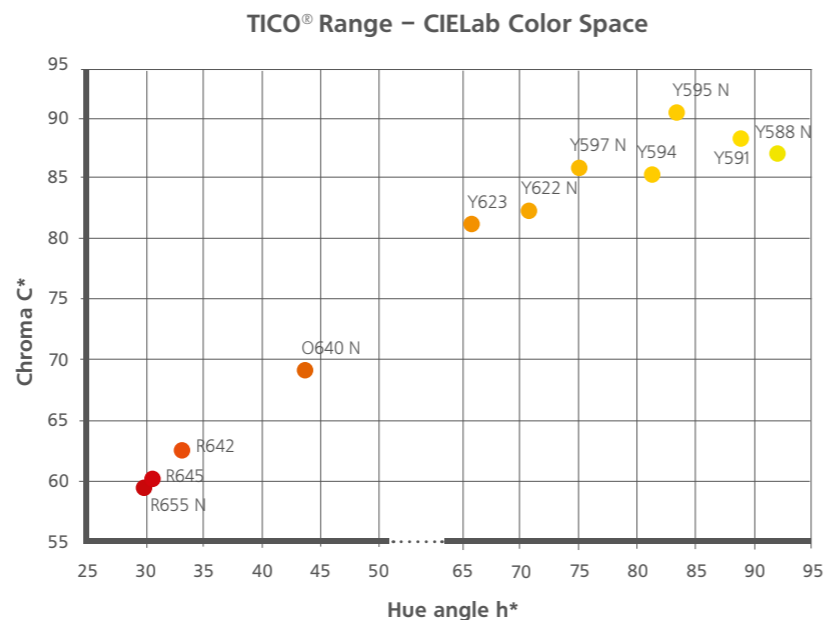
TICO® Color Space

The enhancement of chromaticity is an inherent characteristic of the TICO® pigment technology. The TICO® color space comprises the yellow, orange and red pigment preparations.

Application areas

TICO® hybrid pigments can be used with the majority of the commonly used binder types. The main application areas are:

- › Automotive Coatings
- › General Industrial Coatings
- › Plastics

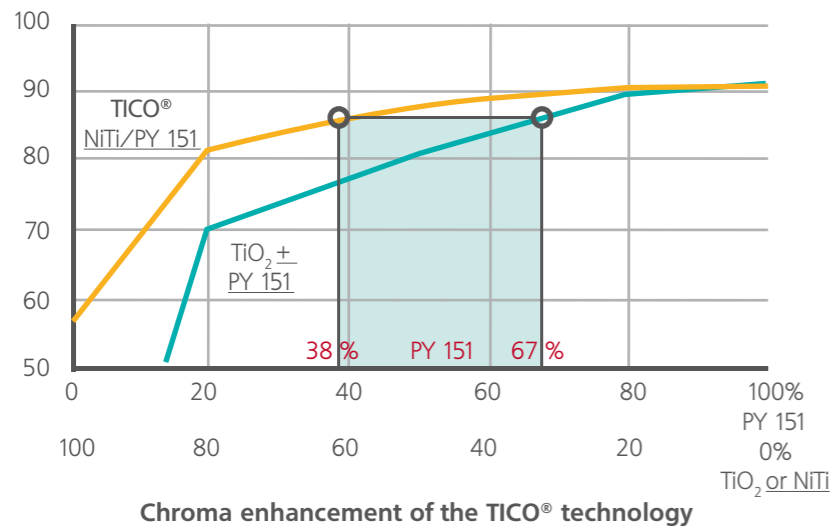




Chroma enhancement

The enhancement of chromaticity is an inherent characteristic of the **TICO®** pigment technology. **TICO®** achieves e.g. identical color saturation at only 38% organic pigment loading as compared to 67% P.Y. 151 for a titanium dioxide blend.

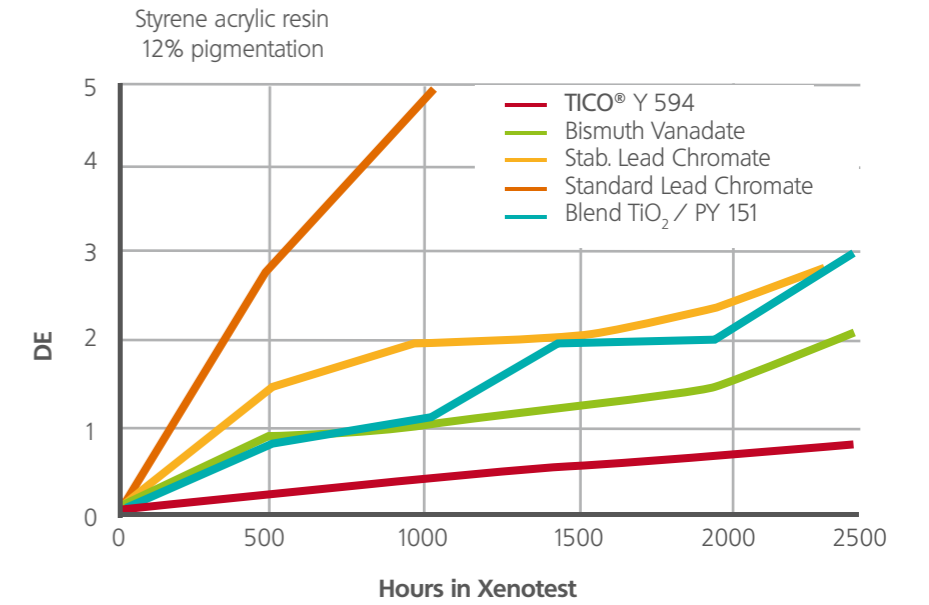
Besides several technical advantages e.g. increased opacity of the paint film the reduction of the organic content is a great potential cost saver.



Improved fastness properties

In **TICO®**s the valuable organic pigments are protected by the specially designed titanium carrier pigments, which leads to outstanding light and weather fastness.

As opposed to titanium dioxide, which has been known to exhibit photocatalytic activity accounting for weather induced degradation mechanisms, the new titanium carrier pigments of **TICO®** act like UV-absorbers and protect the sensitive organic pigment from UV-attacks.



Accelerated weathering results in accordance with DIN EN ISO 11341-1-A

RAL 3000 [Flame Red]	Lead	TICO®	Vanadate	Organic
Molybdate Red	75.9%			
Pigment Red 52:2	8.2%			
Pigment Orange 36				51.9%
Pigment Red 254			44.6%	
Pigment Red 178				15.7%
Bismuth Vanadate			29.4%	
TICO® Red 655 N		50.2%		
HEUCODUR® 6R		39.7%		
Iron Oxide Red	4.5%	10.1%	17.4%	7.1%
Titanium Dioxide	11.4%		8.6%	25.3%
Cost Ratio	1	3	4	6

Formulations are adjusted in opacity

Value-in-use

TICO®s are highly opaque and sufficiently saturated to cover important full shade industry colors like e.g. defined in the RAL register, but also branded shades. Formulation costs with **TICO®**s are lower if compared to alternative high-performance color solutions.

Technical Data			Density [g/cm ³]	Oil Absorption [g/100g]	Specific Surface [m ² /g]	Acid ¹⁾	Alkali ¹⁾	Overpainting ²⁾	Heat Resistance ³⁾ [°C]	Light Fastness ⁴⁾	Weather Fastness ⁵⁾	Automotive Coatings	General Industrial Coatings	Plastics
Product	Full Shade	Reduction [1:3 TiO ₂]	Physical Data			Fastness Properties						Applications		
TICO® Yellow 588 N			3.5	15	6.1	5	4	5	170	8	5	●●	●●	●
TICO® Yellow 591			2.6	23	5.8	5	5	5	200	8	5	●	●	●
TICO® Yellow 594 ⁶⁾			2.8	19	6.0	5	5	5	200	8	5	●●	●●	
TICO® Yellow 595 N			2.0	28	6.3	5	5	2	140	8	5		●●	
TICO® Yellow 597 N ⁶⁾			2.9	23	6.0	5	5	4 - 5	170	8	5	●●	●●	
TICO® Yellow 622 N ⁶⁾			3.1	20	6.6	5	5	4 - 5	200	8	5	●●	●●	
TICO® Yellow 623			3.2	23	5.1	5	5	5	170	8	5	●●	●●	●
TICO® Orange 640 N			2.6	19	2.7	5	5	4 - 5	220	8	5	●●	●●	●
TICO® Red 642 ⁶⁾			2.3	20	8.7	5	5	5	230	8	5	●●	●●	
TICO® Red 645			3.0	17	6.4	5	5	5	220	8	5	●●	●●	●
TICO® Red 655 N			2.7	21	9.0	5	5	5	220	8	5	●●	●●	●

●● Our Recommendation ● Potential Use

¹⁾ Chemical resistance: Pigment, in a paper filter, is immersed for 24 hours in hydrochloric acid and sodium carbonate solutions of varying concentrations from 0,01 to 10%. Assessment is done using the five step greyscale in accordance with DIN EN ISO 105-A02.

²⁾ Overpainting: Bleeding was rated, of a white alkyd-melamine topcoat on a pigmented 2-comp. acrylate base coat in accordance with DIN EN ISO 105-A02.

³⁾ Heat resistance: Pigment was exposed at different temperatures up to 250°C in an alkyd-melamine baking system for 30 minutes. Temperature, above which, a noticeable shade change can be observed.

⁴⁾ Light Fastness: Data on resistance to artificial xenon weathering (DIN EN ISO 16474-2, procedure B, cycle 2) is determined in a 2-comp. polyurethane test system similar to DIN EN ISO 105-B02.

⁵⁾ Weather Fastness: Data on resistance to artificial xenon weathering (DIN EN ISO 16474-2, procedure A, cycle 1) is determined in a water based 2-layer test system after 2000 hours weathering time. Rating of change in color in accordance with DIN EN ISO 105-A02.

⁶⁾ Pigments partially contain PY₈₃ and should not be used at processing temperatures exceeding 200° C due to potential cleavage to 3,3' - dichlorobenzidine (DCB) under these conditions.

Due to limitation of printing process some slight variations between the color as illustrated may be observed.

Guide Formulations

RAL 1003	Signal Yellow	TICO® Yellow 594	52.8 %	
		TICO® Yellow 622 N	25.4 %	
		HEUCODUR® Yellow 251	19.5 %	
		Iron Oxide Yellow	2.3 %	

School Bus Yellow	TICO® Yellow 622 N	43.3 %	
	HEUCODUR® Yellow 6R	53.7 %	
	Iron Oxide Yellow	3.0 %	

RAL 1023	Traffic Orange	TICO® Yellow 622 N	29.1 %	
		TICO® Orange 640 N	40.0 %	
		TICO® Red 655 N	2.4 %	
		HEUCODUR® Yellow 6R	28.5 %	

RAL 2004	Pure Orange	TICO® Orange 640 N	100.0 %	
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Tornado Red	TICO® Red 655 N	85.7 %	
	Pigment Violet 19	14.3 %	

RAL 3020	Traffic Red	TICO® Red 655 N	71.4 %	
		HEUCODUR® Yellow 6R	28.6 %	



Our Service

At Heubach, customer satisfaction comes first. As a supplier of high-quality pigment and pigment preparation solutions we support our customers anywhere where pigments are in use.

With active service centers both globally and regionally we provide our customers with the technical support essential for the implementation of customer-specific requirements and solutions.

Fully equipped technical laboratories and centers enable us to carry out tests for all relevant applications, such as printing inks, paints and coatings, including corrosion protection, coil and powder coatings and plastics.

Custom color adjustments play a significant role both in coatings and plastics applications.

We have extensive expertise in the development of colors for a variety of plastics, paint and coating systems. Depending on fastness properties, application or processing requirements, we can deliver the right color for your application, plastic compounds or even a specific paint system.





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Our product specifications, application information and any other information in this document is based on our current state of knowledge at the Revision Date mentioned below. They are non-binding and cannot be taken as a guarantee. The processing company must establish the suitability of individual products itself. As their use lies beyond our knowledge and control, we cannot accept any liability relating to the use of our products in particular applications. In addition to that, the legal rights of third parties must always be considered. The specification agreed between the customer and ourselves is the basis upon which our general sales and delivery conditions are set and is the deciding factor concerning any liabilities. Our standard specification is then valid if no specification has been agreed upon between the customer and ourselves.

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