AUTOMOTIVE STYLING SHADES

2027 TRENDBOOK

SUDARSHAN

Outshine. Outdo.

TRENDS FOR AUTOMOTIVE STYLING SHADES

Limiting the consequences of climate change and successfully steering our societies and lifestyles towards greater mutual respect and cooperation are among the biggest challenges of our time. Therefore, we have dedicated this 2027 edition of our Trendbook to something very dear and important to all of us: planet Earth.

The unmistakable mix of ocean blue, earth brown, plant green and cloud white are what sets this beautiful little orb apart from countless others. They are colors we love – and must do everything to preserve.

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TRANSITION
CLARIANT PIGMENTS AND HEUBACH MERGE INTO A PIGMENT POWERHOUSE DEDICATED TO GLOBAL RESPONSIBILITY AND FAIRNESS

SUDARSHAN & HEUBACH ARE NOW ONE COMPANY

SUDARSHAN
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Transitions are a necessary part of life, be it in relationships, business, or civilization as a whole. The key to mastering them is to turn them into opportunities: for new forms of cooperation, for new types of innovation and, ultimately, for new and better kinds of growth.

Merging two businesses can be just as challenging as merging two families or integrating new sources of energy into existing economic patterns. But the rewards, too, can be just as high. For the businesses themselves, for their managements, R&D experts and manufacturing teams – and of course for their customers.

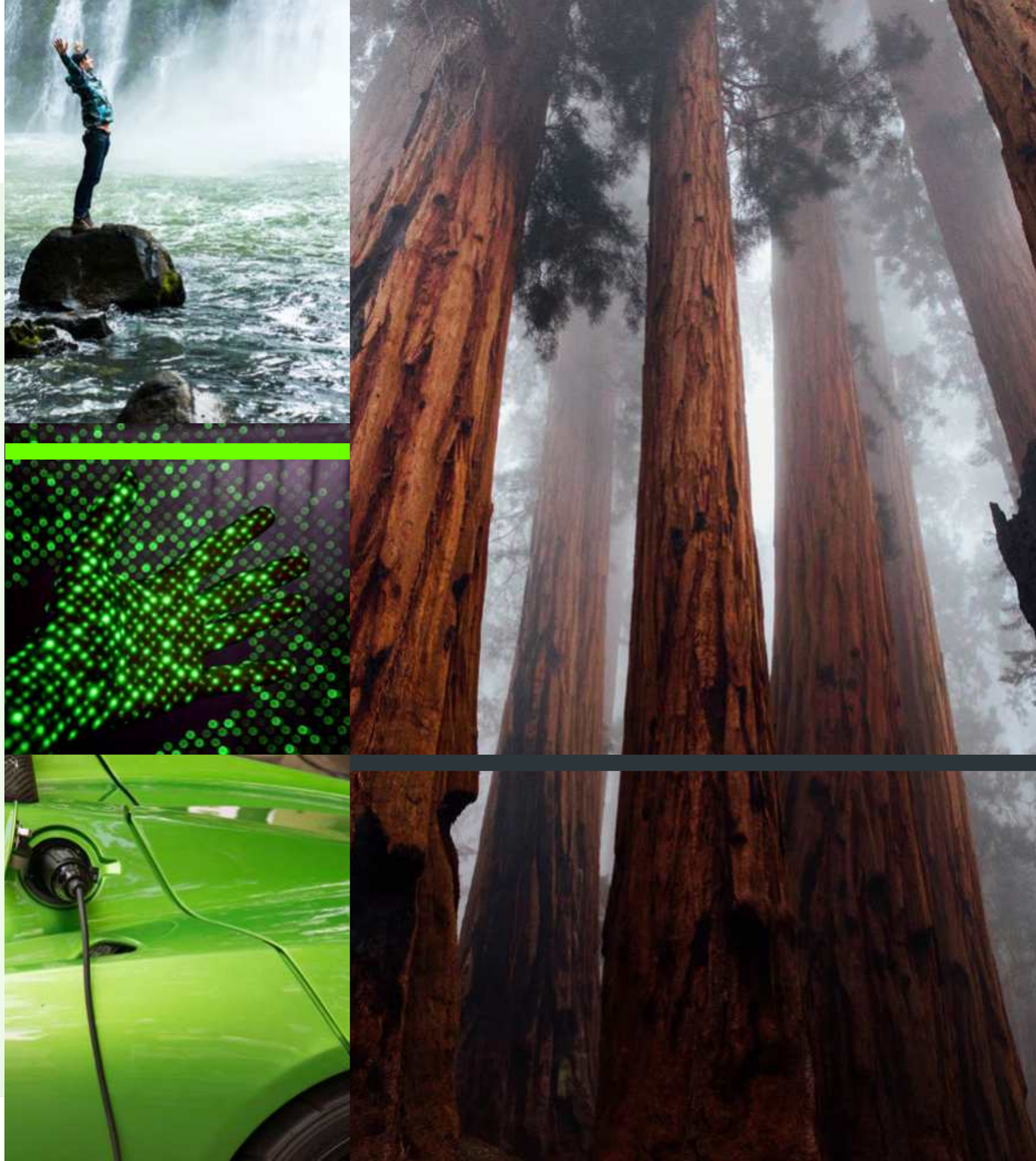
When Clariant Pigments and Heubach merged, market analysts mainly saw it as the birth of the world's biggest pigment provider. While this is true and by no means irrelevant, at a more basic level, something much simpler happened: People who love pigments joined hands and started working together as one – to offer Sudarshan's customers beautiful, well-made and sustainable colors.

THERE IS NO PLANET B

TIME TO SWITCH TO PLAN B FOR PLANET A

SWITCHING TO PLAN B MEANS WE MUST URGENTLY FIND, EXPLORE, AND PURSUE NEW WAYS OF THINKING, LIVING, AND BEHAVING, AND THIS MAY SEEM SCARY AT FIRST. BUT LIKE ANY TYPE OF CHANGE, FOLLOWING PLAN B FOR PLANET A IS ALSO FULL OF OPPORTUNITIES.

The opportunities lie in progressive concepts like green energy, digitalization, and fair trade. Though often still in a fledgling state, they have the potential to not just save the planet. They can also do a lot to make our daily lives on this planet safer and better – including the way we drive, paint, and enjoy our cars. Ultimately, switching to plan B may even take us a big step forward to justice, peace, and freedom on our planet A.



THERE IS NO PLANET B
TIME TO SWITCH TO PLAN B FOR PLANET A

We go through life with the reassuring knowledge that we can have whatever we want, from unlimited supply, and that things that break can either be repaired or simply replaced. This is true for smaller items like dishes, eyeglasses, or worn-out shoes. Even if our car breaks down in a way that can't be mended, there's always the possibility of getting a new one.

This voracious consumption of resources, along with carelessly neglecting environmental, social, and ethical affairs, is typical »plan A« ideology we have been used to for all too long.

However, when it comes to our planet, which some of us affectionately like to call Mother Earth, this thinking doesn't work.

There is no super glue we can put Earth back together with. No shoe repairs shop we can take it to. No trusted mechanic who will take a knowing look under its hood. There is also no cosmic department store, online shop, or Earth dealership where we can simply get a new one.

There is just this one: our planet A. Space scientists say there might be many more just like it out there. But until we've found a way of reaching them that's neither here nor there. No, for the time being we seem to be stuck with the one we have and can't pin our hopes on planet B. And that's why, to take better care of it and keep it in good shape, it's time for all of us to switch to »plan B«.

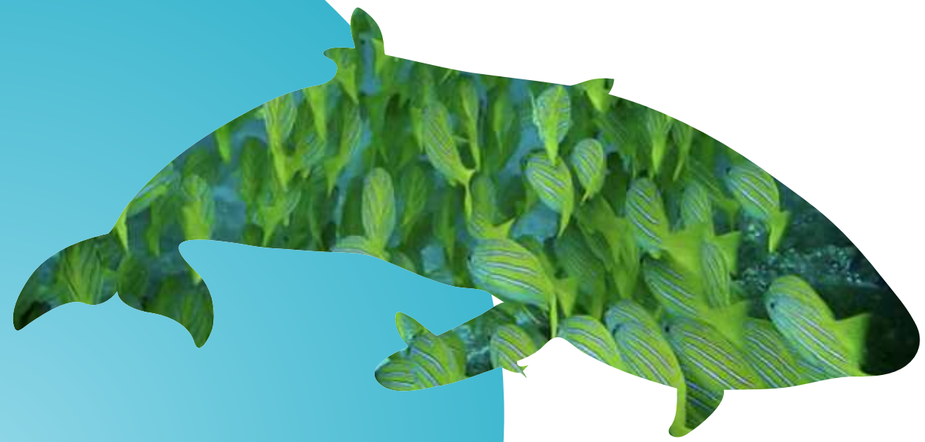
THE BEAUTIFUL COLORS **OF SEA AND NATURE**

To know where you're going, you must know where you come from. We, and maybe all living things on Earth, come from the sea. When, long ago, our fishlike ancestors moved onto land and started walking on their fins, it set the stage for a world of boundless biodiversity. And wherever we walk on our former fins and whatever new paths we follow: The sea remains our home.

The sea is also home to a beautiful universe of colors. From corals to anemones to parrot fish: Tropical reefs harbor a swirling diversity of hues that rival the most extravagant tones of an automotive coatings show. Yet reefs also serve as a literal color test for climate change, bleaching and fading when oceans get too warm.

At the same time, new flecks of color wash up on beaches and other unwanted places – made of mismanaged marine debris. Marine coatings, too, can add to the oceans' load when their binders release toxic ingredients by design or become brittle and flake off into the sea. That's why the coatings should not only be of high quality but their ingredients as sustainable as possible.

Meanwhile, coatings also play an essential role in protecting the hulls of ships and other marine surfaces, extending their life and the time they can be used in a circular economy. It's a sustainable role coatings play not just in global transportation but also in the realm of science – where deep-sea submersibles explore more and more of our beautiful ocean home.



»We need to respect the oceans and take care of them as if our lives depended on it. Because they do.«

Sylvia Earle

Sylvia Alice Earle (*1935) is an American marine biologist, oceano-grapher, explorer, author, and lecturer. She has been a National Geographic explorer-in-residence since 1998. Earle was the first female chief scientist of the U.S. National Oceanic and Atmospheric Administration, and was named by *Time* magazine as its first Hero for the Planet in 1998.

THE BEAUTIFUL COLORS OF SEA AND NATURE

JUST ONE LOOK IS ENOUGH TO KNOW WE HAVE A VERY SPECIAL RELATIONSHIP TO THE SEA. With its wonderful displays of light and color, it makes us aware of the immense beauty but also of the great vulnerability of the planet we all share.

HELPING PRESERVE PLANET A
BY TAPPING THE RESOURCES OF UNIVERSE B

There may be no planet B in the real world. But in the digitized realms of virtual reality, there aren't just planets B, C and D but more alternative worlds than any alphabet has letters. And, as the very page in front of you shows, digitalization can do far more than create a new »metaverse« of virtual games and recreations.

There's nothing to be said against expanding our inner horizon by leading a colorful second life as an avatar. But perhaps even more interesting is how our new ability to create digital »twins« can help us solve our real-world challenges. Take these words you're reading, for example. In the last edition of our Trendbook, they were still set in print, as were all the accompanying images and illustrations. In this edition, you are either reading them in a PDF or on our website, and thus in the »immaterial« form of pixels.

There are several reasons why we decided to take this step. And one of the foremost ones is sustainability. Being creators of highly real and touchable products ourselves, we sincerely appreciate the benefits of a printed book. Yet weighing these against the energy and resources saved by switching to »digital«, both when it comes to manufacture and distribution, we ultimately opted for change. It is one of the many ways in which, at Sudarshan , we try to preserve planet A by leveraging the benefits of digitalization.

DIGITALIZATION MEANS DEMATERIALIZATION AND, THUS, DECARBONIZATION:
Both our digital trendbook and virtual car color configurator help save CO_2. »Digital« also helps us trace our sustainable raw materials.

HELPING PRESERVE PLANET A

BY TAPPING THE RESOURCES OF UNIVERSE B

While digitalization can be a real alternative to using precious resources, it still requires energy – often even a lot of it. That's why it's so crucial that green energy becomes widely available across planet A: whether it's used for running computers, cars or the production of pigments and paints.

Some of the most high-flying ideas for generating green energy include harvesting wind power at high altitudes and solar power in outer space. Meanwhile, down here on Earth, global sales of electric cars are finally taking off. According to estimates from the International Energy Agency, 13% of all new cars sold in 2022 were electric. If the trend holds, cars may reach the lofty goal of net-zero emissions by 2050.*

* IEA, Electric Vehicles, September 2022

Another hot contender for paving the road to net-zero is hydrogen. To do so, however, the versatile energy carrier must be much more widely produced using green energy, such as solar, wind or water power. At the same time, all these sustainable advances must become more generally available to all societies and income levels to really keep us from wishing we had a planet B.

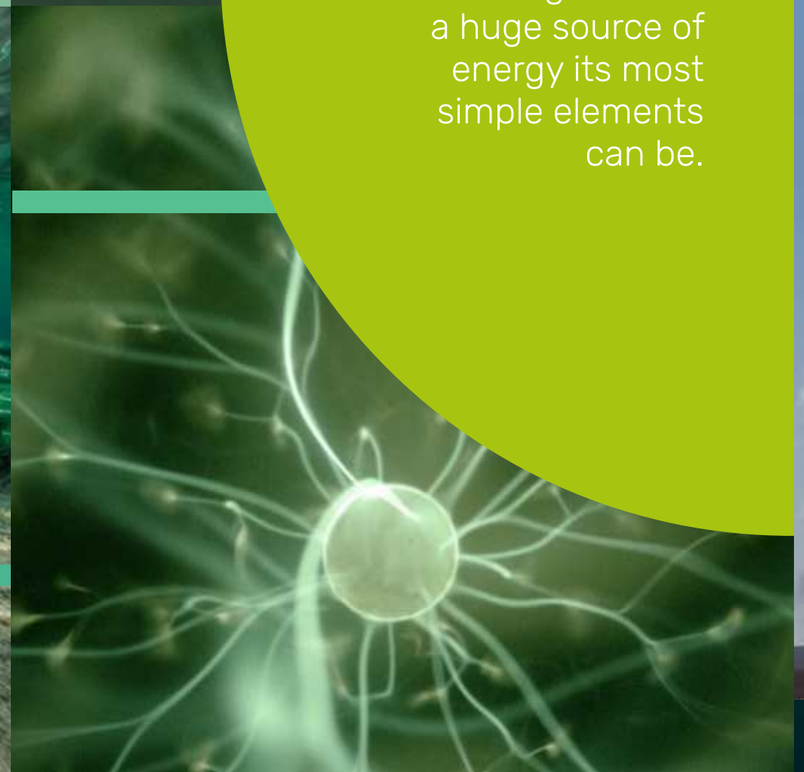
»I am apprehensive, but I still don't think we ought to despair. If we can get together, we can find solutions to a lot of the problems we face, particularly with energy production. «

Sir David Attenborough

Sir David Attenborough (*1926) is an English broadcaster, biologist, natural historian and author noted for his innovative educational television programs, especially the nine-part *Life* series for the BBC. While Attenborough's earlier work focused more on the wonders of the natural world, his later work has been more vocal in support of environmental causes as renewable energy, mitigating climate change, reducing meat consumption, and setting aside more areas for natural preservation.

GREEN ENERGY FOR EVERYONE

THE BASIS OF ANY PLAN B

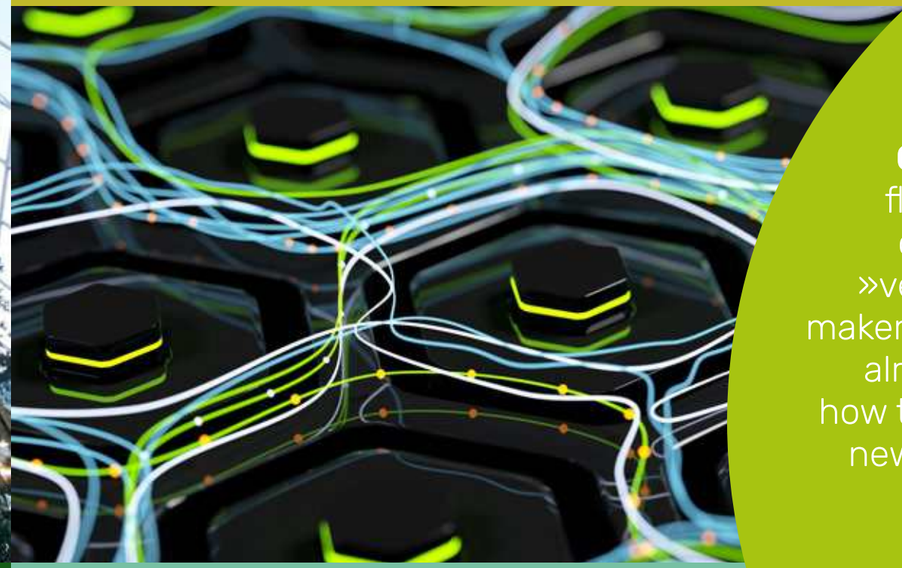


SUNLIGHT LETS WHOLE FORESTS GROW, wind moves mountains over time, tides reverse the flow of rivers: it's as if earth was showing us what a huge source of energy its most simple elements can be.

GREEN ENERGY FOR EVERYONE

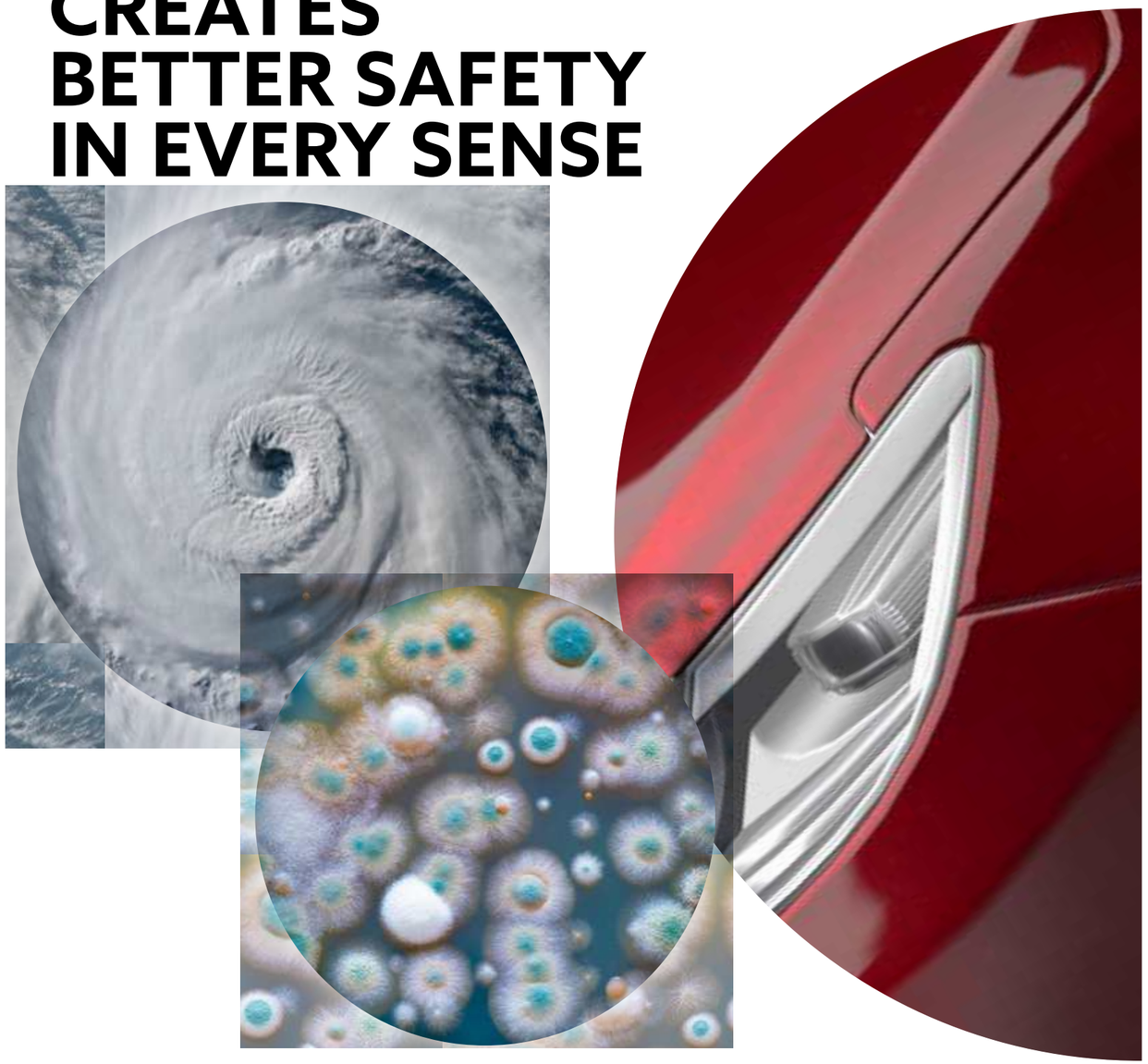
THE BASIS OF ANY PLAN B

TAKING A BEE-LINE **TO THE FUTURE**



THE IDEAS FOR COLLECTING GREEN ENERGY are flying high. With their concept vehicles for »vertical mobility«, car makers and engineers are already thinking about how to use this energy in new and exciting ways.

HOW SAVING THE PLANET **CREATES BETTER SAFETY IN EVERY SENSE**



Wind, sea, heat & fire: The enormous energy the forces of nature hold can turn against us if we don't put the world back in balance. Being more mindful of life and nature's needs can also increase our safety and well-being in other respects.

Scientists are just finding out that what we eat, and the way the microbes in our gut digest it, might not just influence our health but how we think, feel and act.* More reason to pay closer attention to how we grow, raise, and process our food, because what goes in there has even greater relevance for our physical and mental well-being than ever imagined.

In the mobility sector, green innovations in how cars are powered go hand in hand with advances in vehicle safety – such as driver assist technology, pedestrian detection and 360° camera views. In mobility, too, the ingredients that go into materials become increasingly important, whether used on the in- or exterior.

At Sudarshan,we are proud to adhere to high standards in this respect, both regarding the production safety of our pigments and their safety in processing and use.

* C&EN, How your gut might modify your mind, 2019

HOW SAVING
THE PLANET

CREATES BETTER SAFETY IN EVERY SENSE

THE SAFETY OF THE PLANET AND OUR OWN TIGHTLY INTERTWINE: protecting the one creates the right attitudes, approaches and advances for better protecting the other.

WHAT GLOBAL FAIR TRADE HAS TO DO WITH WORLDWIDE SUSTAINABILITY

Saving planet A can only work if we all pitch in. And this kind of global solidarity can only be achieved if nobody feels left out or disrespected.

That's why ensuring fair trade and work conditions across the globe is such a crucial part of organizing its rescue. Economic fairness starts with the abolition of child labor and exploitative work practices. It extends to closing pay and power gaps. And it includes a global financial system that provides a level playing field for all – be they citizens or societies. Only then can these be expected to all pull in the same direction and share in a global effort for the greater common good.

Equal access to mobility is part of this global fair deal. And equal doesn't just mean being able to sort out some rudimentary, cumbersome, and perhaps even unsafe way of getting from A to B.

It can also mean enjoying the freedom, convenience and even the colorful means of self-expression that cars and other vehicles can represent. Always provided the joy they bring doesn't put an excessive burden on the rest of society.

Sudarshan supports the United Nations Global Compact and its ten principles regarding human rights, labor, the environment and anti-corruption. We are also committed to the UN's Sustainable Development Goals (SDGs) and engage to promote them with our business.

»Earth provides enough to satisfy every man's need, but not every man's greed.«

Mahatma Gandhi

Mahatma Gandhi (1869–1948) was an Indian lawyer, publicist, moral teacher, ascetic, and pacifist who became the spiritual and political leader of the Indian independence movement, achieving the end of British colonial rule over India in 1947 through nonviolent action and civil disobedience, inspiring movements for civil rights and freedom across the world.

WHAT GLOBAL FAIR TRADE

HAS TO DO WITH WORLDWIDE SUSTAINABILITY

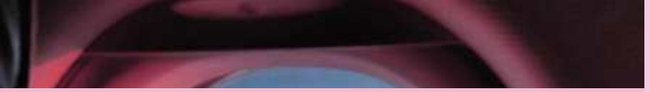
IT’S HARD TO WORK HAND IN HAND when separated by too wide a gulf of wealth and opportunity. Fair trade and global equality are important elements in successfully closing the ranks against climate change.

THE MANY BOLD COLORS OF LIBERTY AND FREEDOM

Freedom means liberty from oppression, aggression, and from other people telling you how to think, dress and behave.

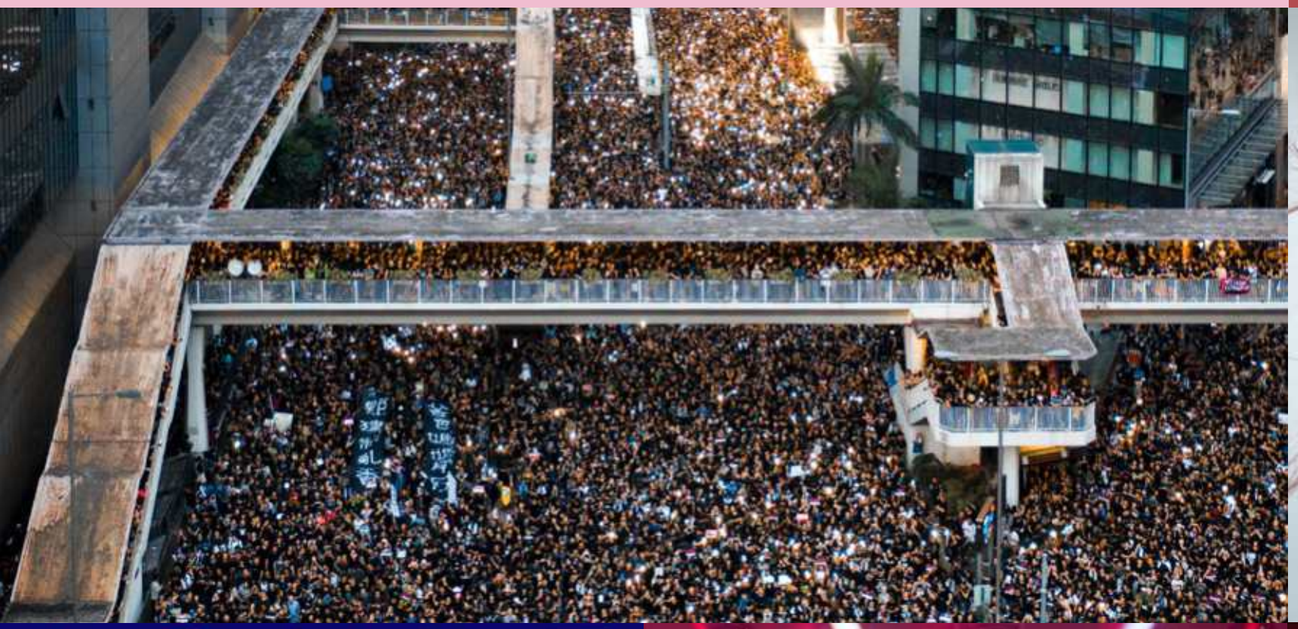
In this regard, the fact that there is no planet B mainly means we should all do our best to get peacefully along on this one. Colors can be powerful symbols of freedom, whether adorning banners, rainbows, or discarded emblems of repression. At the same time, respecting the freedom of others includes being tolerant of their customs and perspectives, even if these are colored by different beliefs and opinions than our own.

Green energy, digitalization, safety-enhancing innovations, fair trade: If used wisely, all these elements can contribute to a better, more sustainable, and perhaps even more peaceful life on planet A. Together, and in combination with many other social and technical steps forward, they can add up to humanity's plan B. Then, up on firm ground as in the swirling jumble of tropical reefs and lagoons, can life once more be lightheartedly enjoyed in all its colorful splendor and variety. Worry can give way to delight – and restraint give way to freedom.

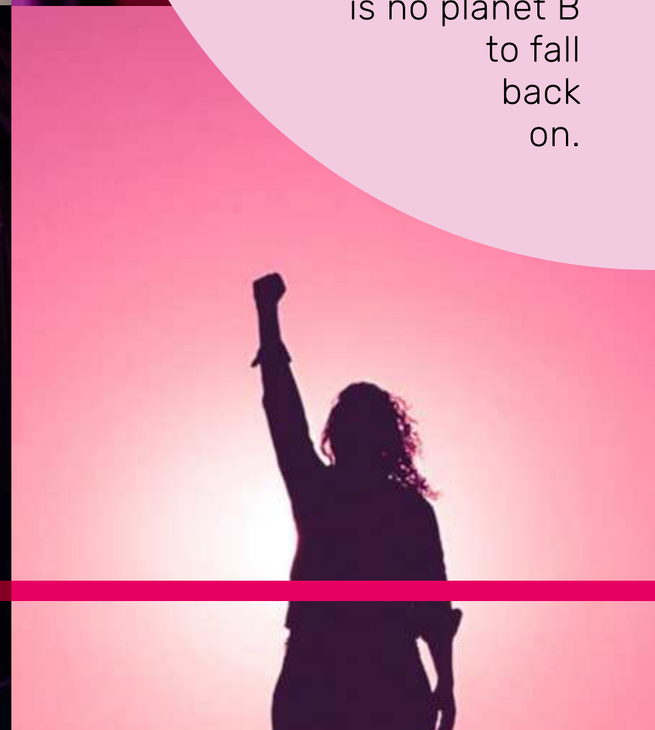


THE MANY BOLD COLORS **OF LIBERTY AND FREEDOM**

FREEDOM CAN TAKE MANY FORMS: from the basic human right of living as one wishes to the wind blowing in the hair of an adventurous traveler.



FREEDOM FROM FEAR IS AN INTERNATIONALLY AGREED HUMAN RIGHT. Especially for those who will inherit planet A, everything should be done to dispel the anxiety arising from the fact that there is no planet B to fall back on.



THERE ARE NO FREE THOUGHTS

WITHOUT THE LIBERTY TO EXPRESS THEM

SUDARSHAN

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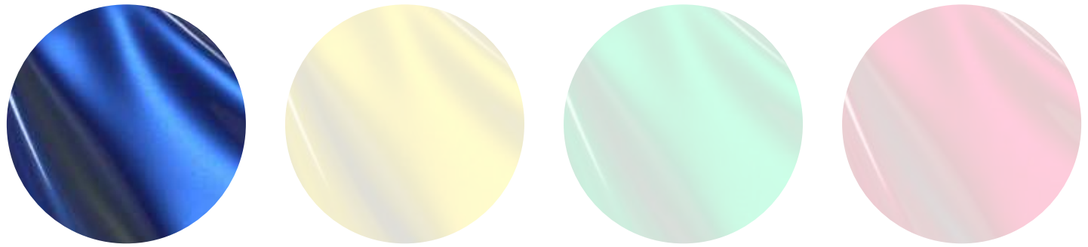
AUTOMOTIVE

STYLING SHADES 2027

PIGMENTS
IN FOCUS

A broader, even more versatile range – Welcoming our new pigment additions

In previous editions of the Trendbook, this section naturally focused on organic pigments manufactured by Clariant. They are now joined by products from the Sudarshan side, which add significantly to the breadth and strength of the two businesses' combined portfolio. It is only natural, then, that this time the focus should lie on these exciting pigment »newcomers«.



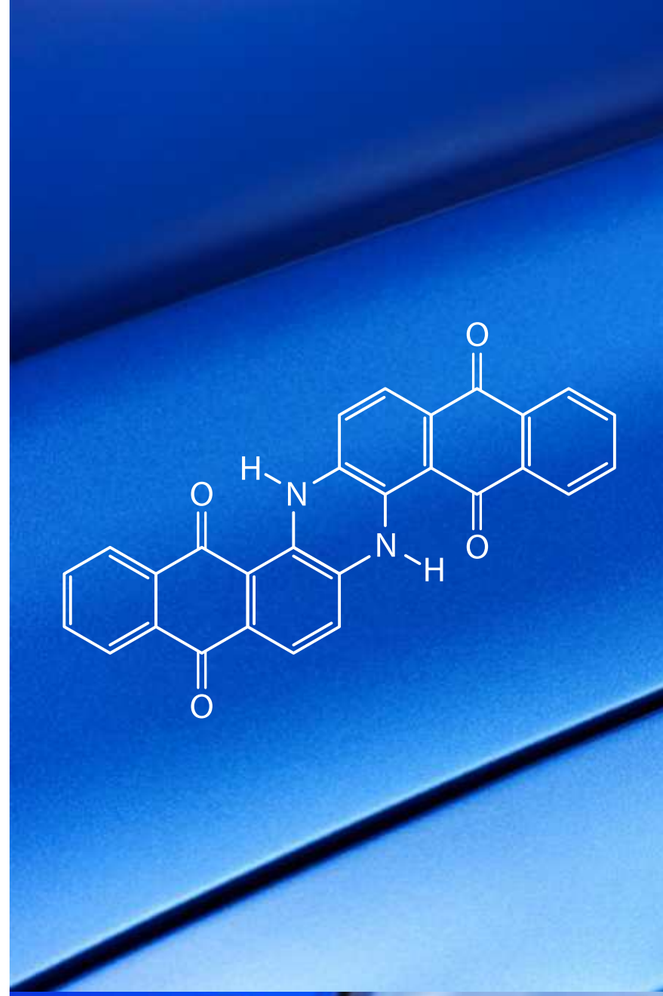
Monolite™ Blue 3RX-H

(C.I. Pigment Blue 60)

Monolite™ Blue 3RX-H is a very red-shade blue pigment. The molecular structure of this indanthrone blue pigment is significantly different from that of common phthalocyanine blue pigments and so are its properties.

Pigment Blue 60 generally is a transparent blue pigment with excellent weather fastness even in very light tints, but its chroma is typically lower than that of α-phthalocyanines. The hue of mid and deep metallic shades can be matched more economically and with higher chroma by a combination of Pigment Blue 15:1 and Pigment Violet 23, but in light and pale metallic shades, the higher weather fastness compared to Pigment Violet 23 really makes a difference! Therefore, the main application is shading blue to the red side, or violet and white to the blue side. The product also works great as a base pigment in pale metallic shades.

Sudarshan offers two grades of Pigment Blue 60: Monolite™ Blue 3RX-H is a transparent grade with high color strength for effect shades, designed for improved performance in waterbased coating systems, while Monolite™ Blue 3R-H is more opaque and better suited for solid shades.



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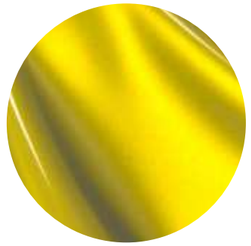


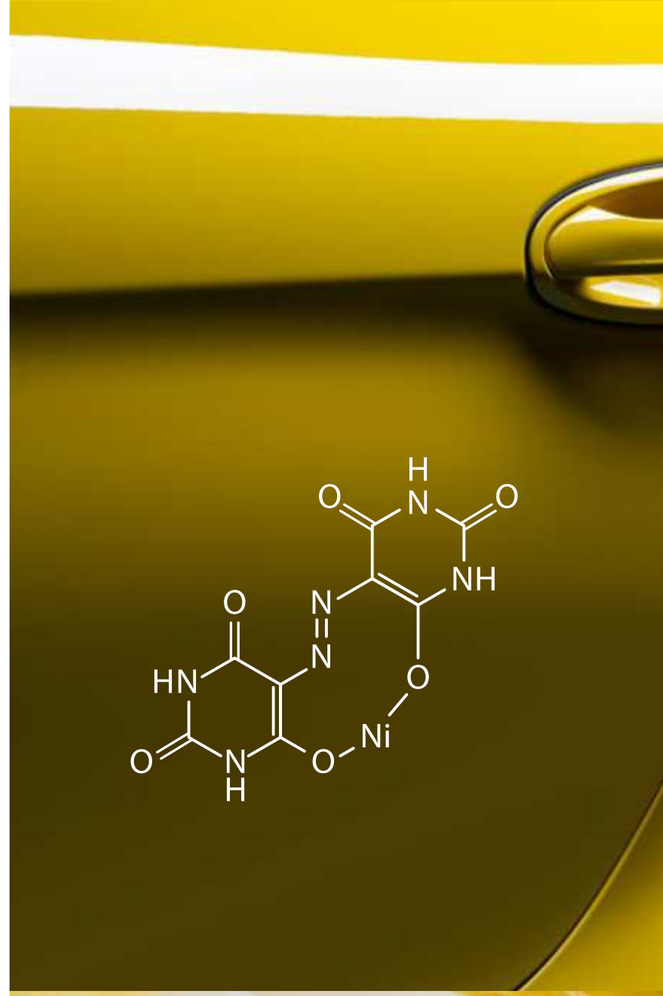
Heuco® Yellow 115003
(C.I. Pigment Yellow 150)

To readers of the previous Trendbooks, Pigment Yellow 150, a nickel complex of an azo pigment, is very familiar, however, not as a product from Sudarshan. Its very high color strength, transparency, and weather fastness even in pale tints makes it the preferred yellow pigment for effect shades. Although new in Trendbook formulations, Heuco® Yellow 115003 is a close match to the product used before.

When formulating with Pigment Yellow 150, its concentration relative to other pigments should not be too high: The mass tone and reductions with white show a mustard-like color, which is even visible in the downflop of effect shades. This is a side effect of the very high color strength.

With golden and copper effect pigments, this pigment can produce both greenish and reddish gold shades which in a basecoat almost look like exclusive gold shades with a yellow tinted clear on top.

Due to the pigment's very high transparency, the achievable flop index can be extraordinarily high, nearly as high as with the pure, unmixed effect pigment. At the same time, there is an exciting gain in chroma.



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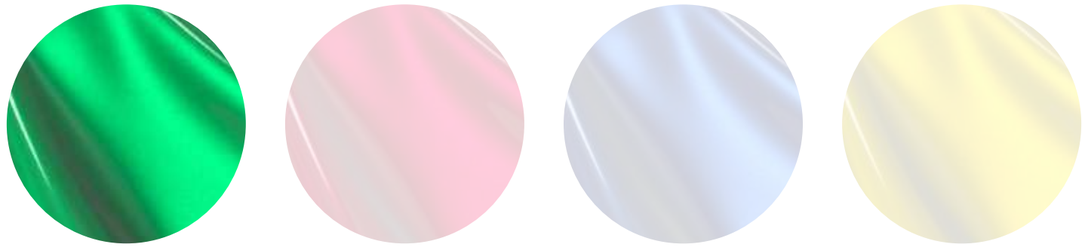


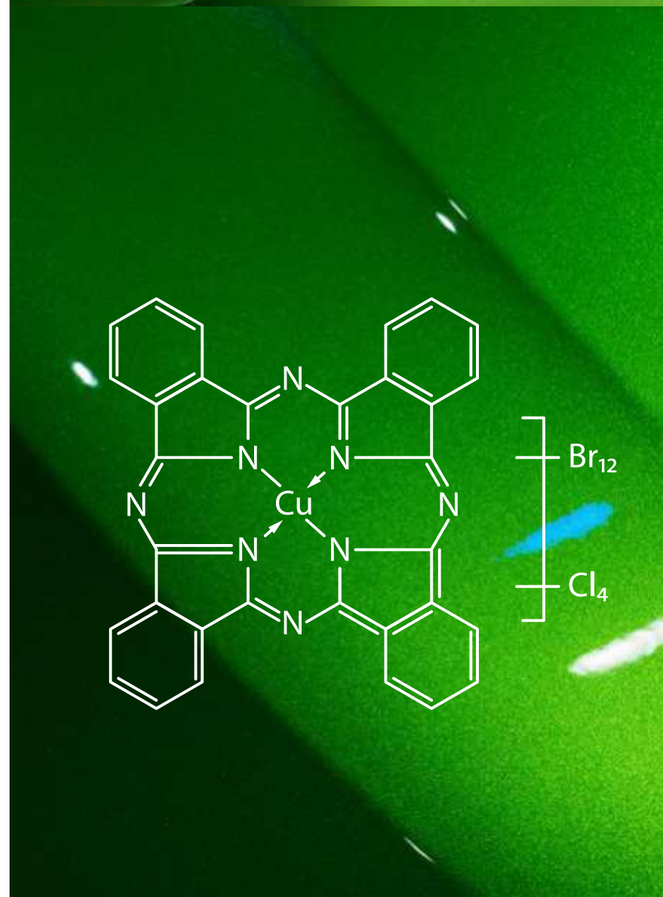
Monastral™ Green 6Y-C*

(C.I. Pigment Green 36)

When the 16 chlorine atoms in phthalocyanine green (Pigment Green 7) are partially replaced by bromine, the hue shifts more towards the yellow part of the spectrum. The resulting green is more chromatic than a mixture of Pigment Green 7 and Pigment Yellow 150. However, due to the higher molecular weight, its color strength is lower.

Monastral™ Green 6Y-C* has a long track record in the automotive industry and has become a market standard. The excellent weather fastness even in pale shades allows the use as tinting pigment in yellow solid shades for opacity improvement.

Combinations with golden effect pigments and Heuco® Yellow 115003 result in dazzling »poison green« shades with a very dark downflop, while use with champagne-shade effects yields beautiful silky greens.



* Monastral™ pigments are not available in the USA

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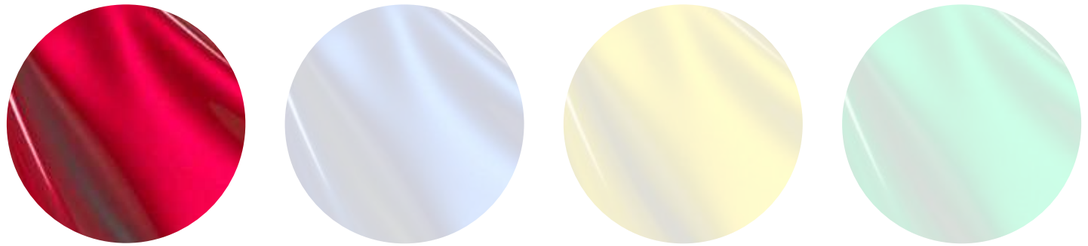


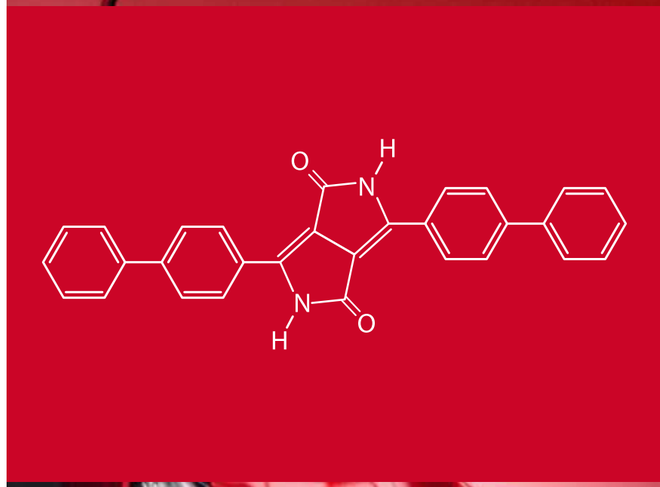
Monolite™ Red 326401

(C.I. Pigment Red 264)

Pigment Red 264 is a DPP Rubine pigment with very high color strength and very good transparency.

Monolite™ Red 326401 is the latest addition to Sudarshan automotive portfolio, and close to the market benchmark. In combination with Hostaperm® Red P2GL-WD (Pigment Red 179) and copper or red effects it can produce shades which resemble exclusive red shades with a tinted clear coat. Combinations with Hostaperm® Scarlet GO (Pigment Red 168) or Hostaperm® Pink EB transparent (Pigment Red 122) result in even more chromatic shades.

However, when it comes to light and pale shades, the fastness properties of the resulting shades must be carefully checked, and for performing shade adjustments at low dosages, Hostaperm® Red P2GL-WD presents a more durable choice.



COLOR POPULARITY 2022

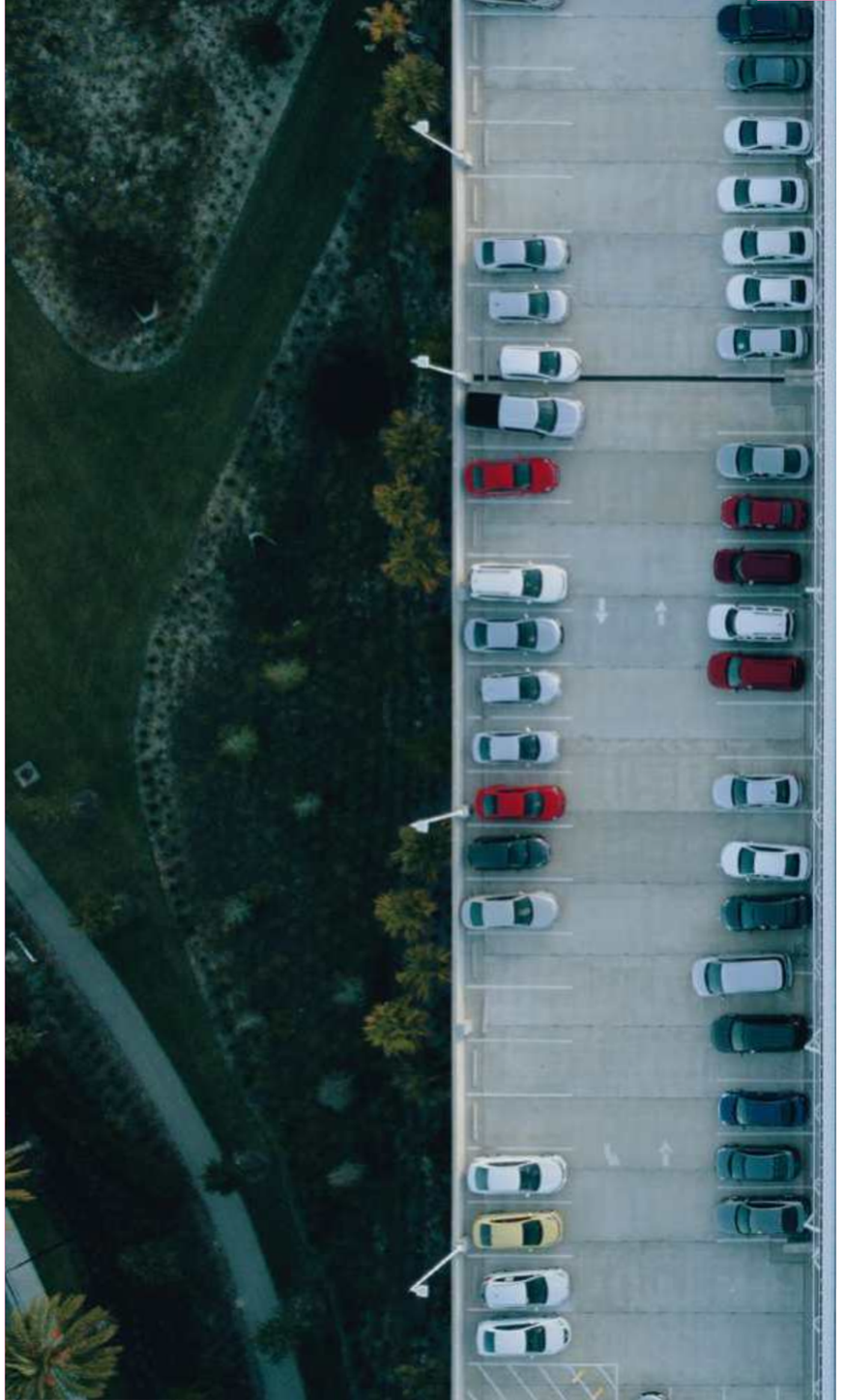
The world’s car colors remain in neutral gear

As they have for two decades, car colors stayed in neutral gear in 2022. White, black, gray and silver continued to dominate the global palette. Together, these so-called non-colors captured a hefty 82% of new car sales. Yet chromatic colors such as blue, red, brown and green stand their ground. And even many non-colors aren’t as neutral as they seem.

White remains the top choice of car buyers worldwide. More than one third of them (34%) opted for this color when making their purchase in 2022. However, a large part of these whites were not simple solids but more lively pearlescent shades. Among the growing number of black cars, this trend for spicing up neutral colors was even more pronounced. Of the 21% of cars sold in black, the vast majority had a metallic sparkle or some other effect.

Europe is the only market where gray takes precedence over white. In 2022, the snowy queen of the non-colors even had to cede second place to black. Europe and North America are also special for the large share of blue cars sold in those regions (11%). At the same time, car buyers in the Americas and Africa, as well as in South Korea and India, have an above-average liking for cars in red (6–8%).

Since blues are often chosen for electric vehicles, and bold colors like red for smaller cars, these trends bode well for the future of planet A. Add to this the growing trend for producing all these beautiful colors sustainably, and the future brightens even more.



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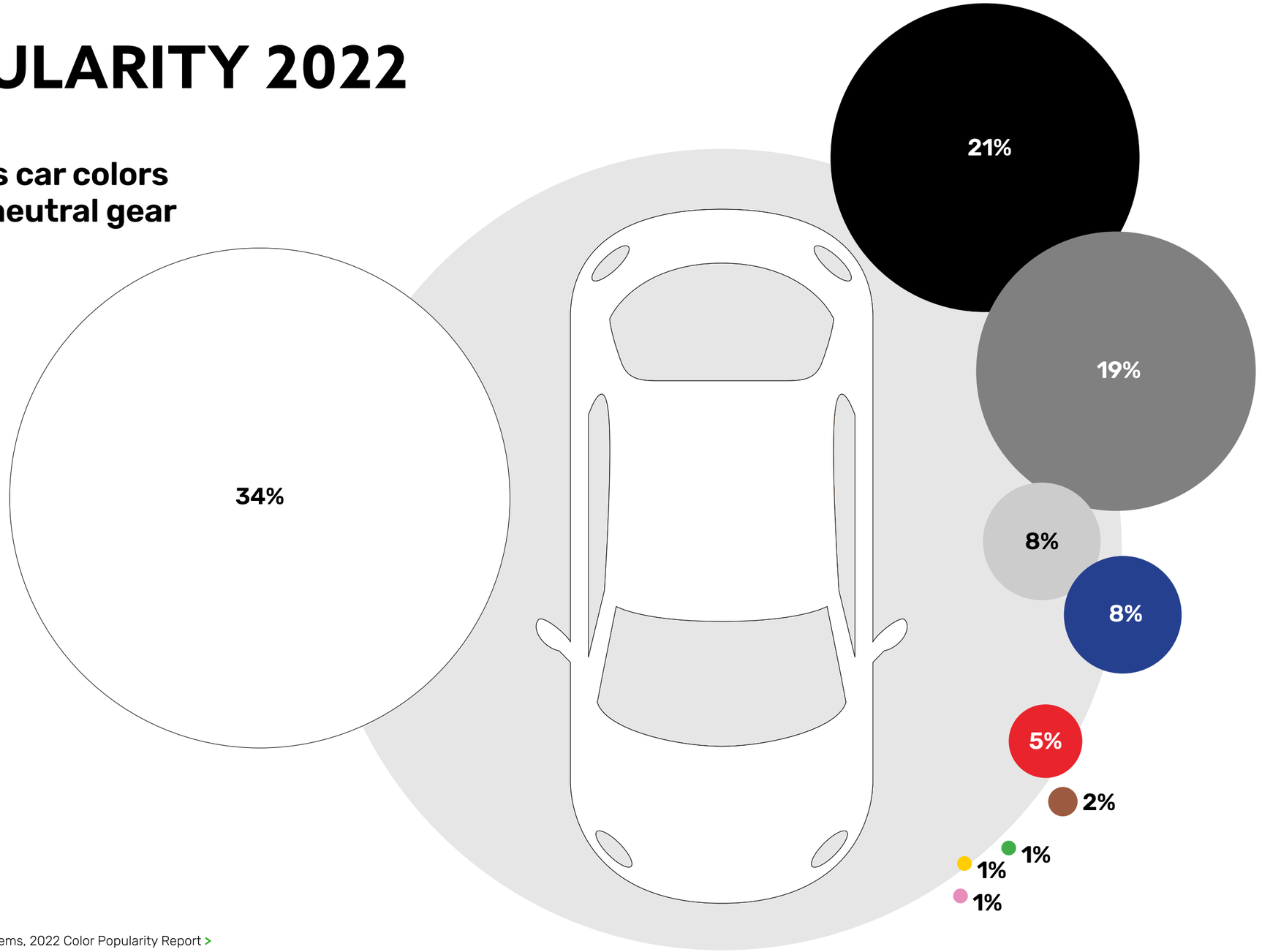


WORLD

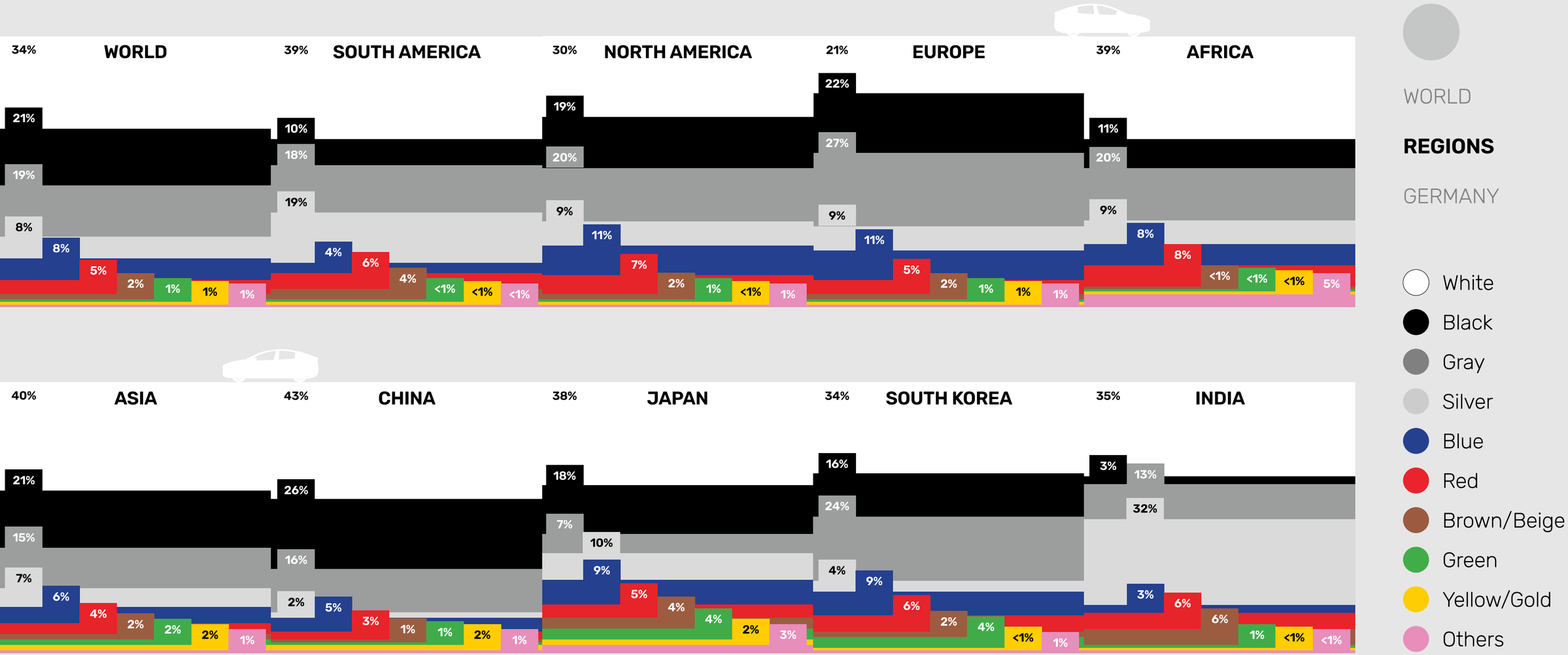
REGIONS

GERMANY

- White
- Black
- Gray
- Silver
- Blue
- Red
- Brown/Beige
- Green
- Yellow/Gold
- Others

Source: Axalta Coating Systems, 2022 Color Popularity Report >

COLOR POPULARITY 2022



WORLD

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- White
- Black
- Gray
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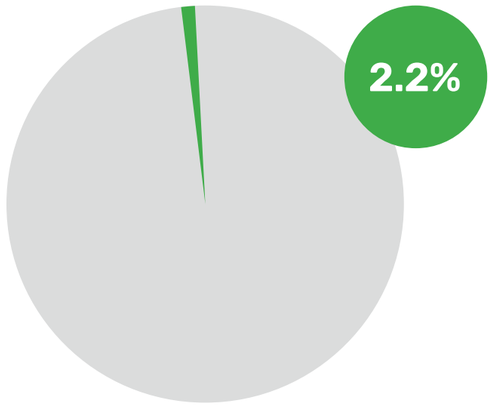
- Green
- Yellow/Gold
- Others

Source: Axalta Coating Systems, 2022 Color Popularity Report >

COLOR POPULARITY 2022

Color popularity in Germany in 2022 : A growing love for green

Sure, you don't really see many green cars on the road. Even in Germany, where the love of nature and the outdoors has a long tradition, only 2.2 percent of all new cars sold in 2022 were painted green. Yet the enthusiasm for green is on the rise.



Source: German Association of the Automotive Industry (VDA) >

In terms of pure growth, cars in green performed better on the German market in 2022 than cars in any other color. Among the chromatic colors, green currently ranks 3rd after blue and red, and has left orange/copper, yellow/gold and brown/beige behind. Two years ago, green ranked 5th and was about to be overtaken by orange. One reason for the new interest in green could be that formulators created fresh and exciting hues which are rare enough to attract highly individualistic drivers.

Together, cars in gray, silver, black and white made up over three-fourths (77.3%) of all German car purchases in 2022. While this is a step up from the previous year, it is still a pretty far cry from the over 80% these non-chromatic colors take worldwide – meaning you will see more color on the streets of Berlin, Frankfurt and Munich than in many other global cities.

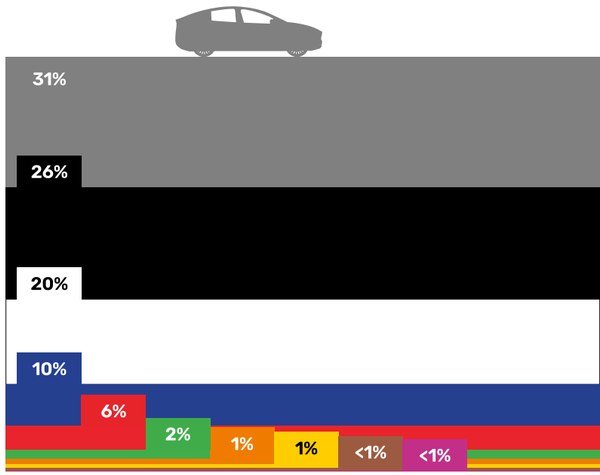
Non-chromatic, neutral colors are often chosen if the car is to be resold after a short time of ownership. This is usually the case with cars operated by rental and leasing companies, or by fleets who only apply temporary decals. Among the neutrals, gray and silver retain their top position. In 2022, nearly a third of Germany's car buyers (30.2%) selected one of these colors for their vehicle. Compared to the year before, this represents a further increase by nearly a whole percentage point (0.9%).

As in global statistics, black saw an even sharper rise in popularity. Increasing by almost two percentage points, the neutral color captured over 26% of new car sales. Taking the opposite turn, world leader white lost more than one percentage point and came in third at just over 20% (compared to 34% globally).

WORLD

REGIONS

GERMANY



COLOR POPULARITY 2022

Color popularity in Germany in 2022 : A growing love for green

WORLD

REGIONS

GERMANY

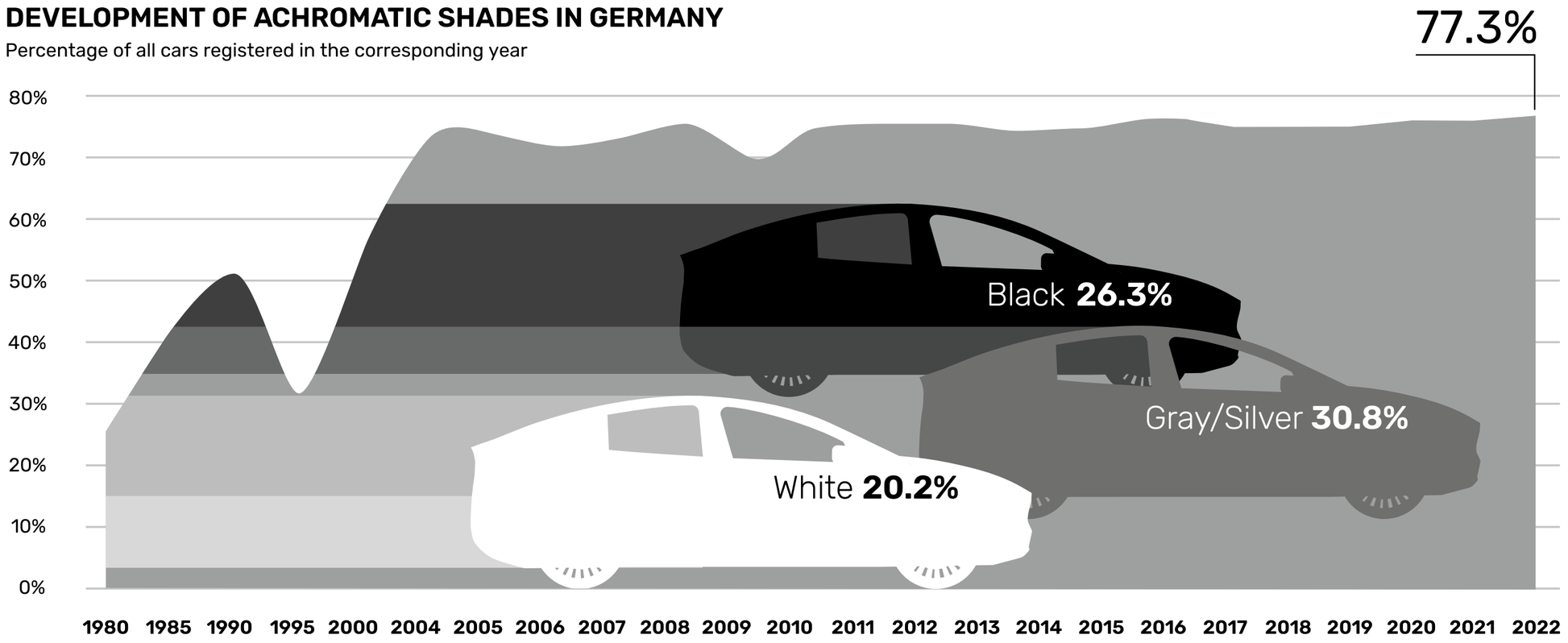
Source: German Association of the Automotive Industry (VDA) >

COLOR
POPULARITY 2022

Color popularity in Germany: Timeline

DEVELOPMENT OF ACHROMATIC SHADES IN GERMANY

Percentage of all cars registered in the corresponding year



WORLD

REGIONS

GERMANY

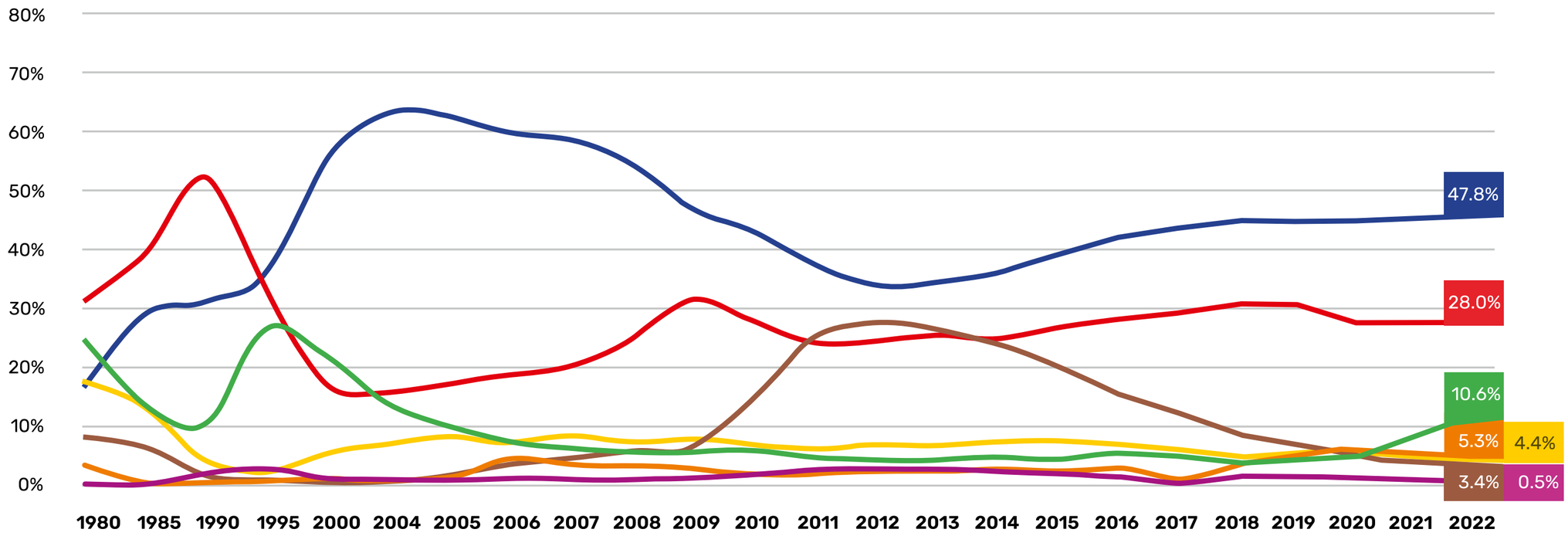
Source: German Association of the Automotive Industry (VDA) >

COLOR POPULARITY 2022

Color popularity in Germany: Timeline

DEVELOPMENT OF CHROMATIC SHADES IN GERMANY

Share of each color among all colored cars registered per year (i.e. within the smaller chromatic segment of, currently, around 25%)



WORLD

REGIONS

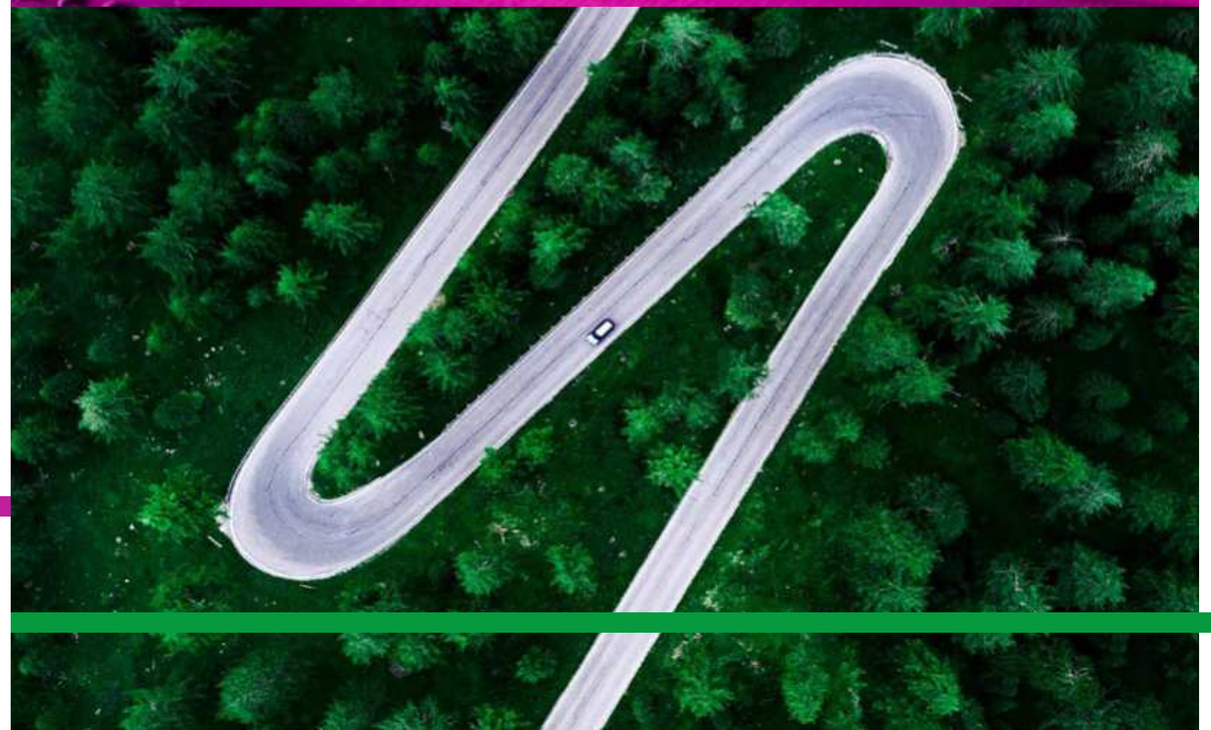
GERMANY

Source: German Association of the Automotive Industry (VDA) >

FORMULATION **TRENDS**

Trends and innovations in organic pigments

In the field of organic pigments, we currently focus more on improving the established colour indices than on inventing new chromophores. One reason is that the color space seems to be sufficiently covered and no unmet need requiring the development of a new chromophore was brought to our attention. Another reason is that there is still a lot to improve about the existing pigments.



At the top of our list: Sustainability

Eliminating unwanted byproducts in the ppm range, such as PCBs (polychlorinated biphenyls) and HCB (hexachlorobenzene), is a top concern for any company with a heartfelt commitment to safety. For our violet and green pigments, we have implemented viable solutions.

To reduce its environmental footprint, Sudarshan is taking an even closer look at the use of renewable raw materials and improvements in process efficiency. Even on the lab level, we eliminated redundant tests and minimized the amount of waste from others.

FORMULATION
TRENDS

Trends and innovations in organic pigments

A source of many benefits: Performance

Effectively addressing ESH (environment, safety and health) topics gives us the freedom to optimize another essential aspect of pigments: their performance. Higher chroma, better transparency or opacity, and better dispersibility can help our customers to save energy and free up capacities for further growth. Such improvements can also reduce pigment loading, improve hiding, and enable more attractively colored paints. As an example, our C.I. Pigment Orange 36, Novoperm® Orange HL 71, disperses in a quarter of the time needed to disperse our traditional Novoperm® Orange HL 70. In addition, it is noticeably more chromatic.

What our customers can count on: Quality

Pigments are chosen for their properties, but their quality is what makes customers happy. Quality is about pigment specifications and how they correlate to those of a customer's paint system. The certificates of analysis (CoAs) Sudarshan offers for selected pigments now also include measured color data of their mass tone; for Hostaperm® Red D2G 71/72 (C.I. Pigment Red 254), even with specifications. In addition to the measured color data of reductions with white, the quality of these pigments is thus validated by another set of measured data. This not only better stabilizes their quality, but also allows a better correlation to their color in a customer's paint system.

FORMULATION
TRENDS

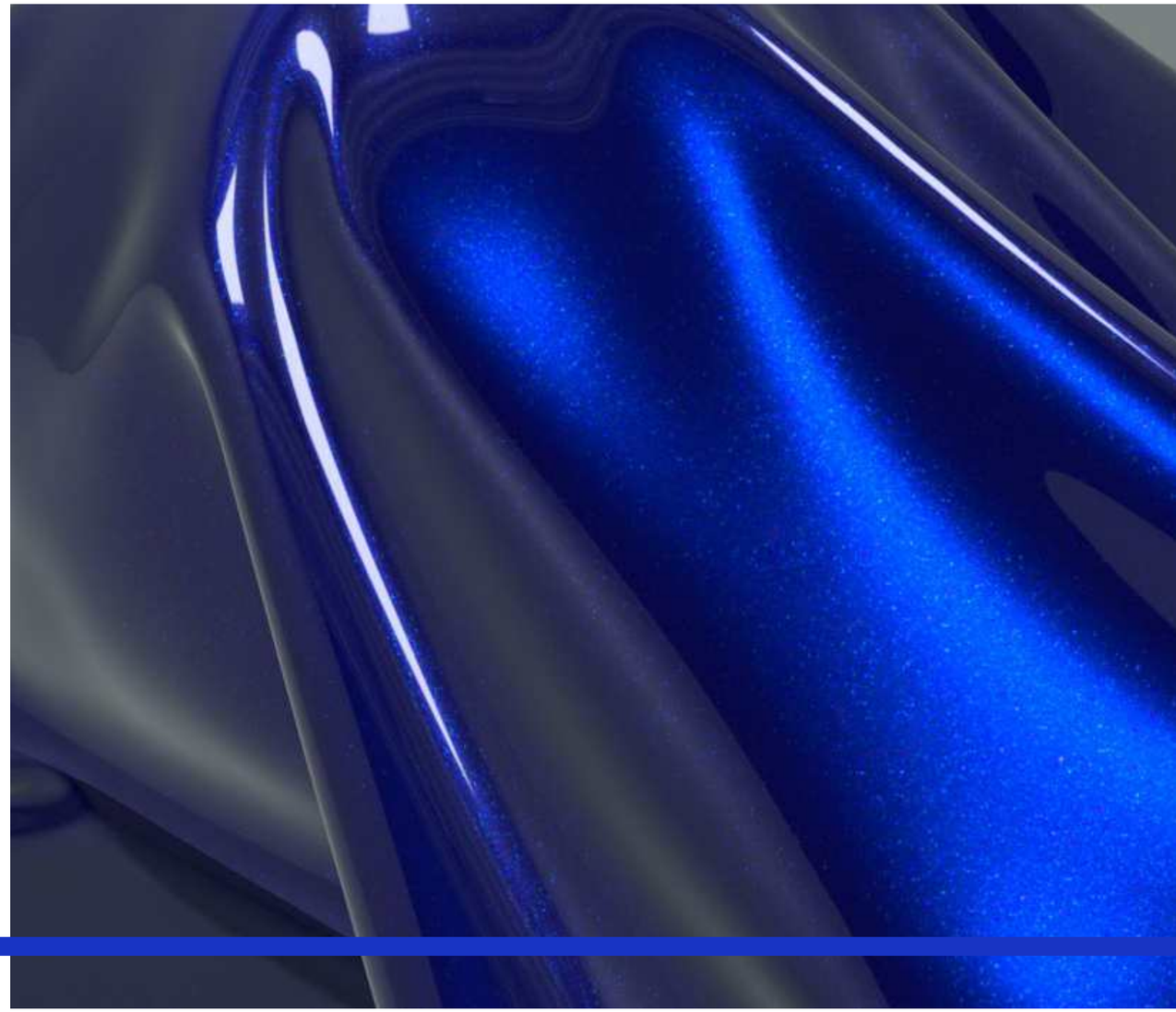
Trends and innovations in effect pigments

New effects will play an important role in color development in the years to come. Beyond fresh colors and looks, they may also provide solutions to economic and technical challenges.

Into the blue:
Of metals and minerals

Aluminum-based effect pigments continue to become thinner and brighter, as well as safer and easier to use. At the same time, a growing number of colored aluminum effect pigments is being developed, ranging from gold to copper shades. However, it seems to be difficult to match the bluish hue that can be achieved with red mineral-based solutions.

When tackling the challenge of poor opacity of mineral-based effect pigments, suppliers introduced such red pigments with bluer hues, some with sparkling effects, some with a silkier appearance. An amazing innovation is an intensive blue pigment that makes it possible to dispense with a blue clearcoat as middle layer and still create premium-quality colors.



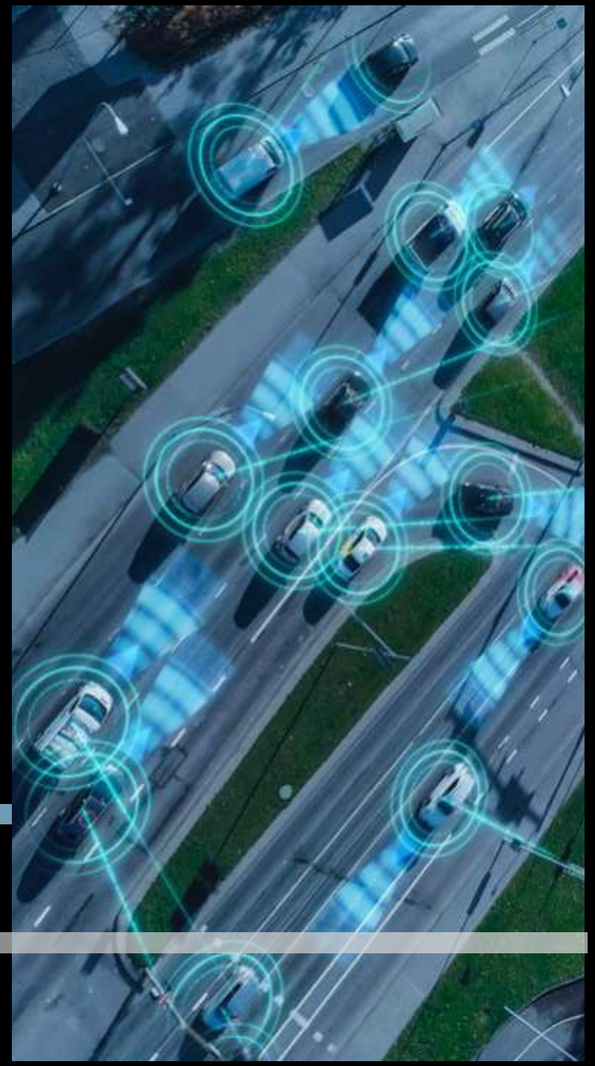
Trends and innovations in effect pigments

On the way down: The costs of color travel

Mineral-based color travel effect pigments are coming down in price as more and more suppliers meet the expectations of the automotive industry better and optimize their processes and supply chains. We think the use of such pigments in attractive OEM paints deserves a closer look in the next Trendbook.

Improved vision: The promises of silver

»Functional« effect pigments are another area of innovation. For autonomous vehicles, a particularly interesting option may be mineral-based silver pigments, which are transparent to radio waves but optically opaque. The challenge is that they must also be IR-transparent in order to ensure the performance of both types of sensors, which are supposed to be hidden in fenders matching the car's body color.



New and interesting topics in the field of formulations

NIR reflectance and RADAR transmission

Autonomous vehicles are an ongoing topic, and progress is noticeable. In the previous editions of our Trendbook, we introduced combinations of IR-transparent colored organic pigments which can replace IR-absorbing carbon black and have good jetness and weather fastness. In contrast to the IR reflectance of inorganic pigments, such blends do not block the IR sensors invisibly hidden under the painted car body and maintain a neutral gray when combined with white.

One pending problem is the recognition of cars by their typical shape. To a hyperspectral camera, they often appear like (disproportionately) small, flat boards. This is because the flop effect, which is a design element in the visible spectrum, also exists in IR, and its brightness matters. If the scattering of IR light could be improved with optically invisible pigments, the color design would not be affected, but an IR sensor could see more of a car's shape, which would make identification and motion detection easier and safer.

Besides NIR devices, autonomous vehicles also use optical and radar detectors. Common aluminum pigments block radio waves but are often essential for adequate hiding of the very thin basecoat layer. Alternative effect pigments based on mineral substrates, e.g. mica, show very poor hiding power, and require significant levels of black to enhance their optical effect, reducing the IR visibility.
We are currently taking a closer look at »aluminum alternatives« and how they might be used to create formulations that are IR- *and* RADAR-friendly (i.e. transparent to both wavelengths).

FORMULATION **TRENDS**

New and interesting topics in the field of formulations

Pseudo solids
The fact that »invisible« amounts of colored effect pigments can provide excellent hiding power without significantly reducing chromaticity has already been discussed in previous Trendbooks. However, the choice of the effect pigment matters, and despite their increased brilliance they are much duller than organic pigments. The challenge is finding the right effect pigment and dosage for each shade area.

Simulated tinted clears
This topic, too, has already been discussed in the previous Trendbook. At the time, however, the available red metallic effect pigments were too yellow to provide sufficient access to the color space. Thanks to the availability of bluer and even blue effect pigments, we can now formulate premium golden, burgundy red and even blue effect shades in just one layer.

FORMULATION
TRENDS

New and interesting topics in the field of formulations

Where tinted clears and tri-coats roam

In what situations can tinted clears or »tri-coats« provide effects that would be hard to simulate in other ways? Answer: When in a combined layer of organic and effect pigments the latter reduces hiding unacceptably and the first obscures the effect. In this case, the lower layer can provide the hiding and the upper the effect.

Color travel with opaque coatings

Creating a color travel effect in a single layer is not too difficult with the right effect pigments. However, they often require the addition of black, or at least a black primer, and combining them with organic pigments can easily reduce or even cancel out the effect. As a rule, the colors of organic and effect pigments combine when viewed head on, but from the downflop angle only the color of the organic pigment is visible. Color travel effect pigments, in contrast, do show a color in the downflop angle and do not necessarily require the addition of an organic pigment. The challenge is finding an organic pigment which enhances the brightness of the effect pigment and goes well with both its colors.

Another approach is to combine colored lamellar pigments with differently colored organic pigments. If the combined color is different enough from the downflop color, a color travel effect can be achieved that does not require the addition of black yet provides excellent hiding.

TREND COLORS 2027

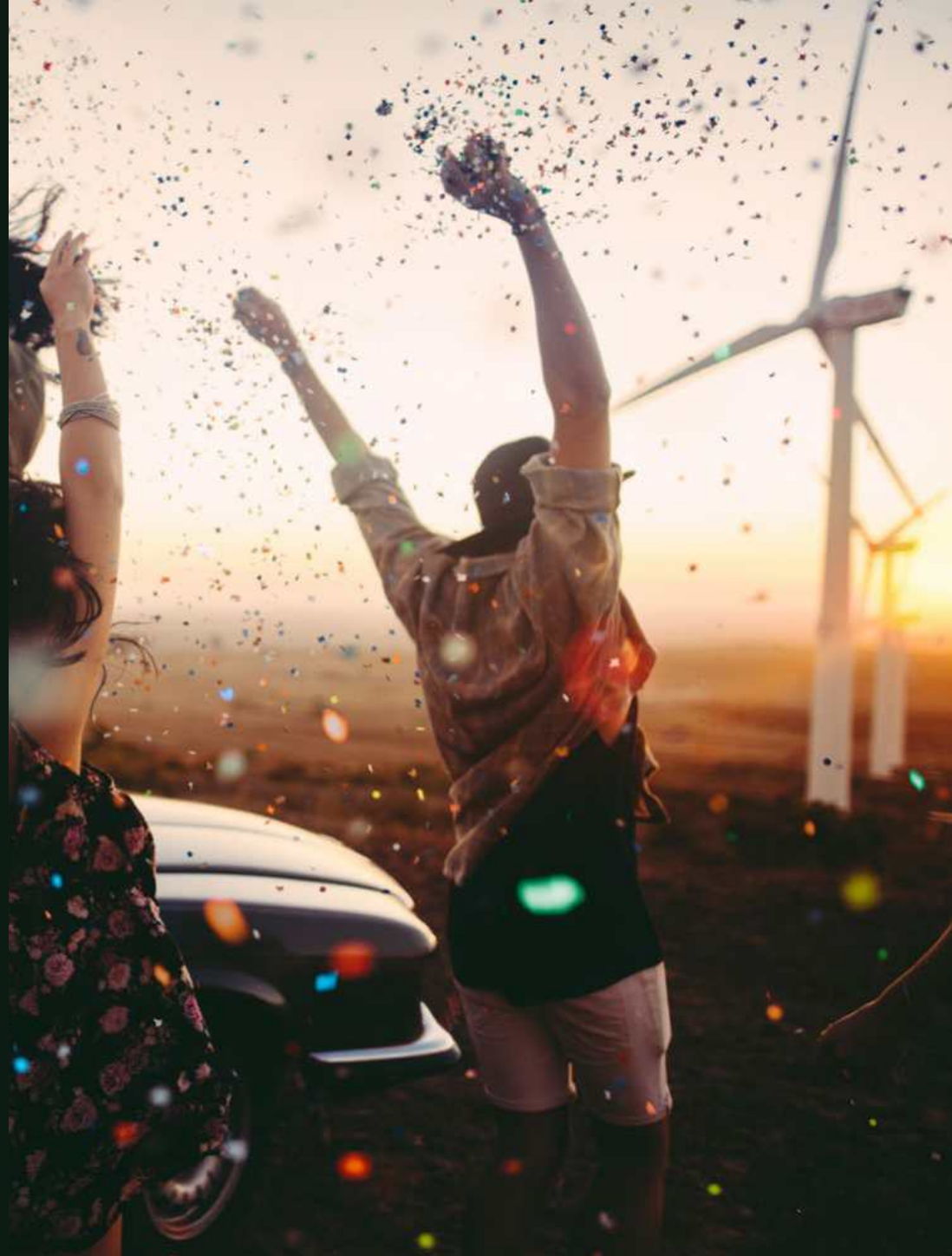
Planet A, plan B, and color

Saving our planet is not only about stopping pollution and global warming. The plan B for a planet worth living on, and fighting for, must take all aspects of freedom, safety, fairness and energy consumption into consideration.

Can we still use significant amounts of resources for producing colorants just for decorative purposes? Yes, we can, and we must, because color promotes happiness, hope, creativity, and determination – i.e. all the right attitudes needed for saving the planet. Without them we'd just be robots who follow their programs until their own extinction.

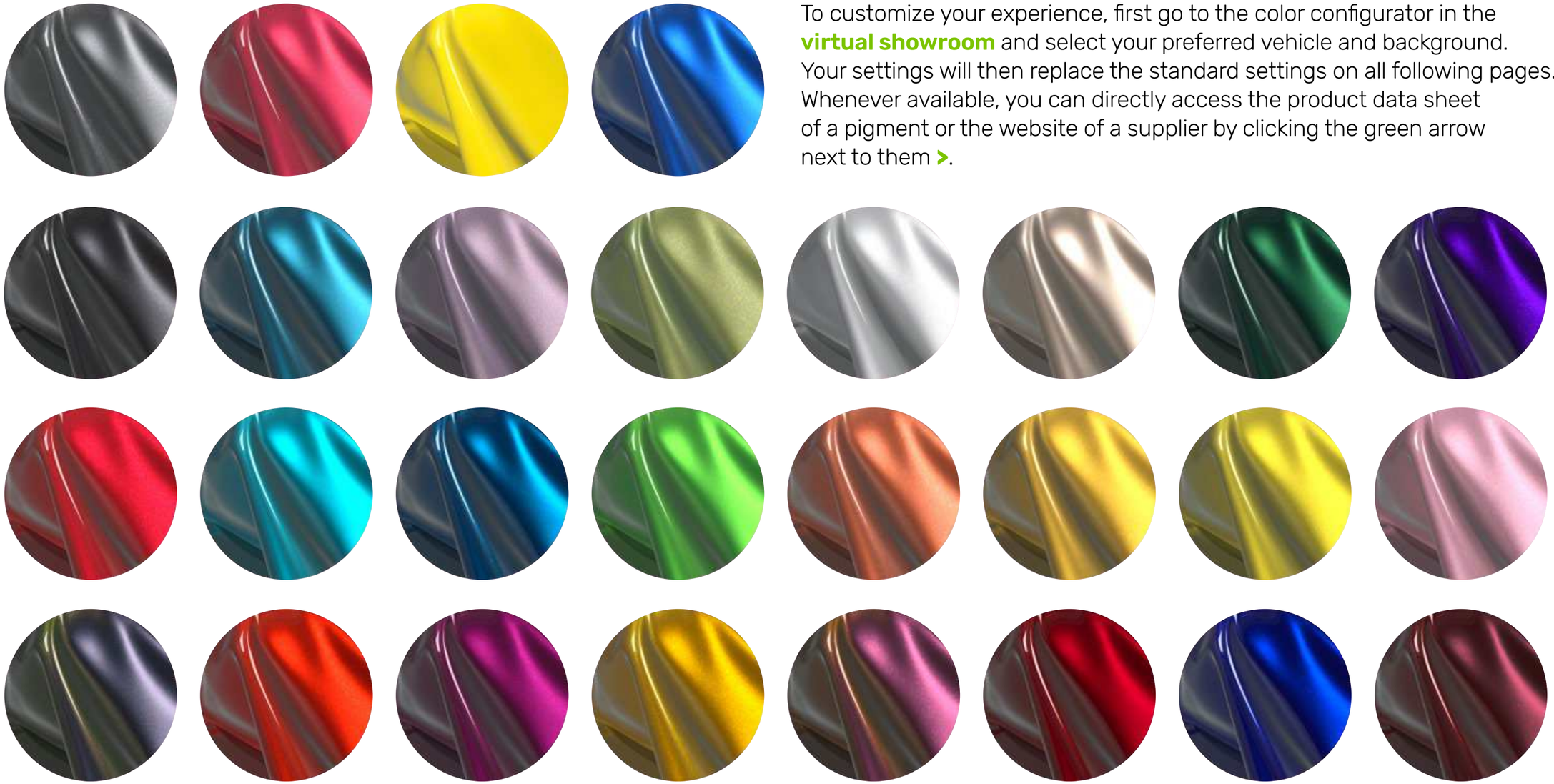
But neither can we behave like the band on the Titanic and go on playing our favorite tunes while the ship is sinking. As a global producer of colorants, Sudarshan is deeply committed to production efficiency, environmental protection and product safety. Only under these conditions can colors live up to their purpose and deserve their existence on planet Earth.

There are many reasons why people choose a certain color for their vehicle. Our color choices reflect our personalities and enrich our lives, regardless of faith, gender or origin.



TREND COLORS 2027

TECHNICAL DETAILS



To customize your experience, first go to the color configurator in the **virtual showroom** and select your preferred vehicle and background. Your settings will then replace the standard settings on all following pages. Whenever available, you can directly access the product data sheet of a pigment or the website of a supplier by clicking the green arrow next to them **>**.

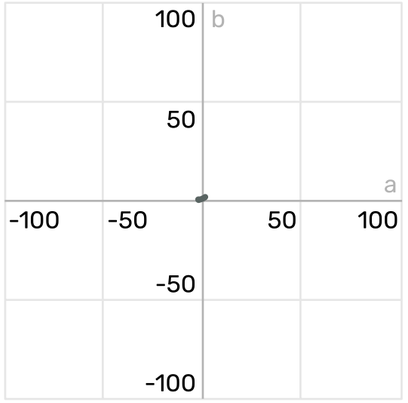
TREND COLORS 2027 – TECHNICAL DETAILS

STATUTE OF LIBERTY

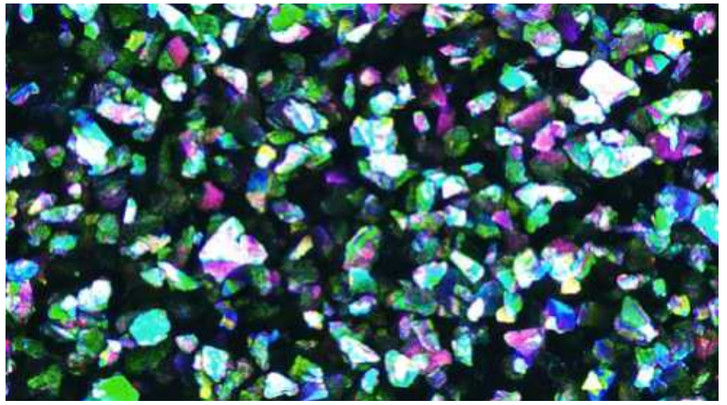
Color is not the most crucial aspect of a car, but we should still be able to choose it. Fuel efficiency or passenger capacity are probably more important criteria. However, wouldn’t it be nice if car colors somehow supported these priorities? To do so, color must not distract from the key purpose of a vehicle, transportation, but also not make the decision a difficult one.

AC 2701
STORM CLOUD

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Yellow H3G >	**7.00%**
Hostaperm® Red P2GL-WD >	**8.80%**
Hostaperm® Blue BT-617-D >	**4.20%**
Symic OEM Medium Opaque Silver >	80.00%

PIGMENTATION LEVEL

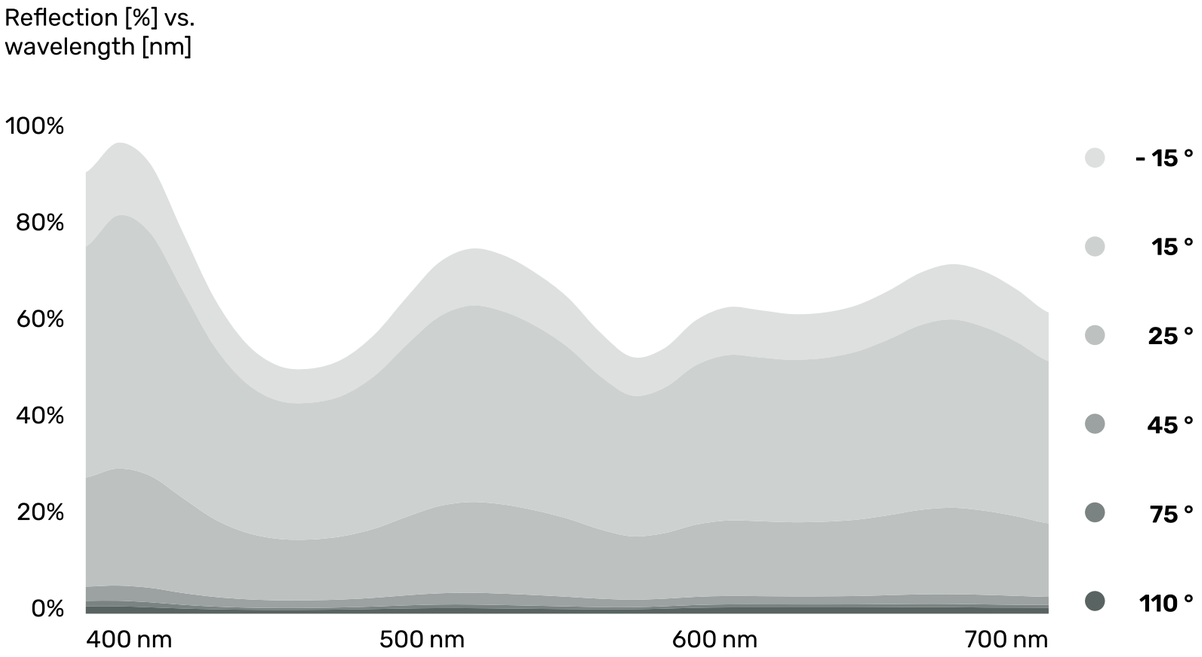
Pigment in wet paint	7.8%
Pigment to binder ratio	38.1%

NIR REFLECTANCE

900 nm	60.3%
1550 nm	57.9%

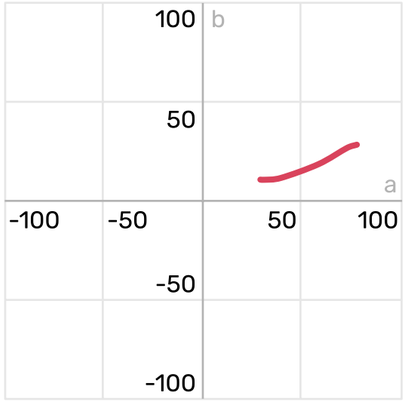
Flop Index	21.5
L [-15°]	82.5

REFLECTANCE CURVES



AC 2702
DAHLIA

COLOR CHANGE



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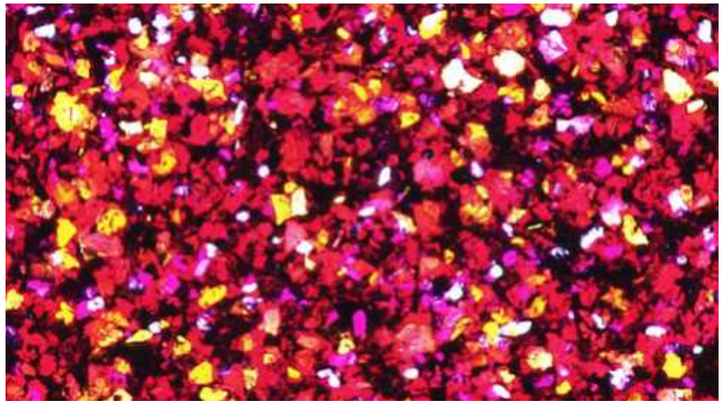


RECIPE

Hostaperm® Red E5B 02 >	**40.00%**
Hostaperm® Red Violet ER 02 >	**10.00%**
STAPA® IL HYDROLAN® 3580 >	5.00%
Zenexo® GoldenShine WB 21 YY >	25.00%
Zenexo® CopperGlow WB 21 00 >	20.00%

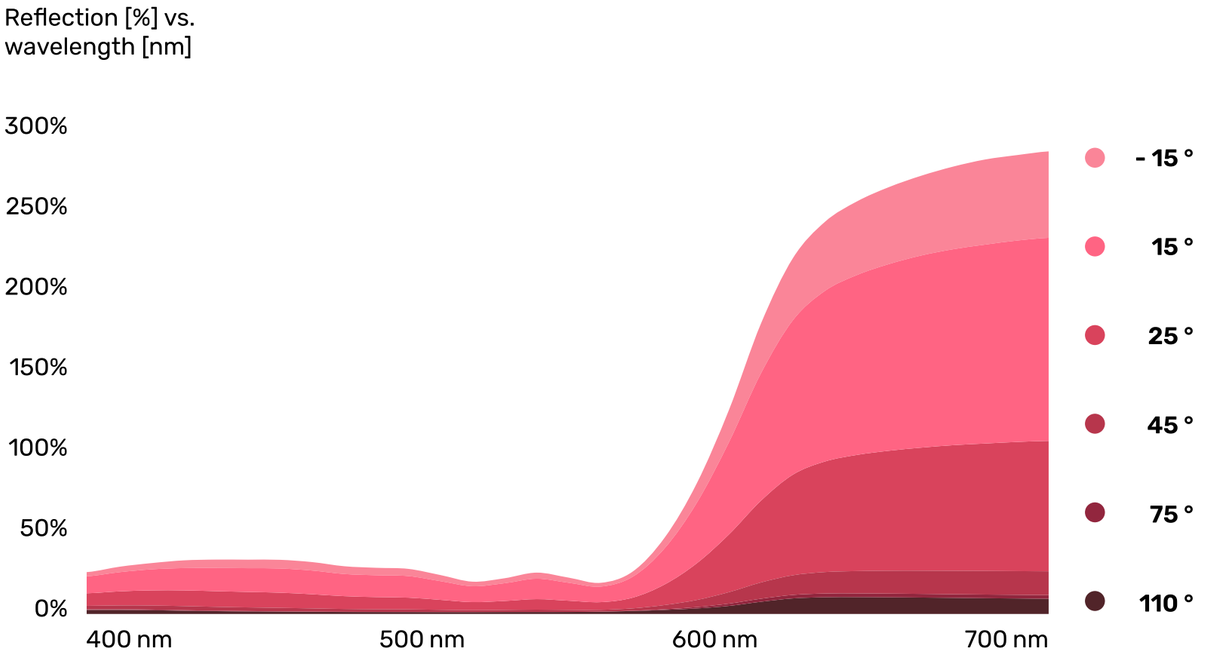
PIGMENTATION LEVEL

Pigment in wet paint	4.7%
Pigment to binder ratio	23.0%

NIR REFLECTANCE

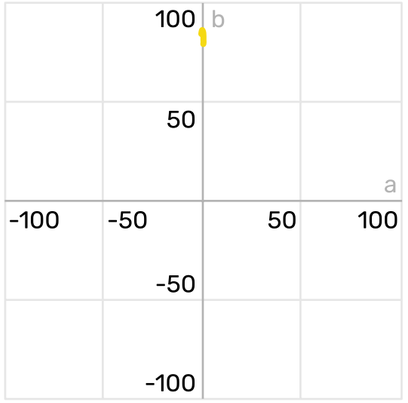
900 nm	66.8%
1550 nm	71.9%
Flop Index	13.8
L [-15°]	79.4

REFLECTANCE CURVES



AC 2703
DANDELION

COLOR CHANGE



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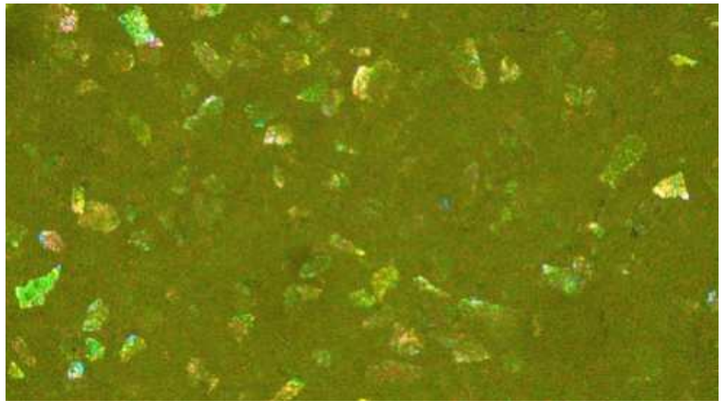


RECIPE

Hostaperm® Yellow H3G >	**5.40%**
Heucodur® Yellow 9116 >	**1.80%**
Hostaperm® Oxide Yellow BV 02 >	**52.80%**
Edelstein CFX Sunstone Champagne >	40.00%

PIGMENTATION LEVEL

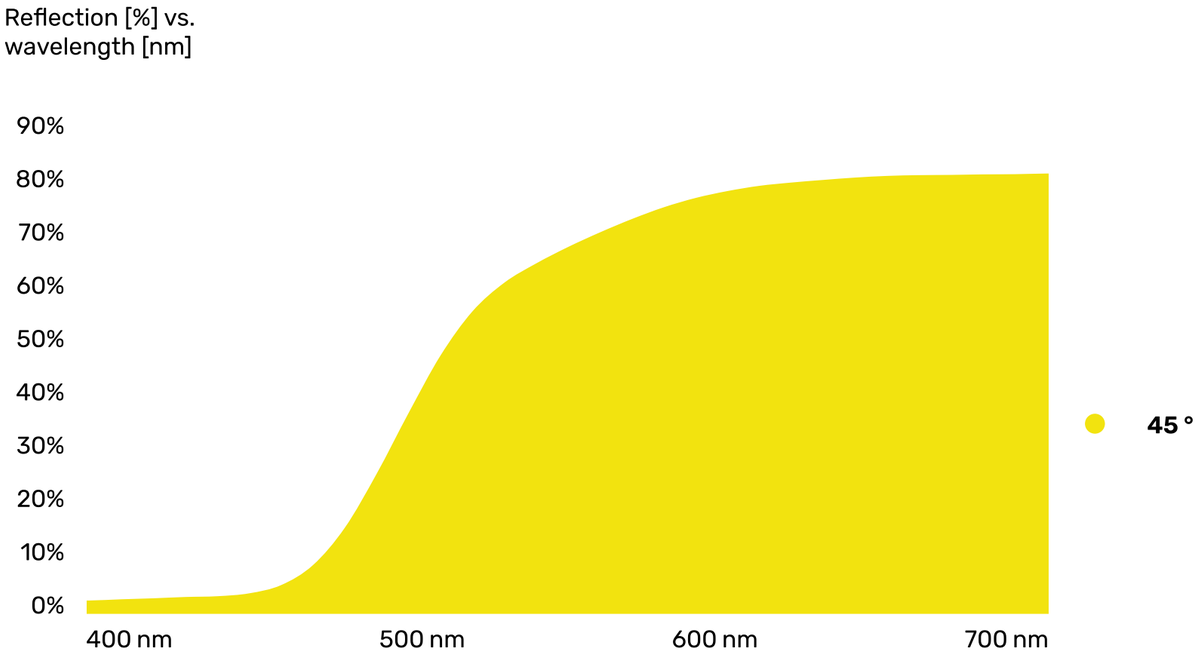
Pigment in wet paint	19.4%
Pigment to binder ratio	106.6%

NIR REFLECTANCE

900 nm	82.9%
1550 nm	79.6%

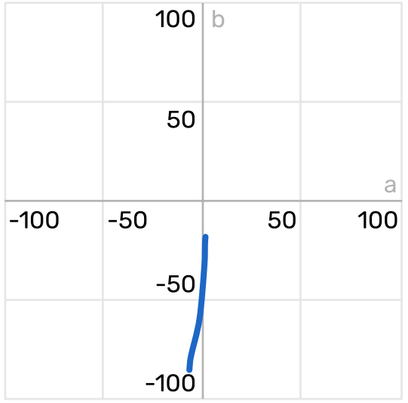
Flop Index	0.2
L [-15°]	81.5

REFLECTANCE CURVES



AC 2704
HIGH NOON

COLOR CHANGE



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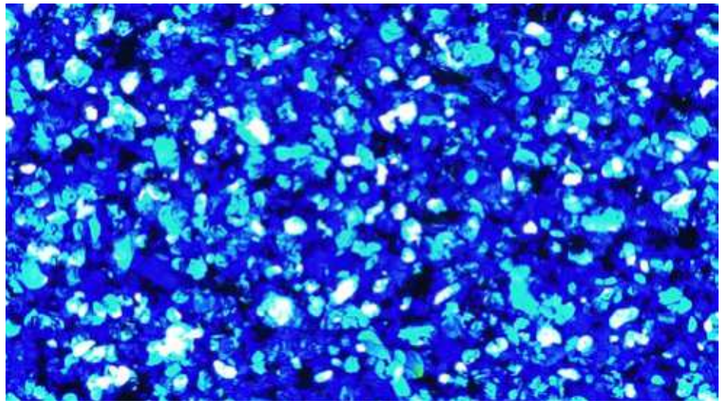


RECIPE

Hostaperm® Violet RL special 01	**10.00%**
Hostaperm® Blue BT-728-D	**20.00%**
Hostaperm® Blue BT-729-D	**20.00%**
STAPA® IL HYDROLAN® 3580	20.00%
STAPA® IL HYDROLAN® 2156 55900/G	20.00%
Edelstein CFX Sunstone Champagne	10.00%

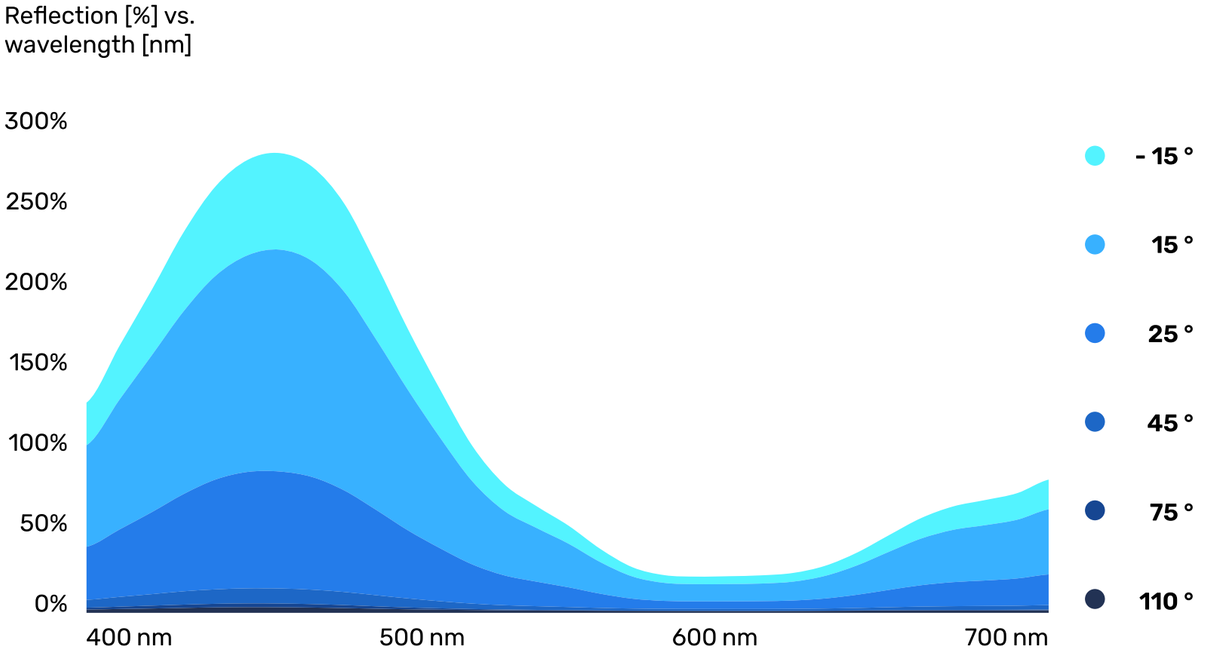
PIGMENTATION LEVEL

Pigment in wet paint	4.7%
Pigment to binder ratio	23.0%

NIR REFLECTANCE

900 nm	74.9%
1550 nm	84.9%
Flop Index	22.0
L [-15°]	89.9

REFLECTANCE CURVES



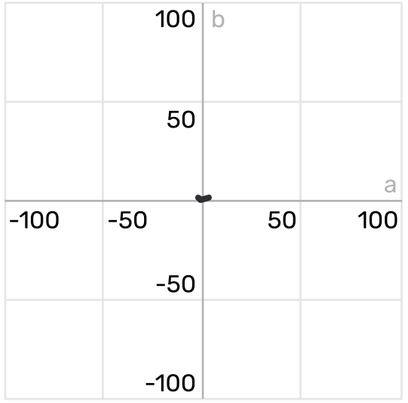
TREND COLORS 2027 – TECHNICAL DETAILS

PERFECTLY UMBRELLAED

Personal safety is a key concern for most drivers, and this is reflected in these carefully selected colors. They are not overly bright and have timeless effects, providing an aura of stability and helping cars to hold their value regardless of transient fashions.

AC 2705
PERENNIAL GRAY

COLOR CHANGE



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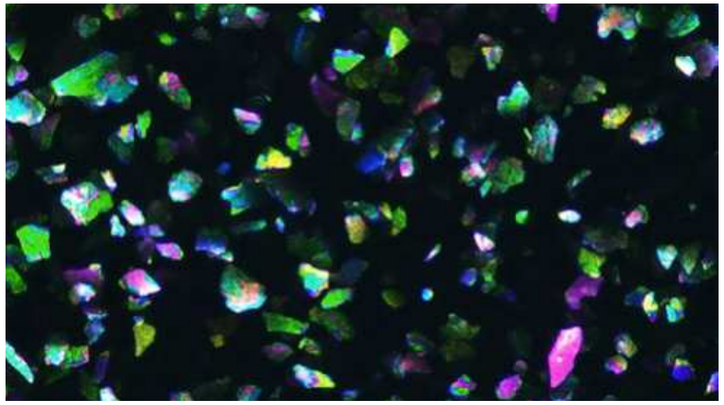


RECIPE

Hostaperm® Yellow H3G >	**17.50%**
Hostaperm® Red P2GL-WD >	**22.00%**
Hostaperm® Blue BT-617-D >	**10.50%**
Symic OEM Medium Opaque Silver >	50.00%

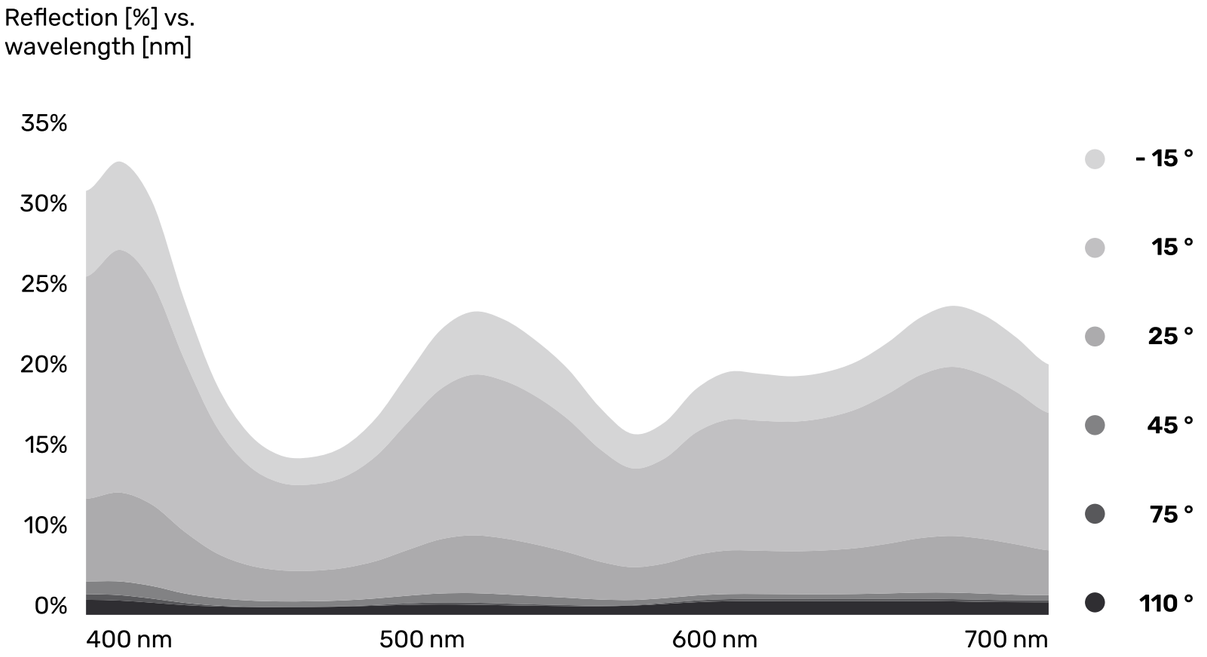
PIGMENTATION LEVEL

Pigment in wet paint	2.2%
Pigment to binder ratio	10.7%

NIR REFLECTANCE

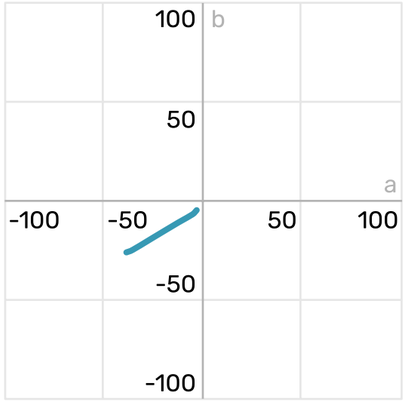
900 nm	60.0%
1550 nm	64.1%
Flop Index	19.8
L [-15°]	47.7

REFLECTANCE CURVES



AC 2706
OCEAN'S ONE

COLOR CHANGE



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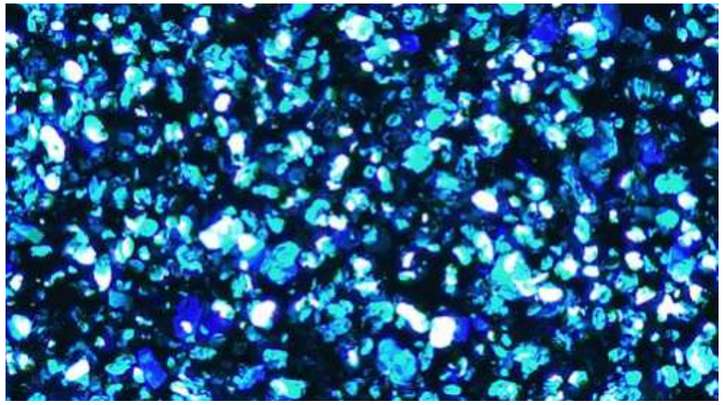


RECIPE

Hostaperm® Red P2GL-WD >	**13.00%**
Hostaperm® Blue BT-728-D >	**20.00%**
Hostaperm® Blue BT-729-D >	**17.00%**
STAPA® IL HYDROLAN® 3580 >	20.00%
STAPA® IL HYDROLAN® 2156 55900/G >	20.00%
Edelstein CFX Sapphire Blue >	10.00%

PIGMENTATION LEVEL

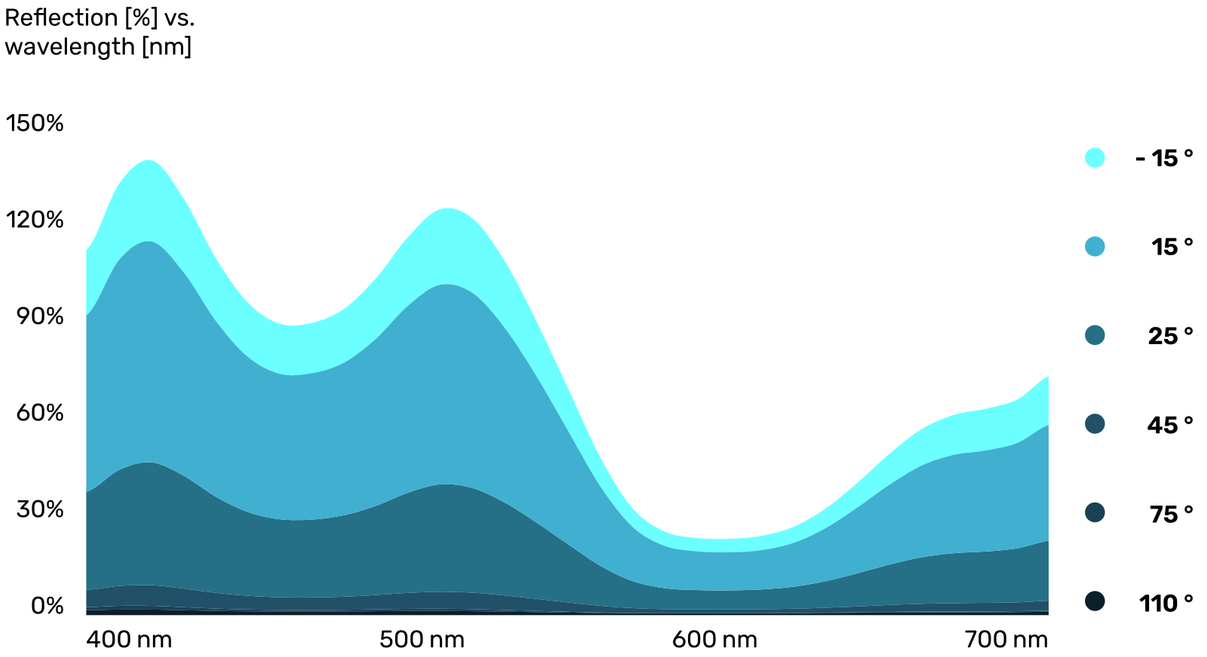
Pigment in wet paint	2.1%
Pigment to binder ratio	10.1%

NIR REFLECTANCE

900 nm	73.4%
1550 nm	83.3%

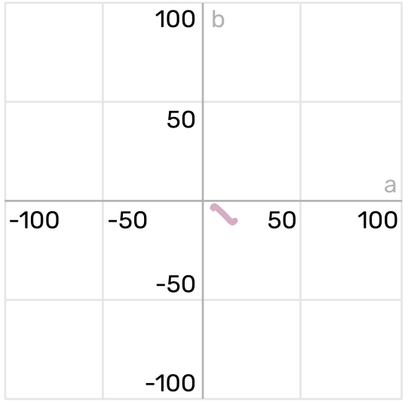
Flop Index	21.7
L [-15°]	87.5

REFLECTANCE CURVES



AC 2707
NOBLE LILLY

COLOR CHANGE



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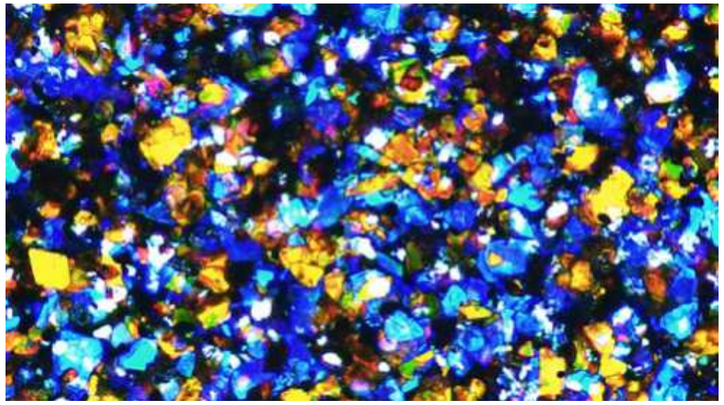


RECIPE

Monolite™ Blue 3RX-H >	**2.00%**
HOMBITEC® RM 220 pigment >	1.00%
STAPA® IL HYDROLAN® 3580 >	5.00%
Edelstein CFX Topaz Orange >	45.00%
Edelstein CFX Sapphire Blue >	47.00%

PIGMENTATION LEVEL

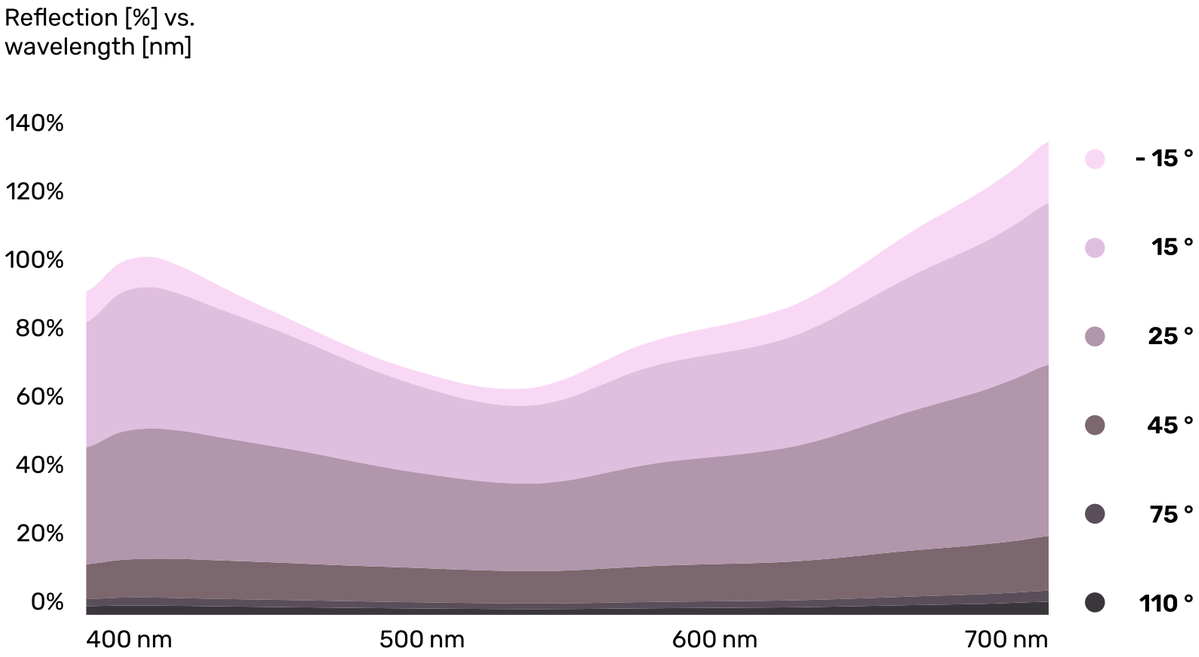
Pigment in wet paint	10.6%
Pigment to binder ratio	53.7%

NIR REFLECTANCE

900 nm	62.8%
1550 nm	68.1%

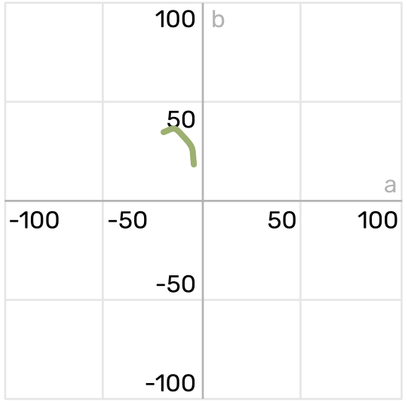
Flop Index	12.2
L [-15°]	88.4

REFLECTANCE CURVES

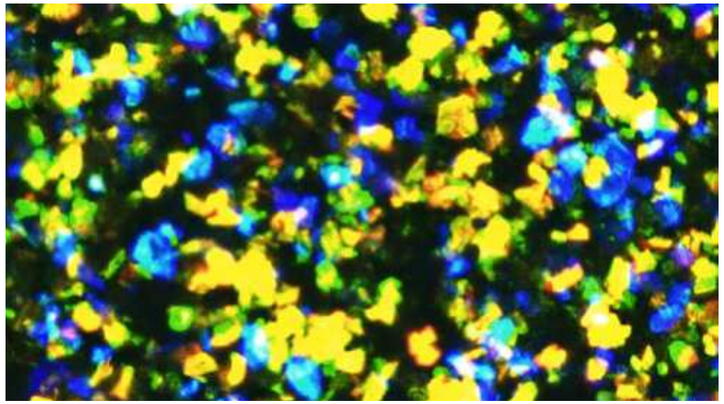


AC 2708
OLIVIA

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Yellow H3G >	**8.00%**
Monolite™ Blue 3RX-H >	**1.00%**
Monastral™ Green 6Y-C* >	**1.00%**
Edelstein CFX Sapphire Blue >	27.00%
Xirallic® NXT M260-30 SW Leonis Gold >	63.00%

PIGMENTATION LEVEL

Pigment in wet paint	13.5%
Pigment to binder ratio	68.3%

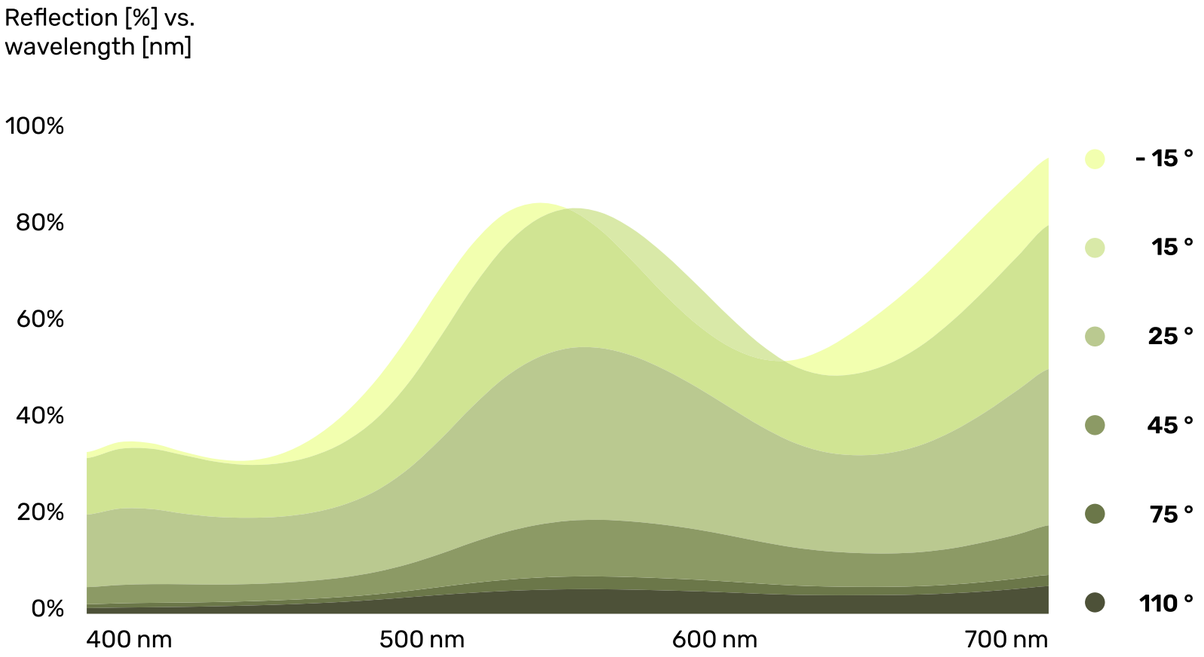
NIR REFLECTANCE

900 nm	50.8%
1550 nm	62.9%

Flop Index	9.6
L [-15°]	84.6

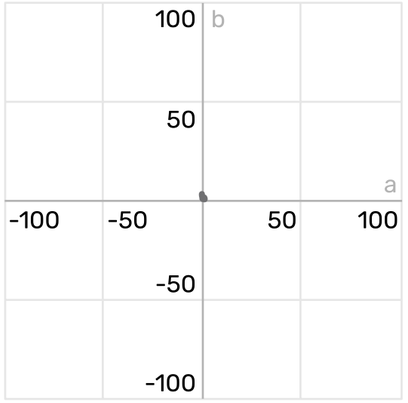
* Monastral™ pigments are not available in the USA

REFLECTANCE CURVES

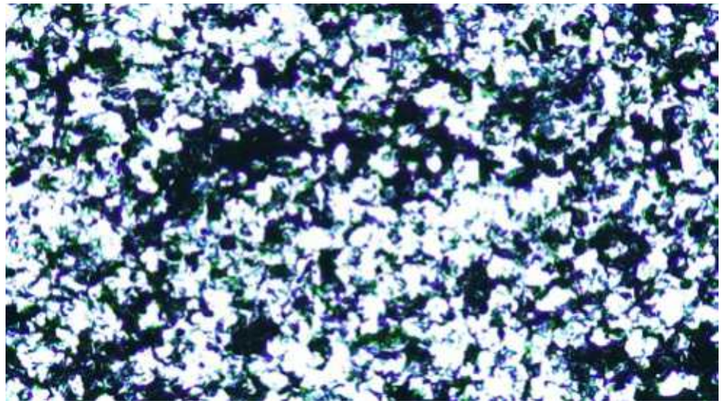


AC 2709
SILVER SPURS

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Monolite™ Blue 3RX-H >	**1.00%**
COLOUR BLACK FW 255 >	4.00%
STAPA® IL HYDROLAN® 3580 >	95.00%

PIGMENTATION LEVEL

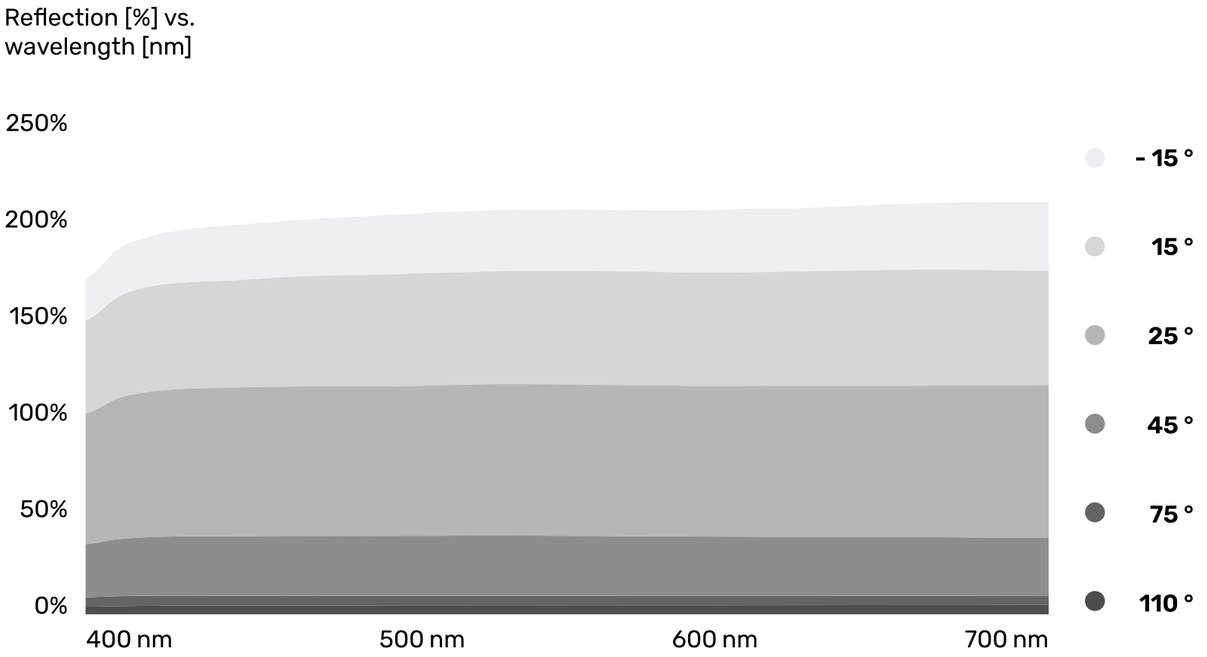
Pigment in wet paint	4.0%
Pigment to binder ratio	23.0%

NIR REFLECTANCE

900 nm	67.9%
1550 nm	78.4%

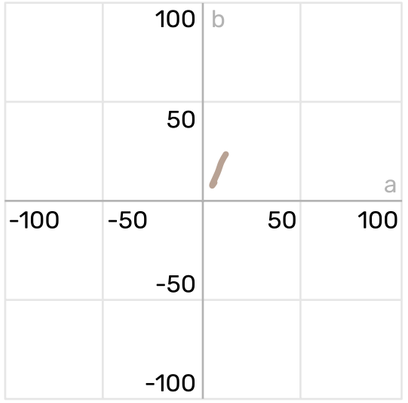
Flop Index	11.5
L [-15°]	130.7

REFLECTANCE CURVES

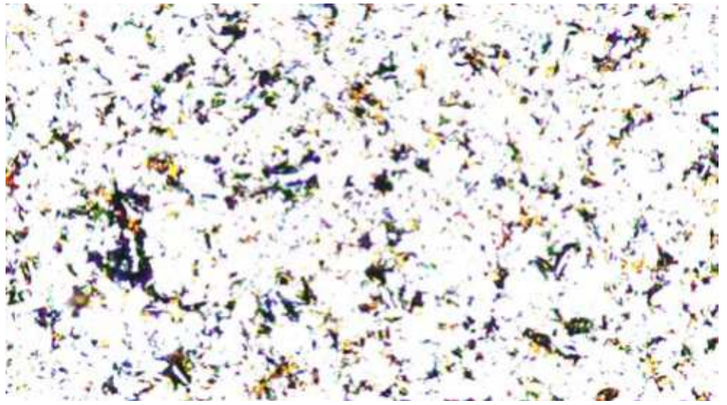


AC 2710
SMOKY MIRROR

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003 >	**5.00%**
Hostaperm® Red P2GL-WD >	**15.00%**
Decomet® STV 2002 12/10 >	60.00%
Edelstein CFX Sunstone Champagne >	20.00%

PIGMENTATION LEVEL

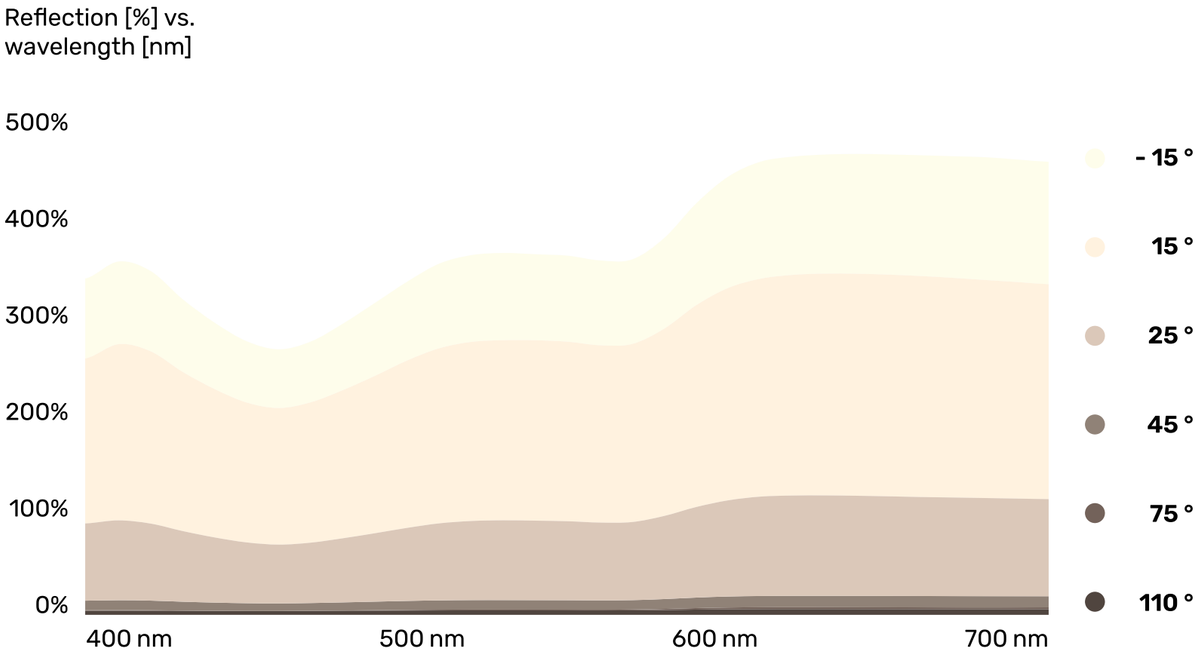
Pigment in wet paint	1.2%
Pigment to binder ratio	6.1%

NIR REFLECTANCE

900 nm	74.3%
1550 nm	82.4%

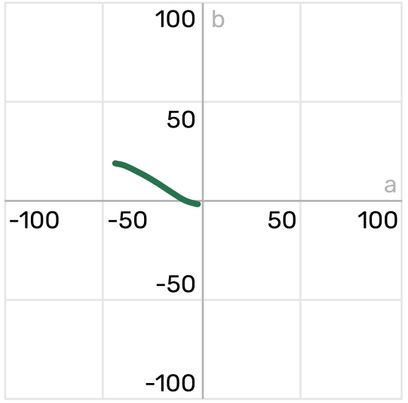
Flop Index	22.1
L [-15°]	162.9

REFLECTANCE CURVES

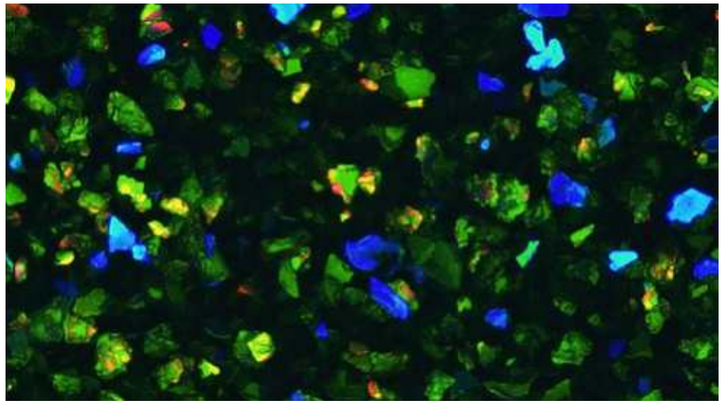


AC 2711
VIRIDESCENT FOREST

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003	**5.00%**
Hostaperm® Blue BT-728-D	**20.00%**
Hostaperm® Blue BT-729-D	**10.00%**
Edelstein CFX Topaz Orange	60.00%
Edelstein CFX Sapphire Blue	5.00%

PIGMENTATION LEVEL

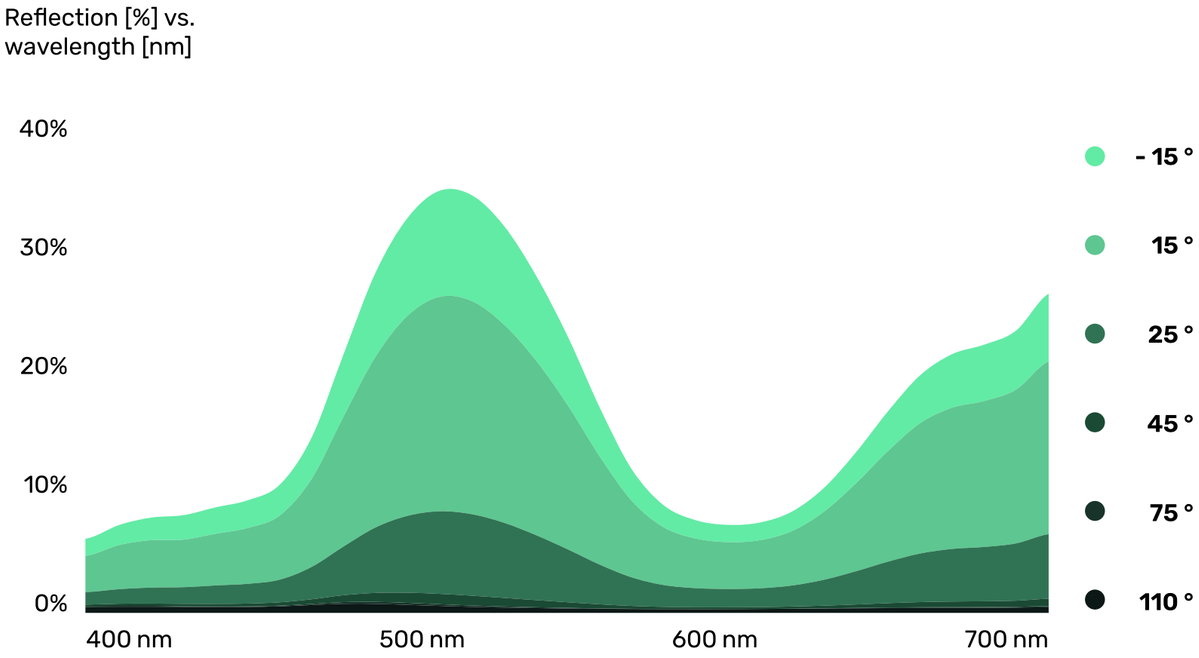
Pigment in wet paint	7.8%
Pigment to binder ratio	37.5%

NIR REFLECTANCE

900 nm	61.5%
1550 nm	78.9%

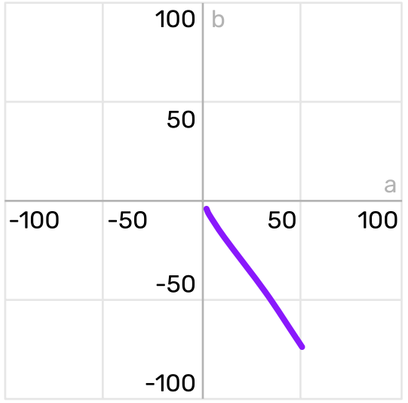
Flop Index	29.2
L [-15°]	54.0

REFLECTANCE CURVES

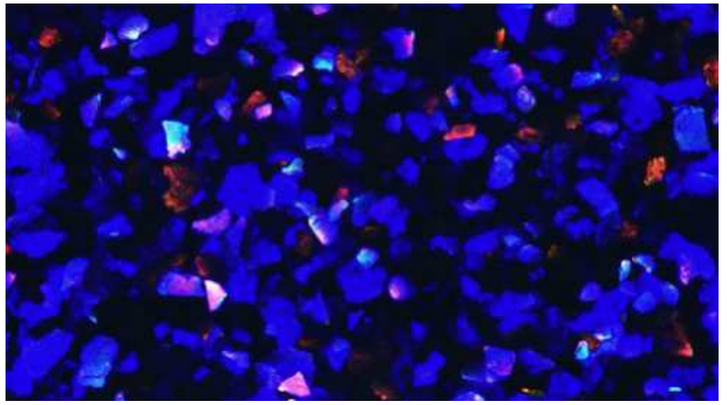


AC 2712
VIOLET WITCH

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Violet RL special 01 >	**30.00%**
Monolite™ Blue 3RX-H >	**10.00%**
Edelstein CFX Sunstone Champagne >	45.00%
Edelstein CFX Topaz Orange >	15.00%

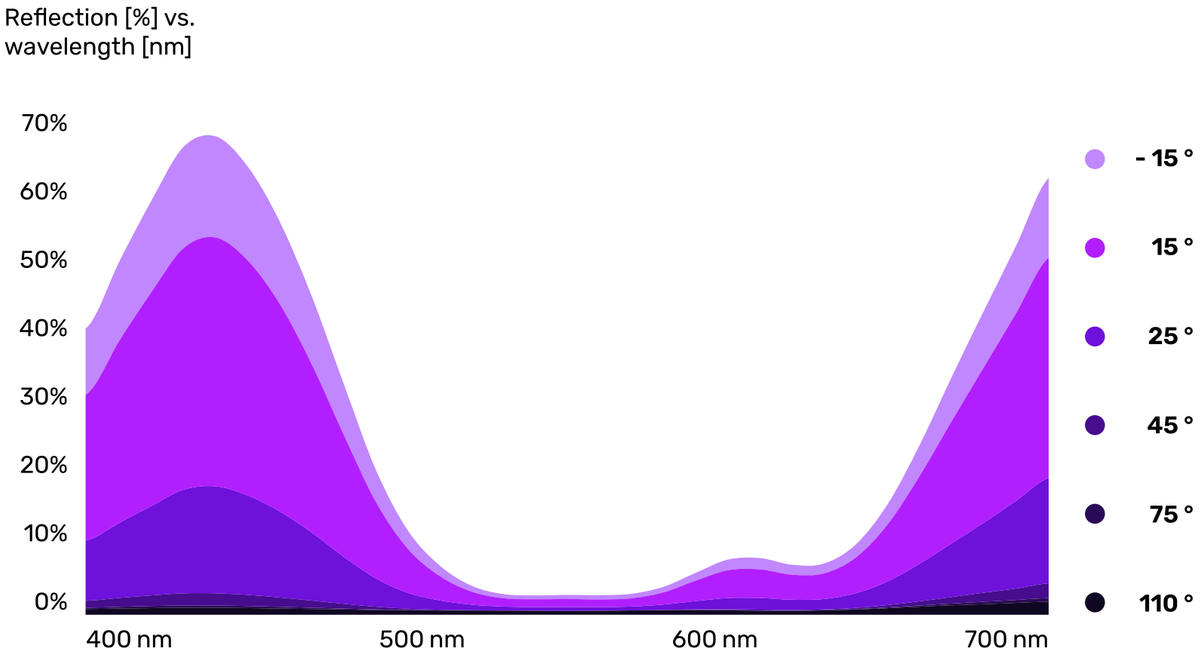
PIGMENTATION LEVEL

Pigment in wet paint	7.7%
Pigment to binder ratio	37.6%

NIR REFLECTANCE

900 nm	59.4%
1550 nm	80.4%
Flop Index	22.9
L [-15°]	35.1

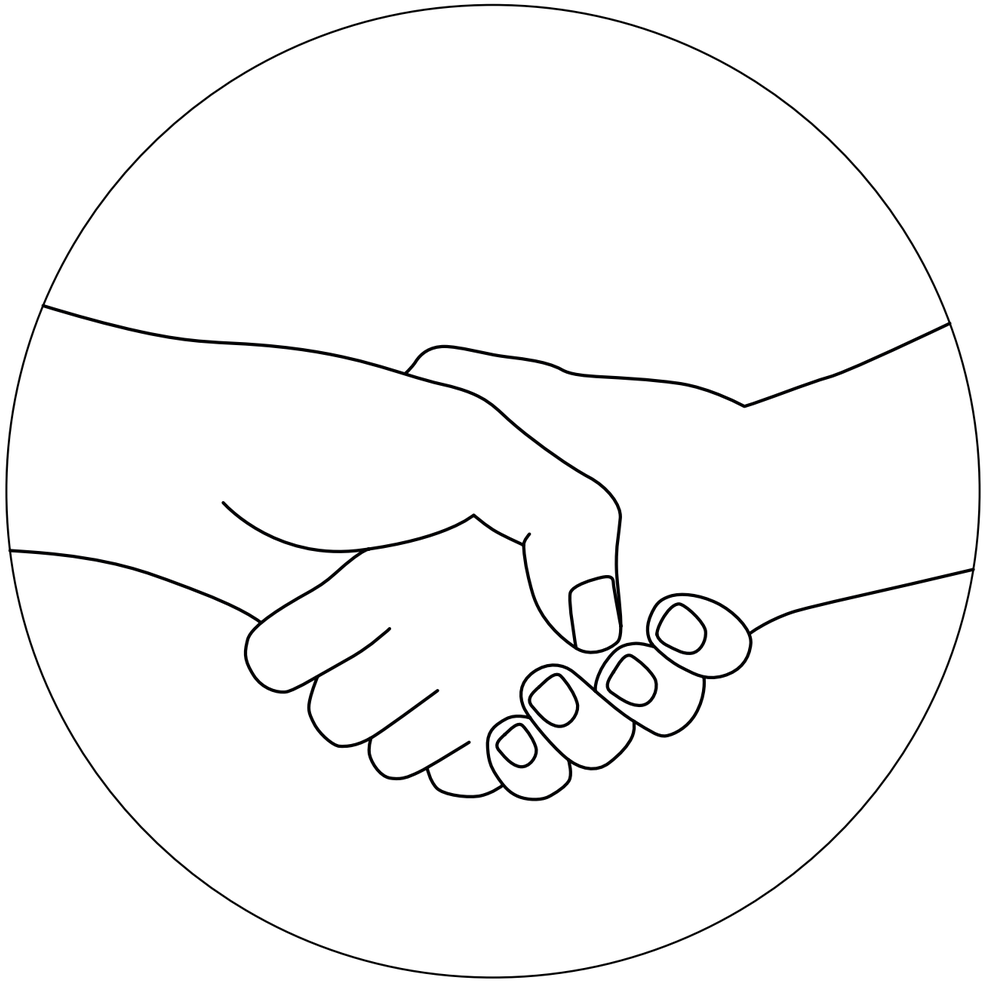
REFLECTANCE CURVES



TREND COLORS 2027 – TECHNICAL DETAILS

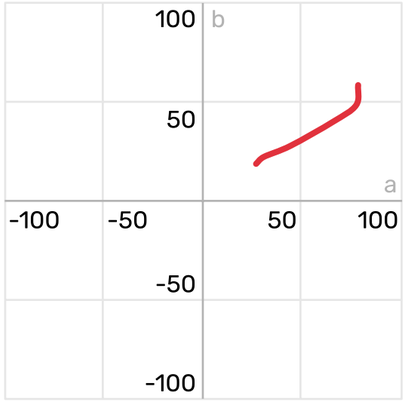
UNCONDITIONAL FAIRNESS

Altruism is a key virtue for people selecting these colors for their vehicles. Fair trade, sustainable food production and equal pay play a major role in their daily decisions. The colors show a high degree of clarity and brilliance, supporting the optimism associated with commitments to personal and global fairness.

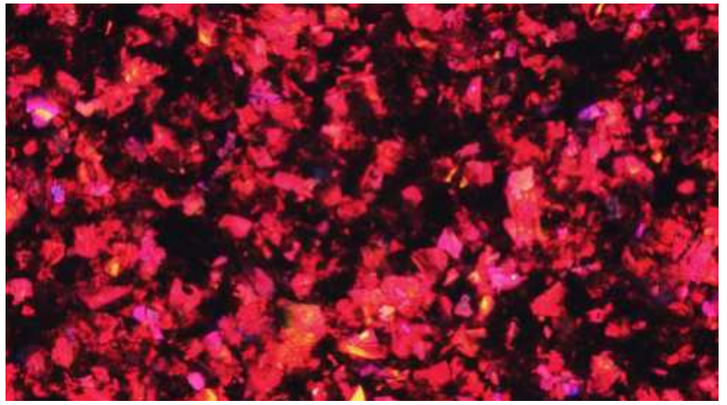


AC 2713
RED HORIZON

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Red P2GL-WD >	**4.00%**
Hostaperm® Brown HFR 01 >	**6.00%**
Colorstream® F20-51 SW Lava Red >	60.00%
Xirallic® NXT F260-51 SW Cougar Red >	30.00%

PIGMENTATION LEVEL

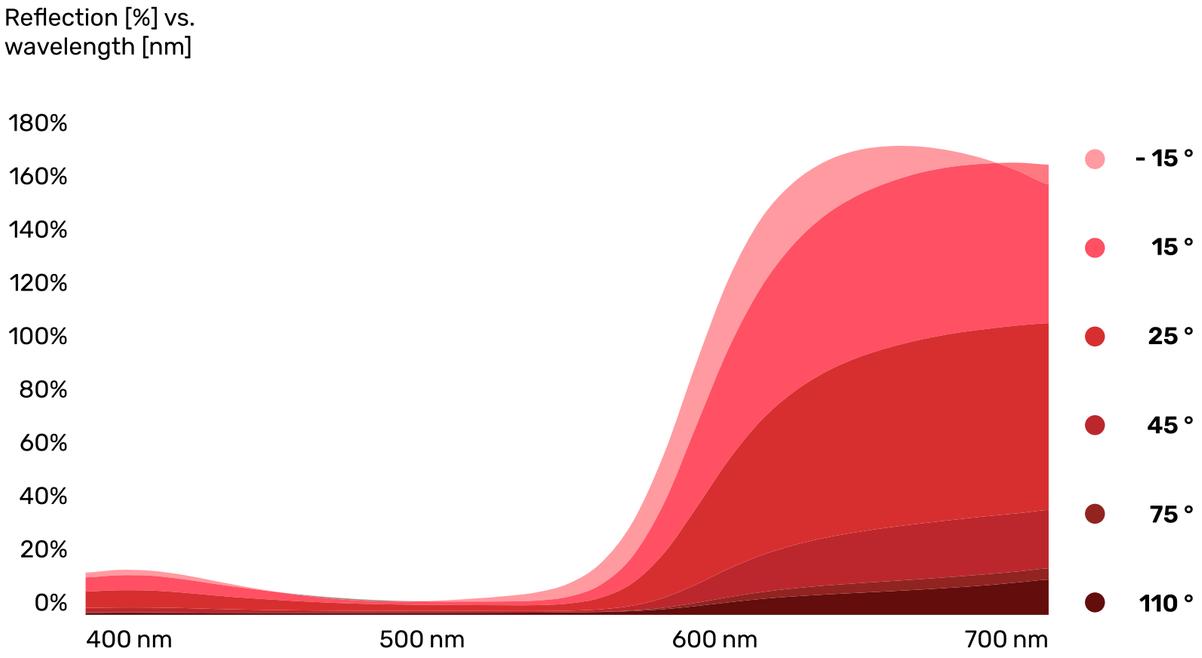
Pigment in wet paint	11.4%
Pigment to binder ratio	56.7%

NIR REFLECTANCE

900 nm	48.7%
1550 nm	86.7%

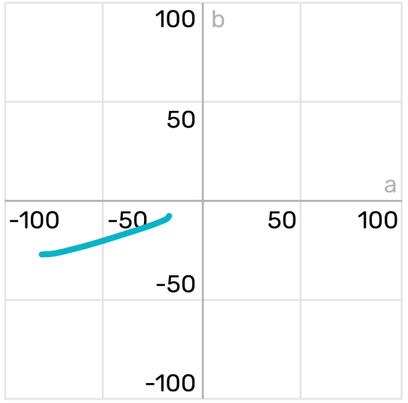
Flop Index	11.6
L [-15°]	70.9

REFLECTANCE CURVES

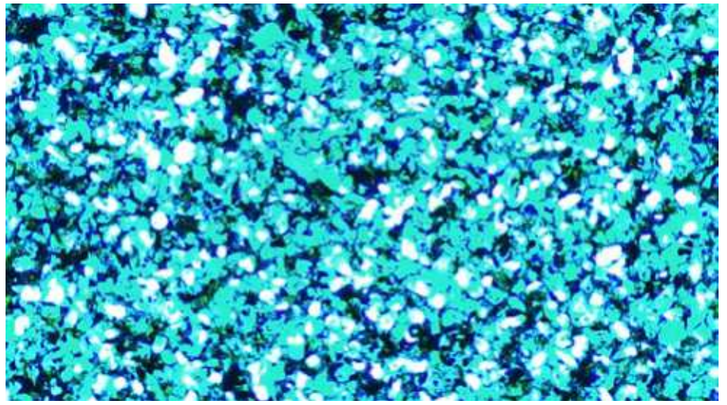


AC 2714
INFINITEAL

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003	**4.00%**
Hostaperm® Blue BT-728-D	**25.00%**
Hostaperm® Blue BT-729-D	**20.00%**
Hostaperm® Green GNX	**1.00%**
STAPA® IL HYDROLAN® 3580	20.00%
STAPA® IL HYDROLAN® 2156 55900/G	20.00%
Edelstein CFX Sapphire Blue	10.00%

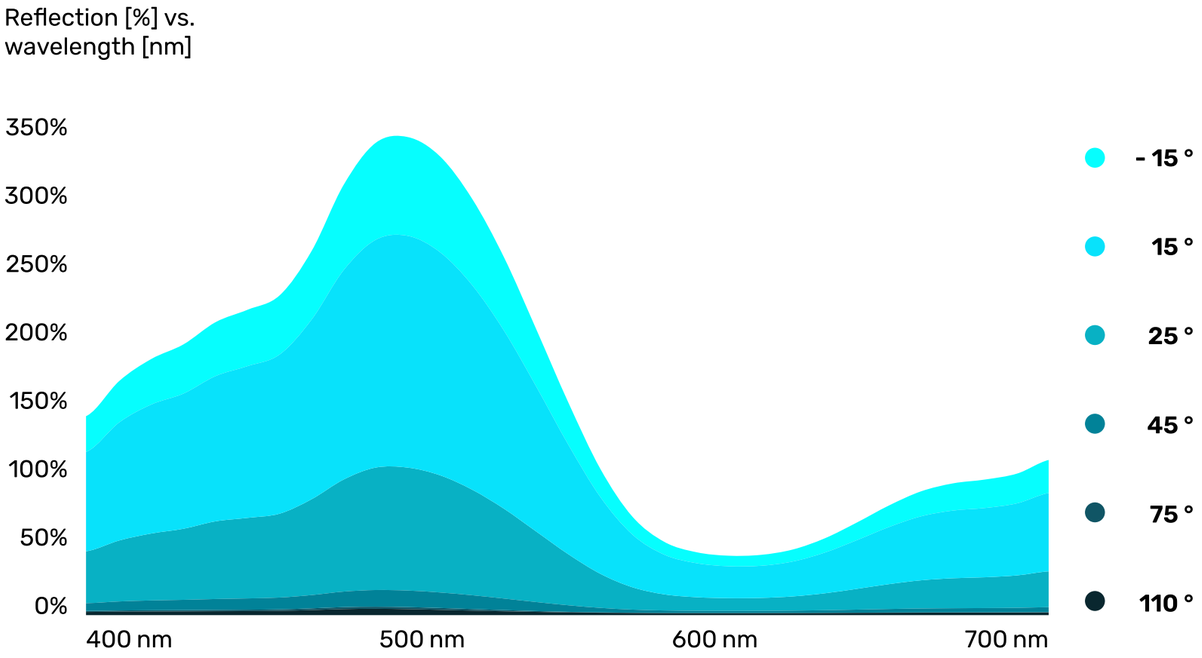
PIGMENTATION LEVEL

Pigment in wet paint	3.7%
Pigment to binder ratio	18.1%

NIR REFLECTANCE

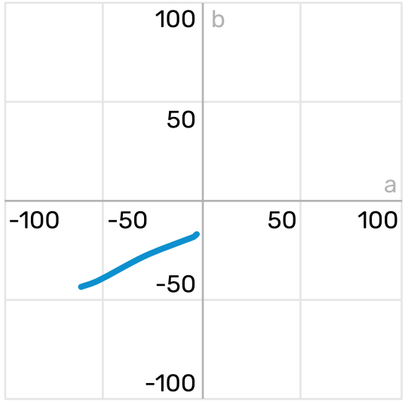
900 nm	77.0%
1550 nm	85.6%
Flop Index	22.4
L [-15°]	121.1

REFLECTANCE CURVES

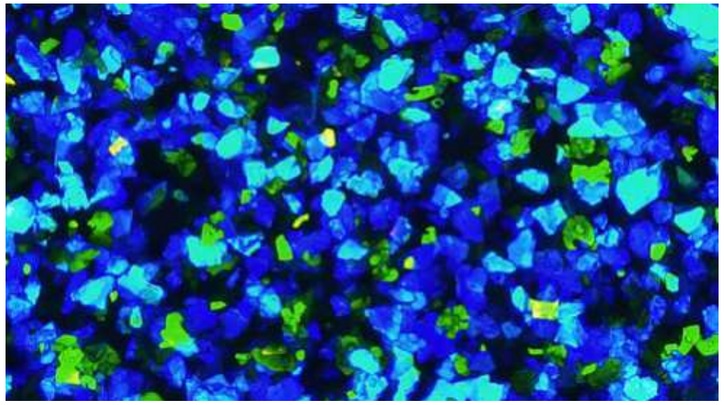


AC 2715
SEA JEWEL

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Blue BT-728-D >	**25.00%**
Hostaperm® Blue BT-729-D >	**25.00%**
Edelstein CFX Sunstone Champagne >	22.00%
Edelstein CFX Topaz Orange >	6.00%
Xirallic® NXT M260-30 SW Leonis Gold >	22.00%

PIGMENTATION LEVEL

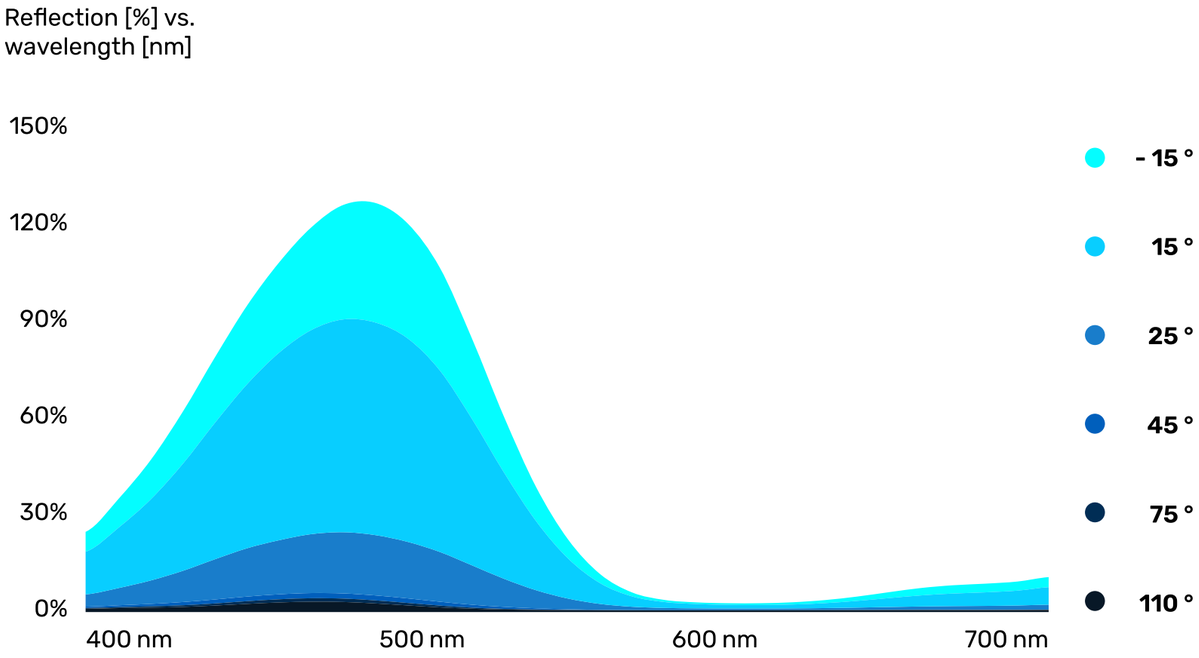
Pigment in wet paint	6.7%
Pigment to binder ratio	32.0%

NIR REFLECTANCE

900 nm	54.9%
1550 nm	75.4%

Flop Index	29.0
L [-15°]	70.2

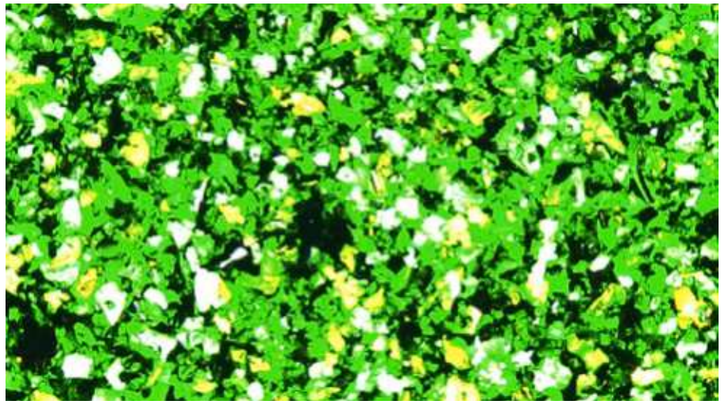
REFLECTANCE CURVES



AC 2716
FRESH FOLIAGE

COLOR CHANGE

MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003 >	**10.00%**
Hostaperm® Green GNX >	**5.00%**
Monastral™ Green 6Y-C* >	**35.00%**
Zenexo® GoldenShine WB 21 YY >	25.00%
Zenexo® GoldenWhite WB 21 YS >	25.00%

PIGMENTATION LEVEL

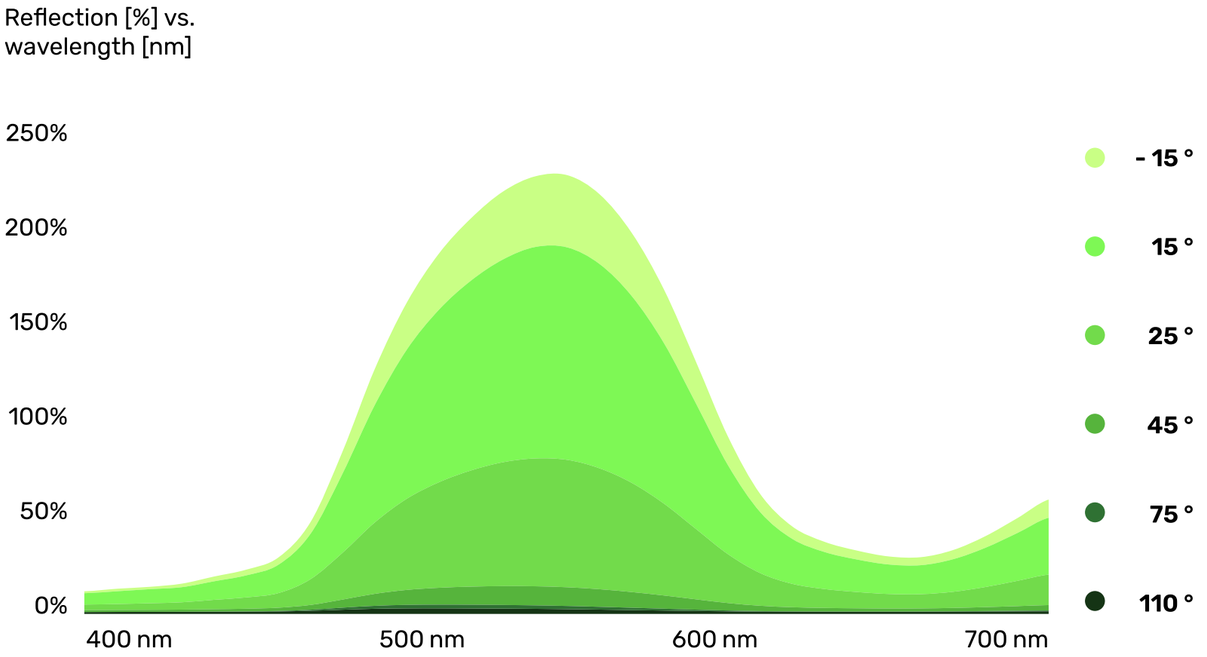
Pigment in wet paint	3.4%
Pigment to binder ratio	17.0%

NIR REFLECTANCE

900 nm	63.8%
1550 nm	75.2%
Flop Index	19.3
L [-15°]	118.8

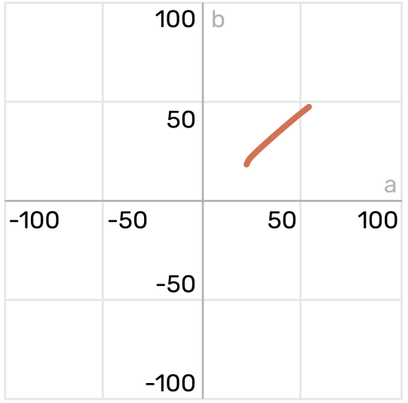
* Monastral™ pigments are not available in the USA

REFLECTANCE CURVES

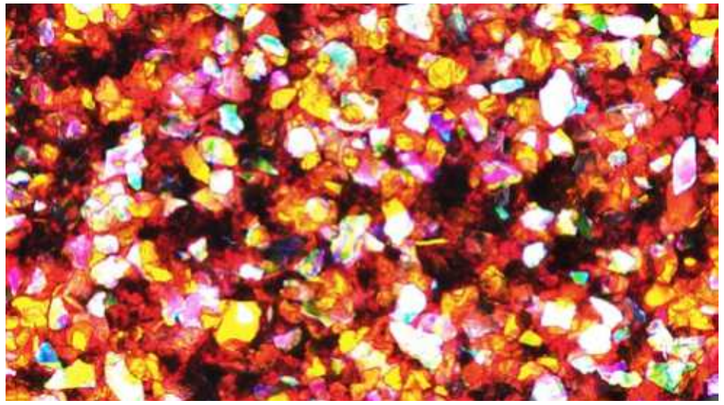


AC 2717
COPPERHEAD

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Red P2GL-WD >	**2.00%**
Hostaperm® Brown HFR 01 >	**8.00%**
Edelstein CFX Sunstone Champagne >	45.00%
Edelstein CFX Topaz Orange >	45.00%

PIGMENTATION LEVEL

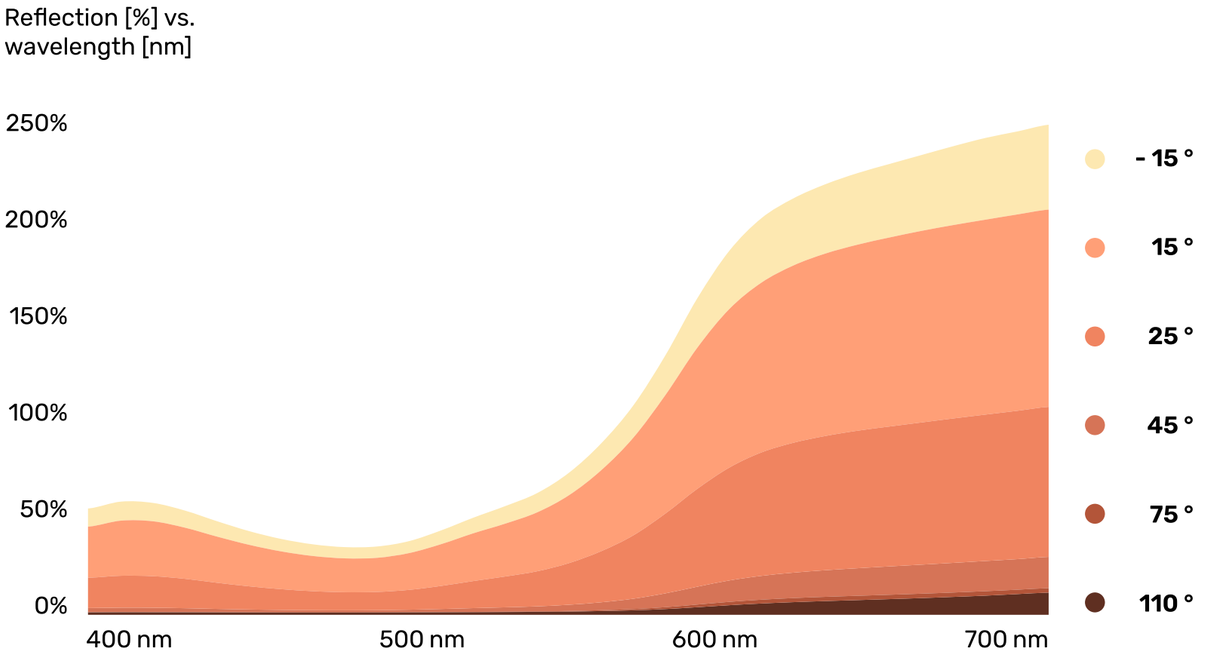
Pigment in wet paint	11.9%
Pigment to binder ratio	59.2%

NIR REFLECTANCE

900 nm	71.9%
1550 nm	84.2%

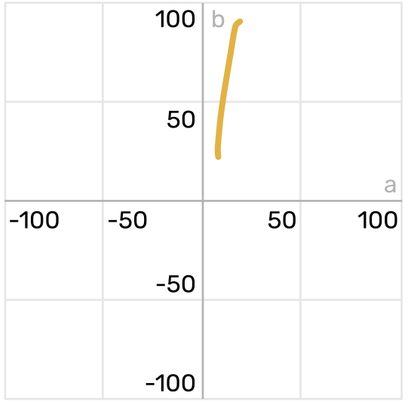
Flop Index	16.3
L [-15°]	98.4

REFLECTANCE CURVES

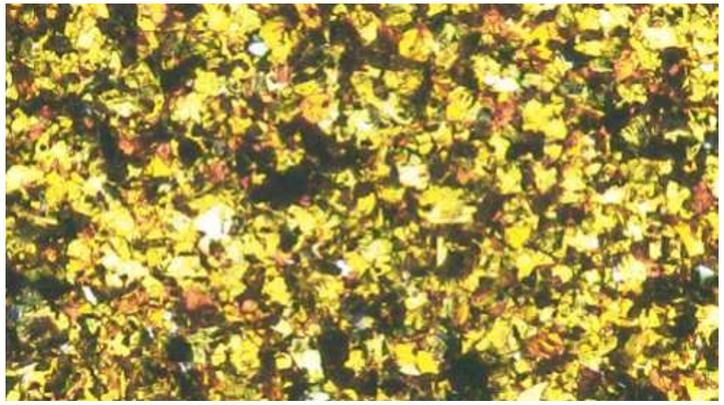


AC 2718 **MOLTEN GOLD**

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003 >	**6.00%**
Hostaperm® Red P2GL-WD >	**1.00%**
Hostaperm® Brown HFR 01 >	**2.00%**
Monastral™ Green 6Y-C* >	**1.00%**
Zenexo® GoldenShine WB 21 YY >	75.00%
Zenexo® CopperGlow WB 21 00 >	15.00%

PIGMENTATION LEVEL

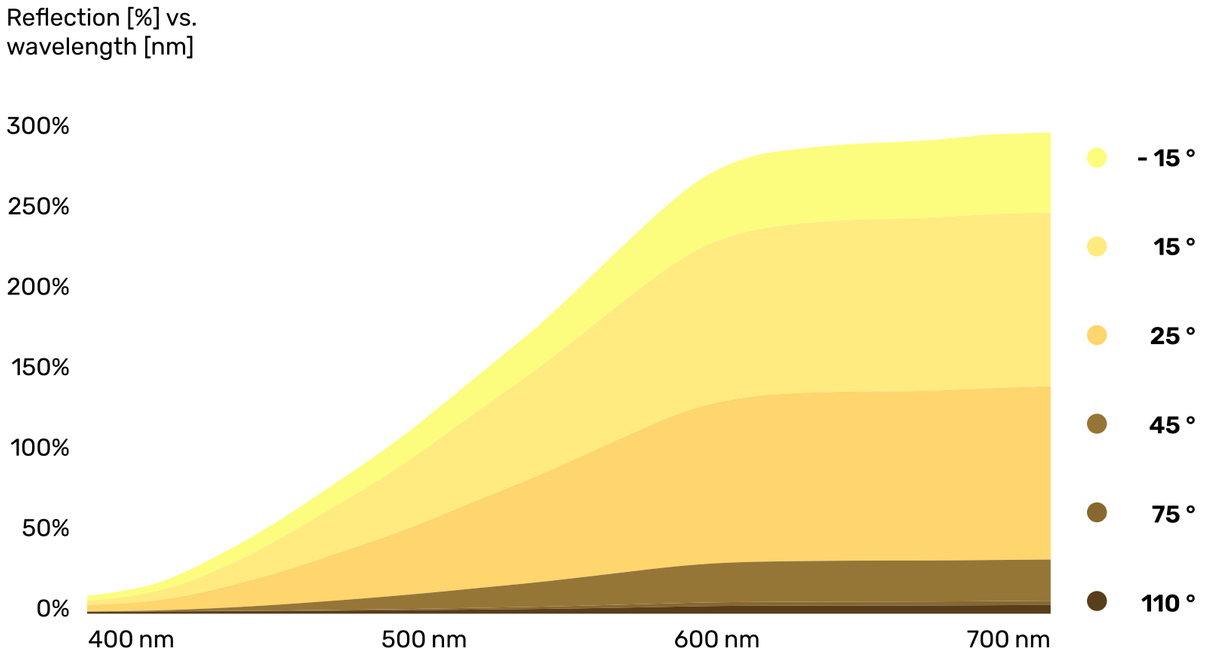
Pigment in wet paint	6.5%
Pigment to binder ratio	32.6%

NIR REFLECTANCE

900 nm	72.0%
1550 nm	74.4%
Flop Index	15.1
L [-15°]	127.9

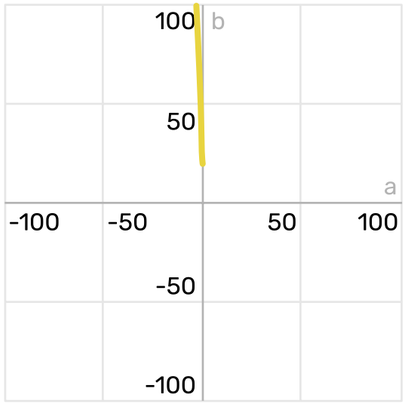
* Monastral™ pigments are not available in the USA

REFLECTANCE CURVES

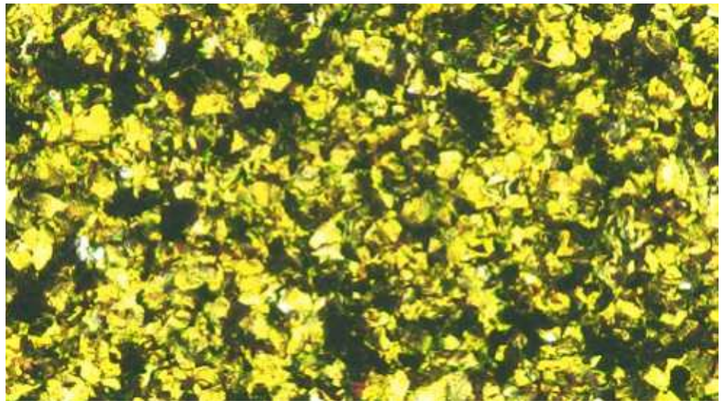


AC 2719
MARIGOLD

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003 >	**6.00%**
Hostaperm® Green GNX >	**1.00%**
Monastral™ Green 6Y-C* >	**3.00%**
Zenexo® GoldenShine WB 21 YY >	90.00%

PIGMENTATION LEVEL

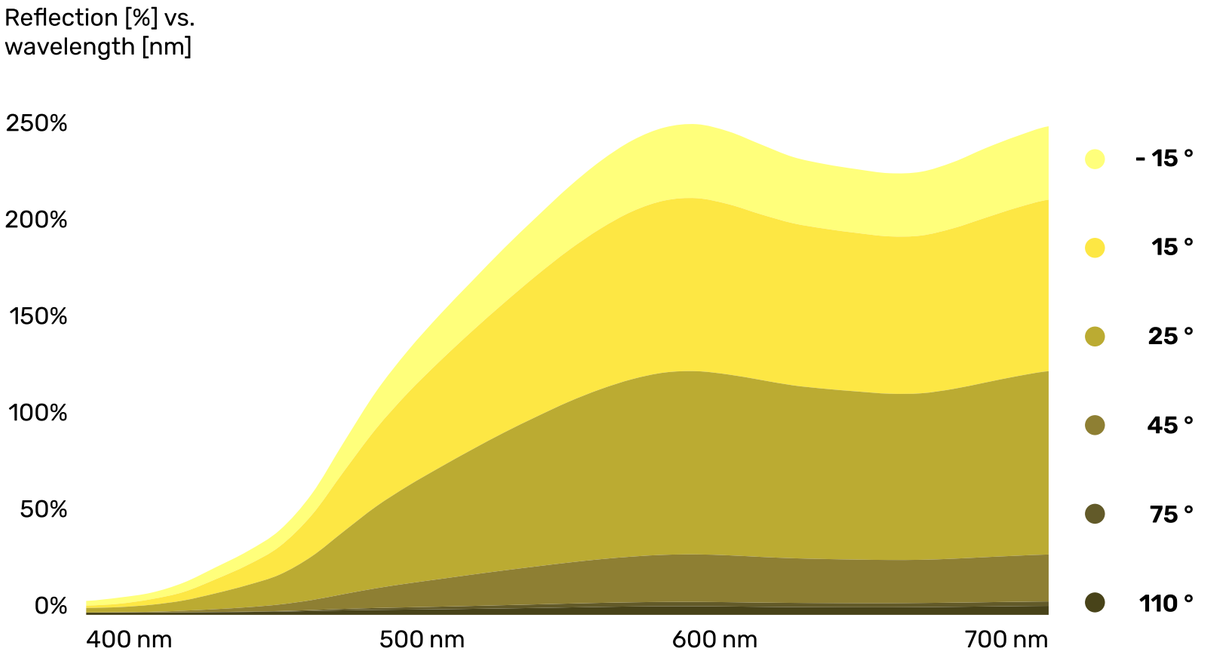
Pigment in wet paint	5.9%
Pigment to binder ratio	29.5%

NIR REFLECTANCE

900 nm	71.7%
1550 nm	74.6%
Flop Index	14.6
L [-15°]	129.0

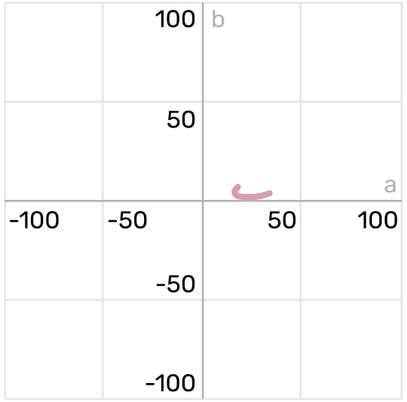
* Monastral™ pigments are not available in the USA

REFLECTANCE CURVES

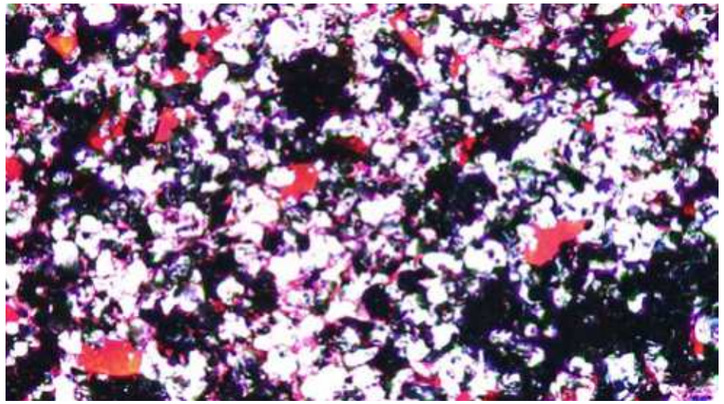


AC 2720
MAGNOLIA

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Red P2GL-WD >	**2.00%**
Monolite™ Red 326401 >	**8.00%**
STAPA® IL HYDROLAN® 2156 55900/G >	70.00%
Edelstein CFX Ruby Red >	20.00%

PIGMENTATION LEVEL

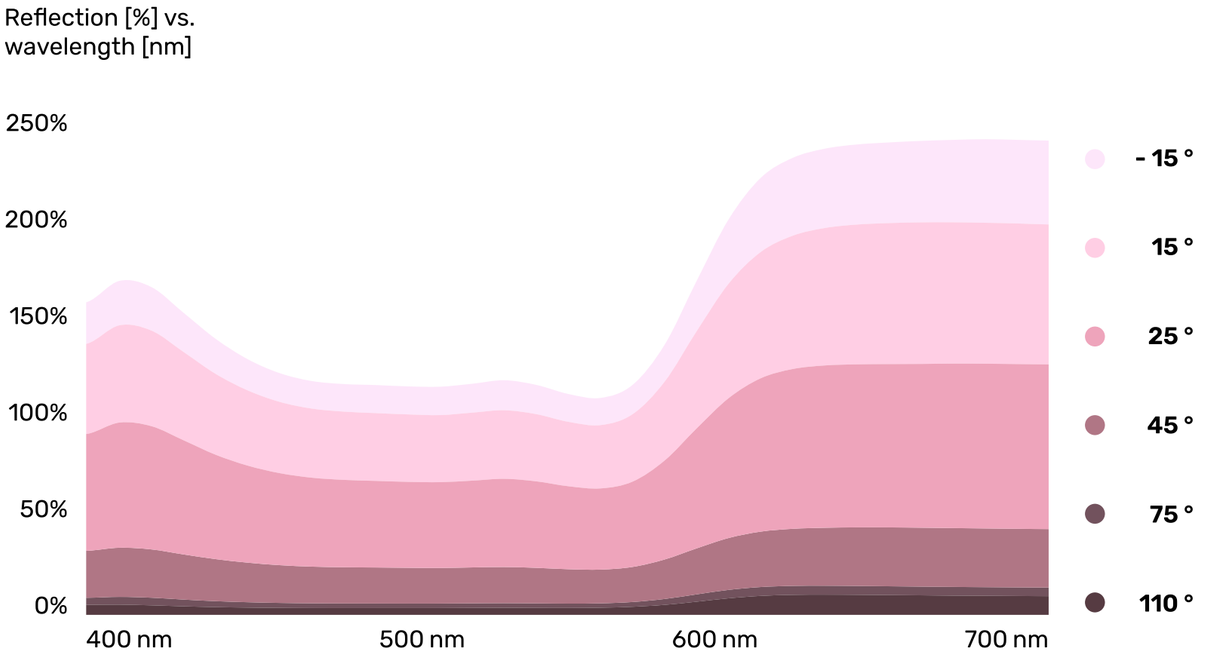
Pigment in wet paint	3.8%
Pigment to binder ratio	20.8%

NIR REFLECTANCE

900 nm	75.3%
1550 nm	83.9%

Flop Index	10.9
L [-15°]	112.9

REFLECTANCE CURVES



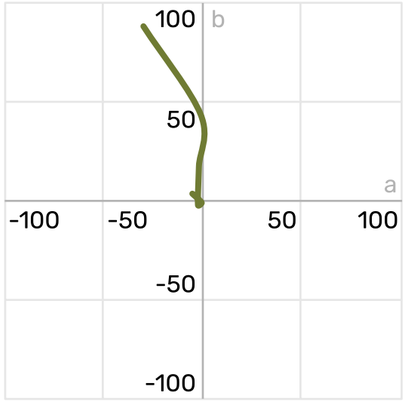
TREND COLORS 2027 – TECHNICAL DETAILS

BALANCED POWER

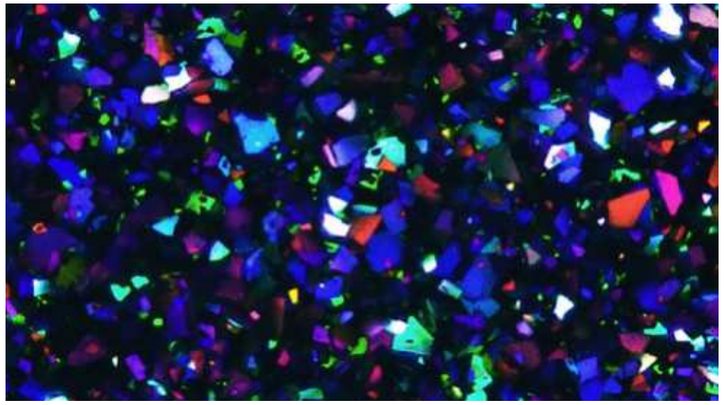
Not wasting energy is a vital element of plan B for planet A, at least until someone invents a machine capable of perpetual motion. Energy efficiency largely depends on vehicle type and power source, but color can also make a difference. Spectacular yet affordable effects explore new paths in the evolution of colors. Starting with a small population, they all have the potential to become the dominant species in the new environment.

AC 2721
MUTANT SERPENT

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Green GNX >	**15.00%**
Monastral™ Green 6Y-C* >	**5.00%**
Chromaflair® Magenta/Gold 334 >	80.00%

PIGMENTATION LEVEL

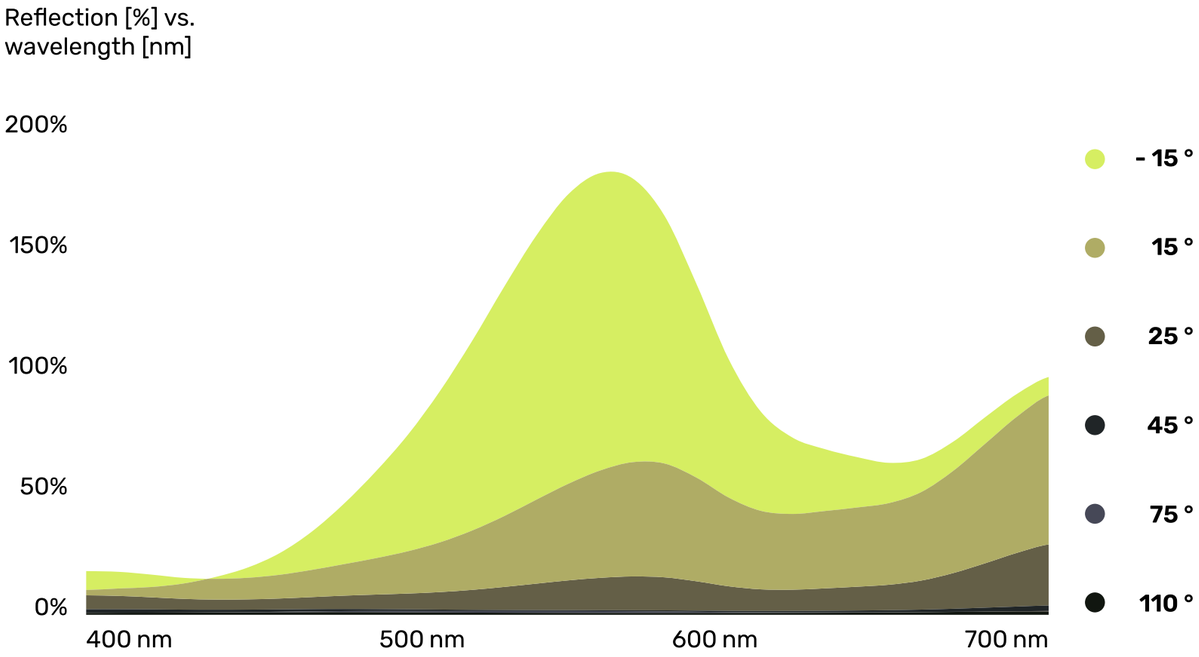
Pigment in wet paint	7.2%
Pigment to binder ratio	35.5%

NIR REFLECTANCE

900 nm	50.3%
1550 nm	22.5%
Flop Index	33.3
L [-15°]	107.2

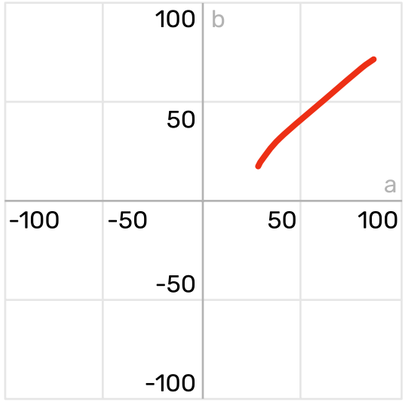
* Monastral™ pigments are not available in the USA

REFLECTANCE CURVES

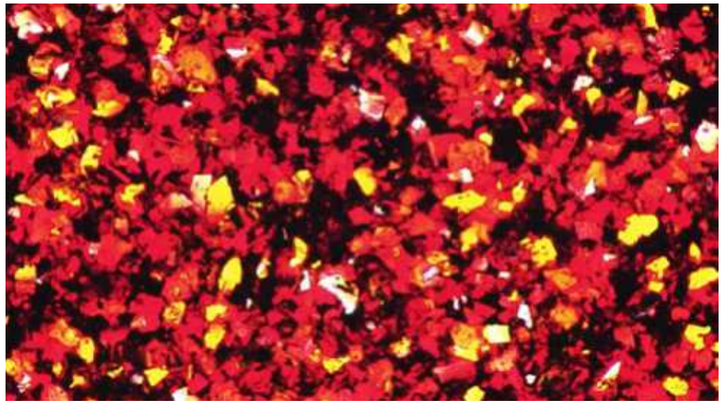


AC 2722
HOT PEPPER

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Red P2GL-WD >	**25.00%**
Monolite™ Red 326401 >	**25.00%**
Zenexo® GoldenShine WB 21 YY >	40.00%
Zenexo® GoldenWhite WB 21 YS >	10.00%

PIGMENTATION LEVEL

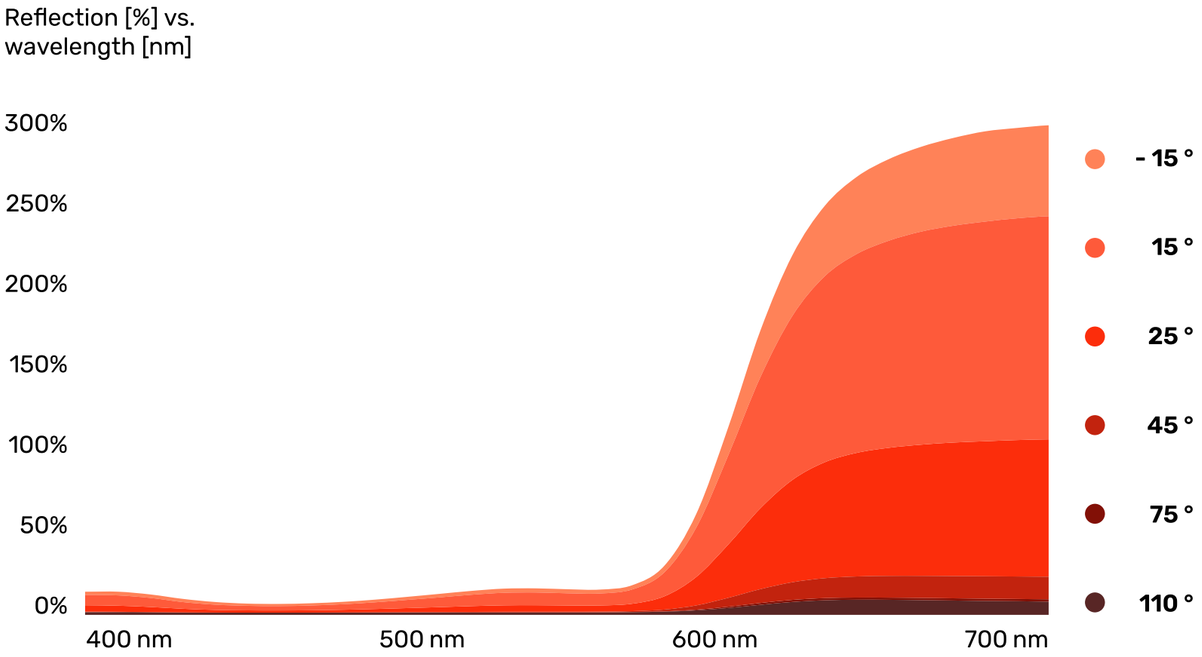
Pigment in wet paint	5.5%
Pigment to binder ratio	26.1%

NIR REFLECTANCE

900 nm	66.6%
1550 nm	72.5%

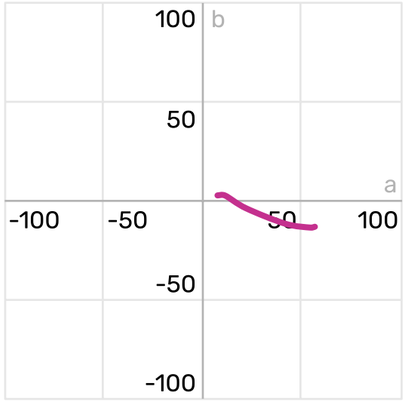
Flop Index	15.9
L [-15°]	74.5

REFLECTANCE CURVES

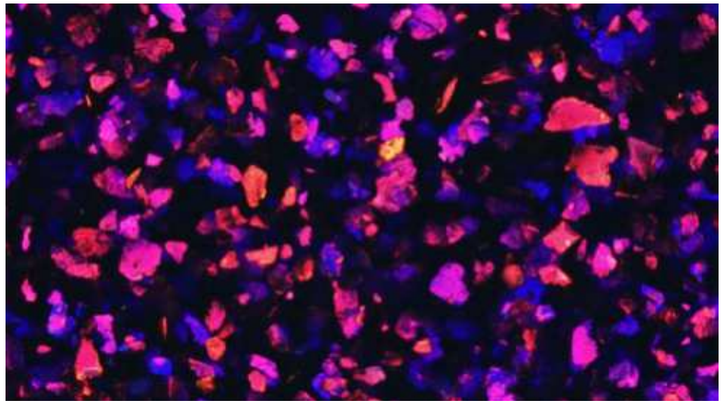


AC 2723
PURPLE POWER

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Violet RL special 01 >	**8.00%**
Monolite™ Blue 3RX-H >	**2.00%**
Edelstein CFX Ruby Red >	60.00%
Xirallic® NXT F260-51 SW Cougar Red >	30.00%

PIGMENTATION LEVEL

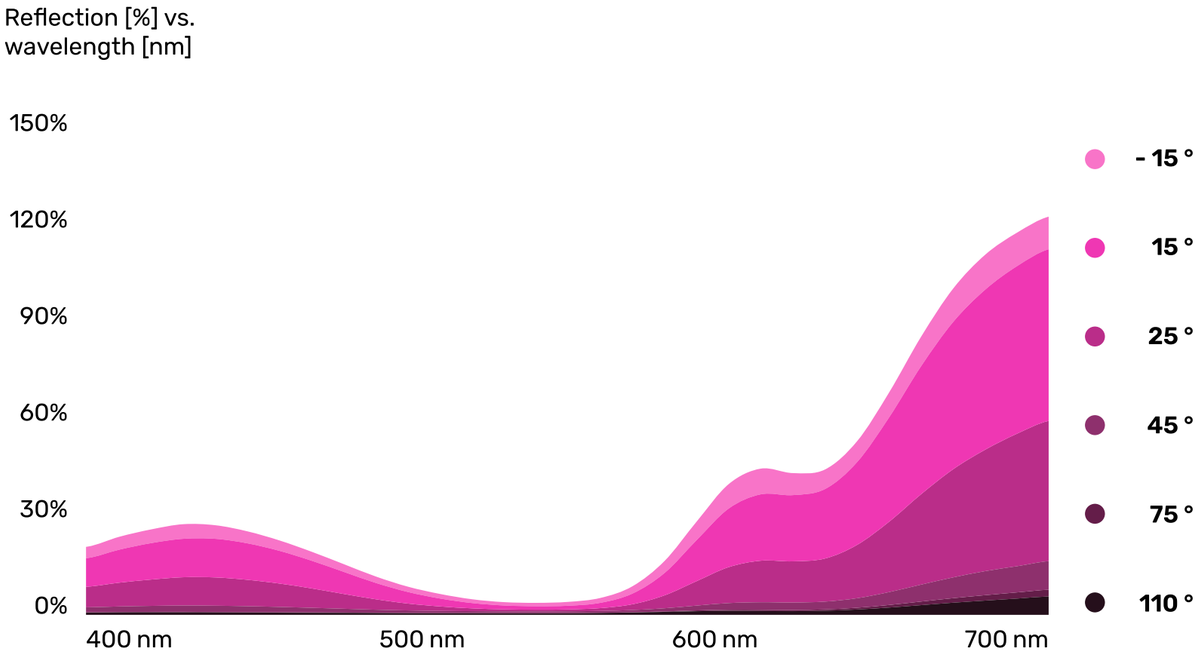
Pigment in wet paint	6.4%
Pigment to binder ratio	33.6%

NIR REFLECTANCE

900 nm	45.9%
1550 nm	82.5%

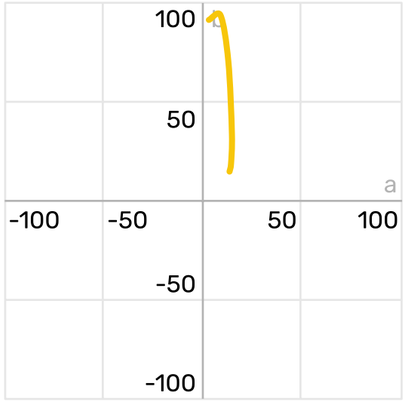
Flop Index	17.0
L [-15°]	46.6

REFLECTANCE CURVES

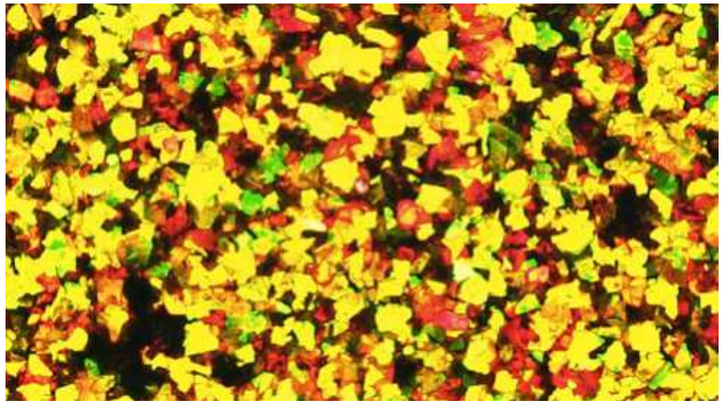


AC 2724
AURELIA

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003 >	**6.00%**
Hostaperm® Red P2GL-WD >	**1.00%**
Hostaperm® Brown HFR 01 >	**2.00%**
Monastral™ Green 6Y-C* >	**1.00%**
Edelstein CFX Ruby Red >	15.00%
Xirallic® NXT M260-30 SW Leonis Gold >	75.00%

PIGMENTATION LEVEL

Pigment in wet paint	12.2%
Pigment to binder ratio	61.1%

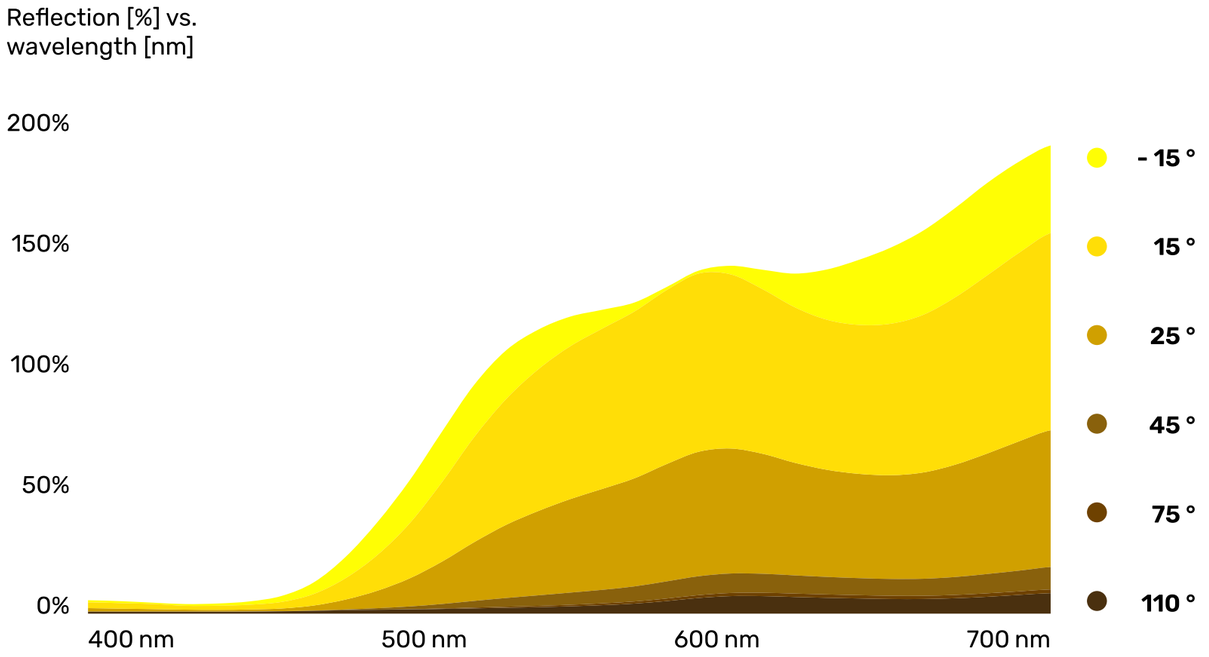
NIR REFLECTANCE

900 nm	50.7%
1550 nm	81.9%

Flop Index	15.5
L [-15°]	101.7

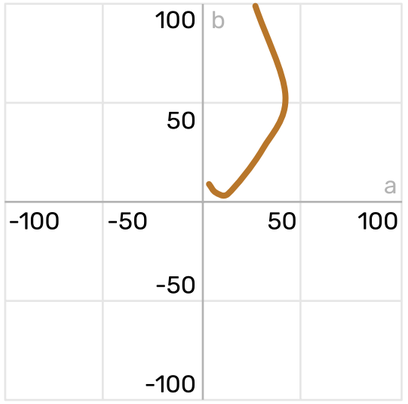
* Monastral™ pigments are not available in the USA

REFLECTANCE CURVES

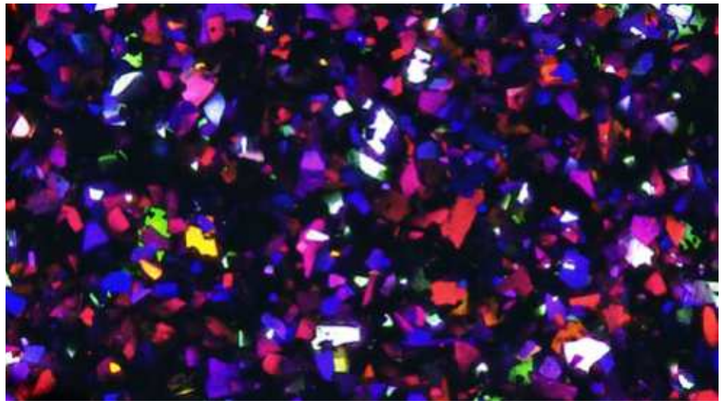


AC 2725
CHAMELEON GOLD

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Heuco® Yellow 115003 >	**0.50%**
Hostaperm® Scarlet GO >	**0.50%**
Hostaperm® Brown HFR 01 >	**4.00%**
Hostaperm® Green GNX >	**5.00%**
Chromaflair® Magenta/Gold 334 >	90.00%

PIGMENTATION LEVEL

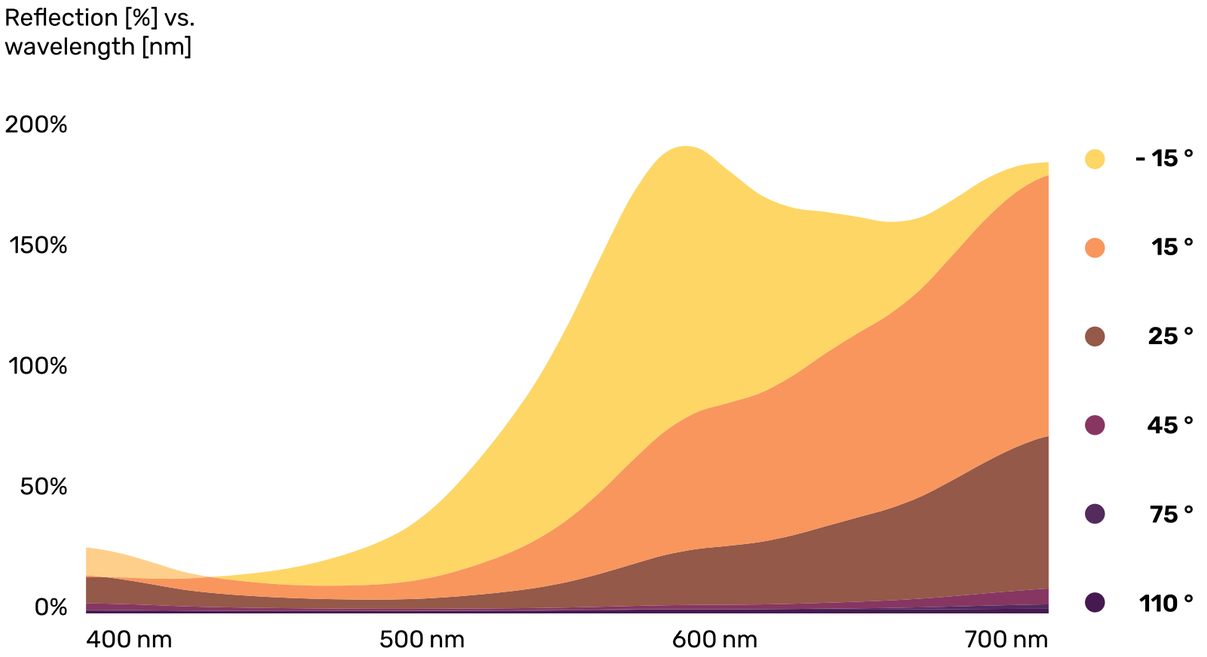
Pigment in wet paint	8.1%
Pigment to binder ratio	40.0%

NIR REFLECTANCE

900 nm	52.8%
1550 nm	22.3%

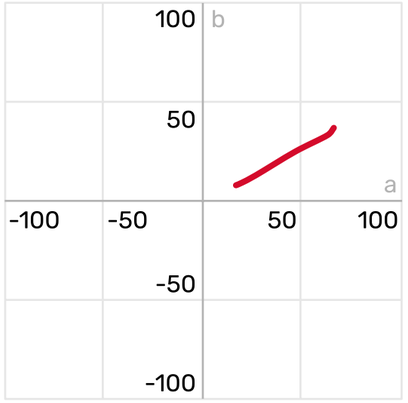
Flop Index	27.0
L [-15°]	105.6

REFLECTANCE CURVES

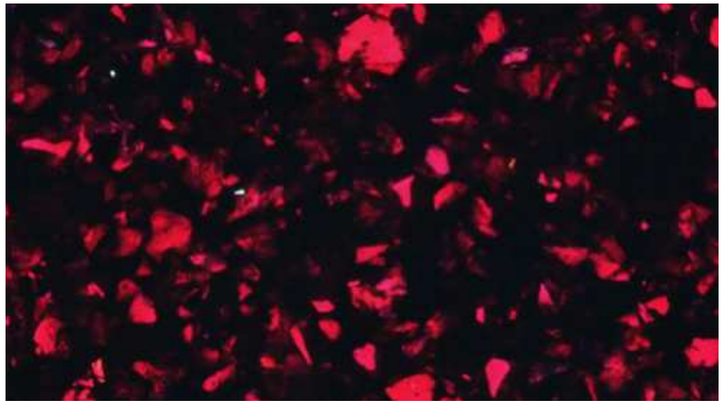


AC 2726
INNATE RED

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Monolite™ Red 326401 >	**45.00%**
Monolite™ Blue 3RX-H >	**5.00%**
Colorstream® F20-51 SW Lava Red >	5.00%
Colorstream® F20-52 SW Mineral Red >	45.00%

PIGMENTATION LEVEL

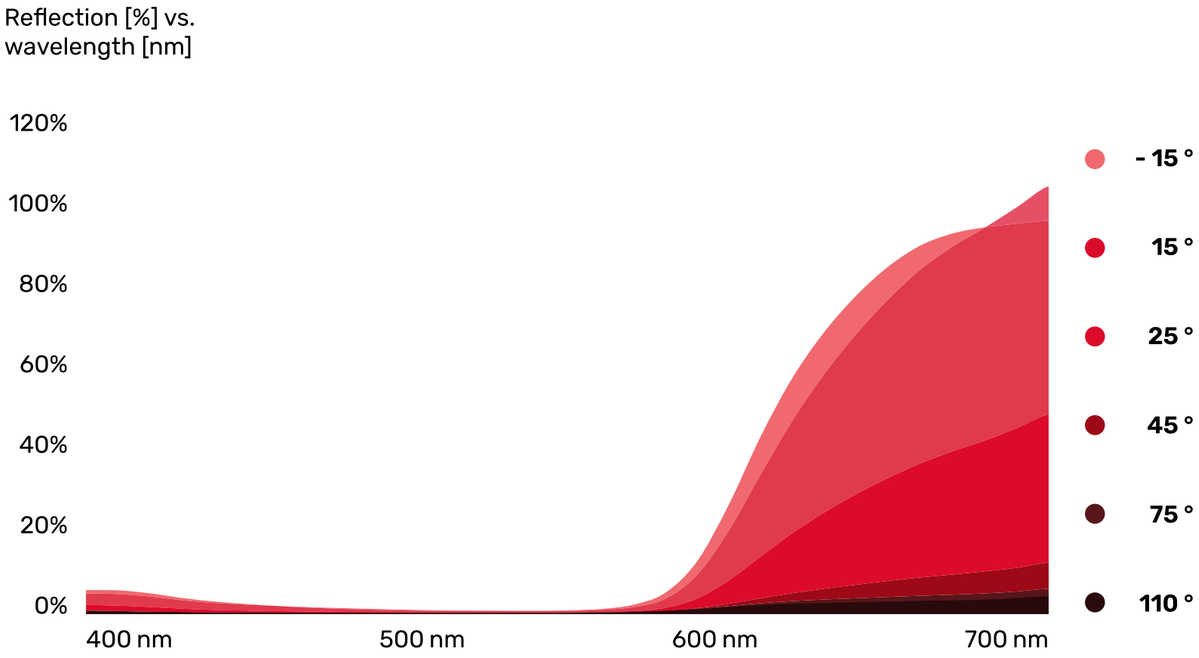
Pigment in wet paint	4.9%
Pigment to binder ratio	23.2%

NIR REFLECTANCE

900 nm	47.8%
1550 nm	86.4%

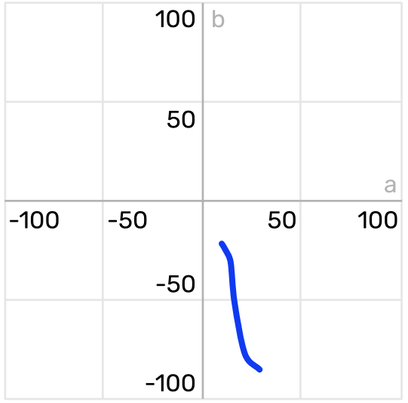
Flop Index	15.7
L [-15°]	38.1

REFLECTANCE CURVES

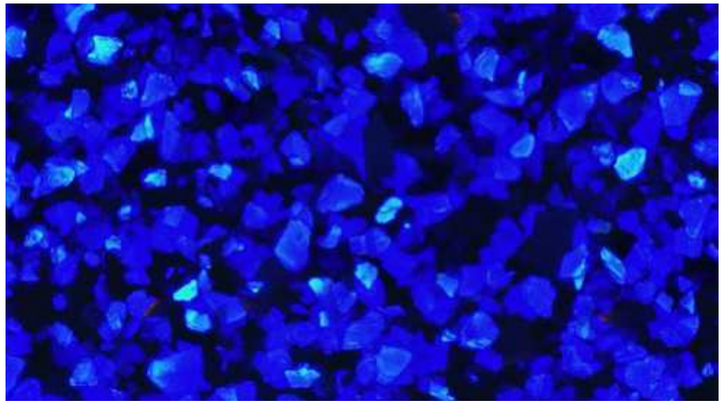


AC 2727
MIDNIGHT GLEAM

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY



RECIPE

Hostaperm® Violet RL special 01 >	**3.00%**
Hostaperm® Blue BT-627-D >	**40.00%**
Hostaperm® Blue BT-617-D >	**7.00%**
Edelstein CFX Sapphire Blue >	40.00%
Luxan C842 Spotlight Red >	10.00%

PIGMENTATION LEVEL

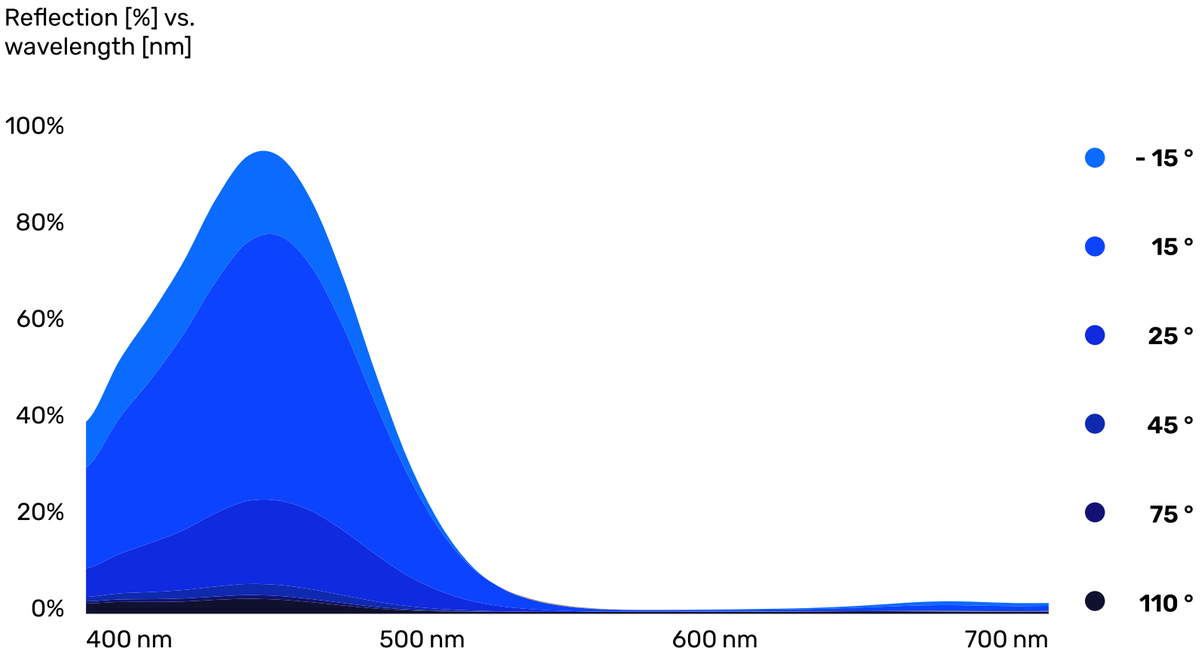
Pigment in wet paint	6.9%
Pigment to binder ratio	33.9%

NIR REFLECTANCE

900 nm	52.9%
1550 nm	61.8%

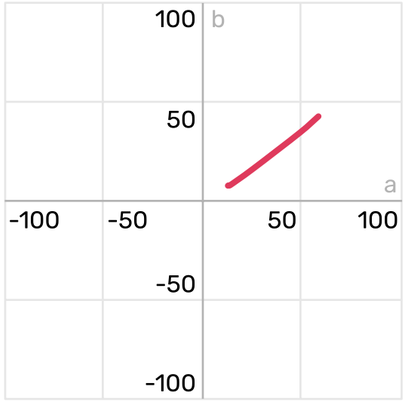
Flop Index	24.8
L [-15°]	40.5

REFLECTANCE CURVES



AC 2728
BLACK CHERRY

COLOR CHANGE



MICROSCOPIC PHOTOGRAPHY

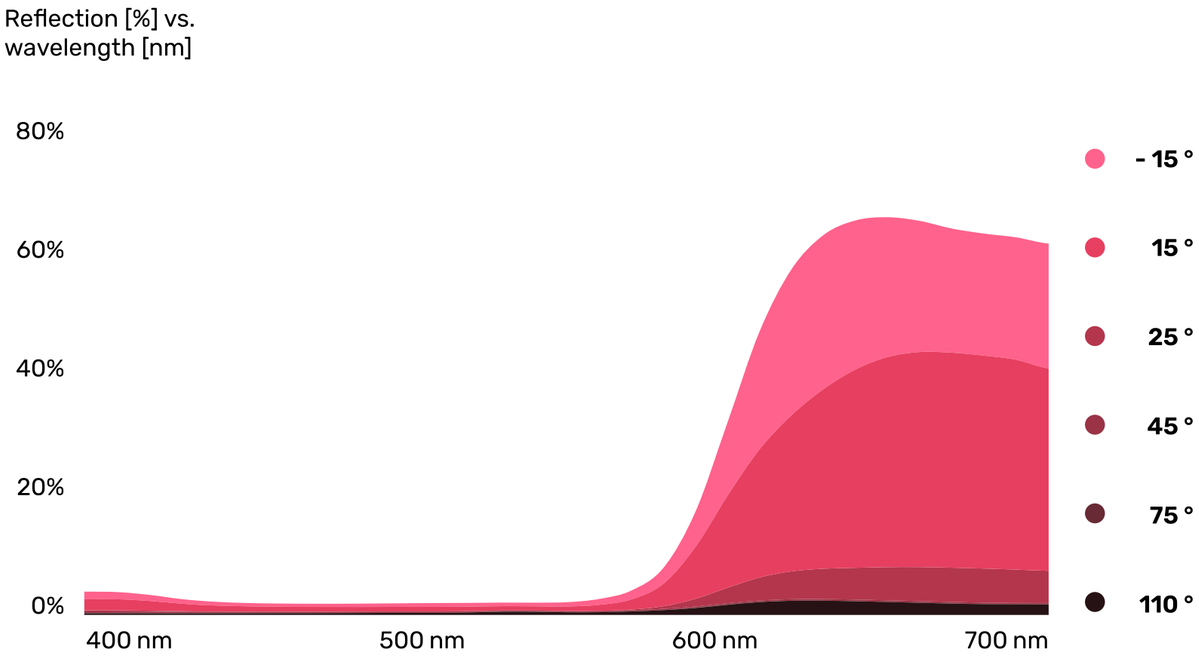
RECIPE

1st layer	
Hostaperm® Yellow H3G >	**37.50%**
Hostaperm® Red P2GL-WD >	**41.10%**
Hostaperm® Blue BT-617-D >	**21.40%**
2nd layer	
Hostaperm® Red P2GL-WD >	**50.00%**
Luxan C842 Spotlight Red >	50.00%

PIGMENTATION LEVEL	1st layer	2nd layer
Pigment in wet paint	1.5%	2.0%
Pigment to binder ratio	7.1%	9.4%

NIR REFLECTANCE	
900 nm	63.5%
1550 nm	78.3%
Flop Index	18.3
L [-15°]	40.3

REFLECTANCE CURVES



SUPPLIERS AND PIGMENT CONCENTRATIONS

SUPPLIER	PRODUCT	Pigment concentration in tinter	Pigment concentration in mill base
Sudarshan	Hostaperm® Yellow H3G >	12%	30%
	Heuco® Yellow 115003 >	6%	17%
	Hostaperm® Scarlet GO >	5%	30%
	Hostaperm® Red P2GL-WD >	3%	10%
	Hostaperm® Brown HFR 01 >	6%	17%
	Monolite™ Red 326401 >	5%	17%
	Hostaperm® Red E5B 02 >	4%	15%
	Hostaperm® Red Violet ER 02 >	5%	17%
	Hostaperm® Violet RL special 01 >	6%	20%
	Monolite™ Blue 3RX-H >	5%	15%
	Hostaperm® Blue BT-627-D >	6%	17%
	Hostaperm® Blue BT-617-D >	4%	18%
	Hostaperm® Blue BT-728-D >	5%	20%
	Hostaperm® Blue BT-729-D >	4%	15%
	Hostaperm® Green GNX >	5%	20%
	Monastral™ Green 6Y-C* >	10%	30%
	Heucodur® Yellow 9116 >	20%	60%
	Hostaperm® Oxide Yellow BV 02 >	30%	60%
EVIDENT Europe GmbH >	Digital Microscopic Images >		

* Monastral™ pigments are not available in the USA

SUPPLIER	PRODUCT	Pigment concentration in tinter	Pigment concentration in mill base
Eckart GmbH >	STAPA® IL HYDROLAN® 3580 >	14%	n.a.
	STAPA® IL HYDROLAN® 2156 55900/G >	14%	n.a.
	Edelstein CFX Sunstone Champagne >	14%	n.a.
	Edelstein CFX Topaz Orange >	14%	n.a.
	Edelstein CFX Ruby Red >	14%	n.a.
	Edelstein CFX Sapphire Blue >	14%	n.a.
	Luxan C842 Spotlight Red >	14%	n.a.
	Symic OEM Medium Opaque Silver >	14%	n.a.
Merck KGaA >	Xirallic® NXT M260-30 SW Leonis Gold >	14%	n.a.
	Xirallic® NXT F260-51 SW Cougar Red >	14%	n.a.
	Colorstream® F20-51 SW Lava Red >	14%	n.a.
	Colorstream® F20-52 SW Mineral Red >	14%	n.a.
Orion Engineered Carbon >	COLOUR BLACK FW 255 >	3%	10%
Schlenk Metallic Pigments GmbH >	Zenexo® GoldenShine WB 21 YY >	14%	n.a.
	Zenexo® GoldenWhite WB 21 YS >	14%	n.a.
	Zenexo® CopperGlow WB 21 OO >	14%	n.a.
	Decomet® STV 2002 12/10 >	3%	n.a.
Venator Materials >	HOMBITEC® RM 220 pigment >	5%	30%
Viavi Solutions Inc. >	ChromaFlair® Magenta/Gold 334 >	14%	n.a.

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