Technical Information

FK06

Performance Coatings

Inclusion Pigments

We apply core technologies in organic and inorganic chemistry to develop leading market positions in a diverse range of industries.

Our mission is “to achieve market leadership through a customer-focused and highly creative organisation committed to delivering top quality products and outstanding services to customers worldwide”.

Our materials are used to add value to, and to improve the performance of products in a variety of end markets including building and renovation, home appliances, cookware, giftware and tableware, transportation, household furnishings, leisure, electronics, and industrial products.

We are among the world’s leading suppliers of ceramic glazes and colors, glass decoration, speciality glasses, porcelain enamel coatings, auxiliary materials, and pigments. We pioneered the development of forehearth color technology for coloring of glass.

Our global commitment to quality, reliability, innovation, and personal customer care is founded on over 80 years of experience in serving the changing needs of the industry, from our international network of manufacturing plants and service centers. Our commitment to quality management has been recognized with the award of ISO 9001 accreditation to all of our global manufacturing and research facilities.

Meeting the needs of the Color World calls for great foresight, flexibility, and innovation...

Our global presence is a strong competitive advantage. Technical, marketing, and management personnel are in continuous contact with customers in every major region. Multinational customers can be assured of standard products and consistent quality wherever they have operations.

We coordinate our R&D activities globally and use our international talent to ensure that product specifications and performance are designed to satisfy the specific requirements demanded by regional markets.

Vibrantz views the growing world-wide concern for the environment as an opportunity to develop improved products and also to participate in Chemical Industry efforts to address public concern. Environmental concerns are a major driving force behind the evolution of our lead-free technology and our low VOC decoration systems.

The markets we cover are extremely service-intensive. Vibrantz has established regional color matching, blending/pasting, and technical support facilities, to provide the level of service demanded by our customers in all time zones.

Think of us as High Performance Partner to manufacturers around the world...

...Helping to create and enhance many of the products you use and enjoy every day of your life.

Top solutions for today's problems

In the ceramic industry, we are world famous for our innovative, high-quality coloring products.

Particularly our inclusion pigments create shining red, brilliant orange, and intense yellow color shades in ceramic bodies and glazes, improving the traditional spectrum of colors available to the ceramic world in a unique way.

Most of our inclusion pigments are distinguished by their chemical and thermal stability. This ensures both a high level of production safety and excellent end-product profitability.

The inclusion principle – brilliant pigments are stabilized by encapsulation in chemically and thermally stable crystals

The colors of yellow, orange, and red inclusion pigments are achieved using well-known, color intensive cadmium-sulfoselenide compounds. These possess very limited chemical and thermal stability, and so we encapsulate them in practically inert, colorless zircon-silicate in a complex chemical synthesis process. As a result, our inclusion pigments compare chemically with pure zirconium silicate, yet demonstrate the optical properties of their embedded color (see figure 1).

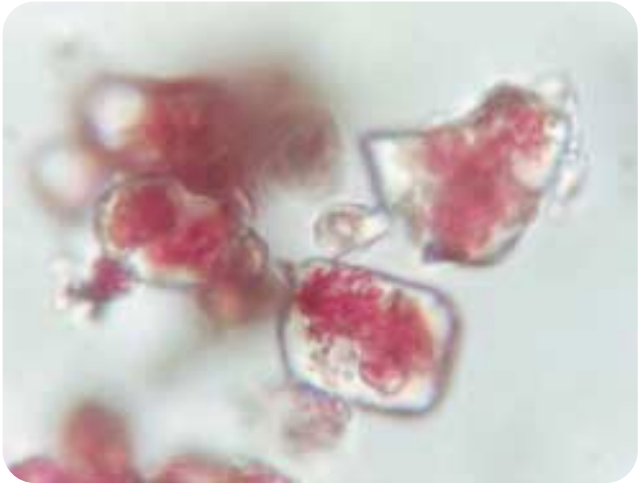

Fig. 1: As seen by microscope, the brilliant red cadmium in an inclusion pigment is completely enclosed in stable zircon crystals.

Low cadmium content

One of the advantages of our cadmium inclusion pigments is that only a very small amount of cadmium is required to achieve the desired color. As little as 0.1 weight-% cadmium is sufficient to create strong colors. This is about one twentieth of the amount required to achieve the same color in conventional cadmium glazes.

1000 times less cadmium released

The cadmium solubility of inclusion pigment glazes is very low. ISO 6713-approved tests for cadmium release show that the cadmium released by inclusion pigment glazes can be a thousand times or more less than that of conventional free-cadmium glazes.

Inclusion pigments for earthenware

Pigment	Color	Firing stability	Sieve residue on 45 µm
230 540	Orange	up to 1250 °C	<2 %
230 942	Brilliant Orange	up to 1350 °C	<5 %
270 496	Fire Engine Red	up to 1250 °C	<2 %
270 497	Bordeaux Red	up to 1250 °C	<2 %
270 547	Signal Red	up to 1250 °C	<2 %
270 548	Bordeaux	up to 1250 °C	<2 %
270 561	Bordeaux Red intens	up to 1250 °C	<2 %
270 944	Intense Red	up to 1350 °C	<5 %
270 946	Coral Red	up to 1350 °C	<5 %

Inclusion pigments for stoneware

Pigment	Color	Firing stability	Sieve residue on 45 µm
239 416	Lime Yellow	up to 1350 °C	<2 %
239 616	Pumpkin Orange	up to 1350 °C	<2 %
279 944	Intense Red	up to 1350 °C	<5 %
279 496	Crayon Red	up to 1350 °C	<2 %
279 497	Claret Red	up to 1350 °C	<2 %

InstantColor®: Dispersible inclusion pigments

Pigment	Color	Firing stability	Sieve residue on 32 µm	Application
230 942	Brilliant Orange	up to 1250 °C	<5 %	earthenware
270 944	Intense Red	up to 1350 °C	<5 %	earthenware
279 944	Intense Red	up to 1350 °C	<5 %	earthenware and stoneware
270 946	Coral Red	up to 1350 °C	<5 %	earthenware

Glaze composition in weight-% (standard values)

Oxide	A Fast-firing, transparent
SiO_2	60
B_2O_3	2
Al_2O_3	9
CaO	12
ZnO	10
MgO	2
Na_2O	1
K_2O	4

Inclusion pigments for stoneware and earthenware

239 416
Lime Yellow

230 540
Orange

239 616
Pumpkin Orange

270 496
Fire Engine Red
279 496
Crayon Red

270 497
Bordeaux Red
279 497
Claret Red

270 547
Signal Red

270 548
Bordeaux

270 561
Bordeaux Red Intense

Dispersible inclusion pigments

230 942
Brilliant Orange

270 944
Intense Red
279 944
Intense Red

270 946
Coral Red

While every attempt has been made to reproduce colors exactly, the color samples printed in this brochure may differ slightly from fired ceramic products. All stains were applied with 5 % in glaze A.

Application hints

With the help of our inclusion pigments, our customers can obtain bright yellow, orange, and red glazes and bodies for applications in the tableware, art ceramic, tile, and sanitary industries. Each inclusion pigment has been optimized for its specific application, both to assist in customer selection and to meet our quality requirements.

When coloring earthenware glazes we recommend that our customers use those inclusion pigments with a "0" as third digit of the product number. For applications in the stoneware and tableware industry we recommend those with a "9" as the third digit, as these pigments have been optimized for these particular applications. Quality and release control testing have also of course been specifically designed for each application. Detailed test conditions for our products are specified in the corresponding data sheets, which we will gladly send you upon request.

For optimal results using our inclusion pigments, please read the following application hints, as these will lead to increased quality of your products.

- Inclusion pigments are intermiscible, as well as miscible with other zircon and brown stains. To increase the red value in brown shades, you can add inclusion pigments to successfully match your desired color.
- Glaze systems containing lead, lime, zinc, boron, or zircon improve the color development of inclusion pigments.
- Alkali-rich glazes reduce the color intensity.
- To avoid mechanical destruction of inclusion pigments during glaze preparation, we recommend adding the stain when only 5 % of the total milling time remains.
- Using inclusion pigments in the InstantColor® range will give you the most striking and intense shades available, along with all the advantages of stir-in (dispersible) stains.
- In the stoneware and tableware application, the remarkable stability of our inclusion pigments is especially evident in pastel shades.
- Inclusion pigments improve the refiring stability of shades that contain zircon-iron-red, particularly in case of partial exchange.
- Inclusion pigments demonstrate good firing stability even under reducing firing conditions.