FERRO
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Technical Information

IS02

Performance Colors & Glass

Pigments for the Dental Industry

In this Technical Information bulletin Ferro presents a selection of color stains for the application in Dental ceramics.

For a natural color, the dental ceramic has to cover a complete spectrum from opaque to transparent in different color shades and intensities. High color fidelity is required even after repeated firing. The color palette presented here ranges from yellow via brown to pink and also comprises a blue for creation of mixed shades.

Pigments for the Dental industry must meet special requirements. The heavy metal content and the radioactivity for example need to be on a very low level.

Only raw materials of very high purity are used for the production of our pigments. In the manufacturing of zircon stains, no baddeleyit is used, but chemically precipitated ZrO_2. Therefore the radioactivity is an order of magnitude lower than with natural zircon raw materials. As adjustment material only silica is employed, to avoid any contamination.

Comprehensive analytical investigations ensure a constant high quality. In the dental ceramic industry, Ferro is known as a reliable partner for high quality products since many years.

Specifications

The content of critical heavy metals is as low as technically possible with the current state-of-the-art technology. In all listed pigments the sum of heavy metals (Pb, Cd, As, Sb) is lower than 300 ppm. Single value can be provided upon request, but are not part of the specification.
All pigments have a sieve residue of less than 1 % on a 45 µm sieve.

The particle size of the zircon stains is characterized by d_{50} and d_{90} values of about 10 and 15 µm, resp. The particle size of all other stains is a little bit lower and lies at 5 and 10 µm, resp., for d_{50} and d_{90}.

The colorimetric values are measured in an opaque fast firing glaze with 3 % pigment addition against standard. The specified limits are $\Delta L<1$, $\Delta a<1$ and $\Delta b<1$.

With this palette of stains, a full color space is accessible. The color shade can be varied by the relation of the components to each other, and the color strength by the quantity of pigment used.

While every attempt has been made to reproduce colors exactly, the samples printed in Table 1 may differ slightly from the finished ceramic products.

In case of questions related to our products or their application, please do not hesitate to contact us.

Table 1: Pigments for Dental Ceramics

Product Group	Product	Color	System	Color Shade
Base stains	234 264	Ochre	Zr-V	
	234 475 IL	Ochre with red tint	Zr-V-In	
Typical dental colors	234 955	Yellow	Zr-Si-Pr	
	264 946	Light brown	Zn-Al-Fe-Cr	
	274 946	Red brown	Zr-Si-Fe	
	274 945	Pink	Sn-Si-Ca-Cr	
Other stains	224 944	Blue	Co-Al	

The colors resemble the addition of 5% pigment to an opaque glaze (2% addition for 224 944).