

Technical Information



781 Series Lead-Free Onglaze Ceramic Colors for the Decoration of Porcelain, Bone China, Vitreous China and Earthenware

Product Codes and Color Shades

Product No.	Color Shade	Pantone®Code ¹
117812	chromium green	364C
117813	blue green	3282C
117814*	Christmas green	363C
127810	sky blue	298C
127811	cyan	307C
127812	cyan	300C
127813	cobalt blue	2935C
127815	cobalt blue	2728C
137811	lemon yellow	3935C
137812	yellow	122C
137813	intensive yellow	137C
137814*	cadmium yellow	116C
137815*	cadmium yellow	115C
147811	black	Black C
157811	grey	429C
167811	yellow brown	153C
167812	dark brown	1685C
177811*	orange red	021C
177812*	light red	172C
177813*	red	1795C
177814*	intensive red	7427C
177815	iron red	174C
177816*	light red	172C
177817*	red	1795C
177818*	intensive red	7427C
177810	peach	495C
777811	pink	182C
777813	purple	205C
777815	purple	207C

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197811	mixing white	
197812	white	
197815	matt additive	
107810	cover flux	
107813	Cover flux	

*Denotes cadmium-containing colors

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¹ The above mentioned Pantone® code is only a guideline for the color shade.

Heavy Metal Release

Colors in the 781 Series formulated to be lead-free and cadmium-free with controls in place to maintain upper limits of 600 ppm lead and 100 ppm cadmium.

The supplementary cadmium colors are lead-free. Ferro maintains and manages the heavy metal limit through careful monitoring of raw materials combined with accurate processing and continuous precise quality control.

All colors in the 781 series meet QB/T 2455-2011 China industrial standard on Ceramic Colors.

All colors in the 781 series except cadmium-containing colors, meet the limits for heavy metal release in accordance with California Prop. 65 and FDA requirements under proper conditions. Whether Cadmium containing colors meet the cadmium release limits of California Prop. 65 and FDA requirements is a function of the decoration area.

Application

Colors in the 781 series have excellent processing properties in all conventional decorating methods including direct and indirect screen printing, spraying, machine lining and banding, and brush application.

Screen printing

For direct or indirect screen printing, we recommend polyester screens with 100-140 threads/cm (250- 350 mesh/inch) and pasting ratio 10:7-8 (take example of 80820) for colors and with 100-120 threads/cm (250-305 mesh/inch) and pasting ratio 10:10 (take example of 80820) for the flux.

Spraying

Color suspensions for spraying can be made with water-soluble or oil-based medium. To get proper gloss, we recommend to add a certain percentage of 107810.

Machine lining and banding

Color suspensions which are applied via brushes, steel- or neoprene-rollers are generally based on water-soluble medium. The viscosity can be adjusted with distilled water or spirit. To get proper gloss, we recommend to add a certain percentage of 107810.

Miscibility

781 Series colors are intermixable with the exception of 127815, 177815 and the cadmium-containing colors. Cadmium colors can only be mixed with one another.

Testing is recommended under individual conditions before batch printing.

781 series need to be overprinted with flux 107810 or 107813 to obtain a sufficient gloss except 127815.

107813 is more suitable for the cadmium containing colors 177816, 177817, 177818 and 137815. These cadmium containing colors have lower cadmium release than that of 177812,177813,177814,137814.

Firing

The best firing temperature is related to glaze and firing cycle. We recommend as follows:

Porcelain : 820-850°C/60-90mins with soaking time 10mins.

Bone China, Earthenware and Vitreous China : 800-850°C/60-90mins.with soaking time 10mins.

Fast firing: 860-900°C/60min.

Note: Cadmium containing colors do not suitable for fast firing.

Color Deposit

The maximum color deposit after firing, depending on the glaze and the firing temperature.

Too thick color deposit may cause blistering. We recommend the customer to do the trials prior to production.

On porcelain (CTE is approx.40-45 x 10⁻⁷/k), the color deposit should not exceed 24 um, measured prior to firing, in order to avoid cracking or chipping.

This thickness will be reached e.g. by a double printing with polyester screen 73 threads/cm and medium 80820 (mixing ratio 10 parts colors and 7 parts medium).

When printing colors on top of each other or overprinting colors with a flux, the total color deposit should not be thicker than the recommended value.

Applied on earthenware, bone china, and vitreous China which CTE is approx. 50-60 x 10⁻⁷/k, the maximum value of 24um may be exceeded but we recommend to perform trials at your condition prior to use.

Four-Color Printing

For the four-color printing, we recommend the following 781 colors, the printing sequence can be adjusted according to the different conditions:

Printing Sequence	Color Shade	Product Code
1	Cyan	127812 or 127811
2	Yellow	137812
3	Magenta	777815 or 777813
4	Black	147811
5	Cover flux	107810

Chemical Resistance

The chemical resistance of the fired color layers is influenced by the color deposit, the firing conditions and the glaze etc.

The colors do not show a visible attack with 4% acetic acid solution ($22\pm 2^{\circ}\text{C}$, 24h) as well as with 5% sodium carbonate solution ($60\pm 2^{\circ}\text{C}$, 32h).

Storage

The colors should be stored in a dry place. Opened containers should be closed carefully. To ensure that the colors have not absorbed any humidity, we recommend drying the color powder at approx. 130°C prior to pasting.

Limitation of Warranty and Liability

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