

Technical Information

DF05



Impression – High Temperature Fast Firing Colors for Porcelain

In this Technical Information Ferro presents the Impression series. It comprises 38 basic colors with high chemical and mechanical resistance.

The decorating colors of the Impression range have excellent processing properties in all conventional decorating methods like screen printing (direct and indirect), spraying, machine lining and banding, and brush application.

Screen Printing

We recommend polyester screens with 73 - 140 threads/cm (186 - 360 mesh/inch) or stainless steel screens VA 100-140 (260 – 360 mesh/inch).

The colors 17 1451 Pink, light and 17 1452 Pink need a higher color deposit to improve firing stability.

Spraying

Color suspensions for spraying application can be produced with oil-based media as well as with water-soluble media.

Machine Banding and Lining

Color suspensions applied with brushes, steel- or neoprene-rollers are generally based on water-soluble media.

For all standard methods, Ferro offers suitable media and covercoats. Further detailed technical information can be found in our **CerDePrint Media Guide**.

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 mixing.

Miscibility

All colors, with very few exceptions, are intermixable. In any case, we recommend to test mixtures under the specific processing conditions prior to use.

The exceptions are mixtures with 12 2201 Cobalt Blue and 14 1450 Black, these are not compatible. The firing stability of mixtures with 12 2201 Cobalt Blue and 17 1452 Pink is only limited.

The colors **77 1910 Magenta**, **77 1911 Rose**, and **77 1912 Purple** can only be mixed with one another. When printing together with other colors, they should always be printed as final layer. If this is not possible, application tests should be made prior to production.

For creation of pastel shades of the colors **13 1454**, **16 1452**, **17 1455**, **17 1456**, **13 2204**, **17 2204**, and **17 2205** we recommend mixtures with the flux 10 136, for all other colors of the Impression range the flux 10 115 should be used. Mixtures with **White 19 1451** are not color stable in combination with certain colors, e.g. chrome oxide containing ones. For very light colors, **Opaque White 19 1450** should be used.

Firing Conditions

Under fast firing conditions (60 to 90 minutes) the firing temperature should be between 1150 and 1200 °C, with an optimum firing temperature on hard paste china of 1180 °C.

Due to its high thermal shock resistance, porcelain is able to withstand fast heating and cooling. To obtain a uniform result, the body must be exposed directly to the thermal radiation in the kiln. The use of kiln furniture might disturb the heat transfer and thus the temperature of the fired pieces is not high enough.

The kiln atmosphere must be oxidizing. When firing longer cycles or using soft glazes, the temperature has to be lowered, otherwise the pigments will be dissolved in the glaze.

For 12 2201 Cobalt Blue we recommend a temperature higher than 1180 °C.

Color Deposit

The maximum color deposit depends on the firing cycle, the body, the glaze, and the form of the decorated surface as well as on the composition of the colors and the sintering grade of the color in combination with the glaze. Too thin layers may result in an uneven, matt surface; too thick layers of color may lead to chipping or cracking.

On porcelain (linear c.t.e. approx. $40\text{-}45 \cdot 10^{-7}/\text{K}$), the total color layer, measured prior to firing, should not exceed 24µm.

When printing colors on top of each other or overprinting them with a flux the total color deposit should not exceed the recommended maximum value.

Acid and Alkali Resistance

The alkali and acid resistance of fired color layers is influenced by the thickness of the layer, the firing conditions, and the glaze. The colors of the **Impression** range show in laboratory tests and under industrial conditions no visible acid or alkali attack (tested with 3 % hydrochloric acid, 20 °C, 5 h, as well as with 0.5 % Calgonite solution, 77 °C, 24 h).

Heavy Metal Release

The colors of the series **Impression** have been tested according to **EN 1388 1-2** (4% acetic acid, 22 °C, 24 h). The heavy metal release was **below** the detection limit of the AAS of 0,020 mg/dm² for lead oxide and 0,001 mg/dm² for cadmium oxide.

All **Impression** colors fulfil the limits for heavy metal release according to EN 1388 1-2 as well as the Californian prop. 65 and the FDA requirements.

Our safety data sheets, which are available for every product, provide you with useful advice for working with our products.

Fig. 1: Color samples of the Impression colors



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

Table 1: The Impression colors

Product No.	Color Shade	Pantone® Code ¹
11 1453	Yellow Green	372 c
11 1454	Light Green	353 c
11 1455	Water Green	3248 c
11 1456	Grass Green	364 c
11 1457	Blue Green	323 c
11 1458	Russian Green	3305 c
12 1451	Turquoise	637 c
12 1452 ³	Middle Blue	2716 c
12 1453	Delft Blue	659 c
12 1915	Sky Blue	2935 c
12 1916	Cyan	3015 c
12 2201 ⁴	Cobalt Blue	2765 c
13 1451	Light Yellow	100 c
13 1452	Lemon Yellow	3935 c
13 2203 ⁴	Intense Yellow	108 c
13 1454 ⁴	Mandarin	136 c
13 2204 ⁴	Intense Orange	165 c
14 1450	Black	Black 5c 2X
15 1450	Blue Grey	643 c
15 1451	Grey	415 c

Product No.	Color Shade	Pantone® Code ¹
16 1452	Rosewood	163 c
16 1453	Olive	722 c
16 1454	Yellow Brown	159 c
16 1455	Chestnut	1685 c
16 1456	Dark Brown	1545 c
17 1451	Light Pink	182 c
17 1452 ⁴	Pink	1945 c
17 1455 ⁴	Light Red	1665 c
17 1456 ⁴	Coral	171 c
17 2204 ⁴	Red	179 c
17 2205 ⁴	Intense Red	1805 c
18 1450	Red Violet	2573 c
18 1451	Blue Violet	2645 c
19 1450	Opaque White	-
19 1451	White	-
77 1910 ⁵	Magenta	207 c
77 1911	Rose	204 c
77 1912	Purple	1945 c
10 1600	Mixing Flux	-
10 115	Overprinting Flux	-

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

Pantone® is a registered trade mark of Pantone Inc.

² A: Product is normally available from stock (safety stock).

³ GHS symbol 08, 09, H phrases 360Df, 411

⁴ GHS symbol 07, 08, 09, H phrases 302, 332, 360Df, 373, 410

⁵ GHS symbol 09, H phrase 400

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