

SkyPlus

Lead Free High-temperature Fast Firing Colours for the Decoration of Porcelain

Performance Pigments and Colors

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Ferro touches your life every day

Headquartered in Cleveland, Ohio, USA, Ferro Corporation is a world leading producer of Performance Materials, with operations in 20 countries across Europe, Asia, and the Americas.

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 colours, glass decoration, precious metal preparations, speciality glasses, porcelain enamel coatings, auxiliary materials, and pigments. We pioneered the development of forehearth colour technology for colouring 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 centres. Our commitment to quality management has been recognized with the award of ISO 9000 accreditation to all of our global manufacturing and research facilities.

Meeting the needs of the Colour 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 co-ordinate 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.
- Ferro 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- and cadmium-free technology and our low VOC decoration systems.
- The markets we cover are extremely service-intensive. Ferro has established regional colour 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.

SkyPlus

Lead Free High-temperature Fast Firing Colours for the Decoration of Porcelain

In this brochure, Ferro presents the CerDeColor high-temperature fast firing colours of the SkyPlus series. These colours have excellent processing characteristics in all conventional decorating methods like screen printing (direct and indirect), spraying, machine lining and banding, as well as hand painting. All available colour shades can be found in table 1 and figure 1.

Screen Printing (Direct and Indirect)

For direct and indirect silk screen printing, we recommend polyester screens with 73 – 120 threads/cm (180-300 mesh/inch) or stainless steel screens VA 110-VA 150 (270-385 mesh/inch).

In order to avoid cracking, the colour layer should not exceed 24 µm, measured prior to firing. This colour layer will be reached e.g. by double printing with polyester screen 73 S and medium 80 820 (mixing ratio 100 parts colour and 70 to 80 parts medium).

Machine Lining and Banding

Colour suspensions applied with brushes, steel- or neoprene-rollers are generally based on water-soluble media. We supply colour pastes that should be adjusted to the correct processing viscosity by adding distilled water and/or spirit.

Spraying

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

Media

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

Storage

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

Miscibility

The colours in the SkyPlus range are generally intermiscible, except the purple colours. The purple colours 77 1910 Magenta, 77 1911 Rose, and 77 1912 Purple Red can only be mixed with each other. When printing other colours on top of each other, these three should be printed as final colour.

In any case, we recommend to test mixtures under the specific processing conditions prior to use.



Table 1: The available SkyPlus colour shades

Product No.	Colour Shade	Pantone® Code ²
11 857	Water Green	337 C
11 858	Yellow Green	372 C
11 859	Grass Green	357 C
11 861	Russian Green	3308 C
12 856	Indian Blue	287 C
12 861	Delft Blue	542 C
12 862	Pastel Blue	297 C
12 1910	Cobalt Blue	2748 C
12 1915	Sky Blue	2935 C
12 1916	Cyan	3015 C
12 1917	Light Blue	2985 C
13 855	Lemon Yellow	101 C
13 856	Gold Ochre	144 C
New 13 1916 ¹	Intensive Yellow	107 C
New 13 1917 ¹	Intensive Orange	165 C
14 1910	Black	Black 2 2XC
15 850	Grey	643 C
15 856	Dark Grey	431 C

Product No.	Colour Shade	Pantone® Code ²
16 855	Black Brown	4975 C
16 856	Maroon	477 C
16 857	Rosewood	159 C
16 858	Yellow Brown	153 C
17 856 ¹	Salmon	163 C
17 1910	Pink Red	694 C
17 1911	Pink, Dark	695 C
New 17 1917 ¹	Intensive Red, Light	179 C
New 17 1918 ¹	Intensive Red, Dark	1805 C
18 852	Lilac	529 C
19 850	White	
77 1910	Magenta	207 C
77 1911	Rose	204 C
New 77 1912	Purple Red	1945 C
10 115	Flux, Transparent	

¹Cadmium containing colours

²The above mentioned **Pantone®** code is only a guideline for the colour shade. **Pantone®** is a registered trade mark of Pantone Inc.

Figure 1: The available SkyPlus colour shades



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

Firing Conditions

The firing range in fast firing conditions (60 to 90 minutes) lies between 1180 and 1250 °C.

The colours 77 1910 and 77 1911 develop their individual colour shade at firing temperatures below 1220 °C. The colour 77 1912 Purple Red should not be fired higher than 1200 °C in order to achieve the maximum red colour shade.

Cobalt Blue 12 1910 needs at least a firing temperature of 1220 °C.

Acid and Alkali Resistance

The alkali and acid resistance of fired colour layers is influenced by the thickness of the layer, the firing conditions, and the glaze. The colours of the **SkyPlus** 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 and Heavy Metal Content

The colours in the **SkyPlus** series are controlled lead free and with the exception of the colours 13 1916, 13 1917, 17 856, 17 1917, and 17 1918 cadmium free as well with following upper limits: 600 ppm PbO and 600 ppm CdO. This ensures that the limits for heavy metal release according to EN 1388 1-2 as well as the Californian prop. 65 and the FDA requirements will be fulfilled.

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



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World Headquarters
Ferro Corporation
1000 Lakeside Avenue
Cleveland, Ohio 44114-1147
USA

