Performance Colors & Glass

SKY*100* – Lead Free High-Temperature Fast Firing Colors for the Decoration of Porcelain

In this brochure, Ferro presents the series **SKY*100***, the new generation of our high-temperature fast firing colors. With a maximum lead content of 100 ppm, these colors set completely new standards in the area of lead free porcelain decoration.

Even the smallest contamination during the production process may cause the excess of the 100 ppm limit, therefore Ferro cares for an accurate processing and precise quality control. Our high quality products easily fulfil the increased demands on heavy metal content.

Advantages of the SKY*100* Series

The **SKY*100*** colors offer numerous advantages:

- all colors fulfil the heavy metal release limits of EN 1388 1-2 as well as the Californian prop. 65 and the FDA.
- maximum possible color intensity even with thin color deposits.
- excellent processing characteristics.

Application

The colors of the SKY*100* range have excellent processing properties in all conventional decorating methods like screen printing (direct and indirect), spraying, machine lining and banding, and brush application. For cleaning all equipment and screens we recommend cleaning oil 80 452.

The available colors are shown in table 1 and fig. 1.

Screen Printing (Direct and Indirect)

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

The color deposit should not exceed 24 μm, 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 S and medium 80 820 (mixing ratio 100 parts color and 70 to 80 parts medium).

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.

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 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 SKY*100* colors with the exception of the purple colors are intermixable. The purple colors 77 1910 Magenta, 77 1911 Rose, and 77 1912 Purple Red can only be mixed with one another. When printing other colors on top of each other, these three should be printed as final color.
Tests have shown, that 12 1915 is not compatible with 12 1917 and 12 862.

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

Firing Conditions

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

The colors 77 1910 Magenta and 77 1911 Rose develop their individual color shade at firing temperatures below 1220 °C.

The color 77 1912 Purple Red should not be fired higher than 1200 °C in order to achieve the maximum red color 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 color layers is influenced by the thickness of the layer, the firing conditions, and the glaze. The colors of the **SKY*100*** 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 cadmium free **SKY*100*** colors are controlled lead and cadmium free with following upper limits: 100 ppm Pb and 600 ppm Cd. The cadmium containing colors are controlled lead free (<100 ppm Pb).

All colors of the series SKY*100* fulfil the heavy metal release limits of EN 1388 1-2 as well as the Californian prop. 65 and the FDA.

However, it is still necessary that the end user tests the cadmium release according to the relevant standard procedures for all products which contain cadmium colors and are manufactured under his technical production conditions.

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

Fig. 1: The available SKY*100* colors

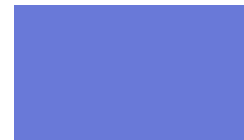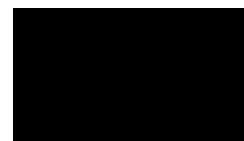|			
11 857 Water Green	11 858 Yellow Green	11 859 Grass Green	11 861 Russian Green
11 1914 Green	11 1920 Green	12 856 Indian Blue	12 861 Delft Blue
12 862 Pastel Blue	12 1910 Cobalt Blue	12 1915 Sky Blue	12 1916 Cyan
12 1917 Light Blue	13 855 Lemon Yellow	13 856 Gold Ochre	13 1916 Yellow
13 1920 Int. Yellow	13 1917 Orange	13 1921 Int. Orange	14 1910 Black
15 850 Grey	15 1912 Grey	15 856 Dark Grey	16 855 Black Brown
16 856 Maroon	16 1914 Brown	16 857 Rosewood	16 858 Yellow Brown
17 856 Salmon	17 1910 Pink Red	17 1911 Pink, Dark	17 1917 Red, Light
17 1921 Int. Red, Light	17 1918 Red, Dark	17 1922 Int. Red, Dark	18 852 Lilac
77 1910 Magenta	77 1911 Rose	77 1912 Purple Red	

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 SKY*100* Colors

Product No.	Color Shade	Pantone® Code[1]
11 857	Water Green	337 c
11 858	Yellow Green	372 c
11 859	Grass Green	357 c
11 861	Russian Green	3308 c
11 1914	Green	323 c
11 1920 [2]	Green	2278 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
13 1916 [2]	Yellow	107 c
13 1917 [2]	Orange	165 c
13 1920 [2]	Intensive Yellow	115 c
13 1921 [2]	Intensive Orange	165 c
14 1910	Black	Black 2c 2x
15 850	Grey	643 c
15 1912	Grey	422 c
15 856	Dark Grey	431 c
16 855	Black Brown	4975 c
16 856	Maroon	477 c
16 1914	Brown	728 c
16 857	Rosewood	159 c
16 858	Yellow Brown	153 c
17 856 [2]	Salmon	163 c
17 1910	Pink Red	694 c
17 1911	Pink, Dark	695 c
17 1917 [2]	Red, Light	179 c
17 1918 [2]	Red, Dark	1805 c
17 1921 [2]	Intensive Red, Light	179 c
17 1922 [2]	Intensive Red, Dark	180 c
18 852	Lilac	529 c
19 850	White	
19 1912	Opaque White	
77 1910 [3]	Magenta	207 c
77 1911	Rose	204 c
77 1912	Purple Red	1945 c
10 115	Flux	

Pantone® is a registered trade mark of Pantone Inc.
[1] The above mentioned **Pantone®** code is only a guideline for the color shade.
[2] Cadmium containing colors
[3] GHS symbol 09, H phrase 400

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