

Technical Information

DF09



Sunshine – Resistant Onglaze Colors for Porcelain, Bone China, Vitreous China, and Earthenware

In this Technical Information Ferro presents the Sunshine onglaze colors. These colors have excellent processing characteristics in all conventional decorating methods like screen printing (direct and indirect), lining and banding, spraying as well as hand painting.

Screen Printing

For the cadmium containing colors **13 1230**, **17 1250**, **17 1251**, and **17 1252**, we recommend polyester screens with 73-90 threads/cm (185-230 mesh/inch) or stainless steel VA 110 – VA 115.

For the purple colors **77 1234**, **77 1235**, **77 1241**, **77 1242** and **77 1243** as well as for **Iron Red 17 578**, we recommend polyester screens with 120-140 threads/cm (300-355 mesh/inch) or stainless steel VA 140 – VA 160.

All other colors should be printed with polyester screens with 77-120 threads/cm (195-300 mesh/inch) or stainless steel VA 110 – VA 140.

Spraying

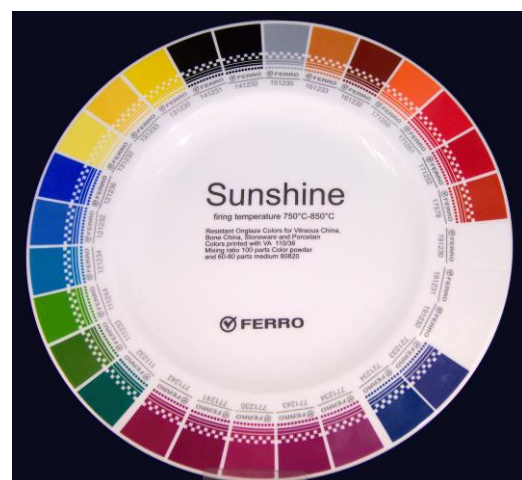
Color suspensions for spraying application can be produced with oil-based media as well as with water-soluble media.

Machine Lining and Banding

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 the cadmium containing colors 13 1230 Mandarin, 17 1250 Orange, 17 1251 Poppy und 17 1252 Cardinal. These can only be mixed with one another, but mixtures with up to 5 % Green, Blue, Black, or the flux 10 117 are according to our experiences possible without problems. However, extreme firing conditions or too thin color deposits might negatively influence the firing stability of the mixed color.

The iron oxide containing color 17 578 is compatible with all other completely intermixable colors. The content of 17 578 Iron Red in the mixture should be higher than 50 %.

Creating pastel shades should be done with Mixing White 19 1231. This is suitable as well for overprinting the cadmium colors 13 1230, 17 1250, 17 1251, and 17 1252 to produce pastel shades like they are desired for "skin" colors.

To lighten and to overprint colors, we recommend our mixing flux 10 117. This flux can also be used as coating flux, but **not for the color 17 578 Iron Red**. The coating flux 10 169 improves resistance and gloss of all Sunshine colors.

Firing Conditions

For **bone china, earthenware** and **vitreous china** under normal firing conditions the firing temperature should be between 750 and 800 °C, depending on firing cycle and glaze. In fast firing (18-23 minutes) on **bone china** we recommend 900 to 920 °C.

Porcelain should be fired at 800 to 820 °C. For temperatures above 820 °C, the colors of our **64 Series** should be preferred.

The firing temperature for **Tiles** should be 820 to 850 °C (25 to 40 minutes).

Color Deposit

Depending on the glaze and the firing temperature, the maximum color deposit after firing lies between 25 and 40 µm (for porcelain max. 20 µm), therefore printing more than three color layers on top of each other should be avoided. When printing colors on top of each other or overprinting them with a flux the total color deposit should not exceed the above mentioned maximum values.

Iron Red 17 578 develops its characteristic color shade best when printed in a thin layer.

Resistance

The resistance of fired color layers to acid and alkali attacks is influenced by the color deposit, the firing conditions, and the glaze.

In laboratory tests and under industrial conditions on various earthenware, vitreous china, bone china and porcelain bodies, the colors of the **Sunshine** series show only a very slight alkali attack (test with 0,5 % Calgonite solution, 77 °C, 16 h).

Heavy Metal Release

The release of heavy metals is primarily influenced by the glaze composition, the firing conditions (firing cycle and kiln atmosphere), and the color deposit. If the layers are too thin, the firing temperature too high, or the firing cycle at peak temperature too long, heavy metal release might be higher.

Test decorations produced with colors of Sunshine series proved to be resistant according to DIN 51032. As the resistance of a decor depends not only on the used color, but also on the individual production conditions, this information can be considered a guideline only. It does not replace own tests.

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 Sunshine series



11 1232 Reed



11 1233 Chrome Green



11 1244 Green



12 1232 Azure



12 1234 Turquoise



12 1236 Ocean Blue



13 1230 Mandarin



13 1232 Lemon



13 1233 Saffron



14 1231 Black



14 1232 Intensive Black



15 1230 Grey



16 1232 Chestnut



16 1233 Ochre



17 1250 Orange



17 1251 Poppy



17 1252 Cardinal



17 578 Iron Red



72 1233 Cobalt



77 1234 Purple



77 1235 Purple Red



77 1241 Magenta



77 1242 Purple Ruby

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 Sunshine colors

Reference	Color Shade	Pantone® Code1
11 1232	Reed	3288 c
11 1233	Chrome Green	364 c
11 1244 ⁵	Green	369 c
12 1232 ²	Azure	294 c
12 1234	Turquoise	307 c
12 1236	Ocean Blue	2728 c
13 1230 ⁵	Mandarin	109 c
13 1232 ³	Lemon	102 c
13 1233 ³	Saffron	122 c
14 1231	Black	Black c
14 1232	Intensive Black	Black c
15 1230	Grey	429 c
16 1232	Chestnut	483 c
16 1233 ⁴	Ochre	1595 c
17 1250 ⁵	Orange	1505 c
17 1251 ⁵	Poppy	1795 c
17 1252 ⁵	Cardinal	187 c
17 578 ²	Iron Red	484 c
19 1230	White	
19 1231	Mixing White	
19 1232 ²	Arctic	
72 1233 ²	Cobalt	2747 c
77 1234	Purple	216 c
77 1235	Purple Red	208 c
77 1241	Magenta	208 c
77 1242	Purple Ruby	194 c
10 117	Mixing Flux, Transparent	
10 169	Coating Flux, Transparent	

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

Pantone® is a registered trade mark of Pantone Inc..

² GHS symbol 07, 08, 09, H phrases 302, 332, 360 Df, 373, 410

³ GHS symbol 08, 09, H phrases 360Df, 373, 411

⁴ GHS symbol 08, H phrases 360D, 412

⁵ Cadmium pigment colors

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