

Technical Information

DF01

Butterfly II – Resistant Onglaze Colours for Bone China, Vitreous China, Earthenware and Porcelain

In this technical information leaflet Ferro presents the CerDeColor onglaze colours of the range Butterfly II. These colours have excellent processing characteristics in all conventional decorating methods like screen printing (direct and indirect), spraying, lining and banding as well as hand painting. All available colour shades can be found in table 2 and figure 1.

Screen Printing

Cadmium colours 13 2300, 17 2300, 17 2304, 17 2305:

We recommend polyester screens with 73 - 90 threads/cm (185 - 230 mesh/inch) or VA 110 - VA 115.

Rose 77 2301, Purple 77 1234, Purple Red 77 1235, and Iron Red 17 2303:

We recommend polyester screens with 120 – 140 threads/cm (300 - 355 mesh/inch) or VA 140 - VA 160.



For all other Butterfly II colours we recommend polyester screens with 77 - 120 threads/cm (195 - 300 mesh/inch) or VA 270 - 140.

Spraying

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

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.

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

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

All colours are universally miscible, except a few exemptions. The exemptions are the cadmium-containing yellows and reds

- 13 2300 Mandarin
- 17 2300 Orange
- 17 2304 Poppy
- 17 2305 Cardinal

These colours can in principle only be mixed with each other, but mixtures with up to 5 % green, blue, black, or the flux 10 175 are possible without problems. Extreme firing conditions or very thin colour deposits might influence the firing stability of mixed colours negatively.

The iron oxide containing colour 17 2303 is compatible with all other universally intermiscible colours. However, mixtures of 17 2303 with these colours and the flux 10 175 should contain 50 weight-% or more of 17 2303.

In combination with White 19 2301, pastel shades can be achieved.

To lighten and overprint, we recommend the mixing flux 10 175. This mixing flux can also be used as a coating flux, but not for the colour 17 2303, Iron Red.

Firing Conditions

Table 1 shows the firing conditions for various substrates.

Table 1: Firing conditions

Substrate	Firing Conditions
Bone China, Earthenware, Vitreous China	760 - 820 °C Normal firing (depending on firing cycle and glaze)
Bone China	900-920 °C Fast firing
Porcelain	780 - 820 °C Normal firing (depending on firing cycle and glaze)
Tiles	820 - 860 °C Fast firing, 25 to 40 minutes (depending on glaze and size of tile)

Colour Deposit

Depending on the glaze and on the firing temperature, the maximum colour deposit after firing should be between 25 and 40 µm (for porcelain max. 20 µm), therefore more than three layers on top of each other should be avoided.

If the colour deposit is too thick, the reaction between colour and glaze is no longer satisfactory, the colours tend to crack and lose resistance. Iron Red 17 2303 develops its characteristic colour only when printed in thin layers.

When overprinting the colours with flux, the colour deposit of the combination of colour and flux should also not exceed the mentioned limits.

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 **Butterfly II** range show in laboratory tests and under industrial conditions on a variety of different earthenware, vitreous china, bone china, and porcelain substrates only a slightly visible alkali attack (tested 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 colour 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.

The **Butterfly II** colours were tested for lead- and cadmium release according to EN 1388.1/2. The release values are considerably lower than the limits in EN 1388.1/2. According to our experience, mixtures of colours have the same resistance values as basic colours.

However, it is still necessary that the end user tests the heavy metal release according to the relevant standard procedures for all products 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 products.

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

Table 2: The available Butterfly II shades

	Product No.	Colour Shade	Pantone® Code*
	11 2300	Reed	3288 c
	11 2301	Chrome Green	364 c
	12 2301	Turquoise	3005 c
New	12 2302	Azure	661 c
	13 2300	Mandarin	109 c
	13 2301	Lemon	102 c
	14 2300	Black	Black c
	15 2300	Grey	429 c
New	16 2302	Ochre	153 c
New	16 2303	Chestnut	1685 c
	17 2300	Orange	151 c
	17 2303	Iron Red	180 c
New	17 2304	Poppy	185 c
New	17 2305	Cardinal	187 c
	19 2300	White	
	19 2301	Mixing White	
	72 2300	Cobalt	2758c
New	77 2301	Rose	1905 c
	77 1234	Purple	216 c
	77 1235	Purple Red	208 c
	10 175	Mixing Flux	

* The above mentioned **Pantone®** code is only a guideline for the colour shade.
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Fig. 1: Colour samples of the Butterfly II range



11 2300 Reed



11 2301 Chrome Green



12 2301 Turquoise



12 2302 Azure



72 2300 Cobalt



13 2301 Lemon



13 2300 Mandarin



17 2300 Orange



16 2302 Ochre



16 2303 Chestnut



17 2303 Iron Red



17 2304 Poppy



17 2305 Cardinal



77 2301 Rose



77 1234 Purple



77 1235 Purple Red



15 2300 Grey



14 2300 Black



19 2300 White



19 2301 Mixing White

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