

SambaPlus

System of lead free ceramic onglaze colours for porcelain, bone china, vitreous china, stoneware and enamel

Firing range: 820 - 900°C

The **SambaPlus** series is a multifunctional system of lead free onglaze colours. Mixing and overprinting with different fluxes gives application versatility never previously possible with colours available in the market.

Colour group 1

The colours of this group must be overprinted with a flux to achieve sufficient gloss.

	Product no.	Colour Shade	Pantone®-Code
	11 1650	chrome green	364 c
	11 1651	blue green	3292 c
	12 1650	light blue	632 c
	12 1651	cyan	314 c
	12 1652	dark blue	308 c
	12 1653	sky blue	2727 c
	12 1654 (**)	cobalt blue	285 c
NEW	12 1655	cyan (four-colour printing)	307 c
	13 1650	lemon yellow	101 c
	13 1651	yellow (four-colour printing)	122 c
	13 1652	golden yellow	137 c
NEW	13 1653 (***)	yellow	116 c
	14 1650	black	Black c
	15 1650	neutral grey	424 c
	16 1650	light brown	153 c
	16 1651	dark brown	1685 c
NEW	17 1650 (***)	orange	151 c
NEW	17 1651 (***)	intensive red	172 c
NEW	17 1652 (***)	dark red	1795 c
	18 1650 (*)	violet	251 c
	19 1650	white	

*) Changes in firing conditions and print deposit may result in intensity variations

**) More suitable for the use on bone china; on porcelain the colour can become matt

***) These colours are cadmium containing and can be used only on bone china; they are not recommended for the use on porcelain.

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Colour group 2

Although the colours in this group fire to a glossy surface they can be overprinted with a flux coat, if for example, they are combined with other **SambaPlus** colours.

Product no.	Colour shade	Pantone® code
12 1634	cobalt blue	2718 c
77 1632	rose	203 c
77 1633	magenta (four-colour process)	674 c
77 1634	dark purple	208 c
77 1635 (*)	rose	197 c
77 1636 (*)	magenta	702 c
77 1637 (*)	dark marone	492 c

*) please refer to the respective firing cycle notes

Colour group 3

Cadmium containing supplementary colours for porcelain and bone china

These colours should be used without flux overprinting.

Product no.	Colour shade	Pantone® code
11 1632 (*)	apple green	383 c
13 1632 (*)	yellow	116 c
17 1632 (*)	red	1645 c
17 1633 (*)	orange	151c

*) please refer to the respective firing cycle notes

The above mentioned **Pantone®** codes are only a guideline for the colour shade. **Pantone®** is a registered trademark of Pantone Inc.

Miscibility / Compatibility

The colours of the **SambaPlus** series are miscible with each other; excluding the cadmium containing colours. The cadmium containing colours can only be mixed with one another. However, the mixtures should be tested under individual processing conditions before use.

Coating fluxes

Product no.	ex	Product	Field of application
10 1650	10 1630	transparent flux	Porcelain, stoneware, bone china, vitreous china, enamel
10 1600	10 150	transparent flux	Stoneware, bone china, vitreous china, enamel

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The colours of group 1 are very intense due to their strong pigmentation and need to be mixed or overprinted with a flux in order to obtain a sufficient gloss.

Both transparent fluxes 10 1600 and 10 1650 offer large variation possibilities. 10 1600 is lower melting and has a higher thermal expansion than 10 1650. Depending on design, substrate and firing conditions the appropriate flux or a mixing of both fluxes can be used.

The colours of group 2 already possess sufficient gloss, but they can be overprinted with flux, particularly if they are mixed with **colours of group 1**.

The colours of group 3 are cadmium containing supplementary colours, which can be applied both on porcelain and bone china.

The cadmium containing colours should neither be mixed nor overprinted with flux.

Colour stability, gloss and surface might be negatively influenced by flux addition or flux overprinting.

Mixing fluxes

The colours of group 1 - excluding the cadmium containing colours can be mixed with the above mentioned fluxes. This lowers the intensity and possibly eliminates the need for a flux overprint. The proportion of flux addition should be determined under individual production conditions.

Possibilities of variation of important technical parameters

Fusibility

The fusibility can be individually adjusted using different combinations with flux 10 1600 (lower melting) or flux 10 1650 (higher melting).

Thermal expansion

The coefficient of thermal expansion can be adjusted individually using combinations with flux 10 1600 (higher expansion) and flux 10 1650 (lower expansion). Thereby the compatibility to the substrate to be decorated will be improved.

Gloss

The level of gloss can be adjusted individually by the addition of more or less flux and by using or not-using a flux overprint.

Intensity

The maximum intensity can be obtained by avoiding the use of a flux addition but overprinting a flux coat instead. Flux additions, if desired, can be adjusted individually to effect changes in gloss and intensity.

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One series rather than three

The colours of the **SambaPlus** eliminate the need for the use of the **Summerday** and **Terra Nova** series.

Reproduction of **Summerday** colours

The colours of the **Summerday** series can be reproduced by the addition of flux 10 1650

For further information please refer to our leaflet **SambaPlus – One series rather than three**.

Reproduction of **Terra Nova** colours

The colours of the **Terra Nova** series can be reproduced by the addition of flux 10 1600

For further information please refer to our leaflet **SambaPlus – One series rather than three**.

Advantages of the **SambaPlus** series

The colours of the **SambaPlus** series offer a lot of advantages:

- ◆ maximum possible colour intensity
- ◆ lower colour consumption by using finer screen meshes
- ◆ improved scope in the design composition
- ◆ new colour tones
- ◆ low colour layers are possible
- ◆ excellent processing characteristics
- ◆ economical and logistical advantages due to the use of only one colour series
- ◆ the multi-purpose application of transparent fluxes 10 1600 (**Terra Nova**) and 10 1650 (**Summerday**) both as overprint and mixing fluxes offers unique adaptability to varying substrates and firing conditions.

Application

The colours in the **SambaPlus** series have excellent processing characteristics in all conventional decorating methods such as:

- ◆ Screen printing (direct and indirect)
- ◆ Spraying
- ◆ Machine lining and banding
- ◆ Brush application

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- ◆ Spraying
- ◆ Machine lining and banding
- ◆ Brush application

a **flux addition** is required.

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Screen printing (direct and indirect)

For screen printing we recommend polyester screen fabric:

Colours:	100-140 threads/cm	(255-355 mesh/inch)
Flux:	100-120 threads/cm	(255-305 mesh/inch)

Spraying

Colour suspensions for spray application can be produced with oil-based or water miscible media. Water containing colour suspensions of **purple colours** should be used immediately and not be stored for a longer time. A **flux addition** is required.

Machine lining and banding

For lining and banding machines, water dilatable suspensions are mostly used. We supply colour pastes which have to be adjusted to the correct processing viscosity by adding distilled water and/or alcohol. A **flux addition** is required.

TT Printing (Total Transfer)

For this special application we recommend our thermoplastic medium 80 4092

Pasting ratio: approx. 10:6 colour to medium	80 4092
Screen working temperature: approx. 80°C	
Substrate working temperature: approx. 40°C	

Cleaning

For cleaning all equipment and screens we recommend cleaning oil 80 452.

Four-colour printing process

Especially for the four colour printing process we recommend the following **SambaPlus** colours:

Sequence of prints		
1 st print	13 1651	Yellow
2 nd print	77 1633	Magenta
3 rd print	12 1655	Cyan
4 th print	14 1650	black

Alternative

77 1636 *) magenta

*) please refer to the respective firing cycle notes

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Manufacture of colour pastes and colour dispersions

For all traditional application processes please refer to our leaflet [Manufacture of colour pastes and colour dispersions](#). This covers decoration by screen printing, machine banding and lining and spraying.

Media

Ferro offers suitable media and covercoats for all standard applications.

For further detailed information please refer to our [CerDePrint Media Guide](#).

Firing

Cadmium free colours

Normal firing:	820-850 °C
Fast firing:	860-900 °C

The above mentioned firing ranges apply to porcelain, bone china, vitreous china and stoneware.

Purple colours 77 1635, 77 1636 and 77 1637

For the above mentioned purple colours the following minimum firing temperatures are required:

Normal firing:	850 °C
Fast firing:	900 °C

Cadmium Containing colours of group 1 Bone china colours 13 1653, 17 1650, 17 1651 and 171652

Normal firing:	780 -820°C;
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Cadmium containing colours of group 3

At an optimum kiln atmosphere the cadmium colours of the [SambaPlus](#) series fulfil the limits of DIN EN 1388 1-2 as well as the Californian prop 65 and FDA.

We recommend the colours favourably for the following application:

Porcelain colours 11 1632, 13 1632, 17 1632 and 17 1633

Normal firing:	(electric powered) 820-900°C,
Normal firing:	(gas-powered) 840-900°C,
Fast firing:	900-950°C;

Note: It is absolutely necessary to apply lead free colours on lead free glazes. Due to the reactions between colour and glaze the surface of lead containing glazes may be altered chemically during firing and considerable amounts of lead can be released.

Lead free products should not be fired together with those containing lead as the resulting emissions could have adverse effects on the heavy metal release.

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Colour deposit

The maximum colour deposit depends on

- ◆ firing cycle
- ◆ body, glaze and shape of the decorated surface
- ◆ sintering grade colour/glaze

If the colour deposits are too thin an uneven or matt colour surface is possible.

If applied in too thick a layer it is possible that the colours could crack or chip off.

When applied to porcelain (coefficient of thermal expansion approx. $40-45 \times 10^{-7}/K$) a maximum colour deposit of 24µm should not be exceeded (measured prior to firing). This colour deposit will be reached e.g. by printing twice with a screen 73 S, medium 80 820, colour to medium ratio 10:7.

When applied to Earthenware, Bone China and Vitreous China (linear thermal expansion approximately $55 \times 10^{-7}/K$) the above mentioned maximum value of 24 µm can be exceeded.

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

Resistance

Heavy metal content

The colours in the **SambaPlus** series are technically lead and cadmium free by control with upper limits of: 0,30 % PbO and 0,03 % CdO.

The cadmium containing colours are technically lead free.

Heavy metal release

The colours in the **SambaPlus** series fulfil the limits of EN 1388 1-2 as well as the Californian prop. 65 and the FDA.

Acid resistance

After testing with 3% hydrochloric acid (20°C/5h) the colours in the **SambaPlus** series do not show any visible attack.

Exception: Cobalt Blue 12 1654 - According to our tests a slight attack was visible.

At low firing temperatures the colours of group 3 show slight colour variations.

Alkali resistance

After a test with 0,5% Calgonite solution (77 °C / 16 h) the colours in the **SambaPlus** series do not show any visible attack.

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Storage

Powder colours should be stored in a dry place. In order to ensure that the colours have not absorbed any humidity, we recommend drying the powder colour at approx. 130 °C prior to mixing.

Safety Data Sheets

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

Quality

All Ferro products are manufactured according to stringent specifications, and thoroughly tested before leaving our premises. Ferro's quality control procedures are warranted by EN ISO 9001, and certification is carried out annually.

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