

Technical Information

DF41

Performance Pigments and Colors

33 Series – Low Fusing Glass Colours

In this Technical Information Ferro presents the **33 Series**. This series comprises 23 lead containing glass colours for the application on decorative glasses by indirect printing.

The colours are usually delivered as powders.

The available colours are listed in table 1 and fig. 1.

Application

The colours of the **33 Series** have excellent processing properties in all conventional decorating methods like screen printing (direct and indirect), spraying and brush application. For cleaning of equipment and screens, we recommend cleaning oil 80 452.

Screen Printing (direct and indirect)

We recommend polyester screens with 68 - 90 threads/cm (175 - 230 mesh/inch) or stainless steel screens VA with 220 – 300 mesh/inch.

For further enhancement of opacity and colour intensity, a white underlayer may be printed first. For this purpose 19 33007 is perfectly suited.

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.

According to our experience, pastes can be stored up to 6 months in originally sealed containers. We recommend to use pasted colours as soon as possible. If the paste is too thick, the viscosity has to be adjusted by addition of a medium.

Miscibility and Compatibility

All colours of the 33 Series are intermixable.

Firing Conditions

The firing temperature range is between 520 and 580 °C.

The optimum firing result depends on the firing temperature, on the total firing time, the soak time and not least on the glass type. To achieve an optimized firing result, we therefore recommend the user to check under his own individual conditions.

Expansion Coefficient

The expansion coefficient of the colours lies between 90 and 100 x 10⁻⁷/K.

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 **33 Series** are not resistant to acids and alkalis (tested with 4% acetic acid, 22 °C, 5 h, as well as with 0.5 % Calgonite solution, 77 °C, 16 h).

Heavy Metal Release

The colours of the **33 Series** contain lead and cadmium.

They do not fulfil the limits of the EN 1388 1-2 standard.

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 fired products.

Fig. 1: Colour samples of the 33 Series

11 33434 Moss Green



11 33446 Blue Green



11 33447 Chrome Green



12 33113 Aqua



12 33116 Sky Blue



12 33117 Middle Blue



12 33118 Ocean Blue



12 33124 Cyan



12 33134 Turquoise



13 33335 Yellow



13 33535 Ochre



13 33575 Orange



14 33886 Black



15 33884 Grey



16 33226 Nut Brown



16 33228 Dark Brown



16 33234 Light Brown



17 33777 Dark Red



17 33778 Red Brown



77 33668 Purple Violet



77 33673 Dark Purple



77 33674 Purple Red

Table 1: The colours of the 33 Series

Product No.	Colour Shade	Pantone® Code ¹
11 33434	Moss Green	377 c
11 33446	Blue Green	3298 c
11 33447	Chrome Green	364 c
12 33113	Aqua	279 c
12 33116	Sky Blue	285 c
12 33117	Middle Blue	2718 c
12 33118	Ocean Blue	2728 c
12 33124	Cyan	2925 c
12 33134	Turquoise	3005 c
13 33335	Yellow	Yellow c
13 33535	Ochre	152 c
13 33575	Orange	1665 c
14 33886	Black	Black 4c2x
15 33884	Grey	431 c
16 33226	Nut Brown	1685 c
16 33228	Dark Brown	4695 c
16 33234	Light Brown	1245 c
17 33777	Dark Red	186 c
17 33778	Red Brown	492 c
77 33668	Purple Violet	2587 c
77 33673	Dark Purple	221 c
77 33674	Purple Red	1945 c
19 33007	White	
10 33000	Flux	

¹ The above mentioned **Pantone®** code is only a guideline for the colour shade. **Pantone®** is a registered trade mark of Pantone Inc.

The information and statements contained herein are provided free of charge. They are believed to be accurate at time of publication, but Ferro makes no warranty with respect thereto, including but not limited to any results to be obtained or the infringement of any proprietary rights. Use or application of such information or statements is at user's sole discretion, without any liability on Ferro's part. Nothing herein shall be construed as a license of or recommendation for use that infringes upon any proprietary rights. All sales are subject to Ferro's General Conditions of Sale and Delivery.

PPC•DS•DF41•11/10•E

Ferro GmbH Performance Pigments and Colors • Gutleutstr. 215 • 60327 Frankfurt/M.
Tel. ++49/(0)69/27116-0 • Fax ++49/(0)69/27116-333 • e-mail: pigments@ferro.com