

# Technical Information

## DF72

Performance Colors and Glass

### 33 Series new – Low Fusing Glass Colors

In this Technical Information Ferro presents the **33 Series new**. This series comprises 17 lead containing glass colors for the application on decorative glasses.

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

#### Application

The colors of the **33 Series new** have excellent processing properties in all conventional decorating methods like screen printing, 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 color intensity, a white underlayer may be printed first. For this purpose 19 33130 is perfectly suited.

#### Spraying

Color 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 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.

We recommend to use pasted colors 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 colors of the **33 Series new** 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 colors lies between 90 and 100 x 10<sup>-7</sup>/K.

### **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 **33 Series new** 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 colors of the **33 Series new** 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 colors exactly, the samples printed here may differ slightly from the fired products.

**Fig. 1: Color samples of the 33 Series new**



11 33641 Green



11 33642 Light Green



11 33667 Dark Green



12 33517 Cyan



12 33530 Blue



12 33602 Dark Blue



13 33440 Yellow



13 33464 Orange



14 33886 Black



15 33125 Grey



16 33310 Yellow Brown



16 33311 Red Brown



16 33444 Dark Brown



17 33395 Red



17 33417 Dark Red



77 495 Purple



77 33673 Dark Purple

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 colors of the 33 Series new**

Product-No.	Color Shade	Pantone®-Code <sup>1</sup>
11 33641 <sup>2</sup>	Green	349 c
11 33642 <sup>2</sup>	Light Green	364 c
11 33667 <sup>2</sup>	Dark Green	3435 c
12 33517 <sup>2</sup>	Cyan	3015 c
12 33530 <sup>2</sup>	Blue	285 c
12 33602 <sup>2</sup>	Dark Blue	Reflex Blue c
13 33440 <sup>2</sup>	Yellow	116 c
13 33464 <sup>2</sup>	Orange	166 c
14 33886 <sup>2</sup>	Black	Black 6 c
15 33125 <sup>2</sup>	Grey	423 c
16 33310 <sup>2</sup>	Yellow Brown	160 c
16 33311 <sup>2</sup>	Red Brown	7594 c
16 33444 <sup>2</sup>	Dark Brown	4695 c
17 33395 <sup>2</sup>	Red	185 c 2 x
17 33417 <sup>2</sup>	Dark Red	187 c
19 33130 <sup>2</sup>	White	
19 33166 <sup>2</sup>	Semimatt	
77 495 <sup>2</sup>	Purple	7655 c
77 33673 <sup>2</sup>	Dark Purple	221 c
10 33000 <sup>2</sup>	Flux	

Pantone® is a registered trade mark of Pantone

<sup>1</sup> The above mentioned Pantone®code is only a guideline for the color shade. Inc.

<sup>2</sup> GHS symbol 07, 08, 09, H phrases 302, 332, 360Df, 373, 410

**Table 2: 4-Color-Process**

Product-No.	Color Shade	Pantone®-Code <sup>1</sup>
19 33130 <sup>2</sup>	Weiss	
13 33440 <sup>2</sup>	Gelb	116 c
12 33517 <sup>2</sup>	Cyan	3015 c
17 33417 <sup>2</sup>	Dunkelrot	187 c
14 33886 <sup>2</sup>	Schwarz	Black 6 c

Pantone® is a registered trade mark of Pantone

<sup>1</sup> The above mentioned Pantone®code is only a guideline for the color shade. Inc.

<sup>2</sup> GHS symbol 07, 08, 09, H phrases 302, 332, 360Df, 373, 410

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.

PCG•DS•DF72•10/14•E

Ferro GmbH Performance Colors and Glass • Gutleutstr. 215 • 60327 Frankfurt/M.  
Tel. ++49/(0)69/27116-0 • Fax ++49/(0)69/27116-321 • e-mail: info-pcg@ferro.com