

# Technical Information

DF19

Performance Pigments and Colors

## CerDecOr – Precious Metal Preparations for Glass Decoration Bright and Semi-matt Preparations for Direct Application

The **CerDecOr** product range offers a wide selection of precious metal preparations especially designed for the decoration of glass surfaces. It includes bright and semi-matt preparations for all common direct application methods employed by the glass decorating industry today.

The variety of glass types goes from drinking glasses to glass ceramics, from surface-treated container glass to decorative giftware. As a result chemical glass composition and firing conditions largely vary. The **CerDecOr** product range provides products for all mentioned glass types and responds to our customers high demand for color shade, brilliance, mechanical and dishwasher resistance.

### Products

Listed in the following tables are our most important standard and special products, arranged according to:

- **Type of preparation** (bright gold, bright lemon gold, bright platinum/ -palladium, semi-matt preparations, decoration auxiliaries)
- **Application** (brushing, lining/banding, direct screen printing).

The information given in the product tables include color shade, precious metal content and important product characteristics. Please note the following abbreviations:

DH: Decoration auxiliary  
GG: Bright gold  
GP: Bright platinum/-palladium  
GZ: Bright lemon gold

MG: Semi-matt PM preparation  
PMP: Precious metal preparation

### Consistency

PM Preparations for **brush application** are fluids with low viscosity ( $\leq 500$  mPa·s), while those for **screen printing** or other **mechanical application methods** are pastes with high viscosity (approx. 2,000-40,000 mPa·s).

**CerDecOr** preparations are generally supplied ready for use. If desired, suitable thinning oils can be added to adjust viscosity to meet individual requirements.

### Quality

In accordance with the quality management system of Ferro's Color and Glass Performance Materials Division, which has been awarded the **DIN EN ISO 9001** certificate, all PM preparations have to pass stringent quality control after production. Each production lot is carefully checked and compared with our production standard. Only those batches that meet Ferro's stringent standards are released for sale.

### Dishwasher Resistance

**CerDecOr** bright PM preparations for glass decoration have been developed to deliver high value to the consumer, the ultimate purchaser of the decorated glass object. Attributes include mechanical resistance during daily use (such as transport stability of container glass), as well as

resistance to chemical attack (such as dishwasher resistance for drinking glasses).

The dishwasher resistance of precious metal decorations is mainly influenced by:

### 1. PMP / glass

- suitable PMP
- gold content
- chemical composition of the glass surface
- PMP layer thickness

### 2. Firing conditions

- firing cycle (temperature/soaking time)
- kiln atmosphere

### 3. Washing parameters

- type of dishwasher (household or professional)
- washing cycle
- type and amount of detergent and rinse aid
- water temperature
- pH-value and hardness of water

Ferro classifies drinking glass decorations as dishwasher proof when they withstand more than 500 washing cycles largely undamaged in professional dishwashers for catering use. The tests are conducted in professional dishwashers under the following conditions:

- washing cycle: approx. 2 min
- pH-value: approx. 9-9,5
- temperature: approx. 60 °C
- degree of hardness: ≤ 4 dH

The data in the tables are based on dishwasher tests conducted in R&D laboratories of Ferro GmbH.

## Application

Different consistencies of precious metal products are required by different application techniques in order to obtain optimum processing and firing results. If desired, suitable thinning oils are available to adjust the viscosity: e.g. for **spray application** or for **screen cleaning**, rapidly evaporating oils and solvents are required, whereas for the application of **brush preparations**, semi-fat oils are needed, and **neoprene banding** requires fat oils with low volatility. The decoration auxiliaries mentioned in this brochure have especially been developed to perfectly suit **CerDecOr** PM preparations.

Before decoration, make sure the glass is clean and fully dry. Usually it is sufficient to rub the article with a water- or alcohol-dampened cloth or chamois leather and allow it to dry. In order to prevent moisture on the surface of the objects to be decorated caused by condensation (for

example during transfer from a cool stockroom into a warm decoration room), we recommend allowing the ware time to reach the temperature of the decoration room, and also for evaporation of any condensation.

## Screen Printing of Precious Metal Preparations

Work should always take place in well-ventilated workshops at room temperatures between 20-25 °C.

**Tab. 1: Recommended meshes for screen printing PM preparations**

Type of preparation	Screen	
	Polyester [threads/cm]	High-grade steel (VA 160-25) [mesh/inch]
Bright PM preparation, semi-matt preparation	120	400

## Screen Printing of Thermoplastic Precious Metal Preparations

The thermoplastic preparation is placed on a preheated (60-90 °C) steel mesh (350-400 mesh/inch) or on a metalen mesh (110-140 threads/cm). After melting on the screen, the precious metal preparation can be applied either manually or mechanically onto the glassware. The preparation solidifies immediately without the need for additional drying.

## Spray Application

Generally, **CerDecOr** PM preparations for brushing may also be used for spray applications. In this case, the right consistency can be obtained by adding suitable thinners (usually in the ratio 1:1).

## Wet Layer Thickness

A number of important product characteristics such as color shade, dishwasher resistance etc. is strongly influenced by the layer thickness of the precious metal preparation. Therefore, we recommend a wet layer thickness of approximately 16 µm.

## Firing Process

The firing conditions largely depend on the type and shape of glass. As a rule of thumb we have distinguished the following types of glass: **hollow glass** (soda lime glass, crystal glass, lead crystal glass), **container glass** (bottles, flacons) and

**glass ceramics.** Below mentioned firing conditions may be considered as a rough guideline and should be adapted individually to obtain optimum firing results.

Please bear in mind that precious metal preparations contain organic compounds that decompose during firing. It is therefore essential to assure sufficient kiln ventilation during the entire process, but especially during the heating up phase up to about 500 °C.

**Tab. 2: Firing conditions common in the glass industry**

Material	Temperature [°C]	Soaking time [min]	Firing cycle [min]
<b>Hollow glass</b>			
Lead crystal	approx. 490-540	approx. 10	approx. 120-180
Crystal	approx. 560-620	approx. 10	approx. 120-180
Soda lime	approx. 560-620	approx. 10	approx. 120-180
<b>Container glass</b>			
Bottles	approx. 580-650	approx. 10	approx. 120-180
Flacons	approx. 580-650	approx. 10	approx. 120-180
<b>Glass ceramics</b>	approx. 600-675	approx. 5-10	approx. 30-60

### Storage

**CerDecOr** precious metal preparations should be stored in a cool and dry place (preferably in a

refrigerator, at approx. 7 °C). Please note that bright gold and palladium / -platinum preparations have a shelf-life of 12 months, whereas bright lemon gold and thermoplastic preparations have a shelf-life of 6 months.

### Packing

**CerDecOr** precious metal preparations are supplied in the following packing sizes: 50 g, 100 g, 250 g, 500 g, and 1 kg.

Containers are made of glass or plastic and carry a seal certifying their authenticity.

### Safety Data Sheets

Safety data sheets supplying health and safety information are available for each **CerDecOr** product.

### Decoration Auxiliaries

Different application techniques as well as the shape of the glassware to be decorated require products with adapted consistency, in order to obtain the optimum processing and firing properties.

For individual adjustment of viscosity, the decoration auxiliaries listed in table 15 are perfectly suited, as they have been specifically designed to fit **CerDecOr** preparations.

### Product Range

**Table 3: Bright gold for brush application**

Product	Color	Gold content [%]	Remarks
<b>GG 100</b>	reddish-yellow	8 / 10 / 12 / 15	good adherence, also suitable for applications on <b>lead crystal</b>
<b>GG 145</b>	yellow	10 / 12	light color shade; also suitable for applications on <b>lead crystal</b>
<b>GG 133</b>	reddish-yellow	12	excellent adherence, also suitable for large area decoration
<b>GG 167</b>	reddish-yellow	10 / 12	refiring stable; good adherence, also suitable for <b>borosilicate glass</b>
<b>GG 234-55</b>	reddish-yellow	5.5	<b>microwave resistant</b> ; specially suited for applications on <b>glass ceramics</b>

**Table 4: Bright lemon gold for brush application**

Product	Color	Gold content [%]	Remarks
<b>GZ 117</b>	greenish-yellow	12	<b>dishwasher proof in professional dishwashers</b> ; also suitable for application on <b>lead crystal</b>
<b>GZ 120</b>	greenish-yellow	10 / 12	<b>dishwasher proof in professional dishwashers</b>
<b>GZ 122</b>	greenish-yellow	12	<b>dishwasher proof in professional dishwashers</b> ; bright reverse side of gold film, especially suitable for glass ware with fire-polished rim areas; also suited for application on <b>lead crystal</b>
<b>TGZ0095A10</b>	greenish-yellow	10	<b>dilutable PMP</b> ; prior to application it has to be diluted by min. 20 %; maximum approx. 50 %.
<b>GZ 125</b>	Greenish-yellow	10	<b>dishwasher proof in professional dishwashers</b> ; color shade similar to <b>GZ 122</b> , stable to tarnishing.
<b>GZ 279</b>	Greenish-yellow	8 / 10 / 12	Medium viscosity, also suited for application on <b>lead crystal</b>

**Table 5: Bright platinum / palladium for brush application**

Product	Color	PM content (Au,Pd,Pt) [%]	Remarks
<b>GP 105</b>	white gold	9.2	<b>bright palladium</b> ; also suitable for application on <b>lead crystal</b>
<b>GP 110</b>	white gold	11.3	<b>bright palladium</b> ; <b>dishwasher proof in professional dishwashers</b>
<b>GP 205 B</b>	white gold	6.5	<b>bright platinum</b> ; suitable firing range 580-720 °C; high viscosity, thinners are required

**Table 6: Semi-matt gold for brush application**

Product	Color	Gold content [%]	Remarks
<b>MG 101</b>	Yellow	12	satin-matt surface finish

**Table 7: Bright gold for lining and banding**

Product	Color	Gold content [%]	Remarks
<b>GG 3132</b>	Rosé	12	<b>dishwasher proof in professional dishwashers</b> ; for neoprene roller application
<b>GG 3133</b>	reddish-yellow	12	<b>dishwasher proof in professional dishwashers</b> ; for neoprene roller application
<b>GG 2100</b>	reddish-yellow	10	low viscosity, fast drying, for <i>Netzsch</i> brush system
<b>GG 3129</b>	Yellow	9.5	bright reverse color of gold film, especially suitable for glass ware with fire-polished rim areas; also suited for application on <b>lead crystal</b> ; for neoprene roller application

**Table 8: Bright lemon gold for banding**

Product	Color	Gold content [%]	Remarks
<b>GZ 3125</b>	greenish-yellow	10 / 12	<b>dishwasher proof in professional dishwashers</b> ; for neoprene roller application
<b>TGZ0088B09</b>	greenish-yellow	9	<b>dishwasher proof in professional dishwashers</b> ; for neoprene roller application

**Table 9: Bright platinum / palladium for banding**

Product	Color	PM content (Au,Pd,Pt) [%]	Remarks
GP 3105	white gold	11.3	<b>bright palladium; dishwasher proof in professional dishwashers;</b> for neoprene roller application

**Table 10: Bright gold for direct screen printing**

Product	Color	Gold content [%]	Remarks
GG 5121	Yellow	8-10 / 12	thixotropic, etch resistant (only the 12 % version), also suited for pre-fired flux underlayers
GG 5103	reddish-yellow	10 / 12	especially suited for application on <b>for cosmetic bottles</b>
GG 5153	reddish-yellow	12	<b>dishwasher proof in professional dishwashers;</b> very good resistance, also on <b>hot-and cold-end treated</b> glass
GG 1236	Yellow	8 / 10	thixotropic; excellent printing properties, versatile use
TGG0152A06	Yellow	6	thixotropic; universal applicable
TGG0144C08	Yellow	8	<b>thermoplastic PMP;</b> high stability of contours, excellent color compatibility

**Table 11: Bright lemon gold for direct screen printing**

Product	Color	Gold content [%]	Remarks
GZ 5120	greenish-yellow	12	<b>dishwasher proof in professional dishwashers;</b> compatible with thermoplastic glass enamels; very good resistance also on <b>hot- and cold-end treated</b> glass
GZ 5122	greenish-yellow	10	<b>dishwasher proof in professional dishwashers;</b> thixotropic, compatible with thermoplastic glass colors; very good resistance also on <b>hot- and cold-end treated</b> glass
TGZ0110C10	greenish-yellow	10	<b>thermoplastic PMP;</b> high stability of contours, excellent color compatibility
TGZ0109C09	greenish-yellow	9	<b>thermoplastic PMP;</b> high stability of contours, excellent color compatibility
TGZ0108C08	greenish-yellow	8	<b>thermoplastic PMP;</b> high stability of contours, excellent color compatibility

**Table 12: Bright platinum / palladium for direct screen printing**

Product	Color	PM content (Au,Pd,Pt) [%]	Remarks
GP 5113	white gold	11.3	<b>bright palladium; dishwasher proof in professional dishwashers,</b> very good resistance also on <b>hot-and cold-end treated</b> glass
GP 5150	white gold	10.5	<b>bright palladium;</b> bright color shade, also on the reverse side of the gold film, also applicable on pre-fired flux underlayers
TGP0076A	white gold	8.1	<b>bright palladium;</b> excellent printing properties, also suitable for decal printing
TGP0074C	white gold	8.2	<b>bright palladium; thermoplastic PMP;</b> high stability of contours, excellent color compatibility

**Table 13: Semi-matt gold for direct screen printing**

Product	Color	Gold content [%]	Remarks
MG 5100	yellow	12	satin-matt surface finish

**Table 14: Semi-matt platinum for direct screen printing**

Product	Color	PM content (Au, Pt) [%]	Remarks
MG 5102	white gold	11.3	satin-matt surface finish

**Table 15: Decoration auxiliaries**

Product	Product description	GG	GZ	GP	MG
DH 1	high volatility <b>thinning oil</b> for <b>brush preparations</b>	x	x	x	x
DH 2	<b>thinning oil</b> for <b>brush preparations</b> , slower drying than <b>DH 1</b>	x	x	x	x
DH 321	<b>thinning oil</b> for <b>brush preparations</b> , faster drying than <b>DH 1</b>	x	x	x	x
DH 26	standard <b>thinning oil</b> for <b>brush preparations</b>	x	x	x	x
DH 354	<b>thinning oil</b> for <b>brush preparations</b> , slower drying than <b>DH 26</b>	x	x	x	x
DH 100 N	<b>thinning oil</b> for <b>spray application</b> , very fast drying	x	x	x	x
DH 92	standard <b>thinning oil</b> for <b>paste preparations</b> , slow drying	x	x	x	x
DH 192 S	special thinning oil for <b>screen-printing</b> containing a defoaming agent, slow drying	x	x	x	x
DH 276 N	<b>thinning oil</b> for <b>neoprene banding</b> , slow drying	x	x	x	x
DH 321 L	<b>thinning oil</b> for <b>steel wheel application</b> and for <b>Netzsch</b> brush system, fast drying	x	x	x	x
80 452	screen cleaning oil	x	x	x	x

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