Technical Information
DF16

Performance Pigments and Colors

CerDecOr – Bright Precious Metal Preparations
for Direct Application on Porcelain, Bone China, Earthenware, Enamels, and Tiles

Bright precious metal preparations are varnish-like organic compounds containing precious metals, combined with flux components (based on organic metal compounds) as adhesion promoters. They further contain resin solutions as film formers. Applied and fired on a smooth ceramic surface, a highly glossy precious metal film forms. According to the colour shade of the fired product we distinguish:

- **Bright gold,** which develops a typical reddish-yellow gold shade after firing, and contains a small proportion of silver.
- **Bright lemon gold**, which fires to a lemon-yellow shade, achieved by formation of a gold/silver alloy.
- **Bright platinum** and **bright palladium,** which fire to a white-gold shade, achieved by formation of an Au/Pt or Au/Pd alloy.

Product Range

Ferro's **CerDecOr** product range contains bright precious metal preparations for all common application methods in use in ceramic industries. Listed in the following tables are standard and special products arranged according to:

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

The information given in the product tables include color shade, precious metal content, important product characteristics as well as the substrate for which each PM preparation is best suited. Please note the following abbreviations:

BC:	Bone China
EM:	Enamel
FL:	Tiles
GG:	Bright gold
GP:	Bright platinum/palladium
GZ:	Bright lemon gold
PMP:	Precious metal preparation
PZ:	Porcelain
SG:	Earthenware

Precious Metal Content

CerDecOr bright gold and bright lemon gold preparations have a fine gold content of 6 % to 15 %. Preparations with a fine gold content of less than 6 % are designated as lustres.

CerDecOr bright platinum and bright palladium preparations have a combined precious metal content (gold, platinum and/or palladium) of 3 % to 12 %. The data given in the tables refer to the total content of Au-, Pt-, and/or Pd.

Consistency

Preparations to be applied by **brush, spraying or stamping** are fluids with low viscosity (≤ 500 mPa·s), while those processed by **screen-printing** or other **mechanical application methods** are pastes with high viscosity (approx. 2,000 - 40,000 mPa·s).

CerDecOr bright PM preparations are generally supplied ready for use. If desired, suitable thinning oils are available 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 is certified according to the **DIN EN ISO 9001, ISO 14001 and OHSAS 18001** certificates, precious metal 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 have been developed to deliver high value to the consumer. This includes mechanical resistance during daily use, as well as dishwasher durability.

Ferro classifies **ceramic decorations** (porcelain, bone china, etc.) as **dishwasher-resistant**, when they withstand more than 1000 washing cycles, and as **dishwasher-proof /-safe** when they withstand more than 500 washing cycles largely undamaged. Tests are conducted in a household dishwasher following the **EN test standard 50275, part 1**.

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

Application

Before decoration, make sure that the substrate is clean and completely 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 to reach the temperature of the decoration room, and also give it time for evaporation of any condensation.

Different consistencies of PM products are required for different application techniques, as well as by the type of substrate to be decorated, 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**, rapid evaporating oils and solvents are required, whereas for the application of **brush preparations**, semi-fat oils are needed, whilst for **stamping application**, fat oils with low volatility are desired. The Decoration Auxiliaries mentioned in this brochure have especially been developed to perfectly suit **CerDecOr** PM preparations.

Printing of Bright Precious Metal Preparations

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

Squeegees should be made of a solvent-resistant material such as polyurethane (hardness 60-75 °Shore). For good results it is important to use squeegees with a clean, well sharpened edge.

Tab. 1: Recommended meshes for screen printing bright precious metal preparations

	Screen	
Preparation	Polyester [threads/cm]	Steel (VA 160-25) [mesh/inch]
Bright gold, bright lemon gold, bright platinum, bright palladium	120	400

Firing Process

The firing conditions depend on the type of substrate to be decorated and further individual processing parameters. 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.

As the firing cycle has a strong influence on the quality of the final decoration, we recommend to determine the optimum conditions by pre-tests.

In contrast to normal firing, fast firing in continuous kilns allows faster firing cycles with a simultaneous increase in maximum temperature. Fast firing conditions impose special require-ments on the preparations.

Tab. 2: Firing conditions common in the ceramic industry

Material	Temperature [°C]	Soaking Time [min]	Firing Cycle
Earthenware	700-780	10	approx. 2-3 h
Tiles	750-900	-	approx. 30-45 min
Porcelain Normal firing Fast firing	 780-840 860-900	 10 -	 approx. 3-4 h approx. 60-90 min
Bone China	750-850	1 - 20	approx. 1-3 h
Enamel	750-850	2-5	approx. 20-40 min

Storage

CerDecOr bright 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 golds have a shelf-life of 6 months).

Packing

CerDecOr 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 bear a seal certifying their authenticity.

Safety Data Sheets

Data sheets providing health and safety information are available for all **CerDecOr** products.

Product Range

Table 3: Bright gold for brush application

Product	Colour Shade	Au content [%]	PZ	BC	SG	FL	EM	Remark
GG 500	reddish-yellow	8 / 10-12	x					**dishwasher resistant;** high viscosity, to optimize the painting properties thinning oil can be used
GG 501	reddish-yellow	7-12	x					**dishwasher resistant**
GG 550	reddish-yellow	10-11	x					**dishwasher resistant;** especially for broad application areas
GG 577	reddish-yellow	10	x					**dishwasher resistant;** firing stability up to 900 °C; for brush and steel wheel application
GG 522	yellow	12	x		x			light color shade, wide firing range: 760 °C (tiles / normal firing) up to 900 °C (porcelain / fast firing)
GG 532	yellow	10	x					orange application color; brillant firimg results; especially for broad application areas
GG 573	reddish-yellow	10	x		x	x		**microwave resistant**; scratch resistant; dark color shade after firing
GG 301	reddish-yellow	8-12			x	x		standard preparation, brillant firing results
GG 575	reddish-yellow	10 / 12		x	x	x		bright gold specifically for **bone china**
GG 605	reddish-yellow	9 / 11			x	x		highly glossy; good adherence at low firing temperatures
GG 700	reddish-yellow	8			x	x	x	standard preparation, especially suitable for applications on **enamel**
GG 590	reddish-yellow	10	x		x	x		**TGG0130B10**; high-viscosity, thinning is recommended; thinning rate 30-50%. The choice of the thinning oil (DH 321 L, DH 1, DH 26) enables different kinds of application. The appropriate diluted preparation can be used for *Netzsch* brush system, steel wheel- or brush application.

Table 4: Bright lemon gold for brush application

Product	Colour Shade	Au content [%]	PZ	BC	SG	FL	EM	Remark
GZ 215	greenish-yellow	10 / 12	x		x	x		economic in use; suitable for etch imitation

Table 5: Bright palladium/-platinum for brush application

Product	Colour Shade	PM content (Au,Pd,Pt) [%]	PZ	BC	SG	FL	EM	Remark
GP 350	white gold	3.8	x		x	x		**bright platinum;** good adherence
GP 318 F	white gold	4,5	x		x			**bright platinum;** light color shade
GP 510 B	white gold	9.2	x		x	x		**bright platinum;** good firing stability, medium viscosity
GP 500	white gold	9.5	x		x	x		**bright platinum**; high viscosity; stable firing properties; good adherence
GP 205 B	white gold	6.5			x	x		**bright platinum;** suitable firing range 580-720 °C; high viscosity, if preferred thinner oil may be used
GP 558	white gold	9,3	x	x	x	x		**bright palladium** for **bone china**
GP 574	white gold	5,7	x		x	x		**TGP0003A; bright platinum;** microwave resistant; scratch resistant; dark color shade after firing
GP 515	white gold	10,2	x					**bright palladium,** dishwasher resistant, excellent painting properties

Table 6: Bright gold for lining and banding

Product	Colour Shade	Au content [%]	PZ	BC	SG	FL	EM	Remark
GG 501	reddish-yellow	9-12	x		x			The adjustment of the application characteristics for *Netzsch* brush system and the required gold content can be achieved by diluting the preparation with 20-30% DH 321 L
GG 590	reddish-yellow	10	x		x	x		**TGG0130B10**; high-viscosity, thinning is recommended; thinning rate 30-50%. The choice of the thinning oil (DH 321 L, DH 1, DH 26) enables different kinds of application. The appropriate diluted preparation can be used for *Netzsch* brush system, steel wheel- or brush application.
GG 3500	reddish-yellow	12	x		x			high viscosity; for banding machine with neoprene roller

Table 7: Bright platinum/-palladium for lining and banding

Product	Colour Shade	PM content (Au,Pd,Pt) [%]	PZ	BC	SG	FL	EM	Remark
GP 2501 A	white gold	4.8	x		x			**bright platinum;** low viscosity; fast drying; for *Netzsch* lining machine
GP 3600 C	white gold	12.8	x		x			**bright platinum;** good firing stability, high gloss, for banding machine with neoprene roller

Table 8: Bright gold for direct screen printing

Product	Colour Shade	Au content [%]	PZ	BC	SG	FL	EM	Remark
GG 5566	yellow	7 / 10			x	x		very light brillant firing results, suitable for fast firing up to 880°C
GG 160	reddish-yellow	12			x	x	x	especially suited for applications on **enamel;** highly glossy; low viscosity
GG 5310	reddish-yellow	9			x	x		**microwave resistant;** good scratch resistance; suitable for firing temperatures up to 940 °C; high viscosity
GG 5573	reddish-yellow	8	x		x	x		**TGG0126A08; microwave resistant**, light color shade after firing
TGG0157A10	reddish-yellow	10			x	x		fast drying and firing stable for direct applications on ceramic
TGG0158A	yellow	8			x	x		fast drying and firing stable for direct applications on ceramic

Table 9: Bright lemon gold for direct screen printing

Product	Colour Shade	Au content [%]	PZ	BC	SG	FL	EM	Remark
GZ 5324	greenish-yellow	9			x	x		thixotropic; brighter color after firing than **GZ 5325**

Table 10: Bright platinum/ palladium for direct screen printing

Product	Colour Shade	PM content (Au,Pd,Pt) [%]	PZ	BC	SG	FL	EM	Remark
GP 5550 A	white gold	10.9	x		x	x		**bright palladium;** high opacity; good firing stability
GP 5311	white gold	8.0			x	x		**bright platinum;** especially suitable **for third firing** applications
GP 5315	white gold	5,9			x	x		**bright palladium**; standard preparation for direct sceenprinting on ceramic
GP 5574	White gold	8,3	x		x	x		**TGP0062A; bright palladium; microwave resistant;** good scratch resistance
TGP0050A	white gold	5,1			x	x		**bright platinum,** very light brillant firing results
GP 5590	white gold	7,2	x		x	x		**TGP0069A,** thixotropic, thinning with app. 10% DH 92 or DH 192 S is recommended

Table 11: Decoration auxiliaries

Product	Description	GG	GZ	GP
DH 100 N	**thinning oil** for **spray application,** very fast drying	x	x	x
DH 321	**thinning oil** for **brush preparations,** faster drying than **DH 1**	x	x	x
DH 1	high volatility **thinning oil** for **brush preparations**	x	x	x
DH 2	**thinning oil** for **brush preparations,** slower drying than **DH 1**	x	x	x
DH 26	standard **thinning oil** for **brush preparations**	x	x	x
DH 354	**thinning oil** for **brush preparations,** slower drying than **DH 26**	x	x	x
DH 92	**thinning oil** for **screen-printing PMP,** slow drying	x	x	x
DH 192 S	special **thinning oil** for **screen-printing PMP** containing a defoaming agent, slow drying	x	x	x
DH 321 L	**thinning oil** for **steel wheel lining** and **Netzsch** brush system, fast drying	x	x	x
80 452	**screen cleaning oil**	x	x	x

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