

Technical Information

DF13

Performance Pigments and Colors

CerDecOr – Precious Metal Preparations for Decal Printing

Ferro's **CerDecOr** product range offers a large number of precious metal (PM) preparations for decal printing, including bright, semi-matt and burnish preparations for the decoration of porcelain, bone china, earthenware and glass.

Product Range

The following tables provide an overview of our most important standard and speciality products for decal printing. We distinguish:

Bright Gold
Bright Lemon Gold
Bright Palladium/-Platinum
Semi-matt Gold / Semi-matt Palladium
Burnish Gold / Burnish Palladium/-Platinum
Auxiliaries

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
GG: Bright Gold
GP: Bright Platinum / Palladium Preparation
GS: Glass
GZ: Bright Lemon Gold
HTF: High Temperature Fast (Inglaze-) Firing
MG: Semi-matt PM Preparation
PG: Burnish Gold, Burnish Palladium/-Platinum
PZ: Porcelain
SG: Earthenware

Precious Metal Content

CerDecOr bright gold, bright lemon gold and semi-matt preparations for indirect screen-printing have a fine gold content of 7 % to 12 %. Burnish gold preparations for indirect screen-printing usually have a fine gold content of 16 % to 42 %.

CerDecOr bright platinum and bright palladium preparations for indirect screen-printing have a combined precious metal content (consisting of gold, platinum and/or palladium) of approx. 6 % to 10 %. Burnish palladium and burnish platinum preparations have a combined PM content of approx. 16 % to 36 %. The data given in the product tables refer to the total Au-, Pt-, and/or Pd-content.

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, 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 batches which meet our stringent standards are released for sale.

Dishwasher Resistance

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

Due to a lower firing temperature, **glass decorations** do not achieve comparable resistance values. The data in the tables are based on dishwasher tests conducted in the R&D laboratories of Ferro GmbH.

Processing

CerDecOr PM preparations for indirect screen-printing are generally supplied ready for use.

During the printing process, pastes naturally lose a certain amount of solvent. In order to maintain the initial printing properties we recommend to constantly add fresh paste during printing. Pastes showing increased viscosity due to long-term storage or extensive printing may be re-conditioned by mixing with fresh material or small amounts of adequate thinning oil.

Since pastes of **bright preparations** contain dissolved gold and/or other metals, sedimentation practically never occurs. Nonetheless, in order to provide optimum homogenization, we recommend to stir the screen-printing pastes before use. Further pre-treatment is not necessary.

Pastes of **burnish preparations** contain precious metal powder in finely dispersed form, and thus need to be stirred thoroughly before printing.

Pastes of **semi-matt preparations** must be stirred thoroughly before use, as they contain matting agents that tend to separate during storage.

Printing

Work should always take place in well-ventilated workshops. Room temperatures between 20-25 °C, and relative humidity of 60-70 % are considered optimum printing conditions.

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

Table. 1: Recommended screens for printing PMP

Preparation	Screen	
	Polyester [threads/cm]	Steel (VA 160-25) [mesh/inch]
Bright preparations Semi-matt preparations	120	400
Burnish preparations	90	350
Covercoat*	26	80

* We recommend to use thixotropic covercoat, for instance 80 2043.

Application of Decals

Before decoration, make sure that the substrate 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 time for evaporation of any condensation.

For best firing results, transfers should be carefully applied using a rubber squeegee or soft cloth. It is important to avoid overstretching, as otherwise hairline cracks may occur. The addition of 1 % to 3 % softener **80 650** to the soaking water improves processing properties and prevents the appearance of fine hairline cracks.

Care should also be taken that no water or gum residues remain on the decal, as this may result in a less than brilliant surface. Especially on large decorated areas, we recommend to clean the decals after drying with a clean wet cloth.

The freshly applied decals should be allowed to dry before firing (for at least 5 hours at room temperature) to avoid holes in the fired film.

Firing Process

The firing conditions largely depend on the type of substrate to be decorated and further individual processing parameters. Please bear in mind that the decals 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 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 means of pre-tests.

Table. 2: Firing conditions most commonly used by the ceramic industry

Material	Temperature [°C]	Soaking Time [min]	Firing Cycle
Glass	490-650	10	approx. 2 h
Earthenware	700-780	10	approx. 2-3 h
Porcelain			
Normal Firing	780-840	10	approx. 3-4 h
Fast Firing	860-900	-	approx. 60-90 min
High Temperature Fast Firing (Inglaze Firing)	1150-1250	-	approx. 60-90 min
Bone China	750-850	1 - 20	approx. 1-3 h

Post-firing Considerations

Bright and semi-matt preparations generally need no further treatment.

After firing, **burnish preparations** are left with a dull non-metallic appearance. In order to obtain their rich matt finish, they have to be burnished either with moist damp sand or with a glass-fiber brush (manually or mechanically). Best results are achieved by increasing the pressure slowly. The result is not only an attractive appearance, but increased functionality. Mechanical burnishing connects the particles, increases the density of the gold film, improves overall adhesive strength and provides increased resistance to chemical attack.

Storage

CerDecOr preparations should be stored in a cool and dry place (preferably in a refrigerator, at approx. 7 °C).

Please note that bright and semi-matt preparations for indirect screen-printing have a shelf-life of 6 months, whereas burnish preparations have a shelf-life of 12 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 plastic and bear a FERRO guarantee sticker certifying their authenticity.

Safety Data Sheets

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

Produkt Range

Table 3: Bright gold

Product	Colour	Au content [%]	PZ	BC	SG	GS	Remarks
GG 5165	reddish-yellow	10				x	standard preparation for glass decoration; suitable matt underlayer system available (underlayer powder: TDF 7608 C , medium: 80 3031), thinning oil DH 165 is recommended
GG 5169	reddish-yellow	10				x	especially suited for hot-and-cold-end treated container glass, thinning oil DH 165 is recommended
GG 5170	yellow	9				x	TGG0141A09 ; lighter color shade after firing compared to GG 5165 10
GG 5566	yellow	7 / 10	x		x		dishwasher resistant ; suitable matt underlayer system available for the 10 % version (underlayer: 19 233 , medium: 80 3031)
GG 5577	reddish-yellow	8 / 10 / 12	x		x		8% = TGG0113A08, 12% = TGG0112A12; dishwasher resistant; superior decal elasticity ; faster surface drying than GG 5566; suitable matt underlayer system available for the 10 % and 12 % version (underlayer: 19 233 , medium: 80 3031)
GG 5560	yellow	7 / 8 / 10	x		x		7% = TGG0127A07, 8% = TGG0127A08; dishwasher resistant; excellent decal elasticity ; color shade after firing between GG 5566 10 and GG 5577 10; suitable matt underlayer system available for the 10 % version (underlayer: 19 233 , medium: 80 3031)
GG 5580	yellow	12	x	x			TGG0107A12; suitable for Bone China , use of thixotropic cover coat is recommended
GG 5581	reddish-yellow	10	x	x			suitable for Bone China , use of thixotropic cover coat is recommended
GG 5573	reddish-yellow	8	x	x	x		TGG0126A08; microwave resistant, dishwasher proof , light color shade after firing

Table 4: Bright lemon gold

Product	Colour	Au content [%]	PZ	BC	SG	GS	Remarks
GZ 5550	greenish-yellow	7 / 10	x		x		excellent decal elasticity ; 10% version is dishwasher proof and can be used in combination with our matt underlayer system (underlayer: 19 233 , medium: 80 3031)
GZ 5555	greenish-yellow	10	x		x		thixotropic, dishwasher proof , suitable matt underlayer system available (underlayer: 19 233 , medium: 80 3031); very light color shade after firing

Table 5: Bright palladium/ platinum

Product	Colour	PM content (Au, Pd, Pt) [%]	PZ	BC	SG	GS	Remarks
GP 5171	white gold	6,7				x	TGP0060A , excellent printing properties similar to GG 5165 10; thinning oil DH 165 is recommended
GP 5172	white gold	8,1				x	TGP0076A ; lighter color shade after firing compared to GP 5171
GP 5566	white gold	7.7	x				standard preparation; suitable matt underlayer system available (underlayer: 19 233 , medium: 80 3031)
GP 5530	white gold	7.4	x				TGP0059A ; product characteristics similar to GP 5566; enhanced scratch and dishwasher resistance
GP 5568	white gold	9.5	x				dishwasher proof; excellent elasticity as a decal; faster surface drying than GP 5566; suitable matt underlayer system available (underlayer: 19 233 , medium: 80 3031)
GP 5582	white gold	9,2	x	x			TGP0070A ; suitable for Bone China , use of thixotropic cover coat is recommended
GP 5574	white gold	8.3	x	x	x		TGP0062A; microwave resistant, dishwasher proof

Table 6: Semi-matt gold

Product	Colour	Au content [%]	PZ	BC	SG	GS	Remarks
MG 5510 60	yellow	10.5	x		x		TMG0047A , matt surface finish, excellent decal elasticity; thinning oil DH 165 is recommended
MG 5506	yellow	12	x		x		matt surface finish
MG 5505	reddish-yellow	12	x		x		matt surface finish
MG 5167	reddish-yellow	10				x	matt surface finish

Table 7: Semi-matt palladium/ platinum

Product	Colour	PM content (Au, Pd, Pt) [%]	PZ	BC	SG	GS	Remarks
MG 5507	white gold	12.1	x		x		matt surface finish

Table 8: Burnish gold – onglaze preparations -

Product	Colour	Au content [%]	PZ	BC	SG	GS	Remarks
PG 5545	yellow	24.0	x				dishwasher resistant ; contains red dye; particularly suitable for decorations on Co-based glazes; excellent drying properties
PG 5547	yellow	26.0	x	x			dishwasher resistant ; very good elasticity as a decal
PG 5548	yellow	32.0	x	x			dishwasher resistant ; very good elasticity as a decal
PG 5544	reddish-yellow	20.0	x				dishwasher resistant
PG 5505 A	reddish-yellow	36.0	x		x		very economical in use

Table 9: Burnish palladium/ platinum – onglaze preparations -

Product	Colour	PM content (Au, Pd, Pt) [%]	PZ	BC	SG	GS	Remarks
PG 5509 C	white gold	36.0	x		x		very economical in use

Table 10: Burnish gold – inglaze (HTF) preparations -

Product	Colour	Au content [%]	PZ	BC	SG	GS	Remarks
GG 5800	reddish-yellow	10	x				very low Au content ; inglaze firing range: 1150-1220 °C, bright finish after burnishing process; dishwasher resistant ; excellent elasticity as a decal
PG 5831	reddish-yellow	16.0	x				inglaze firing range: 1150-1220 °C; low Au content; dishwasher resistant ; excellent elasticity as a decal
PG 5822	yellow	26.0	x				inglaze firing range: 1200-1250 °C; dishwasher resistant
PG 5823	yellow	32.0	x				inglaze firing range: 1200-1250 °C; dishwasher resistant
PG 5854	yellow	32.0	x				special preparation for UV-curing ; inglaze firing range: 1180-1250 °C
PG 5818 S	yellow	38.0	x				inglaze firing range: 1200-1250 °C; high scratch resistance; dishwasher resistant
PG 5813 HA	yellow	42.0	x				inglaze firing range: 1200-1250 °C; dishwasher resistant

Table 11: Burnish palladium/ platinum - Inglaze (HTF-) Preparations –

Product	Colour	PM content (Au, Pd, Pt) [%]	PZ	BC	SG	GS	Remarks
GP 5810	white gold	8.7	x				very low PM content ; inglaze firing range: 1150-1220 °C; bright finish after burnishing process; dishwasher resistant ; excellent elasticity as a decal
PG 5830	white gold	16.0	x				inglaze firing range: 1150-1220 °C; low PM content ; dishwasher resistant ; excellent elasticity as a decal
PG 5853	white gold	31.0	x				inglaze firing range: 1180-1250 °C; dishwasher-resistant ; lighter color after firing than PG 5848
PG 5855	white gold	31.0	x				special preparation for UV-curing ; inglaze firing range: 1180-1250 °C
PG 5848	white gold	36.0	x				inglaze firing range: 1200-1250 °C; light color after firing; dishwasher-resistant
PG 5821	rosé	36.3	x				inglaze firing range: 1200-1250 °C; dishwasher-resistant

Table 12: Decoration auxiliaries

Product	Product Description	GG	GZ	GP	MG	PG
DH 165	Thinning oil for the following preparations GG 5165, GG 5169, GP 5171 and MG 5167 10	x			x	
DH 577	Thinning oil for decal bright- and semi-matt preparations for porcelain, bone china and earthenware	x	X	x	x	
80 954	Thinning oil for decal pastes	x	X	x	x	x
DH 92	Thinning oil for paste preparation , slow drying	x	X	x	x	x
DH 192 S	Special thinning oil for screen-printing containing a defoaming agent , slow drying	x	X	x	x	x
80 452	Screen cleaning oil	x	x	x	x	x

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