

bright gold paste

GGP 5001 D-10% H for stippling

Heraeus Precious Coatings is a global manufacturer of precious metal decoration products for ceramics and glass. Heraeus profits from over 100 years experience in ceramic and glass decoration designs, which has always made the department a pioneer in the development of precious metal colours. Modern precious metal preparations have to meet high demands on different types of substrates – such as on porcelain, tiles, drinking glasses, flacons and bottles. Decorations have to achieve good mechanical and chemical resistance such as dishwasher durability. The products supplied by Heraeus Precious Coatings include: Bright gold and platinum products, silk-matt gold and platinum products, burnish gold and platinum products, lusters and metallo-organic preparations for technical use.

1 General information

GGP 5001D-10% H is a special material for “stippling application”. It has been developed to be used on bone china, but can also be used on porcelain substrates.

2 Standard firing range

Substrate	Firing range [°C]
bone china	750-880
porcelain	780-880

The firing result depends on the firing temperature, the total cycle time, the soak time as well as the glaze chemistry of the substrate decorated. To achieve an optimal firing result, we recommend firing tests under the users own individual conditions.



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3 Properties of the product

The major characteristics of a Heraeus precious metal preparation are determined by its production recipe. From each lot produced, we take a sample and check defined characteristics. In case of decal pastes we check the physical properties (e. g. viscosity, thixotropy) and the printing properties compared to a predefined standard. After firing under standard firing conditions, we check the gold colour shade and the adhesion to the substrate. Controlling each single production lot assures the highest product quality and lot-to-lot consistency.

3.1 Processing

We supply decal pastes ready to use.

3.2 Storage

Printing pastes are subject to an ageing process. Therefore, we recommend using the material within 9 months. The material should be stored at room temperature (20°C). Cool storage – but no freezing – has a positive impact on the shelf life.

3.3 Consumption

The material consumption depends on the thickness of the applied precious metal layer. Under our conditions, the consumption is approx. 0,15 to 0,30g/100 cm².*

4 Properties of finished decorations

The properties of finished decorations are influenced by a number of factors which interact with each other: The precious metal preparation used, possible bordering colours, the quality of the print, the material deposit, the quality of the decal paper, the correct application of the decal and of course the firing conditions. The main properties of fired bright precious metal decorations comprise brilliance and precious metal tone, dishwasher resistance, scratch resistance and resistance against chemical attack. We have processed the bright precious metal preparations under standard test conditions. Then we determined the properties of the finished decorations. The following data indicate achievable quality features for the finished decorations manufactured with bright precious metal preparations. They must, however, always be checked by the user under his own individual conditions.

4.1 Dishwasher resistance

All details as to whether decorations are dishwasher durable are to be regarded as approximate values, as test results vary widely according to the type of dishwasher, washing programme, washing-up detergent, water quality and firing conditions.

Heraeus tests whether finished decorations are dishwasher durable, roughly following the test-washing programme of the Technical Standards Committee for Material Testing (Fachnormenausschuss Materialprüfung) in a Miele continuous dishwasher. If a decoration withstands 500 washing cycles essentially without damage, we designate it as dishwasher durable. If it withstands 1000 washing cycles, we designate it as dishwasher resistant.

Test decorations prepared with GGP 5001D-10% H proofed to be dishwasher durable.

4.2 ASTM/Colgonite/Cascade-Resistance

Test decorations showed good test results in the ASTM and Calgonite test.

4.3 Abrasion resistance

Gold decorations with GGP 5001D-10% H showed a reasonable scratch resistance considering the comparably low metal content.

4.4 Oxidation resistance

Under unfavourable conditions silver containing precious metal decorations can tarnish in the course of time. Especially the contact to cardboard boxes, high humidity and high temperature support the reaction of silver to silver sulphide. GGP 5001D-10% H does not contain silver and therefore is not sensitive to tarnishing.

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5 Application of the material

5.1 Preparation for the decoration

Work in a well-ventilated room. Good printing conditions occur at a room temperature of 20 to 25°C.

5.2 Preparation of the substrate to be decorated

Make sure that the surface of the object to be decorated is clean and dry. Dust, fingerprints and water condensation can affect the decoration while firing. Take care that the objects to be decorated are not taken from a cold store into a warm shop. A fine condensation film may occur, which is not visible to the naked eye. This results in firing disturbance (pinholes) in the fired precious metal decoration. Allow enough time so that they can adjust to the decoration room temperature.

5.3 Recommendations for the usage

The paste can be “stippled” with the use of a kind of sponge onto the substrate to be decorated.

5.4 Firing

- During the first heating phase the organic components of the preparation burn off. This process is completed at approx. 400°C. The gold film is formed. A constant, slow temperature increase, enough oxygen and sufficient ventilation are decisive for the quality of the fired precious metal decoration.
- The firing profile considerably influences the mechanical and chemical properties of the fired decoration.
- The rate of cooling has no major influence on the quality of the gold decoration, unlike the firing temperature and soak time. However, the firing process should not be stopped too abruptly after the soak time. If the rate of cooling is too fast, there may be a danger of damaging the article (cracks and broken glass).

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6 Typical defects, root causes and countermeasures

Defect	Possible Cause	Counter measure
Spots, pin holes	Contamination as dust, finger marks or water drops	Clean the object before decorating
Matt firing result	Problems in the kiln such as: a) Furnace atmosphere reduction b) Insufficient ventilation c) Too quick heat up in the critical phase between 200-400°C d) Too many objects in the kiln	a) Increase air addition b) Improvement of the ventilation c) Reduce the heating speed d) Reduce the number of objects in the kiln
Precious metal is cracking during firing	a) Contamination of the substrate surface causes cracking b) Water residues under the decal c) The layer of the product is too thick	a) Clean the substrate before application b) Careful pressing of the decal by the squeegee and drying c) Reduce the layer of the product
Low mechanical resistance of the precious metal decoration	Too low firing temperature	Increase the firing temperature

Contact

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The statements concerning our products correspond to our current knowledge and experience. It is the obligation of the purchaser to examine the usefulness of the products in its intended use in each individual case. In order to prevent production losses the user has to test the preparations in connection with every other material being involved in the production process and has to be satisfied that the intended result can be consistently produced.