liquid bright gold

FA 135T-12% for brush

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

FA 135T-12% is liquid bright gold in concentrated form designed for brush application on glass. Before usage the material needs to be thinned with approximately 30 to 40% thinner to a brushable viscosity. We recommend as thinner V35 or V39. FA 135T-12% fires with a light yellow gold colour shade.

2 Standard firing range

Substrate	Firing range [°C]
soda lime glass	560-620
borosilicate glass	580-620

The firing result depends on the firing temperature, the total cycle time, the soak time as well as the glass chemistry and a possible coating. To achieve an optimal firing result, we recommend firing tests under the users own individual conditions.

Directly to the product:

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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 liquid bright gold we check the viscosity and the application properties comparing them with the defined standard. After the firing, we check the optical appearance – glossiness and gold colour shade. Controlling each single production lot assures the highest product quality and lot-to-lot stability.

3.1 Processing

We deliver FA 135T-12% as concentrate. Before the usage the material needs to be thinned with 30 to 40% thinner. We recommend the usage of our standard thinners for liquid golds V35 or V39. It is important to carefully homogenize the thinned material.

3.2 Storage

Liquid golds 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 main properties of fired bright precious metal decorations comprise brilliance and precious metal tone, chemical and mechanical resistance. These properties are influenced by a number of factors. The high quality of the preparation used is an absolute prerequisite for manufacturing high-quality decorations. The quality of a fired decoration, however, derives from the interplay of preparation, application, substrate surface and firing conditions. A variation in only one factor – for instance, the firing conditions, has an immediate influence that leads to altered properties of the fired decoration.

4.1 Chemical and mechanical resistance

Decorations created with FA 135T-12% showed in tests a reasonable chemical and mechanical resistance considering the low metal content of the product.

4.2 Oxidation resistance

FA 135T-12% contains a certain amount of silver. 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.

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5 Application of the material

5.1 Preparation for the decoration

Work in a well-ventilated room. The room temperature should be between 20-25°C with a relative humidity of 60-70%.

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 material needs to be thinned with 30 to 40% thinner. We recommend the usage of our liquid gold thinners V35 or V39. Please take care for a good homogenization of the material before starting to brush it.
- Apply the preparation in a moderate layer thickness onto the object to be decorated. A too thin layer influences the mechanical, chemical and optical properties of the fired decoration. In extreme cases, it can lead to a reddish colour of the surface without any gold character. A too thick layer may lead to cracking, blistering, or to a matt surface.

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
Blurred contours, running precious metal	a) Too much thinning of the product b) The thinner was too fat or drying too slowly c) Too much organic fumes in the furnace	a) Leave the bottle open for a while, so that some of the solvent can evaporate b) Leave the bottle open for a while, so that some of the solvent can evaporate c) Reduce the number of objects in the furnace
Preparation shows bad application	Viscosity is too high after long application or long storage	Thinning of the product with V 35 or V43
Spots	Contamination as dust, fingerprints or water condensation	Carefully clean the object before decorating
Firing disturbance	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) Improveme ventilation c) Reduce the heating speed d) Reduce the number of objects in the kiln
Precious metal chips offs during firing	a) Contamination of the surface causes chip off b) The layer of the product it too thick	a) Clean the substrate before decorating b) Reduce layer of the product
Low mechanical resistance of the precious metal decoration	a) Firing temperature is too low b) Layer of the product is too thin	a) Increase firing temperature b) Increase layer thickness
Fine pinholes	Pinholes can be released by moisture on the surface of the decorated object. Taking objects from a cool store into a warm shop leads to invisible condensation on the surface.	Allow enough time for the ware to reach shop temperature, so that the condensation has time to evaporate

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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.