



Liquid Bright Copper for glass FA 115T

1 General Information

FA 115T is liquid bright copper 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 115T shows after firing a copper metal colour shade.

2 Standard Firing Range

Substrate	Firing range
Soda Lime Glass	520 – 620°C
Borosilicate Glass	580 – 620°C

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.

3 Properties of the preparations

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 material 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 115T 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 115T showed in tests a reasonable chemical and mechanical resistance considering the low metal content of the product.

4.2 Oxidation resistance

Decorations with FA 115T are oxidation insensitive.

5 Application recommendations

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.

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 object to be decorated is not taken from a cold store into a warm shop. A fine condensation film may occur, which is not visible for the naked eye. Result: Firing disturbance (pinholes) in the fired precious metal decoration! Allow enough time for the substrate to adjust to the decoration room temperature.

5.2 Application of the material

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.

5.3 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.

6.0 Typical defects, root causes and countermeasures

Defect	Possible Cause	Counter measure
blurred contours, running precious metal	too much thinning of the product	leave the bottle open for a while, so that some of the solvent can evaporate
	the thinner was too fat or drying too slowly	leave the bottle open for a while, so that some of the solvent can evaporate
	too much organic fumes in the furnace	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 V39
spots, firing disturbance	contamination as dust, fingerprints or water condensation	Carefully clean the object before decorating
	problems in the kiln such as: <ul style="list-style-type: none"> • reduced atmosphere in kiln • insufficient ventilation • heat increase is too fast during critical phase between 200-400°C • too many objects in the kiln 	<ul style="list-style-type: none"> • increase air addition • improve ventilation • reduce the heating speed • reduce the number of the objects in the kiln
Precious metal chips off during firing	contamination of the surface causes chip off	clean the substrate before decorating
	the layer of the product is too thick	reduce layer of the product
low mechanical resistance of the precious metal decoration	firing temperature is too low	increase firing temperature
	layer of the product is too thin	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.