luster liquid

LU ST 26 COPPER H 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

LU ST 26 COPPER H is a liquid copper luster for brush application on ceramic. After firing the luster shows and copper golden bright metal layer.

For a nice shiny luster effect, the luster needs to be applied on a smooth surface. Lusters are typically used on glazed ceramic substrates like porcelain pieces or tiles. The layer thickness of a luster decoration is below 0,1 µm.

2 Standard firing range

Substrate	Firing range [°C]
porcelain	700-850
tiles	700-850

The firing result depends on the firing temperature, the soak time and the total cycle of the firing as well as on the type of substrate. For an optimal firing result we recommend pre-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 luster is determined by its production recipe. From each lot produced, we take a sample and check defined characteristics.

In case of luster pastes for direct screen printing and decal production 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 luster 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 deliver LU ST 26 COPPER H ready to use for the application by brush. In case that the luster should be sprayed thinning is required. We recommend using our special thinner V18 H. The thinning ratio will depend on your specific needs. It is necessary to test the material under ones own individual conditions. Starting point could be a thinning of about 20-40% by weight.

3.2 Storage

Liquid lusters are subject to an ageing process. We recommend using LU ST 26 COPPER H within 9 months time. 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.

3.4 Miscability of lusters

Lustres can be mixed with each other. However, unpredictable colour changes may occur, especially if lustres containing precious metals are mixed with lustres free of precious metals.

4 Properties of finished decorations

The main properties of fired luster decorations comprise brilliance, colour intensity as well as chemical and mechanical resistance.

Being extremely thin layers of less than 0,1 µm, luster decorations generally do not achieve the same chemical and mechanical resistance level as bright gold/platinum decorations. Their strength is laying in their artistical level, their special iridicent and metal colour effects.

The quality of a fired decoration derives from the interaction of the preparation, the application, the substrate surface and the firing conditions. With lusters, these influencing factors may cause significant deviations in the colour after firing. When using lustre pastes for the decoration of ceramic tiles, siginificant deviations in colour may occur depending on the glaze used. We recommend printing and firing tests under the ones own individual conditions.

4.1 Chemical resistance

Luster decorations typically do not achieve levels of chemical resistance which distinguish them to be judged as dishwasher durable. This statement is also true for LU ST 26 COPPER H.

4.2 Mechanical resistance

Luster decorations are comparably sensitive to scratching. Still luster decorations are regularly used for example for tile decoration. LU ST 26 COPPER H achieves a mechanical resistance within the boundaries of the product group of lusters.

4.3 Oxidation resistance

LU ST 26 COPPER H does not contain silver. Therefore fired decorations do not tarnish.

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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 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.

5.3 Recommendations for the usage

- Do not shake the luster prior to use.
- Draw from the bottle only as much as you can consume within 15 or 30 minutes and close the bottle. Consider that the solvent continuously evaporates in air and therefore the viscosity slowly increases.
- Apply the luster in a moderate layer thickness onto the object to be decorated. The material deposit will have a strong influence onto the achieved colour intensity and the iridicent effect.
- In case the luster should be sprayed, the material needs to be thinned before spraying. We recommend to use our special luster thinner V18 H. Pre-test under ones own individual conditions are necessary.
- Some general hints to the spraying conditions: for small objects we recommend the usage of a 0,2-0,4mm nozzle and a spraying pressure of about 3,0 bar / 43,5 psi. For larger objects we recommend the usage of a 0,8-1,0mm nozzle and a spraying pressure of about 3,5 bar / 50,8 psi. The optimal distance for the spaying needs to be determined in own tests. It is important that a smooth layer is achieved on the object, while at the same time minimizing the material loss in the spraying process.
- When applying lusters on tiles, the tile glaze might influence the colour impression of the luster decoration significanty.

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.	a) Too much thinner was used. b) The thinner was too fat or too slow drying.	a) Leave the bottle open for a while, so that some of the solvent can escape. b) Leave the bottle open for a while, so that some of the solvent can escape. Use quick drying thinner.
Lustre runs.	Concentration of organic vapours in kiln too high.	Decrease kiln stacking and/or increase kiln ventilation.
Lustre is difficult to apply.	Viscosity is too high after long application or long storage.	Thin lustre with V 35 or V 18.
Spots.	Objects were soiled by dust, finger marks or water drops.	Clean the object before decorating.
Firing faults.	Problems in the kiln such as: a) Reducing atmosphere in kiln. b) Insufficient ventilation. c) Heat increase is too fast during critical phase between 200-400°C. d) Too many objects in the kiln.	a) Increase air addition. b) Improve ventilation. c) Reduce the heating speed. d) Reduce the number of objects in the kiln.
Lustre flakes off after firing.	a) Applied layer is too thick. b) Applied layer is too thin.	a) Reduce the applied layer of the lustre. b) Increase the applied layer of the lustre.
Low mechanical resistance of the lustre decoration.	Firing temperature is too low.	Increase firing temperature.

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Defect	Possible Cause	Counter measure
Contour lines are blurred after lustre has been fired (decoration runs).	Too many objects in kiln.	Reduce the number of objects in the kiln.
Fine pinholes.	Pinholes can be caused by moisture on the surface of the objects to be decorated. For example, condensation occurs when the ware is brought from a cold store into the warmer workshop.	Reduce the number of objects in the kiln.

Contact
Heraeus Tokmak A.S. | Kemalpasa O.S.B. Mah. 37. Sok. No:6 | 35170 | Izmir | Turkey | +90 232 8772 410

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.