



## Heraeus Low Temperature Gold (HLTG™) for Direct Screen Printing

### 1 General Information

Heraeus Low Temperature Gold HLTG 1001D is the worldwide first bright gold paste for direct screen printing that can be fired at a temperature of only 180 to 250°C. For this reason, the new Low Temp Gold can be combined with Organic Colours.

Heraeus Low Temperature Gold HLTG is suitable for printing on glass, of course – flacons, bottles, glasses, for example – but can also be deployed on other substrates. What matters is the surface to be absolutely smooth.

In order to provide the cured, bright gold film with the mechanical and chemical resistance needed, we recommend overprinting it with either the screen printing UV clear coat HLTG 1901D or the water based spraying coat HLTG 1904D NP/CC. Both have been developed specifically for this system.

### 2 Conditions For Curing

Heraeus Low Temp Gold (HLTG™) can be cured at a temperature of 180 to 250°C in about 15 to 30 minutes. Higher temperatures over 200°C provide a better chemical reaction of the paste's organic components and result in a brighter gold shade of colour.

Alternatively, Low Temp Gold decors can be tempered with industrial infrared heaters to implement shorter curing cycles. When curing, it is important that the evaporating materials are dissipated quickly enough. Our colleagues from Heraeus Noblelight, worldwide market leader for industrial light sources, are pleased to advise you. Contact: [hng-uv@heraeus.com](mailto:hng-uv@heraeus.com)

The cured gold decor must be coated with a protective coat. We recommend either our screen printing UV clear coat HLTG 1901D or the water based spraying coat HLTG 1904D NP/CC. Both coats have been developed specifically for this system and feature a high transparency.

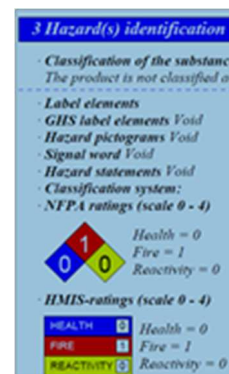
### 3 Properties of Heraeus Low Temp Gold

Heraeus Low Temp Gold is a water/alcohol based system. The screens used need a water-resistant emulsion. Screens can be cleaned with water.

The material is exempt from heavy metal.

With respect to transportation, the material is no dangerous good; this facilitates the transportation and keeps the transportation costs at a low level.

With HLTG 1001D there is currently a 12% gold paste available. Heraeus Precious Colours is working on further gold shades of colour.



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#### Heraeus Deutschland GmbH & Co. KG

HPP – BL Precious Colours  
Heraeusstraße 12-14  
D-63450 Hanau  
Telefon: ++49 (0) 6181 35 4420  
Telefax: ++49 (0) 6181 35 9637  
e-mail: [preciouscolours@heraeus.com](mailto:preciouscolours@heraeus.com)  
internet: [www.heraeus-preciouscolours.com](http://www.heraeus-preciouscolours.com)

## 4 Accomplishable properties of finished HLTG™ decors (with a cover coat)

Low Temperature Gold decors coated with either UV cover coat HLTG 1901D NP/CC or spraying coat HLTG 1904D NP/CC, have undergone several tests, respectively.

Since the system is still very new and Heraeus Precious Colours is working on further improvements of the system, all results of these tests can only be regarded as provisional first results. The system provides manifold possibilities that by far couldn't be tested completely though.

Due to the fact that the system is designed completely new and builds on a totally different basis compared to well-known brilliant preparations, we are very interested in supporting customers in terms of application technology in testing and working with this new product generation.

An important requirement for good mechanical and chemical properties of the finished gold decor is the cleanness of the substrate's surface prior to the decoration. Contamination of all kinds can severely affect the decor's persistence. Therefore, we generally recommend to flame the surface prior to the decoration.

### 4.1 Dishwasher Durability

Glasses which are printed with HLTG 1001D and coated with the special UV clear coat HLTG 1901D NP/CC have endured more than 250 rinse cycles in a Winterhalter-dishwasher without visible offence and proved themselves to be dishwasher durable.

Test decors which have been coated with the water based spraying coat HLTG 1904D NP/CC even showed much better rinsing results above 500 rinse cycles. Amongst other things, this can be attributed to a higher coating strength and an all-embracing covering of the precious metal layer.

Scratches in the decors that disrupt the cover coat can lead to a worsening of the results.

### 4.2 Mechanical Durability

the mechanical resistency is consistent with the common mechanical durability of organic systems. Without covering coat, HLTG lacks resistance and is easily scratched.

### 4.3 Durability against solvent-containing substances (Perfume)

Test decors have been exposed to a solvent-containing test substance for 24 hours before drying them for three hours and undergoing a tape test.

All decors successfully passed the test.

### 4.4. Scotch Tape Test (without prior "Freezing" and on coated bottles after Freezing)

Test decors passed the simple tape test without prior Freezing. They didn't pass the Heraeus Freezing Test.

## 5 Storage

Heraeus Low Temp Gold should be stored at temperatures between 22 and 30°C. In contrast to conventional bright preparations Low Temp Gold must NOT kept cool. When kept cool, the paste can become solid. However, by a moderate and short heating (ca. 60°C) the paste can be transformed back into a workable state.

We recommend to use up the paste within six months.

## 6 Processing

### 6.1 Preparation of the substrate

Please pay attention that the item to be decorated is free from any dirt or grease remnants. If the substrate's surface is contaminated, the resistance of organic colours on the substrate can be

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affected. Flame treatment of the surface prior to the decoration is recommended and also serves as an activator of the surface. HLTG only performs strongly on activated surfaces. The surface energy should be about 45-55 mN/M.

With respect to Pyrosil®: first tests showed that the treatment of surface with Pyrosil, which is recommended to improve the resistance of Organic Colours, leads to matt heating results of the LTG. Recent tests however show different results. It depends very much on the homogeneity and the coat strength of the Pyrosil cover. Further tests for the determination of critical values are still necessary.

Current conclusion: If you don't want to take a risk concerning the brilliance, you only flame and do without Pyrosil. Apart from that, we recommend tests under your own specific conditions.

## 6.2 Making A Low Temp Gold Decor

- Pay attention to surroundings as clean as possible
- Screens must be produced with a water-resistant emulsion since HLTG is a water/alcohol based system
- Printing HLTG requires considerably finer screens than the ones used for converting usual bright gold pastes for direct screen printing for conventional burning process. We recommend to print HLTG 1001D with a 164-24 to 190-31 polyester screen. HLTG™ does not dry at room temperature. After a short time for the leveling process it can be tempered.
- Tempering of the gold decor. In order to get a gold shade of colour as yellowish as possible, the item must be fired at temperatures above 200°C, 250°C maximum. Recommendation: 30 minutes at 200°C, 20 minutes at 230°C and 15 minutes at 250°C.
- Furthermore, organic colours can be combined with HLTG™. In principle, what can be combined are solvent-containing organic colours as well as UV systems. Keep in mind that in order to realize the combination HLTG™ must be printed and cured at first.
- At last, we recommend to overprint and cure the whole decor with UV clear coat HLTG 1901D NP/CC.
- Protecting HLTG 1001D, the gold layer can alternatively be overprinted and tempered with our special spraying coat HLTG 1904D NP/CC

## 6.3 Cleaning Of Screens

Having printed Heraeus Low Temp Gold, the used screens can be cleaned with water. Use deionized water if possible.

## 7 Frequently occurring defects, causes and notes to correction of defects

Defects	Possible Causes	Notes to correction of defects
Heraeus Low Temp Gold has become solid.	<ul style="list-style-type: none"> <li>Material has been kept too cool.</li> </ul>	<ul style="list-style-type: none"> <li>Store material at 22-30°C. Avoid cool storage.</li> <li>Heat material slowly (up to 60°C) and stir it; it can be used again.</li> </ul>
Matt gold layer after being tempered.	<ul style="list-style-type: none"> <li>Has glass surface been treated with Pyrosil?</li> <li>Layer strength of HLTG that is too thick.</li> <li>Printed HLTG layer crystallizes partially</li> </ul>	<ul style="list-style-type: none"> <li>Just flame substrate. Don't treat with Pyrosil (or test finer layer)</li> <li>We recommend the usage of 165-24 to 190-31</li> <li>Please check on room temperature!</li> </ul>
Poor resistance of gold decor.	<ul style="list-style-type: none"> <li>Gold hasn't been overprinted with a cover coat.</li> <li>Substrate hasn't been cleaned before printing.</li> </ul>	<ul style="list-style-type: none"> <li>Overprint HLTG with a clear coat. We recommend UV cover coat HLTG 1901D P/CC or spraying coat HLTG 1904D NP/CC</li> <li>Substrate should be flamed before printing.</li> </ul>
Gold layer is quite dark.	<ul style="list-style-type: none"> <li>Curing temperature too low</li> <li>Matt subfont.</li> </ul>	<ul style="list-style-type: none"> <li>Higher temperatures (250°C max) lead to brighter gold shades of colours.</li> <li>Requirement for a good result is the absolute smoothness of the surface to be printed.</li> </ul>
Streaks towards squeegee.	<ul style="list-style-type: none"> <li>Squeegee is battered</li> <li>Rigidity of squeegee is not proper</li> <li>Angle of squeegee too steep</li> <li>Push of squeegee too high</li> </ul>	<ul style="list-style-type: none"> <li>Use new squeegee</li> <li>Use proper squeegee</li> <li>Adjust angle of squeegee</li> <li>Adjust push of squeegee</li> </ul>
Irregular printing image / colour striae parallel to direction of squeegee, especially with transparent shades of colours.	<ul style="list-style-type: none"> <li>Imprecise push of squeegee</li> <li>Squeegee clatters</li> <li>Vibration during printing</li> <li>Printing speed too high</li> </ul>	<ul style="list-style-type: none"> <li>Adjust push of squeegee</li> <li>Adjust angle of squeegee</li> <li>Stabilize printing machine</li> <li>Reduce printing speed</li> </ul>
Printed layer rolls off from surface, seizes	<ul style="list-style-type: none"> <li>Surface Energy too low</li> <li>Substrate's surface dirty</li> </ul>	<ul style="list-style-type: none"> <li>Higher activation needed</li> <li>Clean and flame surface</li> </ul>

## 7 Safety Instructions

UV colours can lead to skin irritations and trigger hypersensitivity. We recommend the application of disposable gloves and safety glasses when converting the colours. Further facts regarding safety can be learned from the safety data sheet.

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## 8 Products

<i>Products</i>	<i>Shade of Colours</i>	<i>PM-Content</i>								<i>Notes</i>
<i>HLTG® 1001/D H</i>	Yellow									Bright gold paste for direct screen printing
<i>HLTG® 010915 H</i>	Yellow									Bright gold for spray application
<i>HLTG 1901D-NP HD</i>	UV-clear coat									Screen printing
<i>HLTG 1904D-NP HD</i>	Spraying coat									Water based spray

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