# Technical Information

## FG02

# Laser Marking Materials

Vibrantz laser marking materials offer permanent, high-resolution and high-contrast marking for a wide range of metals as well as for glass and ceramic products. The product range is used in various market segments:

- **Automotive and Aerospace industry**
- **Advertising specialties**
- **Sanitary and tile industry**
- **Glass tableware**
- **Medical and surgical equipment**
- **Cosmetics**
- **Kitchen utensils**

## Product types

### CerMark – a Vibrantz trademark

Vibrantz CerMark™ Laser marking materials are first choice products in terms of quality and durability. The product range includes liquid products and pastes as well as spray cans and tapes. Spray cans and tapes are easy to handle, while liquid and paste products are suitable for spray application, screen printing, airbrush or brush application. Depending on the material properties and thermal conductivity of the substrate to be marked, Vibrantz offers the most suitable product for the marking process.



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| Material | Thermal conductivity (Watt/cm K) | Level of difficulty | Product recommendation Vibrantz |
|---|---|---|---|
| Silver | 4,01–7,1 | Very difficult | LMM 14 or LMM 6000 |
| Copper | 4,29–4,50 | Very difficult | LMM 14 or LMM 6000 |
| Gold | 3,18 | Difficult | LMM 14 or LMM 6000 |
| Brass | 3,02 | Difficult | LMM 14 or LMM 6000 |
| Bronze | 2,61 | Difficult | LMM 14 or LMM 6000 |
| Aluminum | 2,37 | Difficult | LMM 6904 |
| Nickel | 0,91 | Medium | LMM 14 or LMM 6000 |
| Tin | 0,52 | Easy | LMM 14 or LMM 6000 |
| Stainless steel | 0,3 | Very easy | LMM 6000 |
| Titanium | 0,22 | Very easy | LMM 14 or LMM 6000 |
| Ceramics | | Medium | LMC-Series |
| Glass | | Medium | LMC-Series |

## LMC-Series for glass and ceramics

The Vibrantz LMC series is suitable for high-contrast and permanent markings on glass and ceramics. The marking material is available in different packaging sizes and is characterized by environmentally friendly cleaning.

| Product name | Properties | Specialties | Packaging |
|---|---|---|---|
| LMC 6044 Black Aerosol Spray Can | Water based | Easy and environmentally friendly cleaning | Spraydose á 340 Gram |
| LMC 6044 Black Laser Mark | Water based | | 50, 100, 250, 500 and 1000 Gram |
| LMC 6098 White Marking | Water based | | 50, 100, 250, 500 and 1000 Gram |

## LMM–Series for metal

The LMM series includes deep black, copper and beige marking materials available in spray, paste or tape. When applied to various metal substrates, they ensure permanent marking, combined with high thermal, mechanical and chemical resistance. The laser marking also withstands intensive radiation from UV and sunlight as well as extreme weather conditions. The contrast produced also improves legibility.

| Product name | Properties | Specialties | Packaging |
|---|---|---|---|
| LMM 6000 Black Aerosol Spray Can | Ethanol-based | Fast drying | Spraydose á 340 Gram |
| LMM 6000 Black Paste | Ethanol-based | | 50, 100, 250, 500 and 1000 Gram |
| LMM 14 Black Aerosol Spray Can | Ethanol-based | Fast drying | Spraydose á 170 Gram |
| LMM 14 Black Paste | Water based | Easy and environmentally friendly cleaning | 50, 250, 500 and 1000 Gram |
| LMM 6012 Black ScreenPrintable | Ethanol-based | Suitable for screen printing. Fast drying | 1000 Gram |
| LMM 6151 Copper Metal Mark | | | 50, 100, 250, 500 and 1000 Gram |
| LMM 6150 Pearl Laser Mark | | | 50, 100, 250, 500 and 1000 Gram |
| LMM 6904 Black Anodized Aluminium | Water based | Especially for anodized aluminium | 50, 100, 250, 500 and 1000 Gram |
| LMM 6018 Marking Tape | | Especially for stainless steel and anodised aluminium | 1"x50ft, 2"x50ft, 3"x50ft and 4"x50ft Roll |

# Methods of Use and Recommendations

**Vibrantz** laser marking materials are available as pastes, spray cans or tapes and are suitable for the following application methods:

- Spray application
- Airbrush
- Silkscreen
- Brush application

The substrate should be cleaned before marking to ensure that it is free of lubricants and oils. Please refer to the Safety Data Sheet (SDS) for safe use, handling and disposal information.

## Thinning

The laser marking materials are basically already in a ready-to-use condition. However, pastes can be diluted as required.

## Marking process

Suitable media and recommended mixing ratios are documented in the technical data sheets. The application of the materials can be easily integrated into the production process and is carried out in a short time.

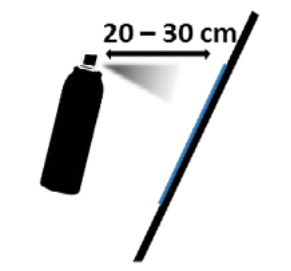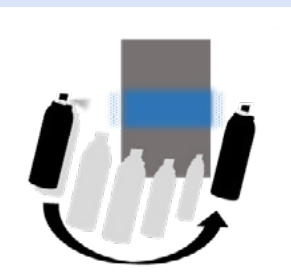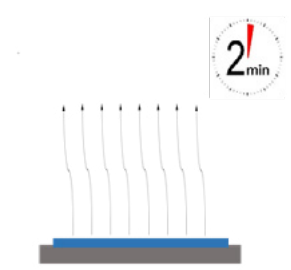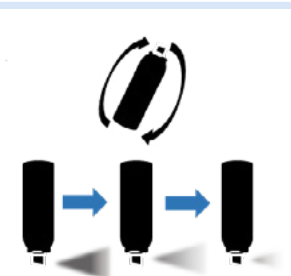| 1 | Apply the laser marking material evenly and constantly. The material is applied with the brush, a spray can or with a tape on the substrate. |
|---|---|
| 2 | Drying of the laser marking materials (only for liquid products). |
| 3 | The laser burns the laser marking material on the substrate (laser bonding). |
| 4 | The excess marking material is removed |
| 5 | Inspection of the marking - done. |

## Handling of spray cans

The handling of aerosol products has several special features. The following recommendations apply to all CerMark aerosol products and especially to LMM 6000:

| 1 |  | Shake the spray can well before using. Allow the agitator ball inside the can to rattle for at least 2 minutes to avoid spitting and clogging of the material delivery system. |
| --- | --- | --- |
| 2 |  | CerMark recommends spraying the metal parts 8-12 inches (20-30 cm) from the part itself. |
| 3 |  | Apply the material as an even thin coat, by using a left-right motion while spraying. Avoid spraying directly at the part without the left-right motion, as this spraying process will lead to an uneven coat. Always start and finish the spraying process off the part. |
| 4 |  | Allow the material to dry thoroughly. It will air dry in about 2 minutes. The drying time can be reduced by using a hair dryer or a heat lamp. |
| 5 |  | After usage, the spray system should be cleaned by inverting the can and spraying until mist becomes clear. This will only take a few seconds and very little product will be lost during this process. Any excess material on the nozzle should be cleaned off with water. |

## Storage

Laser Marking Products must be stored in cool and dry conditions. Storage temperature should be between 40°F (5°C) and 95°F (35°C). Do not expose to temperatures exceeding 50°C (120°F).

**Paste:** Settling may occur if stored for long periods of time. Before use, products must be stirred thoroughly.

## Shelf life

Partly used containers must be tightly sealed after use. If stored as recommended, a minimum shelf life of one year for spray cans and two years for pastes and tapes is guaranteed.

## Laser Settings

It is difficult to determine the correct power and speed settings for creating high quality laser marks using CerMark marking materials. There are numerous variables that must be considered when establishing the proper settings. The type of substrate, its thickness and the substrate's ability to conduct heat will all have an influence in the process. For example, aluminum conducts heat much better than steel, so it will require more marking power (heat) to do so. A thicker substrate will dissipate heat much faster than a thinner one, again meaning more marking power needed to achieve a good mark. More variables come into play when you consider the laser used to produce the mark. The laser's wattage, the type of optics it employs, the quality of the beam, the spot size, and even the software can affect the mark quality achieved via the laser settings. For example, a higher wattage laser will deliver more energy than a lower wattage laser; a smaller spot size will mean more power in a given area. Keeping all of these variables in mind, it is hard to make specific recommendations for laser settings when marking with CerMark products. We can recommend a starting point for power and speed, but this may not be the best for your particular application. So, what is the magic equation that crunches these variables into a perfect power and speed setting?

Well, in short, there is no equation that can calculate the perfect setting. But there is a method which will allow you to quickly and efficiently determine a proper power and speed setting for any type of substrate you choose to mark. The key is to create a power & speed test grid.

## Designing a Test Grid

The goal is to make a series of marks on the metal you want to laser that will vary from low heat to high heat. The grid should look something like the one shown in Figure 1. In this grid, P denotes % Power and S denotes % Speed. The Color Mapping option in your laser system is designed to allow you the flexibility of running multiple laser settings one after the other as one job file. Contact your laser manufacturer or reference your laser Owner's Manual to understand Color Mapping. Adjust your laser's settings to match the selected colors, and then mark the substrate (See Figure 1).

*Note: If your laser system speed is controlled by millimeters per second created the speed steps in increments of 50 mm/sec starting at 50 mm/sec.

# Evaluating the Test Results

After laser marking the part, wash off the CerMark and observe the variation in the marking quality. They should range from barely visible to a slight destruction of the substrate, as seen in the photo in Figure 2. Now, scrub the test marks using the abrasive side of a kitchen scrub pad. The mark with the highest contrast and durability will be your settings. Be careful not to overpower or damage the part. Remember the mark is only as durable as the surface you are marking on. In this example, settings at 100% power and 15–30% speed are optimal. If you are using a lower wattage laser, i.e. 25 or 30 watts, and are having trouble marking aluminum & brass substrates, increase your Dots per Inch (DPI). This will deliver more energy to the surface of the substrate, or, start your test grid with 100% power and 20% speed stepping the speed down as you go.
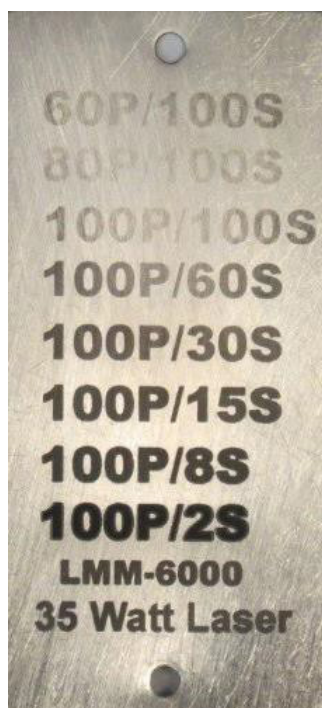


**Figure 1**



**Figure 2**

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