
Vitratek Porcelain Enamel

General Specifications

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Description Porcelain Enamel is a mixture of mineral content glass and inorganic pigments fused to a steel substrate at temperatures exceeding 1400° Fahrenheit. This extreme temperature literally melts and fuses the glass to the steel, forming a molecular bond and creating a permanent coating. Graphics are applied with glass-based inks by a variety of methods including traditional screen printing, stenciling and a high resolution photographic process. Each color is applied and fired one layer at a time. This process produces the most visually striking and durable signage material available.

- Attributes**
- Beautiful graphics, vivid color and high resolution photographic reproduction
 - Impervious to moisture and temperature extremes
 - The best UV protection in the industry
 - Will not delaminate
 - Extremely scratch resistant
 - Graffiti resistant
 - Can be imaged on both sides creating double-sided signage
 - Can be used as an artistic medium
 - Numerous imaging techniques

Imaging Print: High resolution printing process utilizing glass-based inks.
Input Resolution: 200 - 400 DPI
Output Resolution: 100 - 300 LPI (equivalent to 2400 DPI)
Color space: Combination of CMYK and spot color (CMYK is used for photographic elements, spot color is used for vector-based graphics). The quality of Porcelain Enamel graphics is outstanding. The colors are bright and vibrant and photography reproduces remarkably well. Fine detail, small text and color gradations also reproduce extremely well. Porcelain is unique in that the graphics are fused to the surface creating extremely clean, clear, sharp graphics. The ink can also be applied quite heavy, creating texture and depth that simply cannot be achieved in other materials.

Size Maximum panel size: 4' x 7' (48" x 84")
Maximum continuous image size: 4' x 7' (48" x 84")
Murals can be tiled to any size, with graphics indexed over the entire surface.

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Material Specifications

Porcelain Enamel is fabricated from a special low carbon sheet steel as either flat or flanged panels. Flat panels can be cut to shape and flanged panels can have various flange dimensions. Following are specs for material thickness and flange dimensions:

- Flat panels can be fabricated from 14 gauge (.075") 3.12 lbs/sq ft., 16 gauge (.060") 2.5 lbs/sq ft. or 18 gauge (.048") 2 lbs/sq ft. sheet steel. 16 gauge is the standard material used for most applications, 14 gauge is used more for shaped pieces where more rigidity is required, and 18 gauge is used when the porcelain needs to conform to a slight radius (please note: 18 gauge is more susceptible to edge burn-off which can lead to exposed edges).
- The addition of the porcelain coating adds approximately .012" to the overall panel thickness and .5 lbs/sq ft. to the overall weight.
- Flat panels can be laser-cut to a particular shape but need to be cut prior to the application of the porcelain coating.
- Flanges can be added to create a pan-shaped piece. The edges are welded and ground smooth to create a finished look.
- The minimum flange dimension is 3/8" (outside dimension) but should only be used for smaller sized pieces up to 24" in either dimension.
- The maximum flange dimension is 2" (outside dimension) and is typically used for larger sizes.
- Special flanges such as beveled, return, or kick-out flanges are also possible, however, it is best in these situations to consult with KVO regarding the feasibility of your designs.

Finish

- High gloss
- Semi-gloss - only available for background colors; graphics must be regular gloss.

Applications

- Interpretive signs for parks, zoos, aquariums etc.
- Exhibit signage for museums
- Wayfinding for campuses, business parks, retail outlets etc.
- Signs for resorts, theme parks, and recreation facilities
- Corporate identity
- Architectural signage
- Wall murals and interior design
- Commissioned art pieces

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Delivery Color proofing: 2 - 4 weeks
Manufacturing process: 4 - 8 weeks
Shipping: 1 week
Total: 12 weeks (average)
For CMYK printing, color proofing is highly recommended to assure the final product matches your requirements for color and image quality. For spot colors, porcelain color submittals are recommended. A week for shipping should be allowed unless prior arrangements have been made for expedited shipping.

Warranty We guarantee all Porcelain Enamel work against fading due to UV exposure for a period of twenty five (25) years from the date of delivery. We further guarantee all work to be free from defects in materials or workmanship, chipping, delaminating, rusting or deteriorating in any way, with the exception of vandalism, mishandling or improper installation, for a period of five (5) years from the date of delivery. Please note: You must have a written warranty from KVO Industries for your specific project before any claims can be honored.

Performance Porcelain Enamel conforms to the following performance requirements:

- ASTM C346 Gloss of Ceramic Materials 45° Specular
- ASTM D2244 Instrument Evaluation of Color Differences of Opaque Materials
- ASTM C703 Spalling Resistance of Porcelain Enamel
- ASTM C538 Color Retention of Red, Orange and Yellow Enamels
- ASTM C282 Citric Acid Spot Test
- ASTM C283 Boiling Acid Test
- ASTM C614 Alkali Resistance Test
- ASTM B117-571 Salt Spray Test
- Porcelain Enamels are completely resistant to attack by common organic solvents, dyes, greases and oils. Porcelain Enamels are not dissolved by these materials and do not absorb them.
- Porcelain Enamels are formulated with relatively inert inorganic oxides, thus providing an impervious surface that is highly resistant to most chemicals. Resistance to the following chemicals may be provided:
 - Strong Acids (HCL-H₂SO₄) - Any concentration at temperatures up to 375° F
 - Alkali - Maximum pH of 12 at 212°F
 - Water - 190°F (88°C) continuous service
 - Organic acids and solvents, oils, ultraviolet light, salt spray, and soil corrosion
- Hardness - Porcelain enamel on steel falls in the range of 4-5.5 on Mohs scale of mineral hardness (about the same as plate glass). Porcelain Enamel surfaces are unaffected throughout the range of pencil hardness scratch tests commonly used to evaluate organic finishes. Comparable values on the Knopp scale range from 149 to 560. The Sward rocker rating is 100, the same as plate glass.

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Performance (cont.)

- ASTM C448 Abrasion Resistance of Porcelain Enamels - Porcelain Enamel coatings provide excellent abrasion and wear resistance, with every formulation being substantially more abrasion resistant than the hardest organic coating.
- Impact Resistance - Porcelain Enamel can be very strong and flexible if properly installed. As a general rule, porcelain enamel will not fracture due to impact unless the base metal is permanently deformed. Because of its high compressive strength, the enamel is rarely crushed at the point of impact. Porcelain Enamel's compressive strength is in the range of 20,000 psi.
- ASTM C359 Linear Thermal Expansion of Porcelain Enamel and Glass Frits and Ceramic Whiteware Materials by the Interferometric Method
- Color Permanence - Porcelain Enamel provides a permanent lifetime finish in an unusually broad spectrum of colors and hues. Pigments used are primarily inorganic compounds fused into the glass matrix and are extremely stable during aging. The colors are highly resistant to deterioration or change as shown by long-term outdoor exposure tests conducted by the National Institute of Standards Technology (NIST) and the Porcelain Enamel Institute (PEI) at a variety of test sites over a period of thirty (30) years or more.

Usage

Porcelain Enamel should be considered a decorative skin and therefore typically requires a backing material for support. Backing Porcelain Enamel also greatly increases the impact resistance, eliminates oil-canning, and sound-deadens the product.

- All cutting, drilling or routing needs to be performed prior to the enameling process. Any of these functions performed on-site can cause the glass to break away from the steel substrate and will leave exposed steel, causing any warranties to be void.
- It is best to avoid exposed edges when installing Porcelain Enamel. The edges are the most susceptible area for damage. It is best to consult with KVO prior to manufacturing to determine how you intend to install the product. When properly installed, porcelain enamel is extremely durable.
- Most damage to Porcelain Enamel occurs during installation. It is best to consider this product similar to plate glass and therefore it should be handled accordingly during installation. Always place the product on a protective surface and avoid bumping one panel into another. Never over-tighten hardware; finger-tight is enough. It is also recommended to use protective nylon or neoprene washers between the porcelain and the hardware. Once installed, Porcelain Enamel is extremely durable and will last for many years.

Cleaning and Maintenance

Typically, Porcelain Enamel requires little to no maintenance, however, periodic cleaning may be required. If so, clean with soap and water and finish with a household glass cleaner. An annual coating of a carnuba-based wax once a year will keep the product bright and clean, as normal dust and grime will wash away easier with rainfall or regular cleaning with a hose. Waxing will also hide minor scratches or abrasions, and aids in the removal of graffiti such as crayons, lipstick or spray paint, and helps to resist water spots.

- For a periodic thorough cleaning use a solution of water and a simple household liquid detergent. Apply with a sponge or rag and hose off with clean water. For stubborn areas a mild abrasive can be used such as Comet or Tilex (remember, porcelain has a very hard durable finish and is very scratch resistant). Finish with a common glass cleaner.
- Due to its non-porous, baked glass finish virtually nothing will stick permanently to porcelain. To remove spray paint, grease markers, permanent ink etc. Any type of solvent or lacquer thinner will work well. To remove any grease or film left behind finish again with glass cleaner.
- To remove tape, glue, tree sap etc., any of the above mentioned remedies can work but may require the use of a sharp razor blade to scrape off the material. As long as the razor blade is sharp, it will not scratch or damage the surface of the porcelain in any way.
- To remove water spots use a mild abrasive as previously mentioned. To prevent water spots, apply a good quality carnuba-based wax periodically.

Damage and Rust

Chipped enamel: To repair any chips that may occur to the porcelain it is best to use a good quality automotive paint. It may be difficult to get an exact match to the color you need but for small areas this would not be as big a problem as the potential for rust to form from the damaged area. To apply the paint use a Q-Tip or a small, good quality brush. Most paint companies will provide a small quantity of paint for a nominal charge. For a large damaged area call KVO Industries for advice. If the damage is repairable we may be able to find someone in your area to assist you. If the damage is too severe the panel would most likely have to be replaced.

Rust: If you notice rust forming you should first try to locate the source of the problem. Most rust forms as a result of improper installation (chipped corners, incorrect hardware etc.) but is sometimes unavoidable. The smallest area not covered with glass may begin to rust and, over time, become noticeable. Once again, the exact source of the problem needs to be determined before it can be remedied.

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Damage and Rust (cont.)

This may involve removing the panel in question (if you need assistance please call KVO Industries). To fix the problem, clean all the rust from the panel using the various methods mentioned earlier and make sure the area is completely dry. You may have to lightly sand the area with a fine-grit sand paper to remove the rust completely. Once the area is prepped and dry, apply a good quality primer. If necessary, the area can then be finished with a good quality automotive paint as previously mentioned. Typically any rust that may develop originates along the edges of the returns or in the corners on the backside of the panel. This usually does not pose as a problem unless the rust becomes visible on the face.

For more information:

For more information about Vitratek Porcelain Enamel or any of our other products or services please contact KVO Industries at:

1825 Empire Industrial Court, Suite A
Santa Rosa CA 95403
p 707 573 6868
f 707 573 6888
kvoindustries.com