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# Vitratek Porcelain Enamel

Contract Specifications



KVO Industries Inc.

# **SPECIFICATIONS FOR VITRATEK™ PORCELAIN ENAMEL SIGN MATERIAL**

This specification represents the combined experiences of the porcelain enamel industry, specifiers, engineers, architects and designers, as well as related professional organizations and testing institutions. While new and important improvements will be offered as they are tested and proven, these specifications represent a commonly agreed upon definition and standard for workmanship, performance, manufacture and supply of porcelain enamel signs as of this date.

## **PART I - GENERAL SPECIFICATIONS**

### **1.1 DOCUMENTS**

These specifications form part of the Contract Documents and are to be read, interpreted and coordinated with all other parts of the document.

### **1.2 SCOPE**

These specifications apply only to the manufacture and supply of signs and graphic images in porcelain enamel on steel.

### **1.3 DEFINITIONS**

#### **1.3.1 PORCELAIN ENAMEL**

Porcelain enamel on steel is a substantially vitreous (glassy) inorganic coating bonded to metal by fusion at temperatures above 1400° Fahrenheit. Porcelain enamel is not to be confused with baked paints or organic enamels.

#### **1.3.2 STEEL**

For purposes of this specification, “steel” is special purpose enameling iron or steel as defined by ASTM A424 Type 1. The standard thickness for most applications is 16 gauge (.060”). If required, the steel can be as thick as 14 gauge (.075”), and as thin as 18 gauge (.048”). Please note that porcelain enamel edge “burn-off” can occur on steel lighter than 16 gauge.

#### **1.3.3 FRITS/GLAZES/OXIDES**

Specially formulated porcelain enamel frits, glazes and oxides as supplied by Ferro, Chivit, APEC, Pemco, and Degussa. These materials when combined and processed in final form shall have no less than a Class A acid resistance rating as defined by ASTM C282 Citric Acid Spot Test.

#### **1.3.4 ART**

The graphic material and images as supplied by or directed under the supervision of the customer on this project. This includes electronic files, mechanicals, text, photographs, transparencies, film and other graphic source materials.

#### **1.3.5 APPROVALS**

Approvals shall be obtained at each stage of production and are the responsibility of the customer as submitted by the supplier. Work shall not proceed without the proper written authorizations.

#### **1.3.6 FASTENERS**

Stainless steel or cadmium plated steel.

#### 1.3.7 LAMINATES

Laminate material shall be bonded to the back surface of the porcelain enamel sign panel to meet structural and flatness criteria.

#### 1.3.8 ADHESIVES

Adhesives used to bond laminates shall be neoprene based cement. Adhesive shall be water resistant and heat resistant up to 100 degrees C.

### 1.4 REFERENCE STANDARDS

#### 1.4.1 PORCELAIN ENAMEL INSTITUTE

“ Specification for Architectural Porcelain Enamel on Steel PEI S-100 (65)”, by the Porcelain Enamel Institute, Arlington, VA, USA.

#### 1.4.2 VITREOUS ENAMEL DEVELOPMENT COUNCIL

“Vitranamel Quality Standards for Signs”, by the Vitreous Enamel Development Council, London, England.

## **PART II - GENERAL REQUIREMENTS**

The following requirements must be provided by the supplier and approved by the customer prior to fabrication.

### 2.1 REFERENCES

Supplier shall provide references for as many as 10 clients who have used their services to the satisfaction of the customer.

### 2.2 RELATED WORK

Related work shall be carried out by a qualified contractor as approved by the customer.

### 2.3 INSTALLATION

Installation shall be performed in a workmanlike fashion consistent with porcelain enamel requirements. Porcelain enamel company shall provide instructions if installation is to be performed by others.

### 2.4 INSTALLATION MATERIALS

As specified and detailed in drawings.

### 2.5 QUALIFICATION

Suppliers of materials and services shall have five years previous experience with projects of this scope.

### 2.6 SUBMITTALS AND SAMPLES

Upon the customer's request, the supplier must supply samples and colors relevant to the project.

### 2.7 QUALITY ASSURANCE

Quality of the entire project must conform to the specifications and bid submittals as approved by the customer.

#### 2.7.1 EXPERIENCE

Craftsmen shall have a minimum of five years proven experience in this type of work.

#### 2.7.2 EVIDENCE

The supplier shall provide the customer with evidence of having successfully completed the manufacture of two projects of similar scope within the preceding three years.

#### 2.7.3 SPECIFIC SUBMITTAL

The supplier shall provide specific samples of color matching and graphic resolution ability to the customer for approval.

#### 2.8 ENVIRONMENTAL

The supplier shall be able to demonstrate compliance with all workers' safety and environmental regulations in effect at the location of manufacture.

#### 2.9 WARRANTY

The supplier shall provide a signed written warranty issued in the name of the customer stating that the porcelain enamel signage has a guaranteed life of twenty-five years from date of delivery against fading and five years against spalling, pinholes, discoloration, staining, or rusting.

#### 2.10 WRITTEN GUARANTEE

The supplier shall also certify in writing that the porcelain enameling will be performed in accordance with the current edition of the PEI Technical Manual: section PEI 1001 – "Specification for Architectural Porcelain Enamel on Steel for Exterior Use", as issued by the Porcelain Enamel Institute of WA, DC.

#### 2.11 ACCEPTABLE MANUFACTURER

**KVO Industries**  
**1825 Empire Industrial Ct., Ste A**  
**Santa Rosa, CA 95403**  
**Tel: 707-573-6868**  
**Fax: 707-573-6888**

### **PART III - FABRICATION AND PROCESS**

#### 3.1 METAL APPROVALS

The supplier shall generate individual shop drawings from construction drawings provided by the customer. Fabrication shall not commence until said shop drawings have been approved.

#### 3.2 METAL FABRICATION

Steel substrates shall be machine fabricated in accordance with approved shop drawings and shall exhibit straight lines, square corners and/or smooth bends, and shall be free of twists, kinks, warps, dents, and other imperfections which may affect appearance or serviceability. Curved sections shall be formed to smooth and even radii.

#### 3.3 FLATNESS

Finished panels shall have a maximum variation of .188" in a convex direction when measured perpendicular to the nominal plane of the panel face. Variation in the concave direction shall be limited to .094" from the actual plane of the panel face. These tolerances are for panels with a face area of 8 sq. ft. or less. Proportionately greater allowance will be permitted for panels of greater areas.

### 3.4 SQUARENESS

Panels of less than 8 square feet shall be square within .063" as measured across the diagonal and within .094" on panels over 8 square feet.

### 3.5 WELDING

Fusion welds must be free of porosity, inclusions, foreign matter, cracks and pinholes. Any wire or rod fillers used must match the chemical composition of the base metal. All welds shall be ground and sanded smooth to match the radius of the mechanical break. Refer to Porcelain Enamel Institute Technical Manual "PEI-201" section 7.

### 3.6 HOLES AND CUTOUTS

The cutting of any holes shall be made by mechanical equipment and shall be completed prior to applying the enamel coating. All machined edges shall be sufficiently ground to hold a porcelain coating.

### 3.7 FORMING

All forming shall be via mechanical equipment and shall be completed prior to the porcelain enamel coating.

### 3.8 METAL PREPARATION / CLEANING

#### 3.8.1 DEGREASING

Prior to the enameling process, all parts shall be degreased by immersion in an approved degreasing fluid. Oil residues must be completely removed to ensure proper porcelain adhesion to the steel substrate.

#### 3.8.2 RINSING

All parts must be adequately rinsed prior to the phosphate coating process.

#### 3.8.3 COATING

Immediately after rinsing, all parts shall be immersed in a phosphate coating solution to avoid rusting of steel prior to and during the enameling process.

### 3.9 PORCELAIN ENAMELING

A porcelain enamel ground coat shall be applied to all areas of each unit, including backside and flanges, by spraying methods recognized by PEI and VEDC. At least one additional separately fired cover coating shall be applied to the face, sides, and flanges of each unit. For corrosion protection and flatness, one additional cover coating shall be applied to the backside of each panel.

### 3.10 FINISH

The cover coat shall not exhibit any breaks, gas bubbles, scumming, hairlines, stress lines or other surface defects when visually inspected.

### 3.11 FINISH AND BACKGROUND COLOR CONTROL

The color and finish shall match samples previously submitted by the supplier and approved by the customer within (2) NBS units (Note: a 1-2 NBS unit variation is barely perceptible to the human eye.)

### 3.12 GROUND COAT AND COVER COAT THICKNESS

Ground coat and cover coat applications shall be applied in accordance with PEI recommen-

ditions to a thickness range between 0.004" to 0.020", as required by the supplier to suit the intended use.

### 3.13 FIRING

Panels shall be fired at temperatures above 1400° Fahrenheit in a furnace specifically designed for porcelain enamel manufacturing. After firing, each panel shall be submitted to a visual inspection compared to the customer approved control sample for color consistency.

## **PART IV - ART AND IMAGING**

### 4.1 ART PREPARATION

The supplier shall produce film positives and / or negatives from mechanical artwork or electronic art files as supplied by the customer.

### 4.2 ART APPROVALS

All artwork, including laser separations, digital color composites, color keys, bluelines, and/or full size film shall be submitted to the customer for approval before it is reproduced in porcelain enamel.

### 4.3 ART WORK

Original artwork shall not be harmed in any way (writing, cutting, folding, rough handling, etc.) and shall be returned to the client upon successful completion and acceptance of the project.

### 4.4 IMAGING

The application of graphics shall be done using various imaging techniques as required to satisfy the design intent.

#### 4.4.1 LINE ART / SPOT COLOR APPLICATION

Line art and / or spot color shall be printed over background colors in perfect registration, with uniform edges, at a minimum output resolution of 1200 DPI. Line weight thickness shall be printed at a minimum of 1/2 point and type shall be printed at a minimum size of 6 points. The supplier is responsible for the appropriate trapping where colors touch.

#### 4.4.2 FOUR COLOR PROCESS

For panels up to nine square feet, four color process imaging shall be in perfect registration in a resolution of not less than 150 lines per inch (LPI). Please note: 150 LPI requires a minimum input resolution of 300 dots per inch (DPI) at full size, and a minimum output resolution of 2400 DPI. For panels greater than nine square feet, four color process imaging shall be in perfect registration in a resolution of not less than 100 LPI (200 DPI minimum input resolution and 1200 DPI minimum output resolution). If requested, supplier must be able to print at a maximum resolution of 300 LPI (600 DPI input resolution, and 3600 DPI output resolution) for panels which have a maximum dimension of 36" in either direction.

#### 4.4.3 TECHNICAL PROFICIENCY

Supplier shall be proficient in the following imaging techniques and able to demonstrate capabilities to the customer: reproduction of photographs or original art by halftone, duotone, and four color process, as well as special imaging techniques including hand painting, stencil brushing, spraying textures, and air brushing.

### 4.5 SCREEN PRINTING PASTES

Screen printing pastes shall be milled to a 400-mesh particle size or smaller and shall have suffi-

cient glass content to be acid-resistant, corrosion proof, opaque, UV proof, and vandal resistant.

#### 4.6 COLOR MATCHING

The supplier shall demonstrate proficiency in matching a wide range of colors as represented by color systems such as the Pantone Matching System (PMS), Matthews Paints, Toyo Inks, etc.

### **PART V – TRANSPORT AND DELIVERY**

#### 5.1 INSPECTION

Prior to crating, finished panels shall be inspected for blemishes, chips and flatness. Any panel not meeting the requirements of this specification shall be rejected and promptly replaced.

#### 5.2 CLEANING

All panels shall be cleaned in advance of packaging and/or crating.

#### 5.3 CRATING

All sign panels shall be packed in wooden crates that completely enclose them from exposure to the environment and/or equipment. The crates shall be lined with packing material so as to prevent movement of panels within the crates.

#### 5.4 DELIVERY

The responsibility of shipping shall be established per the contract as agreed upon by the supplier and the customer.

#### 5.5 FREIGHT CLAIMS

The receiver shall be responsible for reporting to the supplier any damage incurred during shipping and/or any freight claims within 48 hours of receipt.

### **PART VI - MAINTENANCE**

#### 6.1 MAINTENANCE

The supplier shall provide to the customer instruction documentation addressing the care, cleaning and maintenance of materials for incorporation into maintenance manuals.

### **PART VII - INSTALLATION**

#### 7.1 INSTALLATION

Installation shall be the responsibility of the customer based on supplier recommendations.

#### 7.2 ADHESIVES

When required, apply construction grade adhesive as shown on drawings and /or recommended by supplier.

#### 7.3 INSPECTION - SIGN PANELS

The customer shall be responsible for inspecting completed signage for clarity, proper registration of images, clean backgrounds, correct colors, complete and appropriate thickness of porcelain enamel coverage, blemishes, defects and general workmanship.

#### 7.4 INSPECTION - INSTALLATION

The customer shall be responsible for inspecting the installation site and coordinating the in-

stallation schedule.

#### 7.5 STORAGE AND PROTECTION

The customer shall be responsible for the storage of porcelain enamel signage units and related materials in an orderly and systemized fashion and in a manner that prevents damage and/or theft.

#### 7.6 TRANSPORT PROTECTION

The customer shall be responsible for protecting all porcelain enamel signage units from any and all damage during transportation to installation site.

#### 7.7 WORKMANSHIP

The customer shall be responsible for ensuring that all signage units are installed square, plumb, and level in accordance with applicable drawings and specifications.

#### 7.8 FINAL SIGNAGE CLEANING

The customer shall be responsible for cleaning the installed porcelain enamel signage with a quality glass cleaner, and ensuring the removal of all fingerprints, silicone, dirt, shavings, adhesive, dust particles, etc.

#### 7.9 SITE CLEANUP

The customer shall be responsible for cleaning the installation site prior to vacating the premises. Individual attention should be given to any and all work areas, walls, and/or floors that may have been soiled during the installation process.