

Lead-Free System Technical Data



VPS System

Main Market Use

These lead-free enamels are specially designed for decoration of borosilicate glasses.

Chemical Composition

Colors in this System do not contain voluntary

additions of heavy metals – Pb, Cd, Hg and Cr⁶⁺.

Exceptions are the cadmium-containing yellow, reds and oranges (marked * below) which need to use cadmium pigments, to provide the color tones required by the market.

VPS System contains lithium and we do not recommend these enamels for the decoration of pressurized containers.

COLOR	REFERENCE	Pantone
GREEN	VPS 1100	349 C
EMERALD GREEN	VPS 1101	322 C
ROYAL BLUE	VPS 2102	2945 C
ULTRAMARINE BLUE	VPS 2101	302 C
YELLOW	VPS 3100 *	102 C
YELLOW	VPS 3130	128 C
ORANGE	VPS 7101 *	Orange C
RED	VPS 7100 *	485 C
DARK RED	VPS 7103 *	201 C
BROWN	VPS 6100	4705 C
WHITE	VPS 9102	
BLACK	VPS 4100	
FLUX	VPS 857	

The Pantone references and color prints are provided as an indication of the shade only.

The above mentioned references are randomly selected color shades, please contact your respective Ferro Technical Service to get more information on further available colors.

The above mentioned references refer to the powder form only. If you want the thermoplastic paste, liquid paste or spraying form, make sure to add the suitable name of the medium – mentioned on page 5 - at the end of the reference.

These colors are intermixable. We recommend performing preliminary tests before launching production with color mixtures from this System, especially for combinations of red or yellow cadmium-containing colors (marked *) with any other colors.

Additional colours are available on demand.

Our technical service teams also offer a full custom-color matching service.

Expansion Coefficient (C.o.E.)

Avgc C.o.E. measured on the basic frit System is 60 (+/- 4).10⁻⁷K⁻¹.

The enamels are specially formulated for application onto borosilicate glass and they should be tested for suitability to the expansion of the glass to be decorated. The 'fit' of these enamels is also

dependent on application weight and to avoid microcracking or fracture problems, they should not be applied too thickly.

Recommended Firing Conditions

From 630°C to 650°C in a long cycle; from 630°C to 700°C in a short cycle. Enamels from this System are sensitive to overfiring. We recommend an oxidising atmosphere to give optimal fired appearance, gloss and brightness. It is essential to maintain good ventilation, and an efficient extraction of the combustion gases and the products resulting from decomposition of the medium.

Chemical resistance

Acid resistance: 7

Alkali resistance: 7

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