

Lead-Free System Technical Data



NPR System

Main Market Use

These lead-free enamels are intended mainly for the decoration of glass tumblers and tableware.

Chemical Composition

Colors in this System do not contain voluntary additions of heavy metals – Pb, Cd, Hg and Cr⁶⁺.

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

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

COLOR	REFERENCE	Pantone
GREEN	NPR 1820	7714 C
GREEN	NPR 1821 *	3425 C
BLUE	NPR 2822	301 C
BLUE	NPR 2824	293 C
BLUE	NPR 2826	7687 C
YELLOW	NPR 3820 *	108 C
YELLOW	NPR 3822	130 C
YELLOW	NPR 3823	114 C
RED	NPR 7820 *	485 C
RED	NPR 7822 *	202 C
WHITE	NPR 9820	
BLACK	NPR 4820	
FLUX	NPR 820	
ETCH	NPR 9822	

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.)

This system is suitable for most chemical compositions used in the production of soda-lime glass tableware.

Recommended Firing Conditions

From 630°C to 650°C in a cycle of 1 h to 1.5 h, with a soaking period of approx. 10 min, dependent on both the type of furnace and volume of ware fired.

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.

NPR glass enamels are suitable for tempering cycles; tests are recommended.

Chemical resistance

Acid resistance: 4
Alkali resistance: 5

Limitation of Warranty and Liability

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