

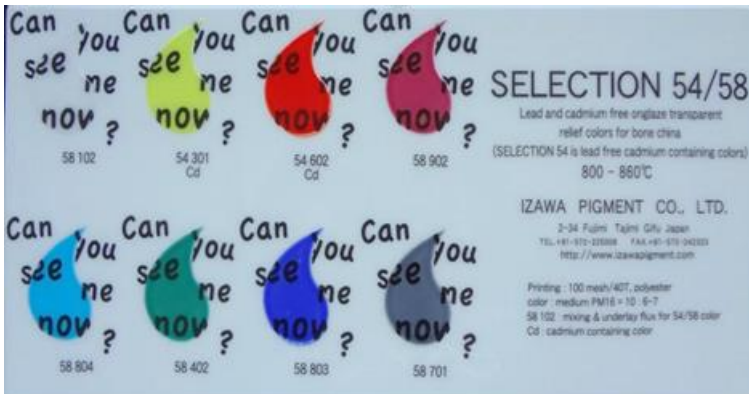
# SELECTION 58/54 800–860°C

Lead- and cadmium-free onglaze transparent relief colors

## 1. General Information

### Features!

- Very transparent color tone.
- Can see through under colors and look different tone depend on under colors.
- Coarse particle size and can make thick relief design.
- Lead and cadmium free except SELECTION 54 colors.
- Excellent combination with SELECTION 58M metallic relief colors.



## SELECTION 58/54 800–860°C Lead- and cadmium-free, intermixable, onglaze transparent relief colors for bone china.

Table 1

Product No.	Color tone	Pantone No.	Transparent	Intermixable	Precious metal containing	Lead free (below 90ppm)	Cadmium free (below 40ppm) *1	Acid resistant, DIN 1388-1-2 *2	Alkali resistant, ASTM C556-88 *3	58102 mixing and overprinting flux	Enamel ware	Bone, vitreous china, earthenware	Porcelain	Hard porcelain	Remarks
58102	flux		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	mixing and underlay flux, transparent relief itself
54301	Cd yellow		✓	✓		✓	*1	✓	✓	✓	✓	✓	✓	✓	cadmium containing, only cannot be mixed with 58902
58402	green		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
54602	Cd red		✓	✓		✓	*1	✓	✓	✓	✓	✓	✓	✓	cadmium containing, only cannot be mixed with 58902
58701	black		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
58803	cobalt blue		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
58804	turquoise		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
58902	magenta		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	only cannot mix with 54301 and 54602

\*1: lead- free cadmium containing colors

\*2: DIN EN 1388-1-2 : The test pieces are immersed in a 4% acetic acid solution for 24 hours at 22±2°C. Refer 8.2 and 8.3

\*3: ASTM C556-88 : The test pieces are immersed in a 0.5 % sodium carbonate solution in water at 95°C for 2, 4 and 6 hours. Refer 8.4

## 2. Firing Conditions

Type of ware	Firing range
Bone china	800–860°C

**SELECTION 58** and **54** are suitable for both normal firing for 3–10 hours and fast-firing for 60–120 minutes, cold-to-cold conditions. Also, use them with lead-free colors and glazes. Fire them only under lead-free conditions to avoid heavy lead release.

## 3. Application

**SELECTION 58** and **54** are suitable for screen-transfer printing, direct printing and hand painting.

## 4. Coefficient of Thermal Expansion (C.O.E.)

Product	Thermal Expansion (C.O.E.)
SELECTION 58/54 colors	$7.5-7.9 \times 10^{-6}/^{\circ}\text{C}$

## 5. Particle size of Distribution (P.S.D.)

Product	D <sub>50</sub> average	D <sub>100</sub> biggest
SELECTION 58/54 colors	20-25 $\mu\text{m}$ ( $\pm 5.0$ )	150 $\mu\text{m}$ ( $\pm 30$ )

## 6. Printing

### 【6.1 Relief printing】

We recommend mesh sizes that are 70-123 mesh/inch (27-48 thread/cm) for all screen applications.

We recommend printing 1-4 times. We do not recommend printing more than four times when there is a pinhole and a bubble on the surface and there is a drying time problem.

### 【6.2 Medium ratio and cover coat】

SELECTION 58/54 colors : Medium PM16	10 : 6-7
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We recommend PM16 flowing medium for relief printing. Adding just sufficient medium will improve the surface of relief, if it has pinhole problems.

We recommend C33 cover coat by printing 70 mesh/inch (27 thread/cm).

### 【6.3 special underlay flux】

58102 fluxes is specially developed as underlay flux for SELECTION 58 and 54 colors. Occasionally these colors react with glaze and become bubble surface. It is due to over fired, too high or too long. In this case we recommend printing 58102 underlay flux as first layer by same screen mesh of relief colors to avoid this issue.

Lead-and-cadmium free onglaze colors absorb moisture easily. Therefore, keep the powder colors in a dry place. We recommend drying the color powder before using.

## 7. Color and Mixability

You can mix SELECTION 58 and 54 colors with each other in any proportions (however, you cannot mix 58902 magenta with SELECTION 54 colors).

To lighten **SELECTION 58** and **54** colors, we recommend mixing with **58102** flux.

You can mix **SELECTION 58** and **54** with normal onglaze series, such as **SELECTION 35, 36** and **39**, but the relief become opaque and show bubble surface.

However, we recommend testing the stability of mixing colors and overprinted flux colors under end-user's firing conditions before mass production. Please note following points and refer to Table 1.

## 8. Chemical durability

Chemical durability of **SELECTION 58** and **54** depends on type of ware, glaze, kiln, color deposit, and firing conditions. The following are the results of tests on bone china, fired at 840°C, with 10 minutes of soaking time and 120 minutes of cold-to-cold firing conditions of gas kiln in production.

### 【8.1 Residual lead and cadmium content】

**SELECTION 58** colors contain less than 90 ppm residual lead and less than 40 ppm residual cadmium, with some exceptions (cadmium-containing colors \*1) and are therefore in compliance with Californian Proposition 65, FDA, CPSIA, EU, and Japanese requirements.

**SELECTION 54** Cadmium-containing colors, **54301** yellow and **54602** red contain less than 90 ppm residual lead and contain more than 50,000 ppm cadmium.

### 【8.2 Lead and cadmium release】

According to the DI EN 1388-1-2 test, **SELECTION 58** and **54** colors show lead releases are below AAS limits. **SELECTION 54** colors show below cadmium 0.02 mg/ dm<sup>2</sup> release.

### 【8.3 Acid resistance】

According to the DI EN 1388-1-2 test, **SELECTION 58** and **54** colors do not show any visible attack after immersion in a 4% acetic acid solution for 24 hours at a room temperature 22±2°C

### 【8.4 Alkali resistance】

According to the ASTM C556-88 test, **SELECTION 58** and **54** colors do not show visible attack for up to 6 hours.

## 9. Safety Data Sheet (SDS)

Safety data sheet (SDS) of **SELECTION 58** and **54** is available on request.

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