

SELECTION 79/74 1,000–1,260°C

SELECTION 79 : Lead- and cadmium-free glaze effect inglaze colors

SELECTION 74 : Lead-free cadmium containing inclusion glaze effect inglaze colors

1. General Information and Color chart

Features!

- Glaze effect can be controlled by application method.
- Can be used with SELECTION 78/64 inglaze colors.
- Suitable for wide range of substrates and firing conditions.
- High chemical durability.





SELECTION 79/74 1,000–1,260°C Lead- and cadmium-free, intermixable, glaze effect inglaze colors for hard porcelain, porcelain, bone china, earthenware, fine china, vitreous china and tile. SELECTION 74 colors contain cadmium as inclusion pigments.

Table 1

Product No.	Color tone	Pantone No.	Intermixable	Lead free (below 90ppm)	Cadmium free (below 40ppm)	Acid resistant, DIN 1388-1-2 *1	Alkali resistant, ASTM C556-88 *2	79101 flux over printing and mixing	79102 mat flux, mixing	Tile, bone, vitreous china, earthenware	Oxidized porcelain (fine china)	Porcelain, hard porcelain	Remarks
Transparent effect													
79101	flux		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	can make transparent flux relief, mixing and covering flux
Mat effect													
79102	mat flux		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	can make mat flux relief
79301	yellow	100U	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
79406	blue green	326U	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
79508	rose wood	157U	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
79706	black	433U	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
79801	turquoise	290U	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
79806	cobalt blue	2728U	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Metallic effect													
79532	gold/brown	8601C/8621C	✓	✓	✓	*3	*3	✓		✓	✓	✓	color shade depend on thickness of color deposit
79533	gold/brown	8621C/8602C	✓	✓	✓	*3	*3	✓		✓	✓	✓	color shade depend on thickness of color deposit
79535	silver/brown	8621C/8623C	✓	✓	✓	*3	*3	✓		✓	✓	✓	color shade depend on thickness of color deposit
79736	silver/black	8603C	✓	✓	✓	*3	*3	✓		✓	✓	✓	color shade depend on thickness of color deposit
Reactive effect													
79251	mixing white		✓	✓	✓	✓	✓	✓		✓	✓	✓	
74353 *4	cadmium yellow		✓	✓		✓	✓	✓		✓	✓	✓	cadmium containing color
74358 *4	cadmium orange		✓	✓		✓	✓	✓		✓	✓	✓	cadmium containing color
79451	brown green		✓	✓	✓	✓	✓	✓		✓	✓	✓	color shade depend on thickness of color deposit
79454	chrome green		✓	✓	✓	✓	✓	✓		✓	✓	✓	
79456	blue green		✓	✓	✓	✓	✓	✓		✓	✓	✓	
79558	rose wood		✓	✓	✓	✓	✓	✓		✓	✓	✓	
79651	red brown		✓	✓	✓	✓	✓	✓		✓	✓	✓	color shade depend on thickness of color deposit
74653 *4	cadmium red		✓	✓		✓	✓	✓		✓	✓	✓	cadmium containing color
74654 *4	cadmium red		✓	✓		✓	✓	✓		✓	✓	✓	cadmium containing color
79756	black		✓	✓	✓	✓	✓	✓		✓	✓	✓	
79854	cyan green		✓	✓	✓	✓	✓	✓		✓	✓	✓	
79856	cobalt blue		✓	✓	✓	✓	✓	✓		✓	✓	✓	
Additive materials													
78192	reactive flux		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	reactive flux for over printing
79197	reactive agent		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	mixing for reactive effect colors, increase reactive effect
88203	white agent		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	mixing for reactive effect colors, make them opaque effect

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

*2: 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.

*3: Slightly visible attack can be seen depend on thickness of color deposit and firing conditions.

*4: lead- free cadmium containing colors as inclusion pigments.

2. Firing Conditions

Type of ware	Firing range
Hard porcelain	1,230–1,260°C
Porcelain	1,180–1,230°C
Bone china	1,000–1,150°C
Earthenware	1,000–1,050°C
Fine china	1,000–1,200°C
Vitreous china	1,000–1,200°C

SELECTION 79/74 colors are suitable for both normal firing of 3–10 hours and fast-firing of 60–120 minutes, cold-to-cold conditions. They can be fired at glaze firing conditions of all type of wares even reduction firing conditions up to 1400°C. Their color tone will be vary under different firing conditions, therefore, we recommend to test under several firing conditions to check their color variation range.

3. Application

SELECTION 79/74 colors are suitable for screen-transfer printing, direct printing, spraying, pad printing and hand painting.

They can be used with **SELECTION 78/64** basic inglaze colors and fired at same temperatures.

4. Particle size of Distribution (P.S.D.)

Product	D ₅₀ average	D ₁₀₀ biggest
79101 transparent flux	4.5 μm (±1.0)	35 μm (±5.0)
79102 mat flux	4.5 μm (±1.0)	35 μm (±5.0)
78192 reactive flux	5.0 μm (±1.0)	35 μm (±5.0)
SELECTION 79 mat colors	4.5 μm (±1.0)	35 μm (±5.0)
SELECTION 79 metallic colors	5.0–25 μm (±1–5)	35–200 μm (±5–20)
SELECTION 79/74 reactive colors	4.5 μm (±1.0)	35 μm (±5.0)

5. Printing

【5.1 Mesh size】

We recommend polyester screen with 60–305 mesh/inch (24–120 thread/cm) for all screen applications. Their color tones depend on the thickness of color deposit.

【5.2 Medium ratio】

Product	Color : medium	Recommended mesh
79101 transparent flux : Medium PM2	10 : 7–9	60–305 mesh/inch (24–120 thread/cm)
79102 mat flux : Medium PM2	10 : 7–9	60–305 mesh/inch (24–120 thread/cm)
78192 reactive flux : Medium PM2	10 : 7–9	60–305 mesh/inch (24–120 thread/cm)
SELECTION 79 mat colors : Medium PM2	10 : 7–8	60–123 mesh/inch (24–48 thread/cm)
SELECTION 79 metallic colors : Medium PM2	10 : 4–8	60–123 mesh/inch (24–48 thread/cm)
SELECTION 79/74 reactive colors : Medium PM2	10 : 7–8	60–123 mesh/inch (24–48 thread/cm)

We recommend C12 cover coat by printing 70 mesh/inch (27 thread/cm).

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

6. Mixability

SELECTION 79/74 colors can be mixed with each other in any proportions. They are also intermixable with **SELECTION 78/64** basic inglaze colors. 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.

79101 transparent flux: This is a flux which can make transparent inglaze relief. In order to obtain a transparent colored relief, we recommend mixing with a small amount of **SELECTION 78/64** basic inglaze colors. This flux is suitable for all of **SELECTION 79/74** colors as mixing flux.

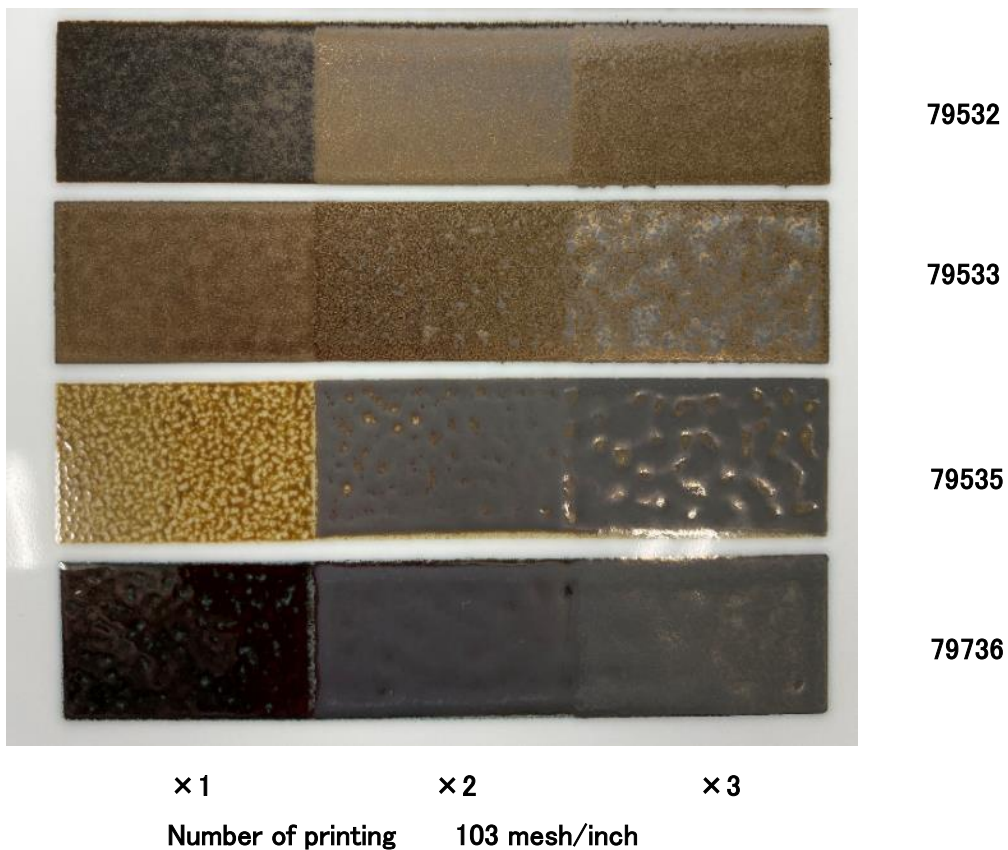
79102 mat flux: This is a flux which can make a mat relief. In order to obtain mat colored relief, we recommend mixing with a small amount of **SELECTION 78/64** basic inglaze colors.

78192 reactive flux: This is a reactive flux which can make a distinctive emboss effect. When combining **78192** with **SELECTION 79/74** colors, very unique and attractive expressions can occur. This flux is suitable for all of **SELECTION 79/74** reactive colors as mixing flux. For more information, please refer to technical information of **78192**.

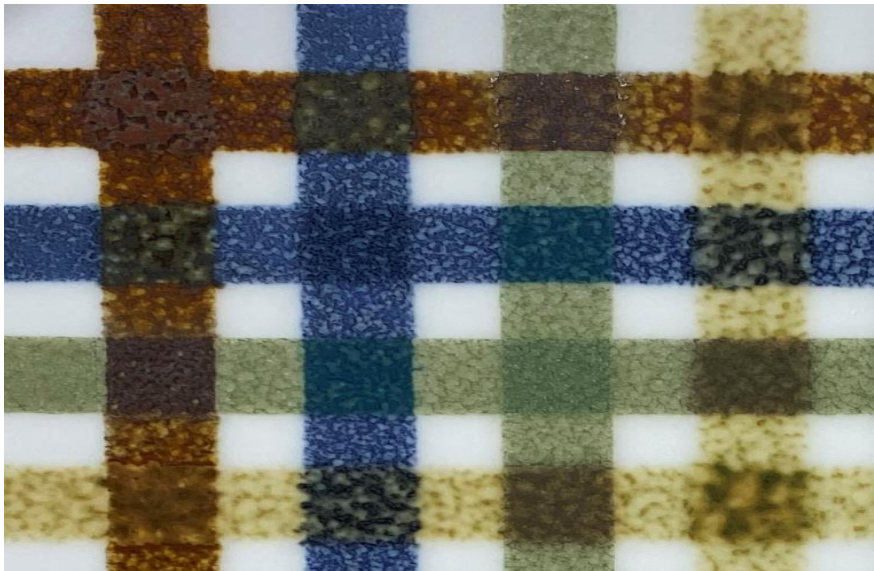
Mat effect colors: 79301, 79404, 79508, 79801, 79706, 79801 and 79806 are mat effect colors. Their mat effects are very smooth and are not affected by the thickness of colors. To lighten these colors, adding 79102 is recommended to maintain the mat effect. They can be mixed with each other and **SELECTION 78/64** colors.



Metallic effect colors: 79532, 79533, 79535 and 79736 are metallic effect colors. Their metallic effect is directly affected by the thickness of colors. If their deposits of colors are not thick enough, the metallic effect cannot be developed. They can be mixed with each other and **SELECTION 78/64** basic inglaze colors. To maintain the metallic effect, adding **79101** is recommended for mixing only, not for covering. As for acid resistance according to DIN EN 1388-1-2 test, they show slightly visible attack.



Reactive effect colors: 79451, 79454, 79456, 79558, 79651, 79756, 79854 (lead and cadmium free), 74353, 74358, 74653, and 74654 (lead free- cadmium containing colors) are reactive effect colors which show a very unique speckled appearance after firing. These color tones depend on type of glaze, firing conditions and thickness of color deposit. These colors can also show very attractive color shades by overlap printing or mixing each other.



1st print, underlay colors

79651

79854

79454

79451

79651

79854

79454

79451

2nd print, overprinting colors



79197 reactive agent: This is a reactive agent for **SELECTION 79/74 reactive colors**. This flux can increase reactive effect by adding about 1–10% in to the reactive colors. By adding **79197**, the reactive effect may increase and their color shades will be changed but it also worsens their chemical resistance, especially dishwasher resistance.



79451

79451 97%
79197 3%

79451 93%
79197 7%

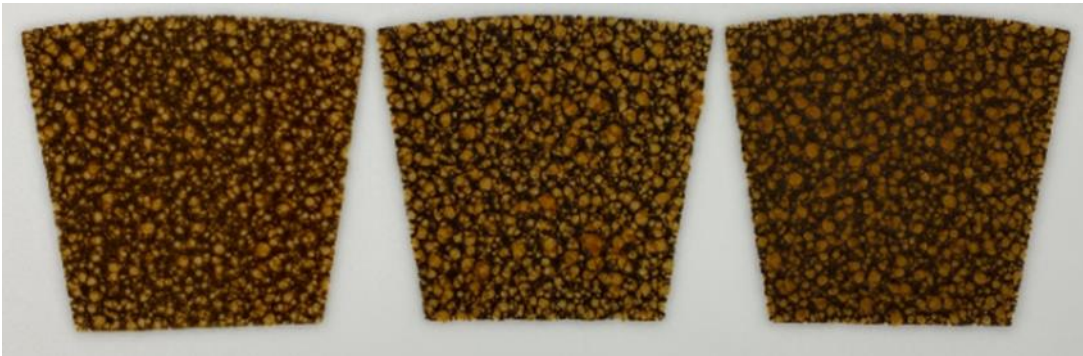


79856

79856 97%
79197 3%

79856 93%
79197 7%

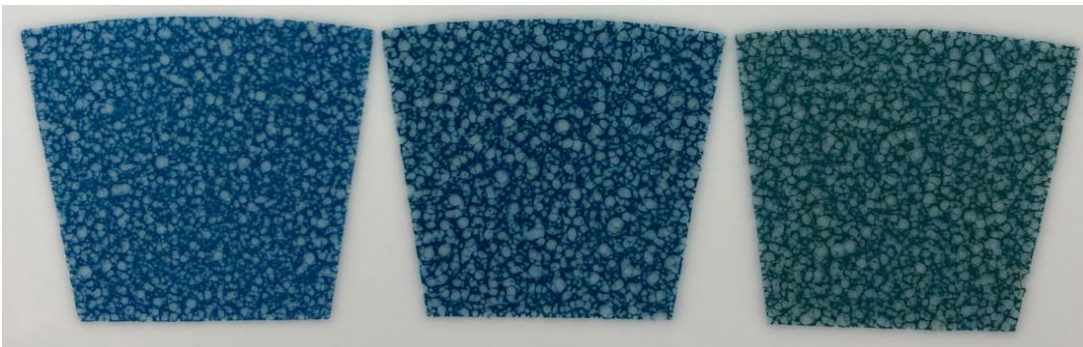
88203 white agent: This is a mixing white agent for **SELECTION 79/74 reactive colors**. To get opaque and intensive reactive colors, by adding this white about 1–15% in to the reactive colors is recommended. **79251** also can be used as mixing white without limitation of amount but the color shades will be lighter compare to adding **88203**.



79651

79651 97%
88203 3%

79651 94%
88203 6%



79456

79456 97%
88203 3%

79456 94%
88203 6%

7. Chemical durability

Chemical durability of **SELECTION 79/74** colors depends on type of ware, glaze, kiln, color deposit and firing conditions. The following are the results of tests on porcelain, fired at 1,230°C, with 10 minutes of soaking time and 120 minutes of cold-to-cold firing conditions of gas kiln in production

【7.1 Residual lead and cadmium content】

SELECTION 79 colors contain less than 90 ppm residual lead and less than 40 ppm residual cadmium and are, therefore in compliance with Californian Proposition 65, FDA, CPSIA, EU, and Japanese requirements. **SELECTION 74** colors contain less than 90 ppm residual lead and contain more than 50,000 ppm cadmium as inclusion pigments.

【7.2 Lead and cadmium release】

According to the DI EN 1388-1-2 test, **SELECTION 79/74** colors show lead and cadmium releases are below AAS limits.

【7.3 Acid resistance】

According to the DI EN 1388-1-2 test, all of the **SELECTION 79/74** colors, except **79532, 79533, 79535** and **79736**, do not show any visible attack after immersion in a 4% acetic acid solution for 24 hours at a room temperature of $22 \pm 2^{\circ}\text{C}$.

【7.4 Alkali resistance】

According to ASTM C556-88 test, **SELECTION 79/74** colors do not show any visible attack for up to 4-6 hours.

8. Safety Data Sheet (SDS)

Safety data sheet (SDS) of **SELECTION 79/74** colors are available on request.

The above information and statements are unsolicited. IZAWA PIGMENT CO., LTD. provides them to promote its products. The above information and statements are also believed to be accurate at the time of publication under their laboratory conditions. Use of them is at the sole discretion of the user and IZAWA PIGMENT CO., LTD. does not give any warranty with respect to any test results. In no event shall IZAWA PIGMENT CO., LTD. be liable for any direct, indirect, special, incidental, or consequential damages arising out of the use of the above information.