Technical Information

Revised: 6/19/2026

SELECTION 58M　　800-850℃

Lead- and cadmium-free onglaze metallic relief colors

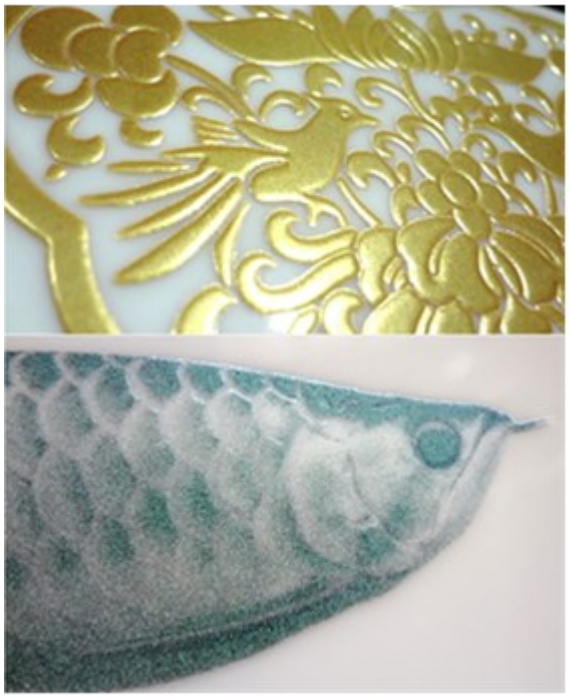
1. General Information

SELECTION 58M series is lead-and cadmium-free, intermixable, onglaze metallic relief and interference metallic relief colors for, bone china, earthenware and vitreous china.

Features!

- **Lead and cadmium free.**
- **Glossy metallic surface.**
- **Transparent and can see through underlay colors.**
- **Microwave and dishwasher safe.**
- **Coarse particle size and can make thick relief design.**





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800–850 ℃ lead–and cadmium–free, intermixable, onglaze metallic relief and interference metallic relief colors for, bone china, earthenware and vitreous china.

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	58 101 mixing and underlay flux	Bone, vitreous china, earthenware	Porcelain, hard porcelain *3	P.S.D. D50 average μm	P.S.D. D100 biggest μm	Printing mesh size (mesh/inch, thread/cm)	Remarks
Metallic colors														
58M113	white silver	–	✔	✔	✔	✔	✔	✔	✔		15–20	80–100	103, 40T	can mix with other color to make color metallic relief
58M109	lemon gold	8640C	✔	✔	✔	✔	✔	✔	✔		12–14	60–70	103, 40T	
58M110	green gold	8660C	✔	✔	✔	✔	✔	✔	✔		12–14	90–100	103, 40T	
58M159	orange gold	8642C	✔	✔	✔	✔	✔	✔	✔		12–14	90–100	103, 40T	
58M103	copper	8920C	✔	✔	✔	✔	✔	✔	✔		12–14	100–120	103, 40T	
58M105	red copper	8901C	✔	✔	✔	✔	✔	✔	✔		12–14	100–120	103, 40T	
Interference metallic colors														
58M160	silver	–	✔	✔	✔	✔	✔	✔	✔		70–80	370–420	103, 40T	transparent silver, can mix with other colors
58M128	yellow green	–	✔	✔	✔	✔	✔	✔	✔		30–45	350–420	103, 40T	glitter interference colors, firing lower than 820℃ is recommended
58M161	rainbow	–	✔	✔	✔	✔	✔	✔	✔		30–45	350–420	103, 40T	glitter interference colors, firing lower than 820℃ is recommended
58M162	gold	–	✔	✔	✔	✔	✔	✔	✔		30–45	350–420	103, 40T	glitter interference colors, firing lower than 820℃ is recommended
58M163	blue green	–	✔	✔	✔	✔	✔	✔	✔		30–45	350–420	103, 40T	glitter interference colors, firing lower than 820℃ is recommended
58M164	red	–	✔	✔	✔	✔	✔	✔	✔		30–45	350–420	103, 40T	glitter interference colors, firing lower than 820℃ is recommended
Flux														
58101	mixing & underlay flux		✔	✔	✔	✔	✔	✔	✔		20–30	150–200	103, 40T	can be used as underlay and mixing for all of 58M colors

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

*2: ASTM C556–88 : The test pieces are immersed in a 0.5 % sodium carbonate solution in water at 95℃ for 2, 4 and 6 hours. Refer section 8.4

*3: Refer section 7

2. Firing Conditions

Type of ware	Firing range
Bone china, vitreous china	**800–850℃**
Porcelain	820–850℃

SELECTION 58M 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.

58M161, 58M162, 58M163 and **58M164** are very sensitive for firing temperature and conditions. We recommend to fire them bellow 820℃, otherwise they may lose metallic effect

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3. Application

SELECTION 58M 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 58M colors (average)	6.5×10^{-6}/℃
58101 flux	7.6×10^{-6}/℃
32189 flux (lead containing underlay flux for porcelain)	5.1×10^{-6}/℃

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

Product No.	Color tone	D50 average	D100 biggest
Metallic colors			
58M113	white silver	15-20 μm	80-100 μm
58M109	lemon gold	12-14 μm	60-70 μm
58M110	green gold	12-14 μm	90-100 μm
58M159	orange gold	12-14 μm	90-100 μm
58M103	copper	12-14 μm	100-120 μm
58M105	red copper	12-14 μm	100-120 μm
Interference metallic colors			
58M160	silver	70-80 μm	370-420 μm
58M128	yellow green	30-45 μm	350-420 μm
58M161	rainbow	30-45 μm	350-420 μm
58M162	gold	30-45 μm	350-420 μm
58M163	blue green	30-45 μm	350-420 μm
58M164	red	30-45 μm	350-420 μm
Flux			
58101	mixing & underlay flux	20-30 μm	150-200 μm
32189	underlay flux	3.5-4.5 μm	25-30 μm

6. Printing

【6.1 Relief printing】

We recommend mesh sizes that are 103-123 mesh/inch (40-48 thread/cm) for all screen applications.
We normally recommend printing 1-2 times. To get thick relief effect they can be printed 3-4 times but need to make sure there are no pinhole and bubble problems on the surface after firing.

【6.2 Medium ratio and cover coat】

SELECTION 58M colors : Medium PM2	10 : 7-9

We recommend PM2 flowing medium for relief printing. Adding just sufficient medium will improve the surface of relief, if it has pinhole problems.

We recommend C12 cover coat by printing 70 mesh/inch (27 thread/cm).
Lead- and cadmium-free glass colors absorb any moisture easily. Therefore, keep powder colors in a dry place. We recommend drying the color powder before using.

7. Color and Mixability

SELECTION 58M colors can be mixed with each other in any proportions.
To obtain colored metallic, it is suitable to mix **58M113** silver with approximate 15-30% of **SELECTION 35, 36 and 39** colors.

To lighten **SELECTION 58M** colors, we recommend to mix with **58101** flux. If normal onglaze flux such as **36101**and **35101** are mixed, the metallic effect maybe disappeared. According to our test, adding 20% of **58101** flux is maximum to maintain the color tone. After mixing **58101** flux, they become lower firing temperature. **58101** flux can be also used as underlay flux and if it is printed under **SELECTION 58M** colors, the surface of metallic become smooth and glossy.

To use **SELECTION 58M** colors on porcelain, there is a possibility to use low C.O.E. underlay flux from **SELECTION 32** (leaded onglaze series). According to our experience, **32189** flux is suitable for **SELECTION 58M** colors as their underlay flux. Use the same screen as **SELECTION 58M** and just print as first layer of the relief. We cannot guarantee the heavy metal release in this case, therefore we recommend testing the stability of mixing and using with other colors under end-user's firing conditions before mass production.

8. Chemical durability

Chemical durability of **SELECTION 58M** colors depends on type of ware, glaze, kiln, color deposit and firing conditions. The following are the results of tests on bone china, fired at 820℃, 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 58M 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.

【8.2 Lead and cadmium release】

According to the DI EN 1388-1-2 test, **SELECTION 58M** shows lead and cadmium releases are below AAS limits.

【8.3 Acid resistance】

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

【8.4 Alkali resistance】

According to ASTM C556-88 test, **SELECTION 58M** metallic colors do not show any visible attack up to 6 hours.

9. Safety Data Sheet (SDS)

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

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