

# SELECTION 64 950–1250°C

## Lead-free cadmium containing inclusion inglaze colors

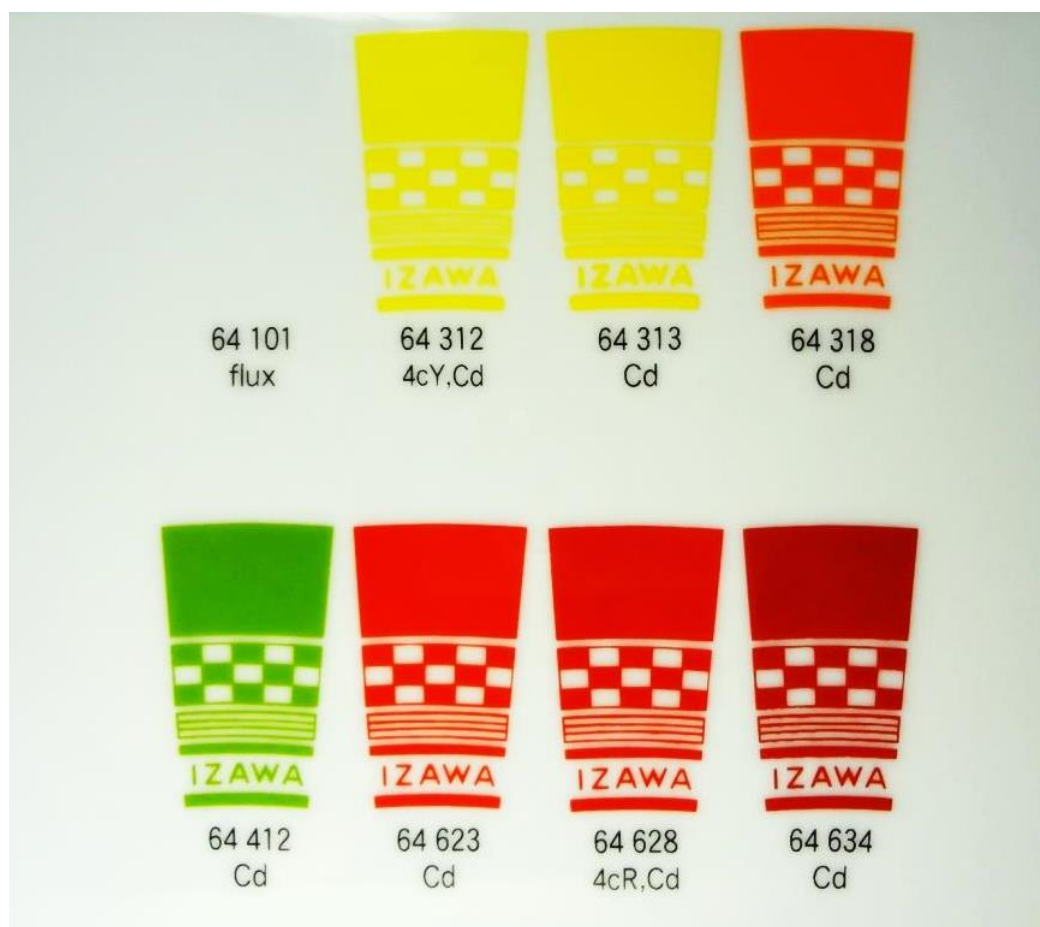
### 1. General Information and Color chart

**SELECTION 64 series** is a range of lead-free cadmium containing, inclusion inglaze colors for hard porcelain, porcelain, bone china, earthenware, vitreous china and tile. They show very intensive color tone and are stable at low- and high-firing temperatures. Even though, they do not show cadmium release after proper firing, we separated them from the **SELECTION 66 and 78 series** because they contain cadmium. **SELECTION 64** colors are intermixable and can be used with **SELECTION 66 and 78** inglaze colors under their firing conditions. As overprinting flux for **SELECTION 64 colors**, we recommend **64101** flux.

**Options for this series:** Please refer to their individual technical information.

**SELECTION 66 and 78:** Lead- and cadmium-free inglaze colors.

**SELECTION 66 and 78 Relief:** Lead- and cadmium-free inglaze relief flux and white.



## SELECTION 64 950–1250°C Lead-free cadmium containing inclusion inglaze colors for hard porcelain, porcelain, bone china, earthenware, vitreous china and tile.

Table 1

Product No.	Color tone	Pantone No.	Intermixable	Lead free (below 90ppm)	Cadmium free (below 40ppm) *1	Acid resistant, DIN 1388-1-2 *2	Alkali resistant, ASTM C556-88 *3	64101 overprinting flux	Vetrosa	Tile	Bone, vitreous china, earthenware	Porcelain, Hard porcelain	Remarks
64101	flux		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	special overprinting flux for 64 inclusion colors
64312	lemon yellow	Yellow C	✓	✓	*1	✓	✓	✓	✓	✓	✓	✓	four-color orange yellow
64313	cadmium yellow	Yellow 012C	✓	✓	*1	✓	✓	✓	✓	✓	✓	✓	
64318	cadmium orange	Orange 021C	✓	✓	*1	✓	✓	✓	✓	✓	✓	✓	
64412	cadmium green	377C	✓	✓	*1	✓	✓	✓	✓	✓	✓	✓	
64623	cadmium red	Red 032C	✓	✓	*1	✓	✓	✓	✓	✓	✓	✓	
64628	cadmium red	186C	✓	✓	*1	✓	✓	✓	✓	✓	✓	✓	four-color red
64634	cadmium red	187C	✓	✓	*1	✓	✓	✓	✓	✓	✓	✓	

\*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 section 7.2 and 7.3

\*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 section 7.4

## 2. Firing Conditions

Type of ware	Firing range
Hard porcelain	1,230–1,250°C
Porcelain	1,180–1,230°C
Vitreous china	1,000–1,200°C
Bone china	1,000–1,150°C
Earthenware	1,000–1,150°C
Tile	950–1,250°C

SELECTION 64 colors are suitable for fast-firing conditions, 60–150 minutes, cold-to-cold. They can be used as under colors of Vetrosa for tile decorations.

## 3. Application

**SELECTION 64** colors are suitable for screen-transfer printing, direct printing, spraying, pad printing and hand painting.

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

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

Product	D <sub>50</sub> average	D <sub>100</sub> biggest
<b>SELECTION 64</b> colors (average)	6-8 $\mu$ m	50 $\mu$ m
<b>66101, 64101</b> flux	4 -6 $\mu$ m	40 $\mu$ m

## 5. Printing

### 【5.1 Mesh size】

We recommend mesh sizes that are 195-305 mesh/inch (77-120 thread/cm) for all screen applications.

### 【5.2 Medium ratio】

<b>SELECTION 64</b> color : Medium PM2/PMT8	10 : 7-9/8-10
<b>64101</b> overprinting flux : Medium PM2	10 : 9-11

We recommend PM2 flowing medium, PMT8 thixotropic medium for dot printing.

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

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

## 6. Color and Mixability

**SELECTION 64, SELECTION 66 and 78** inglaze colors can be mixed with each other in any proportions.

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.

**Mixing flux:** **66101** flux is suitable for mixing all colors. After mixing with flux, the color is lighter and glossier.

**Overprinting flux:** **64101** overprinting flux is suitable for **SELECTION 64** inclusion colors. Overprinting flux improves color gloss and chemical durability, such as heavy metal release, alkali durability and dishwasher resistance.

## 7. Chemical durability (refer to the Table 1)

Chemical durability of **SELECTION 64** colors depends on type of ware, glaze, kiln, color deposit and firing conditions. Therefore we recommend testing under end-user's firing conditions before mass production.

The following are the results of tests on porcelain, fired at 1200°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 64** colors contain less than 90 ppm residual lead and contain more than 50,000 ppm cadmium. **64101** flux contain less than 90 ppm residual lead and less than 40 ppm residual cadmium.

After proper firing, **SELECTION 64** colors show very low cadmium release therefore they can pass FDA, EU and Japanese requirements.

### 【7.2 Lead and cadmium release】

According to the DI EN 1388-1-2 test, **SELECTION 64** colors show lead and cadmium releases are below AAS limits.

### 【7.3 Acid resistance】

According to the DI EN 1388-1-2 test, **SELECTION 64** colors 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, **SELECTIN 64** colors do not show any visible attack for up to 6 hours. If **64101**, **66101** or **78101** flux are overprinted, they can stand more than 6 hours.

## 8. Safety Data Sheet (SDS)

Safety data sheet (SDS) of **SELECTION 64** colors are available on request.

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