Technical Information IZAWA PIGMENT CO., LTD.

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32220 Underlay white Low-lead release onglaze colors

Features!

・Low-lead release
・Cadmium free
・Low C.O.E.
・Very intensive & opaque
・Less color changing with other colors
・Can mix with other colors

1. General Information

32220 is low-lead-release-cadmium-free onglaze white for porcelain, bone china, earthenware, vitreous china and enamel ware. It is specially developed as a low C.O.E. and an intensive underlay white, which can hide the colored glaze.
32220 is suitable for screen-transfer printing, direct printing, spraying, pad printing and hand painting.

2. Firing Conditions

Type of ware	Firing range
Porcelain	760-860℃
Bone china	760-860℃
Earthenware	760-840℃
Vitreous china	760-840℃

Enamel ware	780–820℃

32220 is suitable for fast–firing for 60–150 minutes, cold–to–cold conditions and it becomes a yellowish–white tone under longer and over–firing conditions.

3. Coefficient of Thermal Expansion (C.O.E.)

Product	Thermal Expansion (C.O.E.)
32220 underlay white	5.9×10^{-6}/℃

32220 is carefully developed and tested under optimum conditions to minimize cracking or chipping problems. The maximum thickness of a color layer, including additional over–printed colors, should be below 40 μ (approx. by 200 mesh/80T, four time printing) for porcelain glaze (C.O.E. 4.5–5.5 $\times 10^{-6}$/℃). Thicker printing of more than 40 μ could be allowed for bone china, earthen ware and vitreous china (C.O.E. 5.5–8.5 $\times 10^{-6}$/℃) However, it is necessary to consider the total thickness of the color layer with other colors. Therefore, we recommend testing the cracking or chipping before mass production. The results will depend on the end–user's conditions.

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

Product	D_{50} average	D_{100} biggest
32220 underlay white	3 μ	15–20 μ

5. Printing

5.1 Mesh size

We recommend mesh sizes that are 200–250 mesh (80–100T) polyester for all screen applications. We recommend printing 1–2 times as an underlay white.
32220 can be printed by finer mesh up to 350 mesh (140T) polyester.

5.2 Medium ratio

32220 underlay white : Medium PM2	10 : 6–6.5

We recommend keeping the powder in a dry place. We recommend drying the color powder before using.

6. Color Changing and Mixability

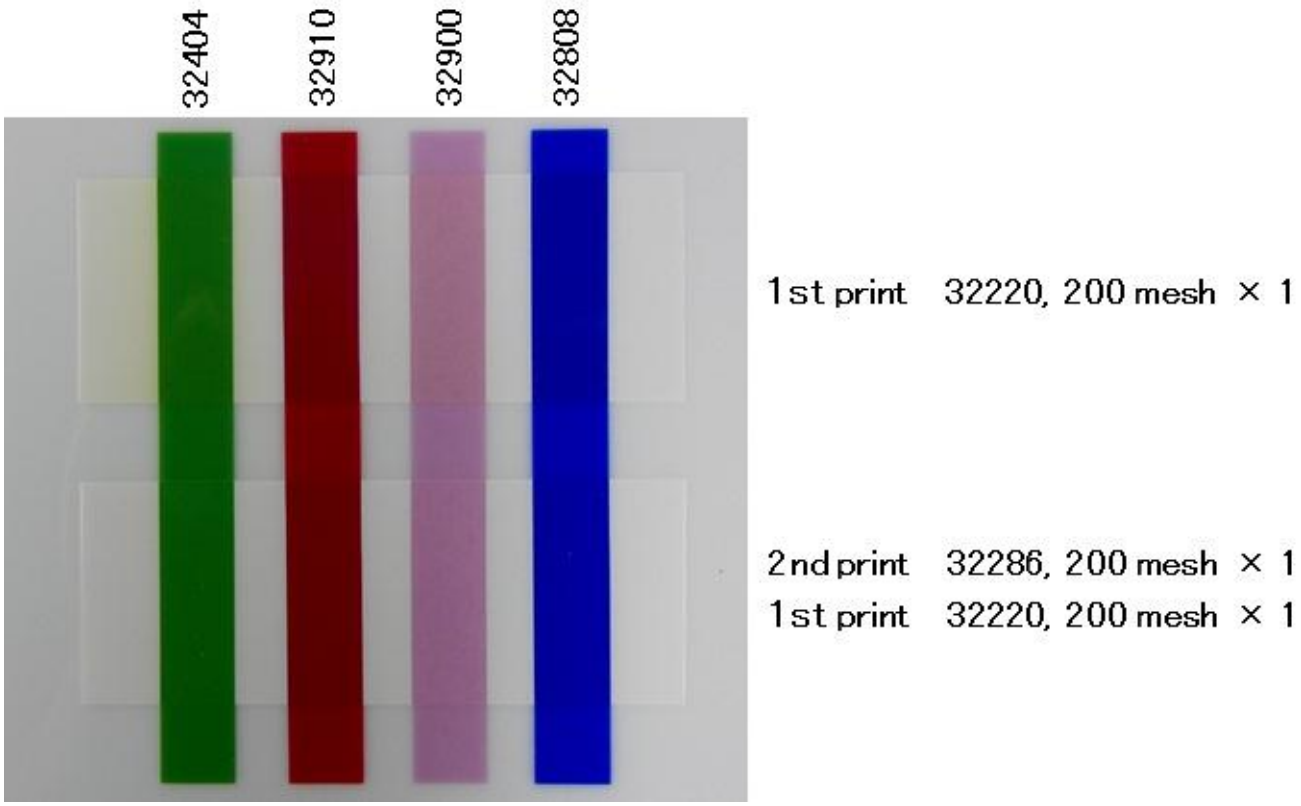
32220 can be under-printed and mixed with **SELECTION 31 and 32** colors in any proportions. However, it is mainly developed as an underlay white. Therefore, we recommend testing the stability of colors under end-user's firing conditions before mass production. **If you find unstable or color changing problems, please refer to the following guidelines.**

6.1 Sensitive colors for color changing

Cobalt-containing colors: such as 31803, 32808, 31845, 32845, 31990 can be greenish.
Chrome-containing colors: such as 32404, 32406 can be yellowish and 32220 becomes yellowish tone. In this case, overprinting flux such as 31100, 32100, 32101 is effective.
Chrome-tin violet: such as 31906, 32900 can be yellowish.
Iron red: such as 31611, 32601 can be lighter.
Cadmium-containing colors: such as 32313, 32318, 32413, 32623, 32628 become matte surface if they are over fired.
Gold-containing colors: they become bluish tone.

6.2 Printing recommendations

Printing 32286 white on 32220 underlay white: 32286 is a relief white but it helps a no-color-changing effect if it is printed between 32220 underlay white and above sensitive colors. 32286 white does not change other colors too. In this case, we recommend printing 1st 32220 by 200 mesh (80T) and 2nd 32286 by the same 200 mesh (80T) polyester.



6.3 Firing recommendations

Over-firing and longer-firing conditions make 32220 underlay white-yellowish and change the overprinted colors. In this case we recommend to fire as low as possible.

7. Chemical durability

Chemical durability of 32220 depends on type of ware, glaze, kiln, color deposit and firing conditions and it is evaluated with other colors. The following are the results of tests on porcelain, fired at 820℃, with 10 minutes of soaking time and 120 minutes of cold-to-cold firing conditions of gas kiln in production

7.1 Lead and cadmium release

According to the DI EN 1388-1-2 test, 32220 shows less than lead 0.02 mg/dm2. Cadmium release is below AAS limits. However, it is necessary to test the total lead and cadmium release when it is used with other colors.

7.2 Acid resistance

According to the DI EN 1388-1-2 test, 32220 does not show any visible attack after immersion in a 4% acetic acid solution for 24 hours at a room temperature 22±2℃.

7.3 Alkali resistance

According to the ASTM C556-88 test, 32220 does not show visible attack for up to 4 hours.

8. Material Safety Data Sheet (MSDS)

Material safety data sheet (MSDS) of 32220 is available on request.

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