VINTAGE Art Universal

Tooth Color & Gum Color

Low fusing Stains and Glazes

Instructions for Use

Tooth Color

Thank you for purchasing our VINTAGE Art Universal Porcelain Stains. Please read these advanced product information carefully before use to maximally benefit from this product.
Kindly keep this document for your future reference.
VINTAGE Art Universal low fusing fluorescent Stains (Tooth Color) and Glazes are designed for internal and external modifications of the shades of all existing ceramic materials. They can be applied to all low fusing ceramic materials, monolithic and veneered zirconia, pressable ceramic frames, PFM and artificial porcelain teeth. In a very simple way, they allow users to reproduce any natural tooth characteristics with a vital appearance.

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1. Notes on Use

1-1 Precautions and Warnings

1. If any inflammation or other allergic reactions occur in either the patient or operator, immediately discontinue use and seek medical advice.
2. Avoid contact with skin and eyes. In case of accidental contact with skin, immediately blot with alcohol moistened cotton ball, and rinse with plenty of water. In case of contact with eyes, immediately flush the eyes with plenty of water and seek medical advice.
3. Wear protective glasses and dust mask, and use local dust extractor etc., while grinding and polishing this product.
4. Avoid any source of ignition since VINTAGE Art Universal liquids are flammable.
5. In case any serious health hazards occur on a patient or an operator by use of this product, please report to local competent authority, our local distributor and sales company. Contact information on our sales companies is available on www.shofu.com

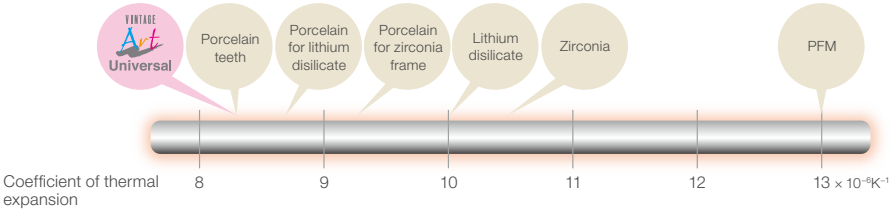
1-2 Notes

1. This product should not be used for patients with bruxism or occlusal abnormality etc.
2. Tightly close the cap immediately after each use.
3. Do not put remaining material back into the container.
4. When using Vis-N and Vis-GU, they should be used for ceramic materials with a CTE of 11.7 x $10^{-6}K^{-1}$ or less.
5. The viscosity can be adjusted by adding some mixing liquid.
6. Do not touch VINTAGE Art Universal YAMAMOTO LIQUID or the mixture of this material with bare hands.
7. Do not use any liquid other than VINTAGE Art Universal LIQUID and VINTAGE Art Universal YAMAMOTO LIQUID.
8. Do not mix with any other products.
9. Follow the instructions for use of each dental material, instrument, or equipment to be used in conjunction with this product.
10. Do not use this product for any purposes other than specifically outlined in these instructions for use.
11. This product is intended for use by dental professionals only.

2. Characteristics

2-1 Compatible with various dental ceramic materials

VINTAGE Art Universal Porcelain Stains can be used for the internal and external staining of various dental ceramic materials, such as ceramic systems for zirconia or pressable ceramic frames, PFM and artificial porcelain teeth.



2. Characteristics

2-2 Easy-to-use powder stains

VINTAGE Art Universal is a powder-type stain system. The viscosity can be easily adjusted to suit personal preference in each case. The color intensity can also be adjusted by mixing with Glaze Powder (GP: non-fluorescent, GP-F: fluorescent). Mixing with Glaze Powder adds glass particles to the mixture and allows users to apply it evenly and properly, resulting in a 3-dimensional effect and a smooth surface after firing.

2-3 Excellent luster and color intensity

VINTAGE Art Universal uses newly developed low fusing glass and micro-fine pigments derived from new pigment technology. These state-of-the-art technologies allow users to obtain a lustrous surface even with a thin layer without ruining the characterization created with the stain. Thanks to its excellent color intensity, VINTAGE Art Universal offers users a wider variety of options for characterization.

1 Excellent luster

Before glaze firing

After glaze firing

2 Example of staining with VINTAGE Art Universal

Application to monolithic zirconia

2-4 A wide variety of colors and shades are available to meet the requirements of various aesthetic restorations (Stain 27 colors and Glaze 2 colors)

Stains

P Pink		**O-Br** Orange Brown		**B** Black	
V Violet		**MP** Mamelon Pink		**G** Gray	
DR Deep Red		**MIv** Mamelon Ivory		**K** Khaki	
Y Yellow		**LO** Light Orange		**AS** A shade	
LY Light Yellow		**DR-Br** Dark Red Brown		**BS** B shade	
Gr Green		**Br** Brown		**CS** C shade	
Bl Blue		**B-Br** Black Brown		**DS** D shade	
Bl-G Blue Gray		**W** White		**RS** R shade	
O Orange		**Vn** Vanilla		**LS** Light shade	

Color fidelity is not perfect on the printout.

Base Color Stains Color Stains Shade Stains

2. Characteristics

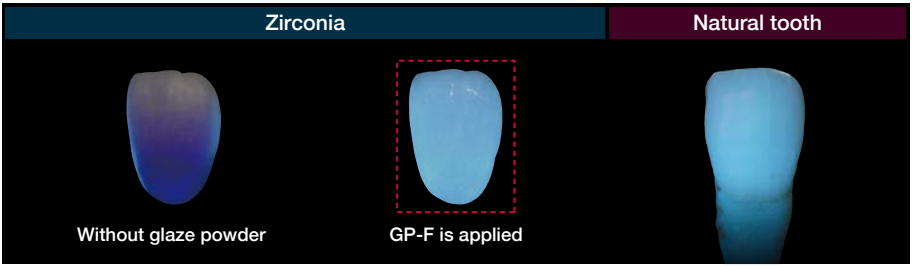
Glaze * (2 colors)

Color	Under ambient light	Under black light (ultraviolet light)
GP-F Glazing Powder Fluorescent		
GP Glazing Powder		

* Zirconia circle plates applied with each glaze

2-5 Fluorescence

VINTAGE Art Universal Stains and Glazing Powder GP-F match the fluorescence of natural dentition and enhance the vitality of ceramic materials as well as monolithic zirconia.



3. System Components

Set

BASIC COLOR SET

Stains 16 colors/2g each
P, V, Y, Gr, Bl, Bl-G, O, O-Br, DR-Br, W, B, K, AS, BS, CS, DS
Glaze 1 color/15g
GP-F
VINTAGE Art Universal LIQUID 50mL

Refills

Stains

Contents : 2g (Powder)
27 colors : P, V, DR, Y, LY, Gr, Bl, Bl-G, O, O-Br, MP, Mlv, LO, DR-Br, Br, B-Br, W, Vn, B, G, K, AS, BS, CS, DS, RS, LS

Glaze

Contents : 15g, 50g (Powder)
2 colors : GP, GP-F
GP: Glaze Powder without fluorescence, to be used when the layered porcelains already have natural fluorescence
GP-F: Highly fluorescent Glaze Powder, preferably for monolithic restorations that are not fluorescent

VINTAGE Art Universal LIQUID

Contents : 50mL
Standard mixing liquid for mixing VINTAGE Art Universal Porcelain Stains

VINTAGE Art Universal YAMAMOTO* LIQUID

(True color mixing liquid)
Contents : 50mL
Mixing liquid with a similar refractive index as the glass. The mixture with VINTAGE Art Universal Stains and Glazes shows its final color and effect before firing.

Use a glass or ceramic mixing palette since this liquid might soften plastics.

Glaze Powder mixed with VINTAGE Art Universal LIQUID

Glaze Powder mixed with VINTAGE Art Universal YAMAMOTO LIQUID (true color mixing liquid)

* DT. Makoto Yamamoto, the developer of YAMAMOTO LIQUID, was the author of "The Metal-Ceramics" – Principles and Methods of Makoto Yamamoto –and the inventor such as of Opal porcelain and Margin porcelain. He was also SHOFU's senior technical advisor and the designer of all SHOFU porcelains.

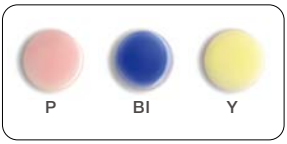
4. Color Concept

The color concept of the VINTAGE Art Universal system is logically structured in three main color groups.

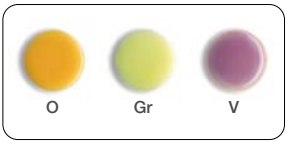
Base Color Stains	Shade Stains	Color Stains

4-1 Base Color Stains

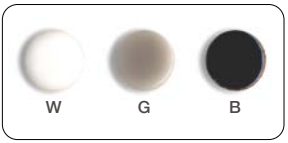
Basic shade adjustment and characterization are performed with these colors.



Primary colors



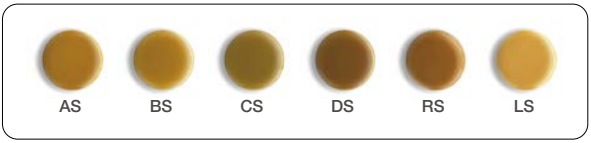
Secondary colors



Achromatic colors

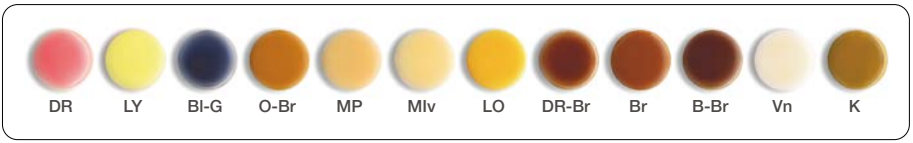
4-2 Shade Stains

The shade intensity of each shade group can be controlled with these materials.



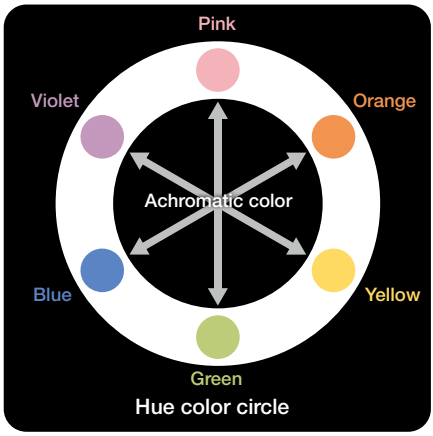
4-3 Color Stains

Thanks to this extensive color lineup, the desired shade can be obtained easily without complicated mixing, allowing users to reproduce natural-looking restorations in a large variety of cases.



4-4 Base Color Stains and Hue Color Circle

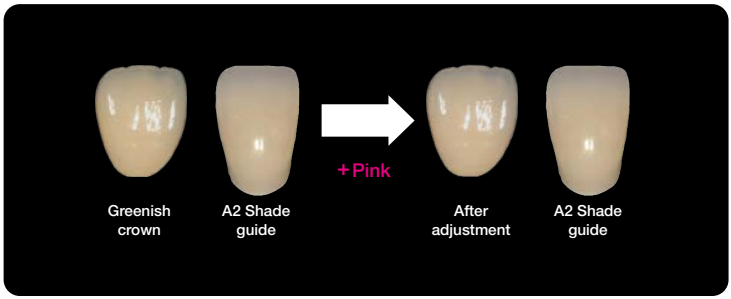
The Base Color Stains include primary colors, secondary colors and achromatic colors.
Base Color Stains are used to adjust shade and brightness of each stain material.



Primary colors	<Pink, Blue, Yellow>
Secondary colors	<Orange, Green, Violet>
Achromatic colors	<White, Gray, Black>

The hue color circle displays the primary colors such as Pink, Yellow and Blue. Between the primary colors, the secondary colors are located. In the center of the hue color circle, there are achromatic colors.
The opposing colors of the hue color circle are called “complementary colors” and neutralize each other. This means that opposing shades turn gray when mixed in equal quantities. This is based on the subtractive color mixing theory.
Mixing stains for shade adjustment is easy, based on this concept. Achromatic colors such as White, Gray and Black can be used for the adjustment of brightness (value).

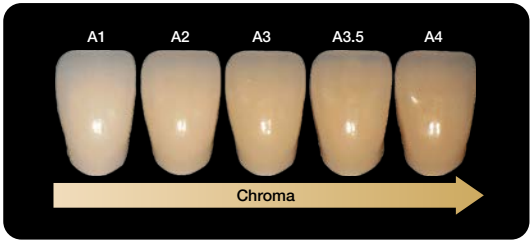
Example: To reduce a greenish tone, the complementary color, Pink, is applied.

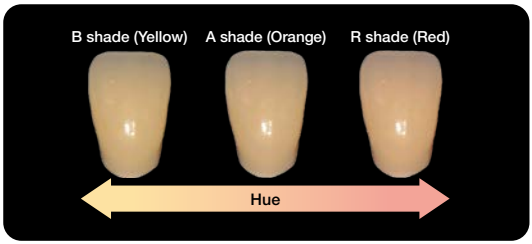


4. Color Concept

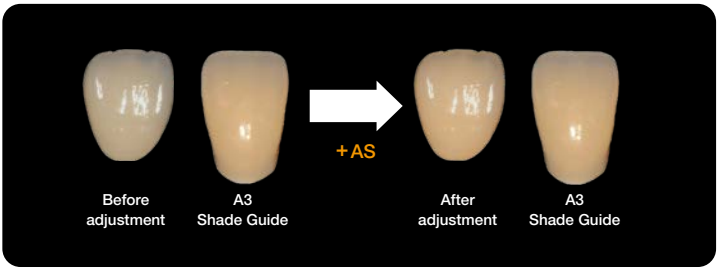
4-5 Shade Stains

Shade stains are recommended for adjusting the shades of pre-colored ceramic restorations. They should be applied to the porcelain surface to adjust the chroma and hue of the shade. In addition to the five shades based on the shade guide, AS, BS, CS, DS and RS, a new shade, LS, has been added to the lineup.
LS is effective for fine tuning of shades while maintaining the brightness of the whitening shade.





Example: In order to emphasize an A shade, AS (A shade) is applied.



5. Directions for Use

5-1 Cleaning of the restoration

Thoroughly clean the restoration with a steam jet and/or ultrasonic bath.

5-2 Mixing of Stains and Glazes

VINTAGE Art Universal Stains and Glazes can be mixed with VINTAGE Art Universal LIQUID or VINTAGE Art Universal YAMAMOTO LIQUID. When mixing with YAMAMOTO LIQUID, the Stains show their final color effects before firing.
Dispense the desired powder onto a glass plate or stain palette. When mixing the stain powders, use any ratio to obtain the required shade. Add adequate amount of VINTAGE Art Universal LIQUID to the dispensed powder and mix them. The viscosity can be adjusted by mixing with VINTAGE Art Universal LIQUID. The color intensity can also be adjusted by mixing with Glaze Powder (GP: non-fluorescent, GP-F: fluorescent). Mixing with Glaze Powder adds glass particles to the mixture and allows users to apply it evenly.

Example: Adjustment of viscosity

High viscosity

Low viscosity

Example of using YAMAMOTO LIQUID

A 3-dimensional effect can be produced by mixing with YAMAMOTO LIQUID. Thanks to its higher viscosity and exact color, VINTAGE Art Universal Porcelain Stain and fluorescent Glaze create the illusion of spatial depth, especially on monolithic restorations.

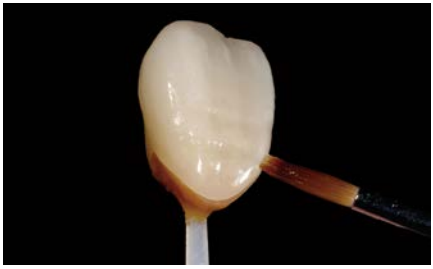
3-dimensional staining after firing

With extremely thin layers, the illusion of spatial depth can be created

5. Directions for Use

5-3 Staining

Apply the mixed stains with a thin brush to the dry surface.



5-4 Firing Schedule

Refer to the following firing schedules.

Material	Inner/Outer porcelain staining, Glazing Lithium disilicate	Staining monolithic zirconia
Drying temperature (°C)	400	400
Drying (min.)	6:00 (7:00*3)	6:00 (7:00*3)
Close (min.)	1:00	1:00
Preheat (min.)	1:00	1:00
Heat rate (°C/min.)	50	50
Firing temperature (°C) *1	730	800
Holding time (min.)	1:00	1:00
Vacuum/Atmosphere *2	Vacuum	Vacuum
Vacuum start (°C)	450	450
Vacuum end (°C)	720	790

*1 VINTAGE Art Universal can be fired at 730 °C or higher temperature. If surface luster is insufficient, raise the final temperature or set longer the hold time.

*2 Vacuum firing 1.3~8.0kPa

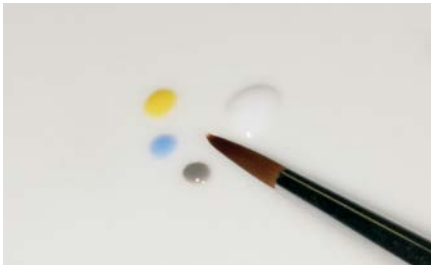
*3 When VINTAGE Art Universal YAMAMOTO LIQUID is used, drying time should be 7 min.

Note:
Firing conditions may vary, depending on the design and operation voltage of the porcelain furnace used. So, test firing is recommended for appropriate firing conditions and results.
Stain and Glaze mixtures with YAMAMOTO LIQUID should be pre-dried approx. 1-2 minutes longer than mixtures with VINTAGE Art Universal LIQUID.

6. Usage Examples

6-1 Shade adjustment and glazing

VINTAGE Art Universal Stains are recommended for shade adjustments, while Glazes are used to increase luster. Universal Stains and Glazes can be mixed to perform shade adjustment and glazing simultaneously.



Mix Stain and Glaze

Apply the mixture

Before shade adjustment of monolithic zirconia

After shade adjustment of monolithic zirconia

They can also be used for glazing, shade adjustment and characterization of artificial porcelain teeth after contouring.

Artificial porcelain teeth after contouring

After shade adjustment

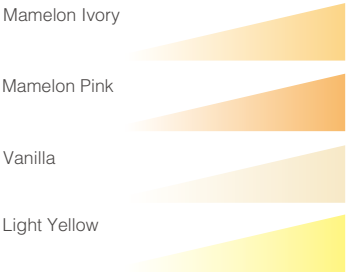
6. Usage Examples

6-2 Various staining techniques

Porcelain, zirconia and pressable ceramics can be stained with VINTAGE Art Universal Stains to obtain the desired shade. They can also be used for foundations of frameworks made of different materials.

6-2-1 Designing of mamelon shapes

To emphasize mamelon structures, Mamelon Ivory, Mamelon Pink, Vanilla or Light Yellow can be applied.



Adjustment of mamelon structure on the foundation of a frame

6-2-2 Adjustment of translucency on the incisal area

To intensify the translucency of the incisal area and adjust the light reflection, Blue, Blue Gray and Violet can be applied.

Adjustment of incisal translucency

6-2-3 Shade adjustment on occlusal surface

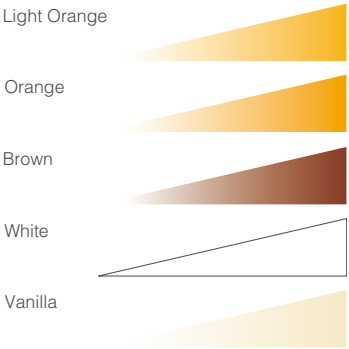
To create an individual occlusal surface, Orange, Light Orange, Orange Brown or Brown can be applied thinly to the center of the occlusal area. Dark Red Brown or Black Brown can be placed in the fissure using a small brush.

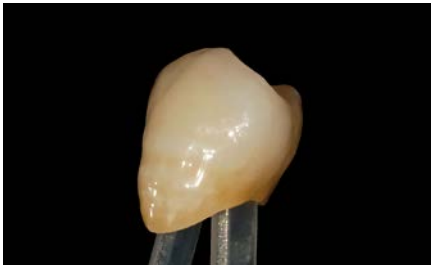
Shade adjustment on occlusal surface

6. Usage Examples

6-2-4 Application of white bands and decalcifications

To create white or bright bands or decalcification areas, Light Orange, Orange or Brown can be mixed with White or Vanilla.



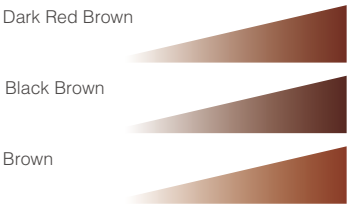


Decalcification

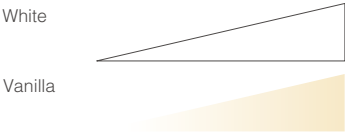
White band

6-2-5 Application of hair lines and crack lines

For creating hair lines, Dark Red Brown, Black Brown or Brown are recommended. Crack lines can also be created using White or Vanilla.



Hair lines



Crack lines

Gum Color

VINTAGE Art Universal (Gum Color) is available in 17 colors. It contains 15 stain powders that can be used as per the standard, as well as 2 Vis-modifiers for adjusting the viscosity of the paste.
A wide range of shades can be achieved with the rich color selection and highly saturated red. This makes it possible to respond to a wide variety of cases.
Vis-modifier is a new material used to adjust the paste viscosity. Gingival restorations require staining large areas or creating partially protruding effects. Using Vis-modifier allows you to adjust the paste's consistency so that it does not drip, even when applied to a large area or when a 3-dimensional effect is created. This makes it easier to characterize gingiva that could not be expressed in the past.
These line-ups enable more realistic expressions and make it easier to reproduce natural-looking gingiva.

Contents

1. Notes on Use

VINTAGE Art Universal

1-1 Precautions and Warnings

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2. Avoid contact with skin and eyes. In case of accidental contact with skin, immediately blot with alcohol moistened cotton ball, and rinse with plenty of water. In case of contact with eyes, immediately flush the eyes with plenty of water and seek medical advice.
3. Wear protective glasses and dust mask, and use local dust extractor etc., while grinding and polishing this product.
4. Avoid any source of ignition since VINTAGE Art Universal liquids are flammable.
5. In case any serious health hazards occur on a patient or an operator by use of this product, please report to local competent authority, our local distributor and sales company. Contact information on our sales companies is available on www.shofu.com

1-2 Notes

1. This product should not be used for patients with bruxism or occlusal abnormality etc.
2. Tightly close the cap immediately after each use.
3. Do not put remaining material back into the container.
4. When using Vis-N and Vis-GU, they should be used for ceramic materials with a CTE of 11.7 x $10^{-6}K^{-1}$ or less.
5. The viscosity can be adjusted by adding some mixing liquid.
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7. Do not use any liquid other than VINTAGE Art Universal LIQUID and VINTAGE Art Universal YAMAMOTO LIQUID.
8. Do not mix with any other products.
9. Follow the instructions for use of each dental material, instrument, or equipment to be used in conjunction with this product.
10. Do not use this product for any purposes other than specifically outlined in these instructions for use.
11. This product is intended for use by dental professionals only.

2. Characteristics

2-1 A wide variety of colors are available

The line-up includes 15 Gum Color Stains and 2 Vis-modifiers.
The wide variety of Gum Color Stains allows you to create various shades and reproduce fuller gingival surfaces. In addition, using a Vis-modifier in combination with stains enables easy application over a large area and 3-dimensional expression.

Gum - High Opacity Stains					
G1	G2	G3	G4	Gum-D	High opacity stains. They are ideal for gum foundations. The G1, G2, G3, and G4 correspond to the shades of SHOFU Gumy-V. This makes it easy to match the Gumy-V system.
					
Gum - Base Stains					
Gum-R	Gum-RR	Gum-LP	Gum-P	Gum-SP	Stains with moderate translucency and suitable for gum base color.
					
Gum-Or					
					
Gum - Characterize Stains					
Gum-DP	Gum-V	Gum-BBr	Gum-DR		Characterize stains. Suitable for characterizing gums such as blood vessels and melamine.
					

Vis-modifier			
Vis-N	Translucent and used to adjust the viscosity of stains without changing its color.	Vis-GU	Reddish (equivalent to Gum-D) and used to add redness while adjusting the viscosity of stains.
			

* Color fidelity is not perfect on the printout.

2-2 SHOFU Gumy-V shades (G1, G2, G3, G4)

We offer colors that match the gingiva-colored SHOFU Gumy-V shade tab holder: G1, G2, G3 and G4. They correspond to the SHOFU Gumy-V shades Light, Medium, Medium Dark and Dark, respectively. These colors have high opacity and mask the color of the base material. Using these colors as a foundation will make it easy to match the Gumy-V shades.

Zirconia coated with G1

SHOFU Gumy-V (Light)

Correspondence chart of Gum Colors and Gumy-V shades

VINTAGE Art Universal Gum Colors	G1	G2	G3	G4
Gumy-V shades	Light	Medium	Medium Dark	Dark

2-3 High chroma reds

This product uses high chroma pigments created with advanced technology. Gum-R and Gum-RR, in particular, are highly saturated red hues. This allows for a more vivid expression of the gingival characteristics.

Tooth Color	Gum Color	
P	Gum-R	Gum-RR
		

2. Characteristics

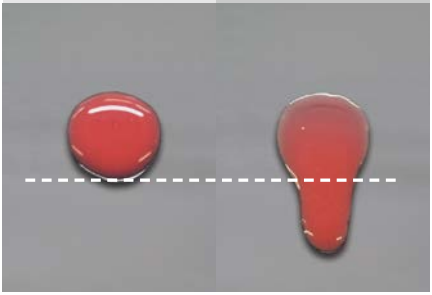
2-4 Vis-modifiers (Vis-N, Vis-GU)

When characterizing gingiva, it is necessary to apply high-intensity or deep color over a large area. The Vis-modifier is designed to meet these needs.
Although it is possible to adjust the stain viscosity by changing the powder-to-liquid ratio, controlling the drooping of the paste only with the ratio is difficult (see figures on the left).
Using Vis-modifier reduces the drooping of the paste (see figures on the right). The paste's viscosity can be controlled by adjusting the mixing ratio of the Vis-modifier.

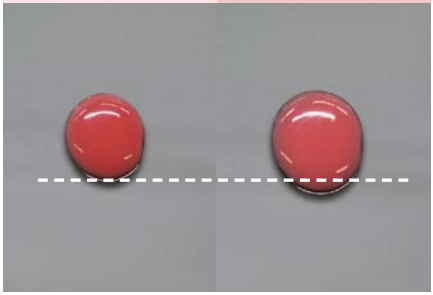
Paste adjusted to high viscosity
only by the powder-to-liquid ratio

Paste adjusted to high viscosity
by mixing Vis-modifier

Immediately after placing the paste | After standing it vertically for one minute



Immediately after placing the paste | After standing it vertically for one minute



* 0.2g of paste was placed on a glass plate and allowed to stand vertically for 1 minute.

3. System Components

Set

Gum Color Set

Stains 15 colors/2g each

G1, G2, G3, G4, Gum-D, Gum-R, Gum-RR, Gum-LP, Gum-P, Gum-DP, Gum-SP, Gum-Or, Gum-V, Gum-BBr, Gum-DR

Vis-modifier 2 colors/15g each

Vis-N, Vis-GU

VINTAGE Art Universal LIQUID 50mL

Refills

Stains

Contents: 2g

15 colors: G1, G2, G3, G4, Gum-D, Gum-R, Gum-RR, Gum-LP, Gum-P, Gum-DP, Gum-SP, Gum-Or, Gum-V, Gum-BBr, Gum-DR

Vis-modifiers

Contents: 15g

2 colors: Vis-N, Vis-GU

VINTAGE Art Universal LIQUID

Contents: 50mL

VINTAGE Art Universal YAMAMOTO LIQUID

Contents: 50mL

4. Directions for Use

4-1 Mix in the usual way

As with the Tooth Color, mix the stain powder with either VINTAGE Art Universal LIQUID or VINTAGE Art Universal YAMAMOTO LIQUID. (See p.11)

4-2 Mix with Vis-modifier

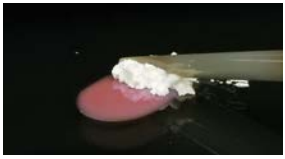
The viscosity of the paste can be adjusted by adding Vis-modifier.

Example:

Mix Gum-R and YAMAMOTO LIQUID

Mix stain powder and liquid to form a paste following the standard method.

Add Vis-modifier (Vis-N) to the paste



Mix Vis-modifier into the paste, adjusting until the desired viscosity is achieved.

Paste after adjusting the viscosity

The paste can be used as usual.

Viscosity differences by Vis-modifier mix rate

Gum Color Stain + Vis-modifier (Ex. Gum-R: Vis-N)

Before mixing

Low — viscosity — High

After mixing

The stain can be used as usual.

Low viscosity but does not drip during use. Suitable for staining large areas.

Suitable for characterizing deep tones with a 3-dimensional effect.

i. The thickness of a layer shall be such that the layer thickness after firing is 0.2 mm or less. Applying a thicker layer may result in bubbles and sink marks on the fired surface.
ii. When changing the paste's viscosity by using Vis-modifier, mix Vis-N or Vis-GU with GP, GP-F, or stain at a ratio ranging from 1:8 to 8:1.

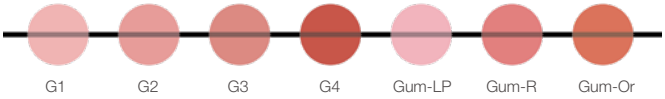
Example of color changes when mixing Vis-modifier

Vis-modifier is available in 2 colors: Vis-N and Vis-GU. Depending on the application, use different Vis-modifiers to adjust the viscosity and achieve the desired color and translucency.

Vis-N

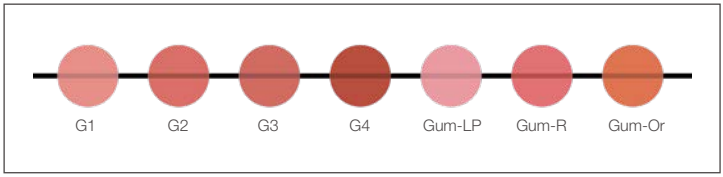
Effect on color: None
Effect on translucency: Slightly

Gum Color Stain: Vis-N = 1:1



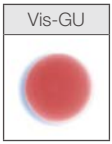
- Vis-N is translucent and adjusts the viscosity without changing the color of Gum Stains.
- As the amount of Vis-N increases, so does the translucency.

Color of Gum Stain alone (without Vis-modifier)



- Vis-GU is a reddish color that can be used to add redness to Gum Stains and adjust viscosity without changing translucency.
- As the amount of Vis-GU increases, redness increases, but the translucency remains the same.

Vis-GU



Effect on color: Slightly
Effect on translucency: None

Gum Color Stain: Vis-GU = 1:1

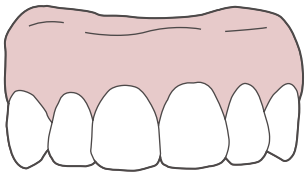
* Color fidelity is not perfect on the printout.

5. Usage Examples

Gum Color Stains can be used to characterize the following areas.
(These are just a few examples, and the use of each stain is not limited to these areas.)

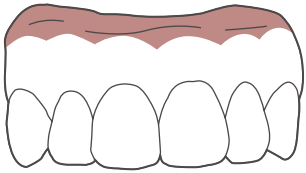
Foundation

The stains are high opacity, which allows them to mask the color of zirconia. They can be used as a foundation for the gingival area.
The colors G1, G2, G3 and G4 match the gingiva-colored SHOFU Gumy-V shade tab holder, so it is simple to stain the gum into the Gumy-V shades.
G1, G2, G3, G4, Gum-D, Vis-GU



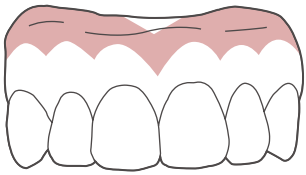
Alveolar vascular

Gum-DR, Gum-RR, Gum-V and BI can be used to express the blood vessels in the alveolar mucosa.
Gum-DR, Gum-RR, Gum-V, BI (Base Color Stains)



Alveolar mucosa

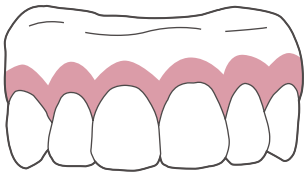
The numerous capillaries visible beneath the thin epithelium of the alveolar mucosa can be expressed with deep red stains.
Gum-D, Gum-RR, Gum-DR



Attached gingiva

Capillaries in the attached gingiva, which has very thick epithelium, are difficult to see through, so they are expressed in relatively light colors.

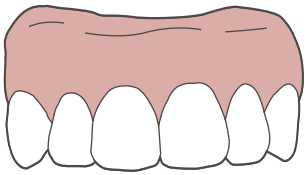
Gum-LP, Gum-P, Gum-R, Gum-Or, Gum-SP



Epithelium

The translucency of the epithelium can be expressed with a light pink color such as Gum-LP, Gum-P and Gum-R. If necessary, GP or Vis-N can be mixed to adjust the translucency.

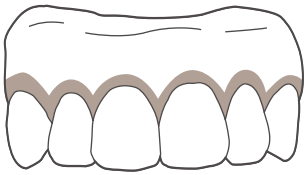
Gum-LP, Gum-P, Gum-R, Vis-N, GP (Glaze)



Free gingiva

The light tone and translucency of free gingiva can be expressed in light pink such as Gum-LP and Gum-P. If necessary, GP or Vis-GU can be mixed to adjust the translucency.

Gum-LP, Gum-P, Vis-GU, GP (Glaze)



Characterization

Blood vessels can be expressed with Gum-V, Gum-DR. Melanin can be expressed with Gum-DP, Gum-BBr. Redness such as gingivitis can be expressed with Gum-RR. Bone protrusions can be expressed with Vn.

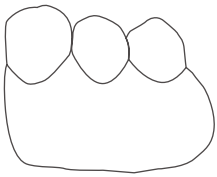
Gum-DP, Gum-RR, Gum-V, Gum-BBr, Gum-DR, Vn (Color Stains)

6. Production Examples

Using this material allows you to reproduce natural-looking gingiva with a small number of firings. The following is an example of the three-step production process.

STEP 0 **Plan color composition**

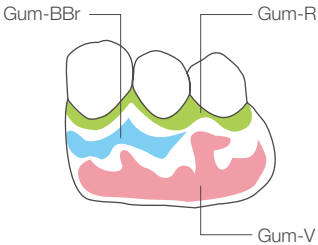
Review the case photographs, observing the attached gingiva, alveolar mucosa, and free gingiva separately. Then, plan the color composition, including the stains to be used, the color scheme, and the layers of color.



Zirconia frame (before staining)

STEP 1 **Staining (1st time)**

Stain the darker areas and the areas where you want to add depth on the gum.
(Gum-R, Gum-BBr, and Gum-V)

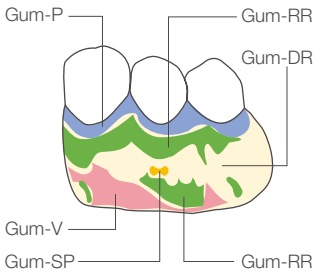


After 1st firing

STEP 2 **Staining (2nd time)**

Characterize free gingiva (Gum-P), attached gingiva (Gum-RR), and alveolar mucosa (Gum-V). Stain them slightly lighter than in the case photo. Stain other unstained areas with Gum-DR or Gum-SP to even out the overall color.

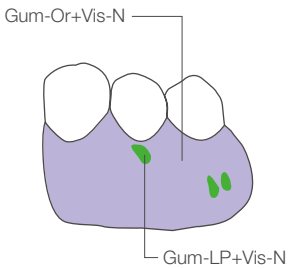
After 2nd firing



STEP 3 **Staining (3rd time)**

Finally, use Vis-N to adjust the color density and create the 3-dimensional effect and depth of the gums. Apply a thin layer of Gum-Or + Vis-N over the entire surface, then partially stain with Gum-LP + Vis-N.

After 3rd firing



7. Example of Firing Conditions

Example	Drying temperature (°C)	Drying (min.)	Heat rate (°C/min.)	Firing temperature (°C)	Hold time (min.)	Vacuum/ Atmosphere	Vacuum start (°C)	Vacuum end (°C)
 **Crown**	400	6 (7*1)	50	730*2	1	Vacuum*3	450	720
 **Long-span bridge***4	400	10	35	730*2	1	Vacuum*3	450	720

*1 When VINTAGE Art Universal YAMAMOTO LIQUID is used, drying time should be 7 min.
*2 VINTAGE Art Universal can be fired at 730 °C or higher temperature. If surface luster is insufficient, raise the final temperature or set longer the hold time.
*3 Vacuum firing 1.3~8.0kPa
*4 We recommend setting the cooling process according to the size of the frame.

Glazing

Trouble	Cause	Solution	Note
No luster	Too much liquid	Reduce the amount of liquid	Mix powder and liquid in a ratio of 1g:1.25g
	Firing temperature is too low	Raise the firing temperature	Firing temperature needs to be changed depending on the material and size of the restoration

Glazing and staining

Trouble	Cause	Solution	Note
White discoloration	GP-F layer is too thick	Apply thin layer	GP-F imparts sufficient fluorescence even with a thin layer. Apply it thinly
	Vacuum firing has not been performed	Fire in vacuum	Confirm the firing schedule and conditions of porcelain furnace
	The heat rate is high relative to the restoration's size	Lower the heat rate	Insufficient firing of the porcelain is the cause. If the restoration is large, its surface temperature will not rise easily, so it is necessary to reduce the heat rate
Bubbles	Contamination of application surface	Thoroughly clean the surface with ultrasonic or steam cleaner	–
	Drying time is too short	Prolong the drying time	Insufficient drying causes boiling of the liquid components remaining in the paste
	Drying temperature is too high	Lower the drying temperature	Residual liquid components must have boiled
	Firing temperature is too high	Lower the firing temperature	Maximum firing temperature is 850°C or lower
	Firing table or firing tray is too hot	Place the firing tray on the firing table 2-3 minutes after the firing stage comes down	If the restoration stained with VINTAGE Art Universal is placed on the extremely hot firing table, liquid components might boil quickly, causing bubbles. Place the firing tray after the firing table cools down sufficiently enough to avoid boiling the liquid components
	Air bubbles in the paste	Remove the air bubbles before applying the paste	Before applying, spread the paste thinly on the mixing plate and remove any air bubbles

Vis-modifier

Trouble	Cause	Solution	Note
Sink marks	Incorrect mixing ratio	Mix stain and Vis-modifier in a ratio between 1:8 and 8:1	Vis-modifier should not be used by itself
Bubbles	The layer is too thick	Apply thin layer	The layer thickness after firing shall be 0.2 mm or less
Cracks	The thermal expansion coefficient of the restoration is inappropriate	Vis-modifier should be used with ceramic materials that have a thermal expansion coefficient of $11.7\times 10^{-6}K^{-1}$ or less	Using Vis-modifier increases the layer's thickness, which can cause cracking when there is a large difference in thermal expansion coefficients

Notes

Notes

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