kuraray

Noritake

KATANA™ Zirconia

UTML *Ultra Translucent Multi-Layered*

STML *Super Translucent Multi-Layered*

ML *Multi-Layered* **HT** *High-Translucent*

TECHNICAL GUIDE

KATANA™ Zirconia

High Esthetic Potential for Zirconia Dental Restorations*

New series which features translucency similar to natural tooth enamel is now available.

Introducing the new series of ultra translucent multi-layered UTML and superior translucent multi-layered STML, ideal for efficient esthetic anterior teeth restorations.

These high translucent zirconia materials require different technical methods from the previously introduced ML and HT. This technical guide will explain the important points to help you achieve successful restoration using KATANA™ Zirconia.

*Compared to our conventional products

Four-Layer Structure:

- **Enamel Layer (35%)**
- **Transition Layer 1 (15%)**
- **Transition Layer 2 (15%)**
- **Body (Dentin) Layer (35%)**

Percentages shown in the brackets reflect the thickness ratio of the disc.

Restoration process

1. Series Selection
2. Shade Selection
3. Disc Thickness Selection
4. Framework Design and Milling Process
5. Sintering and Adjusting
6. Finishing Methods

- 6-1 Glazing
- 6-2 Glazing and Staining
- 6-3 Build-ups

Completion

1 Series Selection

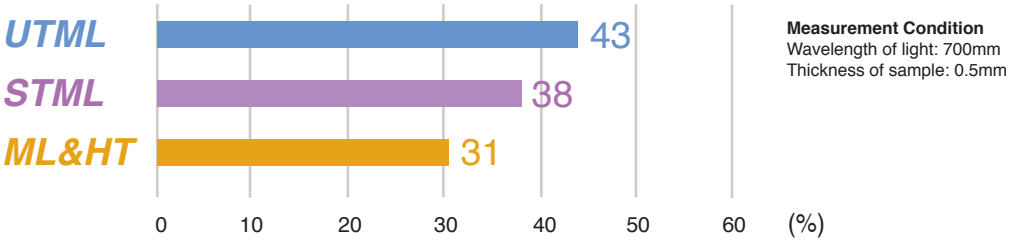
Each series has different translucency and mechanical properties. By choosing the right series, you can successfully restore a wide-range of cases, from the esthetic anterior to posterior bridgework.

UTML Ultra Translucent Multi-Layered. Ideal for anterior crowns and veneers, inlays/onlays and posterior single crowns.

STML Super Translucent Multi-Layered. Ideal for up to 3 units posterior bridges with a well-balanced combination of chromatic and gradational translucency, which reproduces esthetic enamel and dentin effects.

ML&HT High flexural strength zirconia is suitable for single unit frameworks and long-span bridges.

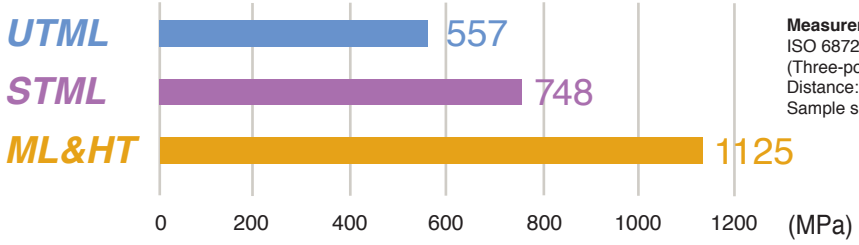
Translucency (raw zirconia material) / Transmittance Rate (%)



Measurement Condition
Wavelength of light: 700mm
Thickness of sample: 0.5mm

Data Source: Kuraray Noritake Dental Inc. The numerical value varies according to the conditions.

Mechanical Properties (raw zirconia material) / Flexural Strength (MPa)



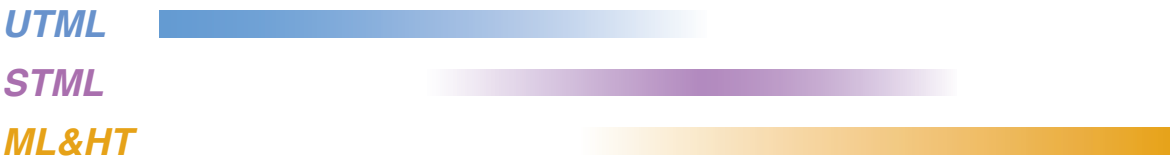
Measurement Condition
ISO 6872: 2015
(Three-point bending test)
Distance: 30mm
Sample size: 40mm x 4mm x 3mm

Data Source: Kuraray Noritake Dental Inc. The numerical value varies according to the conditions.

Recommendations for each series

Recommended Applications*

Veneer | Inlay/Onlay | Anterior Crown | Posterior Crown | 3 Unit Bridge | Long-span Bridge



*HT is recommended for the framework if you overlay with layered porcelains.

2 Shade Selection

UTML Shades

There are two different shade groups: “Standard Shades” and “Enamel Shades”. Enamel Shades have reduced chroma in the upper layer (①) which allows you to enhance the translucent appearance of the incisal area, as desired, by utilizing external stain characterization.

Standard shade (A1～D4)

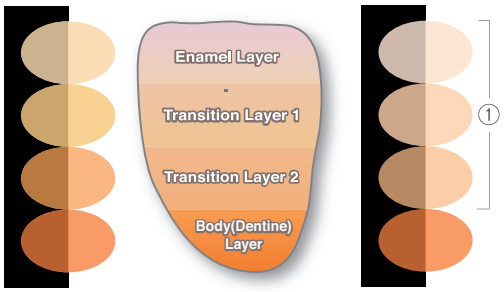
Translucency

High translucency through all the disc layers.

Color

Color of Shade Guide*

*VITA Classical Shade Guide



Color and translucency of the layers after sintering
(Image of gradation)

Enamel shade (ENW, EA1, EA2, & EA3)

Translucency

High translucency through all the disc layers.

Color

Reduced chroma from incisal to the middle layer (① part).

STML Shades

A well-balanced combination of chromatic and gradational translucency reproduces esthetic enamel and dentin effects.

Standard shade (NW、A1～A3.5)

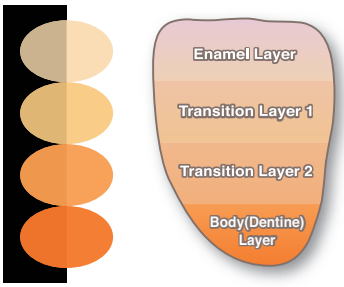
Translucency

Translucency is gradually decreased from the incisal to the cervical region to increase the masking level in the cervical region.

Color

Color of Shade Guide*

*NW: NORITAKE Shade Guide A1～A3.5 : VITA Classical Shade Guide

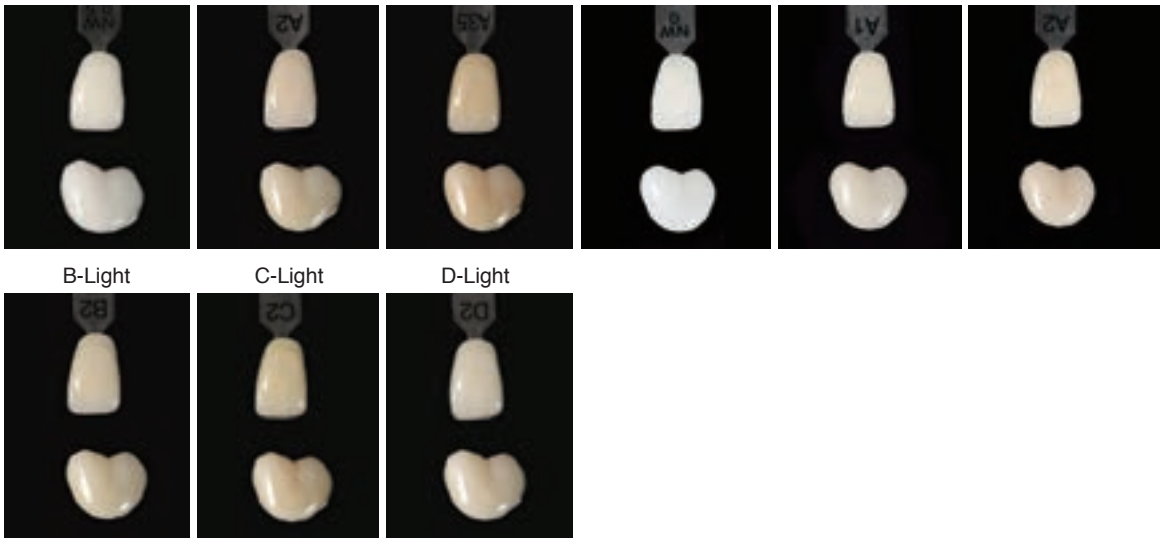


Color and translucency of the layers after sintering
(Image of gradation)

ML & HT Shades

ML (Multi-Layered) is suitable for full contour crowns and bridges, and HT (High-Translucent) Monolithic Shaded is suitable for frameworks.

Series	ML			HT		
Shade Color and Shade Matching	A-White	A-Light	A-Dark	HT10	HT12	HT13
	B-Light	C-Light	D-Light			

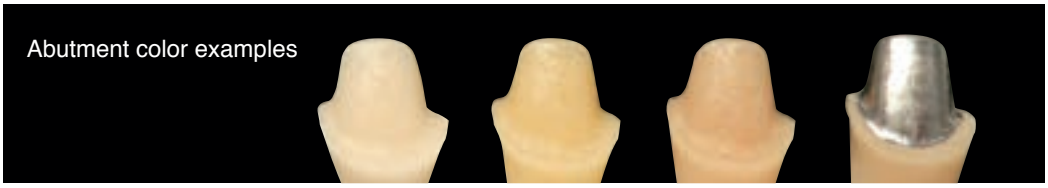


Shade Selection

Series										
UTML	Standard Shades	A1	A2	A3	A3.5	A4	B1	B2		
		B3	B4	C1	C2	C3	C4	D2	D3	D4
	Enamel Shades	ENW	EA1	EA2	EA3					
STML	Standard Shades	NW	A1	A2	A3	A3.5				
ML		A-White		A-Light		A-Dark		B-Light	C-Light	D-Light
HT		HT10		HT12		HT13				

Recommendations for Shade Selection

1. Range of abutment color varies by translucency of the series.



Select the shade number that corresponds to the target color.

Select a shade number one level brighter than the target color (with external staining).

2. Zirconia with a high refractive index tends to look brighter on the posterior area. For posterior restorations using UTML or STML, choose one shade darker than the target shade to achieve a natural look with surrounding teeth.

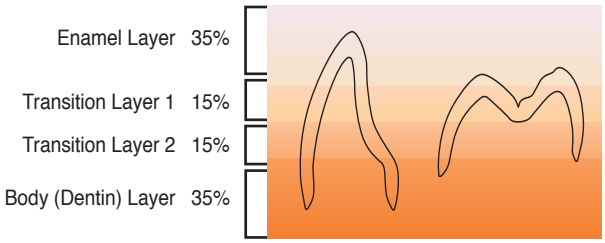
3. Even when the same shade color is used, the glazing and polishing finish will result in different color outcomes.

UTML **STML** For glazing, select the target shade color, and for polishing, it tends to become one shade darker. Therefore, select one lighter shade than the target shade color.

ML & HT For polishing, select the target shade color, and for glazing, it tends to become lighter. Therefore, adjust the color by external staining.

3 Disc Thickness Selection

Multi-Layered UTML, STML and ML discs come in three thicknesses; 14, 18 and 22mm. When sintering, the thickness will reduce to 80%. Therefore, select the right disc thickness to achieve the appropriate gradation between the crown length the enamel to the body (dentin).



(Image of gradation)

Thickness after sintering (before sintering)

11.2mm (14mm) 14.4mm (18mm) 17.6mm (22mm)

Actual size

Example: Fabricating an anterior crown with 11mm length, use an 18mm disc (14.4mm after sintering) including the enamel layer to the body (dentin) layer. For the 7mm posterior crown fabrication, a 14mm disc (11.2mm after sintering) is recommended between enamel and body (dentin) layers.

4 Framework Design and Milling Process

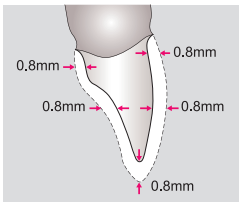
Anterior crown, Veneer, Posterior crown, Inlay, Onlay

It is crucial to keep a minimum wall thickness* for a successful restoration, and keep in mind:

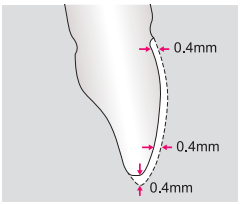
*Not including the thickness of build-up porcelain

Minimum Wall Thickness of Zirconia

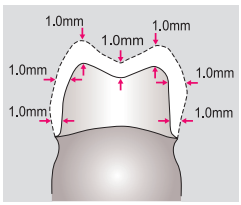
UTML **STML**



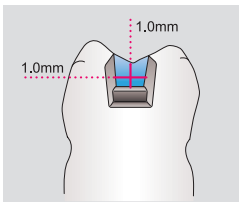
Anterior crown



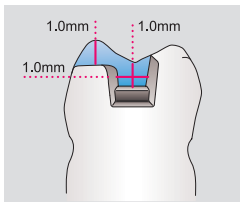
Veneer



Posterior crown



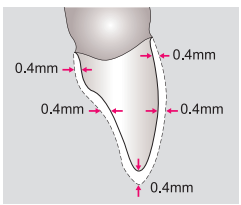
Inlay



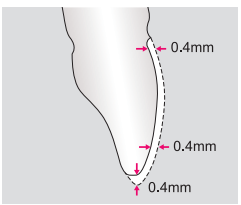
Onlay

*Keep 0.8mm in case of porcelain build-up. You can reduce to 0.4mm when finishing with glaze and polish.

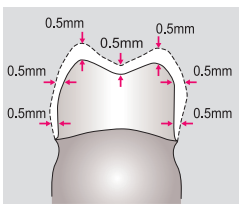
ML&HT



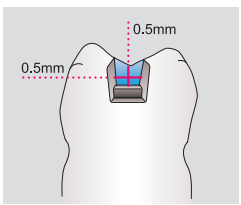
Anterior crown



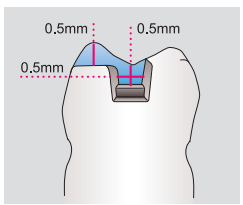
Veneer



Posterior crown

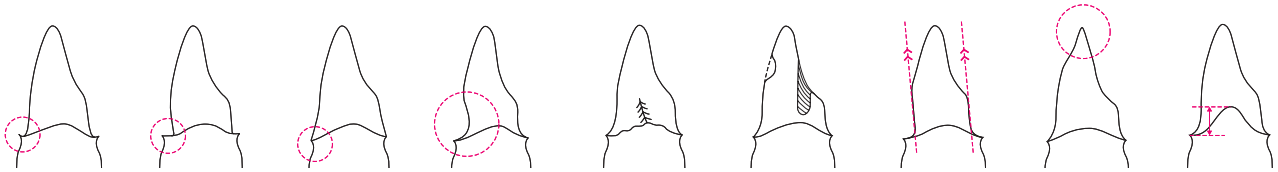


Inlay



Onlay

Contraindications



"J" Margin | Deep Shoulder | Knife Edge | Undercuts | Rough Margin | Groove | Parallel Axis | Sharp Incisal Top | Height Difference (Anterior)

Bridge / Connector Cross Section

Follow the formula of applicable wall thickness.

1) Do not make a sharp cut to adjust connector cross section by using a diamond disc as the disc creates sharp notches that may lead to cracks and imminent bridge failure.

2) UTML and STML are not suitable for a cantilevered pontic bridge.

3) ML and HT are limited to 2 pontics within a bridge. When 2 pontics connect, the cross section should be 12mm^2 or more. The cantilevered pontic is limited to 1 and cross section should be 12mm^2 or more.

Minimum Connector Cross Section

	UTML	STML	ML & HT
Anterior 2-3 units	12mm^2 or more	12mm^2 or more	7mm^2 or more
Anterior 4 units or more	.....(not recommended).....		9mm^2 or more
Posterior 2-3 units	16mm^2 or more (Premolar only)	16mm^2 or more	9mm^2 or more
Posterior 4 units or more	.....(not recommended).....		9mm^2 or more

5 Sintering and Adjusting

Follow the sintering schedule. After sintering adjust inside of the framework and margin.

1) Be sure that material is fully cooled to avoid cracking.

2) UTML and STML flexural strength are not as strong as ML and HT, therefore need special attention like not using excess force or work under running water for inside and/or margin adjustment.

3) Use “Crack Finder” after adjustment to make sure no cracking occurred.

Sintering Program Setting

	UTML	STML	ML & HT
High Temperature	1550°C / 2822°F		1500°C / 2732°F
Hold Time	2 hours		2 hours
Rate of Temperature Increase	10°C / 18°F minute		10°C / 18°F minute
Rate of Temperature Decrease	-10°C / -18°F minute		-10°C / -18°F minute

6 Finishing Methods

Compatible Materials

Cerabien™ ZR	**CZR Press LF**
FL Glaze, VC Glaze, External Stain, Internal Stain, Luster, etc.	LF External Stain, LF Internal Stain, LF Luster, etc.

Warning: Do not mix Cerabien™ ZR and CZR Press LF powder for build-up.
Do not use CZR Press (H-ingot, L-ingot, Esthetic White Ingot) for UTML and STML.

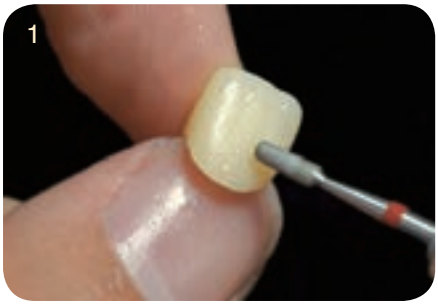
Crucial technical points of finishing

1) Polish contact area with opposing tooth and clean restoration by using an ultrasonic cleaner for maximum benefits.
2) After sintering and adjustment, clean restoration thoroughly.
3) When glazing, staining and sintering porcelain always use a stand-pin. Sintering schedules vary per product, therefore review technical instructions.
4) Do not fabricate until cool down to avoid potential cracking.
5) Select the shade number that corresponds to abutment color and according to KATANA™ Zirconia.

6-1 Glazing

The multi-layered zirconia is designed to achieve esthetic results by using glaze method at final process.

Glazing method

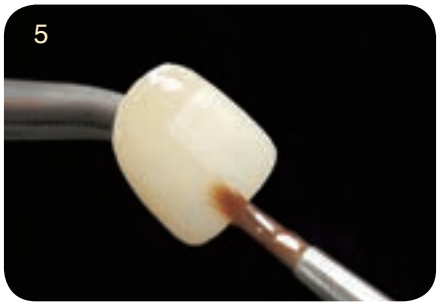


Create a surface texture over the entire crown under running water or wet condition

Polish areas in contact with opposing tooth. For polishing only finish complete entire crown with polishing

Alumina sandblast surface of the crown (50~70µm, 30psi, 0.2MPa)

Clean restoration using an ultrasonic cleaner in alcohol or acetone, or steam cleaner



Apply glaze, bake, complete*

* Under A, B or C method, it is possible to mix glaze and external stain then bake.

Glazing Method: Select A, B or C method according to the material

No.	Product	Dry-out Time min.	Low Temperature °C/°F	Start Vacuum °C/°F	Heat Rate °C/°F min.	Vacuum Level kPa	Release Vacuum °C/°F	Hold Time in the air min.	High Temperature °C/°F	Cooling Time min.
A	**CZR Press** Glaze	5	600/1112	600/1112	65/117	96	850/1562	1	850/1562	4
B	**Cerabien™ ZR** FL Glaze, VC Glaze	5	600/1112	600/1112	65/117	96	850/1562	1	850/1562	4
C	**CZR Press LF** Glaze	5	600/1112	600/1112	45/81	96	800/1472	1	840/1544	4

Mix Glaze and External Stain Method: Select A, B or C method according to the glaze material (or choice of glaze)

CZR Press	Glaze	+	Cerabien™ ZR External Stain Blue, Gray, A+, *etc.*	Baking Schedule A
Cerabien™ ZR	FL Glaze, VC Glaze	+	Cerabien™ ZR External Stain Blue, Gray, A+, *etc.*	Baking Schedule B
CZR Press LF	Glaze	+	CZR Press LF External Stain Blue, Gray, A+, *etc.*	Baking Schedule C

6-2 Glaze and Stain Method

After glazing, applied staining will enhance translucent appearance. The UTML enamel shades have reduced chroma in the upper layer which allows you to enhance the translucency appearance of the incisal area, as desired, by utilizing external stain characterization.

Technical Points of Staining

1) In addition to the feature of horizontal gradation of the multi-layered disc, applying stain with a vertical direction will create three-dimensional appearance.

2) Apply Gray, Blue on the incisal edge area, and A+, B+, C+, D+, *etc*. on the mamelon area to enhance internal texture and translucency.

Example of External Stain

Blue: Gray= 1:1

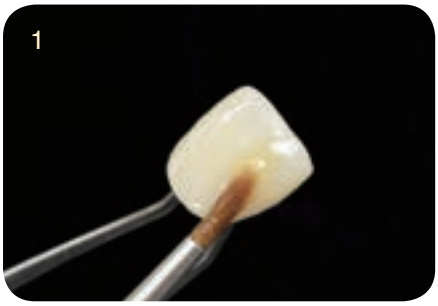
- Apply stains to create shadows of mamelon characterizations

A+, B+, C+, D+, *etc*.

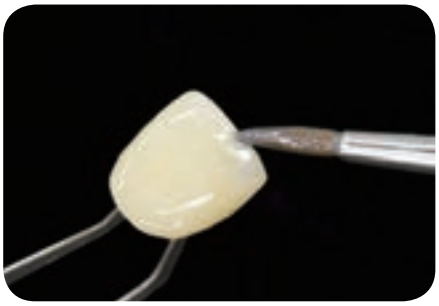
- Apply external stain horizontally for adjusting chroma
- Apply external stain vertically to show internal texture characterization

Glazing Process

Process glazing on zirconia surface using page 7 "**Glazing**" method.



Apply external stain over glazed surface



Bake (under schedule D or E), completion

External Stain: Select D or E according to the material

No.	Product	Dry-out Time min.	Low Temperature °C/°F	Start Vacuum °C/°F	Heat Rate °C/°F min.	Vacuum Level kPa	Release Vacuum °C/°F	Hold Time in the air min.	High Temperature °C/°F	Cooling Time min.
D	**Cerabien™ ZR** External Stain Blue, Gray, A+, *etc.*	5	600/1112	–	50/90	–	–	–	850/1562	4
E	**CZR Press LF** LF External Stain Blue, Gray, A+, *etc.*	5	600/1112	–	45/81	–	–	1	840/1544	4

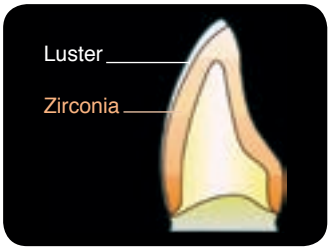
6-3 Porcelain Build-up Method

Higher esthetic appearance will be created by layering Luster porcelain over zirconia.

Technical Points of Build-up

1) For UTML/STML, it is crucial to secure the minimum wall thickness as recommended on page 5 "**Framework Design and Milling Process**", and apply only one layer on the incisal part.

2) Polishing finish on lingual side is recommended.



UTML/STML Build-up Image

Fabrication Process

Select layering material: either Cerabien™ ZR or CZR Press LF.

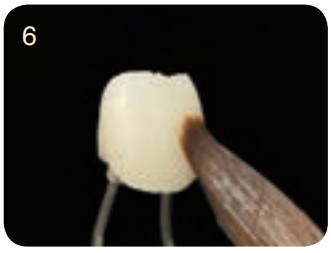
Create mamelon structure under running water or wet condition

Determine build-up and zirconia thickness

Polish areas in contact with opposing tooth

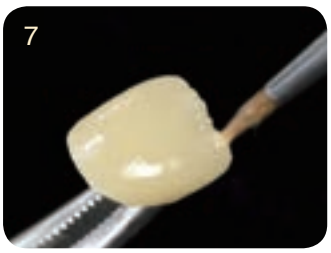
Perform Almina sandblast on the surface of the unpolished area of the crown (50~70µm, 30psi)

Clean restoration using an ultrasonic cleaner in alcohol or acetone, or steam cleaner



Apply wash, then bake*1 (schedule F)

*1 In case there is not enough build-up space, internal stain can be used during wash baking (schedule F), and be sure to cover entire build-up surface with internal stain.



Apply internal stain, then bake (schedule G)

Porcelain build-up, then bake (schedule H)

Perform morphological correction and smooth surface

Apply glaze, external stain, then bake, complete*2

*2 The surface without porcelain build-up (for example lingual side) is recommended polishing finish.

For glazing, external stain and baking on the non build-up surface of Cerabien™ ZR material it is crucial to follow methods of page 7 "**Glazing**" step 5 and page 8 "**Glaze & Stain Method**" steps 1 and 2.

Cerabien™ ZR Baking Schedule

No.	Step	Dry-out Time min.	Low Temperature °C/°F	Start Vacuum °C/°F	Heat Rate °C/°F min.	Vacuum Level kPa	Release Vacuum °C/°F	Hold Time in the air min.	High Temperature °C/°F	Cooling Time min.
F	Wash Baking Wash Baking during Internal Stain	5	600/1112	600/1112	45/81	96	930/1706	1	930/1706	4
G	Internal Stain*	5	600/1112	–	50/90	–	–	–	900/1652	4
H	Translucent Luster, *etc.*	7	600/1112	600/1112	45/81	96	930/1706	1	930/1706	4
I	External Stain Glaze, Blue, Gray, A+, *etc.*	5	600/1112	–	45/81	–	–	–	930/1706	4

*Can be eliminated if a wash coat baking was performed during the internal stain process.

CZR Press LF Baking Schedule

No.	Step	Dry-out Time min.	Low Temperature °C/°F	Start Vacuum °C/°F	Heat Rate °C/°F min.	Vacuum Level kPa	Release Vacuum °C/°F	Hold Time in the air min.	High Temperature °C/°F	Cooling Time min.
F	Wash Baking Wash Baking during LF Internal Stain	5	600/1112	600/1112	45/81	96	840/1544	1	840/1544	4
G	LF Internal Stain*	5	600/1112	–	45/81	–	–	–	840/1544	4
H	LF Translucent LF Luster, *etc.*	7	600/1112	600/1112	45/81	96	840/1544	1	840/1544	4
I	LF External Stain Glaze, Blue, Gray, A+, *etc.*	5	600/1112	–	45/81	–	–	0.5	840/1544	4

*Can be eliminated if a wash coat baking was performed during the LF internal stain process.

SYMBOLS USED IN A LABEL

MANUFACTURER	LOT BATCH CODE	USE BY	REF CATALOGUE NUMBER
CONSULT INSTRUCTIONS FOR USE	EC REP AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY		

Contraindications

If the patient is hypersensitive to zirconia or any other components, this product should not be used.

EU Authorized Representative

Name: Kuraray Europe GmbH
Address: Phillipp-Reis-Str.4 65795 Hattersheim am Main, Germany

Kuraray Noritake Dental Inc.
300 Higashiyama, Miyoshi-cho
Miyoshi, Aichi 470-0293, Japan
http://www.kuraraynoritake.com

Read the IFU (Instructions For Use) before the procedure.
Printed color may not accurately present actual color.

No1_2016.01