Zirconia block User Instruction（ST+）

[Before use]

Zirconia blocks are produced by CIP technology and pre-sintered in low temperature. Although the product has some strength, because of porosity, please handle carefully. When you receive the product, please check as below. If there is something exceptional, please contact the sales manager.
1. Product is complete without any damage.
2. The packing is complete without any damage.

[ST+ Material Usage and Technical Parameters]

Materials function

The zirconia can be used to manufacture crown, the bridges and other restoration.

Chemical Composition and Powder Characteristics

Chemical Composition

Y_2O_3	5.3wt%
Al_2O_3	0.25wt%
SiO_2	≤0.002wt%
Fe_2O_3	≤0.02wt%
Na_2O	≤0.02wt%
Aging Properties	Monoclinic Phase＜25%
Chemical Solubility	≤2000μg.cm^{-2}

Mechanical Property

Sintered Density	≥6.0g/cm^3
Flexural Strength	≥1000MPa
Fracture Toughness	≥5MPam½
Hardness (Hv10)	1250MPa

[Indications]

coping、coping bridge、full arch coping bridge 、custom abutment、screw retained crown、screw retained bridge、inlay、onlay、posterior crown、posterior crown bridge.

[Requirements for preparation]

1.Prepare base into obviously sloping shoulder or round shoulder.
2.The milling thickness of edge of cervical region should be at least 1mm.
3.Occlusal surface and incisal need to grind off 1.5-2.0mm.
4.Knuckle radius should be 0.7mm.
5.Axial surface aggregation degree should be 6-8 degree.
6.For bridges, adjacent abutment should be parallel between each other to avoid undercut.

[Application Method]

Coping: Scanning and Designing→Milling→Cleaning→Dyeing→Drying→Sintering→Polishing→Porcelain→Staining→Finishing
Full contour crown: Scanning and Designing→Milling→Cleaning→Dyeing→Drying→Sintering→Polishing→Staining→Finishing

1. Scanning and Designing

Please scan with highly precise scanner to get accurate data of the restoration model.
For full-ceramic restoration, we have to meet certain requirements as below
1.1 The thickness of the zirconia should be at least 0.6mm.
1.2 The geometric structure of the zirconia bridge is the key of cracking strength, so the height of the connection body should be big as far as possible.The cross-sectional area of anterior teeth connection body should be at least 9mm². The cross-sectional area of posterior teeth connection body should be at least 12mm².
1.3 Continuous loss no more than two units.
1.4 Avoid the free deletion.

2. Milling

When making restorations by using zirconia ceramic materials, a new bur should be changed as highly recommended. Besides it is not allowed to cool zirconia using liquid during manufacture process. After manufacture, please checked that if there are any defects happening listed below:
Is there any crack?
Is there any contamination?
Is there any break?
If any of these defects happen, reasons need to be found and restorations need to be manufactured again.

3. Separation of Restoration and Cleaning
Separation of restoration:
Using technician specialized hand piece and grinding head to separate restorations from blocks.
Before grinding, a towel should be put on the desk to avoid restorations dropping on desk and crack or break. When operating, hand needs to find a fulcrum: hand piece speed should be controlled at 10000-12000rev/min. And then the connector needs to be polished successively in one direction. Don’t separate one connector completely off at one time; finally, the rest of connector could be polished slightly. It is not advised to make too much adjustment on the restorations in soft condition to avoid subfissure or chipping and so on.
Cleaning
Please clean up the powder on surface and inner side of restorations with brush. If cleaning is not thorough, powder residues will contaminate color liquid when dyeing and the powder residues will stay on the surface and inner side of restorations after high temperature sintering, forming white spots and therefore having negative effect on esthetics and positioning of restorations.

4. Internal dyeing
Please dye the cleaned restoration with the method of immersion.
Before dyeing, gently shake the dyeing liquid, and then put the dyeing liquid into a clean and dry plastic container. Please make sure color liquid completely cover the entire crown.
Fully immerse the entire crown or bridge into the liquid for 1min with plastic forceps.
Flip the restoration with plastic forceps and remove the bubbles on the surface to ensure uniform absorption. After 1min, put restoration on the clean glass board. Remove visual liquid on the surface of restoration as well as glass with tissue. Naturally dry out for 10-15mins.

5. Drying
Drying instrument:
Infrared drying light
Drying method:
Distance: (100w) place the restoration under the light by 8-15cm.
(250w) place the restoration under the light by 20-30cm.
Time: single crown and the bridge below 3 units: 20-30mins.
3-6 units bridge: 40-60mins.
Above 6 units bridge: more than 90mins.

6. Sintering
Preparation:
Step 1: check the zirconium beads
Firstly, inspect the color, shape, number of the zirconium beads. If the yellowing and mutilated zirconium beads are found, they should be replaced immediately.
Secondly, check the adhesive zirconium bead. If any adhesive zirconium beads habe been found, please separate them and ensure the mobility. The entire bottom of crucible should be covered by the zirconium beads.
Step 2: Inspect the sintering furnace, it is important to clean the furnace cavity in time if there is any contaminant there.
Cleaning method:
Scrap away the impurity in the chamber, then the waste zirconia materials can be put in the chamber and sintering. The suggestion is to clean the sintering furnace once a week.
Sintering:
The dried restoration with occlusion facing down should be putted on the beads in sagger, then sinter strictly in compliance with sintering process.

7. Grinding & Polishing
Use special zirconia grinding head to trim the surface of restoration. The following three procedures (coarse grinding, fine grinding and coarse polishing) can make restoration surface smooth.
Coarse grinding:
This is the first grinding step after sintering restoration. The aim is to seat the restoration, adjust adjoining, occlusion and trim the anatomic contour.
Fine grinding:
Please make restoration surface evenly and uniformly as well as the surface texture more smoothly.
Rough polishing:
To make the surface even and smooth.

8. Porcelain
For coping, using zirconia specialized porcelain, and the process should be operated according to the porcelain user instruction.

9. Staining and Glazing
Please stain the entire ceramic crown or entire zirconia crown.
Better result can be achieved by using Glaze Paste.
Glaze Paste introduction:
A, B, C, D four shades.11 effect colors: blue, white, brown, pottery clay, black, orange, purple, yellow, violet and grey, pink, pale brown, transparent glaze liquid and dilution liquid.
Advantage:
Each bottle of stain contains glaze, no need to glaze additionally. The ideal effect can be achieved just by one-step staining. Product features a state of paste, intermediate denseness and fine particles. Even the beginner can learn how to use it fast and easily.
Operation method:
Please selected main color scheme and effect shades according to proportioning table of Glaze Paste. They should be mixed in consistency as cervical color; the cervical color and transparent glaze need to be mixed to get lighter color as middle 1/3 transitional color; The following step is to mix transparent glaze with a little blue or purple-grey, the mixture can be regarded as incisal transparent effect color. The terracotta can be used as occlusal surface color. Groove can be applied color using brown. You can glaze the whole crown directly, if nowhere in the crown could be stained. Please ensure that the whole crown should be covered by the stains.

10. Finishing
Fabrication of restoration is finished.

The suggested crystallization curve:

Below 3 units bridge(7h):

Start temp	Phase 1 Heating rate	Phase 1 Maximum temp	Holding time	Phase 2 Heating rate	Phase 2 Maximum temp	Holding time	Cooling rate	Cooling to
Room temp	10°C/min	900°C	20min	5°C/min	1530°C	120min	10°C/min	300°C

From 4 to 6 units bridge(10h):

Start temp	Phase 1 Heating rate	Phase 1 Maximum temp	Holding time	Phase 2 Heating rate	Phase 2 Maximum temp	Holding time	Cooling rate	Cooling to
Room temp	5°C/min	900°C	30min	3°C/min	1530°C	120min	8°C/min	300°C

Above 7 units bridge(15h):

Start temp	Phase 1 Heating rate	Phase 1 Maximum Ttemp	Holding time	Phase 2 Heating rate	Phase 2 Maximum temp	Holding time	Cooling rate	Cooling to	Cooling rate	Cooling to
Room temp	4°C/min	900°C	20min	2°C/min	1530°C	120min	3°C/min	900°C	7°C/min	200°C