Instruction for Use of Dental Zirconia Blanks

1. Intended Use

This product is a pre-sintered zirconia ceramic material. It is applicable for CAD/CAM system milling and fabrication of dental fixed restorations, including anterior and posterior full-contour crowns, fixed dental bridges, implant-supported crowns and bridges, inlays, onlays and aesthetic veneers.

2. Indications

It is used for fixed restoration of single-tooth defect and missing tooth, fixed bridge restoration for dentition defect, superstructure crown and bridge restoration after implant treatment, and aesthetic restoration for defective tooth color and morphology (veneers, inlays, onlays).

3. Contraindications

a. Patients with allergy to zirconia, yttria, alumina and other product components;

b. Patients with severe bruxism and excessive occlusal stress without occlusal protection measures;

c. Restoration scenarios with insufficient abutment height and poor retention form that cannot provide effective retention for restorations;

d. Patients with poor oral hygiene who cannot cooperate with oral maintenance.

4. Product Composition

	3D Series	**ST Series**	**SHT Series**
ZrO_2+HfO_2	≥92%	≥94%	≥92%
Y_2O_3	4.5%~8.0%	4.5%~6.0%	6.5%~8.0%
Al_2O_3	< 0.15%	< 0.15%	< 0.15%
Other Oxides	< 0.5%	< 0.5%	< 0.5%

5. Physical & Chemical Properties

	3D Series	ST Series	SHT Series
Density before sintering	3.15±0.05 $g \cdot cm^{-3}$	3.15±0.05 $g \cdot cm^{-3}$	3.15±0.05 $g \cdot cm^{-3}$
Density after sintering	6.07±0.02 $g \cdot cm^{-3}$	6.09±0.02 $g \cdot cm^{-3}$	6.08±0.02 $g \cdot cm^{-3}$
CTE (25~500℃)	$(10.5 \pm 0.5) \times 10^{-6}$ K^{-1}	$(10.5 \pm 0.5) \times 10^{-6}$ K^{-1}	$(10.5 \pm 0.5) \times 10^{-6}$ K^{-1}
Fracture toughness	5.0~6.5 $MPa \cdot m^{1/2}$	6.5 $MPa \cdot m^{1/2}$	5.3~6.3 $MPa \cdot m^{1/2}$
Hardness	1250~1350 Hv10	1350 Hv10	1270~1330 Hv10
Accelerated aging surface monoclinic content	< 5%	< 15%	< 5%
Chemical solubility after sintering	< 100 $\mu g \cdot cm^{-2}$	< 100 $\mu g \cdot cm^{-2}$	< 100 $\mu g \cdot cm^{-2}$
Cytotoxicity	0 Level	0 Level	0 Level
Radioactivity	< 0.1 $Bq \cdot g^{-1}$	< 0.1 $Bq \cdot g^{-1}$	< 0.1 $Bq \cdot g^{-1}$
Sintering temperature	1480~1510℃	1500~1530℃	1500~1530℃

6. Safety Warnings and Precautions

a. Zirconia dust generated during milling may irritate the respiratory tract, eyes and skin. Operators must turn on equipment dust suction device and keep the working environment ventilated.

b. Follow the specified heating, holding and cooling parameters strictly for sintering. Do not open the furnace door when the furnace temperature is higher than 300℃. Rapid cooling of large restorations is forbidden to prevent cracking caused by thermal expansion and contraction.

c. Do not mix and sinter zirconia products of different brands, specifications and translucency grades, so as to avoid product performance failure caused by mismatched sintering parameters.

d. This product is a special dental restoration material. It is strictly prohibited for implantation in other parts of human body or non-medical use.

7. Product Technical Specifications

<table>
<tr><th>Model</th><th>Shade</th><th>Specifications</th><th>Thickness</th></tr>
<tr><td>3D-Pro-A0</td><td>White</td><td rowspan="8">98mm
95mm
92*75mm</td><td rowspan="8">10mm
12mm
14mm
16mm
18mm
20mm
22mm
25mm</td></tr>
<tr><td>3D-Pro-ML</td><td rowspan="2">A1, A2, A3, A3.5, A4
B1, B2, B3, B4
C1, C2, C3, C4
D2, D3, D4
BL1, BL2, BL3, BL4</td></tr>
<tr><td>3D-Pro-Esthetic</td></tr>
<tr><td>ST</td><td>White</td></tr>
<tr><td>ST-C</td><td rowspan="2">A1, A2, A3, A3.5, A4
B1, B2, B3, B4
C1, C2, C3, C4
D2, D3, D4
BL1, BL2, BL3, BL4</td></tr>
<tr><td>ST-ML</td></tr>
<tr><td>SHT</td><td>White</td></tr>
<tr><td>SHT-C</td><td rowspan="2">A1, A2, A3, A3.5, A4
B1, B2, B3, B4
C1, C2, C3, C4
D2, D3, D4
BL1, BL2, BL3, BL4</td></tr>
<tr><td>SHT-ML</td></tr>
</table>

Minimum Wall Thickness Standard: Anterior full crown ≥0.4mm, posterior full crown ≥0.5mm, cross-sectional area of full-contour bridge connector ≥12mm². Fabrication below the minimum thickness is forbidden to prevent restoration fracture.

8. Standard Operating Procedures

8.1. CAD/CAM Milling Processing

a. Firmly clamp the zirconia blank/disc in the fixture of milling equipment to ensure no looseness and offset;

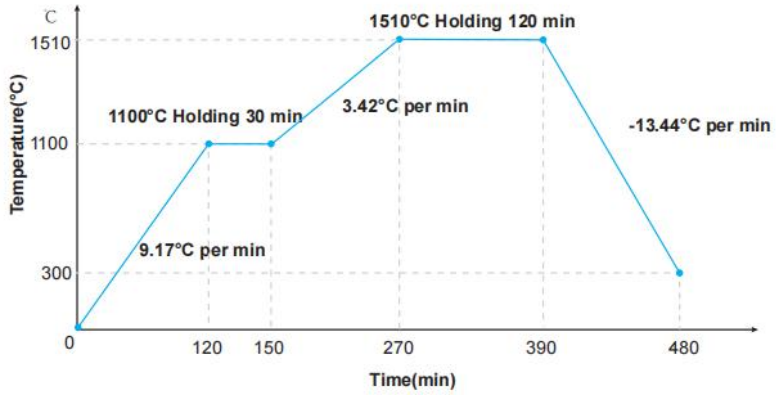
b. Check the product shrinkage rate parameters and match the equipment milling compensation coefficient;

c. Use special sharp zirconia burs for milling to ensure cutting accuracy;

8.2. Standard Sintering Process

1~3units

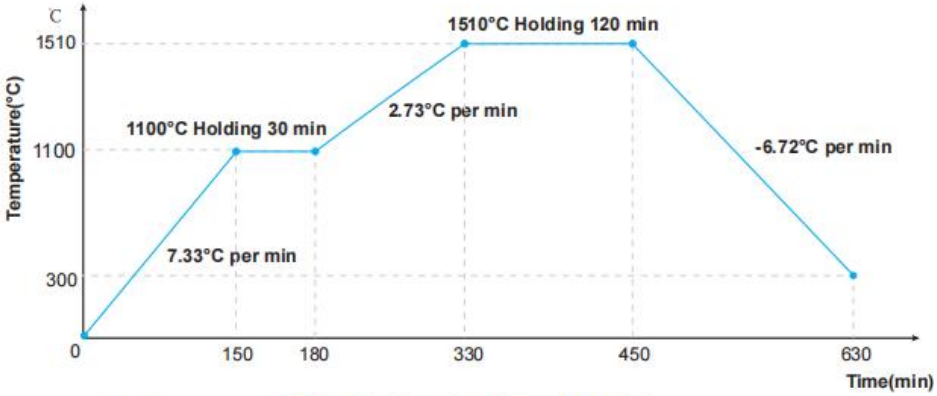
Time (min)	0	120	150	270	390	480
Temperature (℃)	0	1100	1100	1510	1510	300



4~6 units

3D-Pro-ML Sintering Curve (4~6 units)

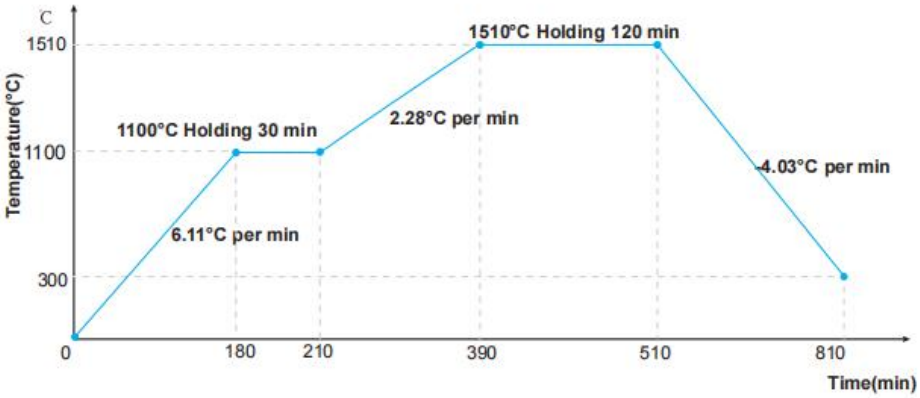
Time (min)	0	150	180	330	450	630
Temperature (℃)	0	1100	1100	1510	1510	300



> 7 units

3D-Pro-ML Sintering Curve (>7 units)

Time (min)	0	180	210	390	510	810
Temperature (℃)	0	1100	1100	1510	1510	300



8.3. Finishing, Polishing and Glazing

a. Use fine-grained diamond burs for restoration adjustment after sintering with high-speed and water cooling operation;

b. Sandblast the bonding surface of restorations with 50μm alumina sand under 2-3bar pressure to improve bonding strength;

c. Completely remove surface dust and impurities by ultrasonic cleaning or steam cleaning;

d. Use special zirconia stains and glaze powder for staining and glazing, and follow the matching glaze firing curve strictly.

9. Clinical Cementation Operation

a. Recommended bonding method (high-strength bonding): After sandblasting the bonding surface, apply MDP special zirconia primer, and use dual-cure resin cement for bonding and curing;

b. Self-adhesive method: Suitable for single crown restoration with good abutment retention form and low occlusal stress;

c. Traditional cement bonding: Zinc phosphate cement and glass ionomer cement are available, only applicable to restoration scenarios with low occlusal stress and excellent retention conditions.

10. Storage Conditions and Shelf Life

Storage environment: Temperature 15°C-25°C, cool, dry, ventilated and away from light, far from corrosive chemicals and humid environment.

Shelf life: 10 years for unopened products with intact packaging and standardized storage.

11. Waste Disposal

Product milling waste, grinding dust and waste restorations are ordinary non-hazardous ceramic wastes, which do not require special hazardous waste treatment.

12. Manufacturer Information

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