VITA All Ceramics

VITA In-Ceram®
YZ CUBES for CEREC®

Directions for use
Fabrication of bridge/crown frameworks

VITA SYSTEM 3D-MASTER®
Material-technical aspects of VITA In-Ceram® YZ Cubes for CEREC®

Zirconium oxide is an oxide ceramic material with numerous fascinating properties - from its translucency in case of thin walls and its bright color up to its excellent biocompatibility. Not without reason this material is widely used in implantology. Additional features are the superior flexural strength among oxide ceramic materials, the low modulus of elasticity and the fracture toughness of the zirconium oxide. The latter results from the possibility of stabilizing ZrO₂ in its denser high temperature phase through the appropriate addition of e.g. yttrium oxide. Only if external energy is supplied - as it occurs e.g. when a crack is formed - individual ZrO₂ particles are transformed locally into their stable phase at room temperature. The compressive stress resulting in the structure avoids uninhibited crack growth and thus the failure of the ceramic – a behavior which creates a stress and elongation progress which is otherwise only known from steel. This is why zirconium oxide is also referred to as "ceramic steel". This property also ensures the high durability of zirconium oxide under permanent load.

VITA In-Ceram® YZ Cubes for CEREC® are presintered (see fig. 1) zirconium oxide blocks partially stabilized with yttrium oxide. In this condition that allows easy processing they are used to grind enlarged bridge and crown substructures in the CEREC inLab system. Then these structures are sintered (dense sintering process) in a special high temperature furnace (see fig. 2) so that they shrink and form highly stable and precision-fit structure which offer all physical benefits of zirconium oxide.

Important information:

According to the information provided by Sirona Co., VITA In-Ceram YZ Cubes may only be used in grinding systems with long traverse paths (from serial no. 5000)!

The material can only be processed in Cerec 3/inLab, software update version 1.40 R950 (or higher) of Sirona Co.

Indication
- crowns in the anterior and posterior area
- 3-unit bridges in the anterior and posterior area
- primary crowns for telescopic work to be prepared

Counterindication
- if sufficient oral hygiene is not present
- in case of inadequate/inappropriate tooth preparation
- in case of insufficient hard tooth substance
- bruxism

Technical data
TEC (thermal expansion coefficient): 10.5 · 10⁻⁶ K⁻¹
Flexural strength: > 900 MPa
Fracture toughness (K₁₀): 5.9 MPa · √m
Modulus of elasticity (E): 210 GPa
Composition
zirconium dioxide (ZrO₂), yttrium oxide (Y₂O₃) 5%, hafnium oxide (HfO₂) < 3%, aluminium oxide (Al₂O₃) and silicon dioxide (SiO₂) < 1% (weight percentage)
Clinical aspects
- Zirconium dioxide has been used in the field of hip-joint prosthetics for roughly 30 years. It exhibits very high strength, high corrosion resistance and low thermal conductivity. The structure and the veneering material are both biocompatible and do not have any allergic potential.

Radiopacity
- Zirconium dioxide ceramic is radiopaque.

General preparation information
- The preparation can be carried out either using a chamfer or a shoulder preparation with rounded interior angle. A circular cutting depth of one millimeter is required. The vertical preparation angle should be 3°, however, parallel preparation is also possible if it is clinically required. All transitions from the axial towards the occlusal resp. incisal surfaces must be rounded.

Shoulder preparation

Chamfer preparation

Incorrect chamfer preparation

Tangential preparation is counterindicated
Preparation of premolars and molars

- In the case of posterior teeth a simplified occlusal relief should be prepared to provide more space for the ceramic. The aperture angle should be 120 – 140°. In the occlusal area at least 1.5 mm of substance should be removed.

Preparation of anterior teeth

- The incisal area of anterior teeth should be reduced by 2 mm.

Fixation information

- Restorations made of VITA In-Ceram® YZ Cubes for CEREC® are suitable for non-adhesive fixation with glass ionomer or zinc phosphate cements or adhesive fixation with the self-hardening PANAVIA 21 TC or the dual-hardening PANAVIA F (Kuraray).

Pretreatment of the zirconium oxide restorations prior to adhesive fixation:

- Sandblast the inner surfaces of the restoration using aluminium oxide (max. 50 µm) at a pressure of = 2.5 bar. Avoid contact with the cleaned surface.
- Etching with hydrofluoric acid is not possible. Silanizing is not required.
- Please observe the instructions for use of the manufacturers of the adhesive materials.

Removal of integrated restorations

- To remove a fixed zirconium dioxide restoration it is recommended to use cylindrical diamond instruments whilst ensuring maximum cooling with water and a speed of 120,000 rpm to separate the restoration.
**Trepanation**

- The veneering ceramic can be removed with a diamond instrument. Then the framework can be trepaned with a coarse-grained, spherical diamond whilst ensuring maximum cooling with water and working at a speed of 120,000 rpm.

**Scanning**

- Scanning in the CEREC inLab system is done analogously to the previous working steps.
- The VITA In-Ceram® YZ Cubes for CEREC® bear a bar code which can be read by a scanner. This way the shrinkage factor of the charge in use is scanned automatically and considered during grinding to achieve a final result with high precision of fit.

**Constructing**

- Constructing in the CEREC inLab system is done analogously to the previous working steps.

**Design of the framework**

![Diagram](image)

**Important:**
The default parameters for In-Ceram ZIRCONIA in the software must be used for wall and connector thicknesses of restorations made of VITA In-Ceram® YZ Cubes for CEREC®.

The average diameter of the connectors should not be less than 4 mm and must be designed while observing the following two criteria:

1. Maximum value for height \( h \) must be selected.
2. Height \( h \) should be at least as large as or larger than width \( b \).

**Important information:**
Please use suitable grinding tools for VITA In-Ceram® YZ CUBES for CEREC® (e.g. cone-shaped diamond XL*).

After completing the grinding process and prior to sintering, the restoration is cut off using a diamond grinding tool, the cut-off area must be ground smooth and in some cases it may be required to reduce the thickness of the margin. After sinter firing, further adjustments must be avoided.

* Sirona-Art.-No. 593 566 8 D3329
Important note:
Since grinding of sintered dental ceramic products includes the formation of dust, always wear a face mask or grind when wet. Additionally, use an extraction unit and work behind a protective screen.

Sinter firing in the high temperature furnace Thermo-Star

Important information:
Sinter firing is exclusively permissible in the high-temperature furnaces approved by VITA. Only in this way perfect sintering with the resulting physical properties of the frameworks is ensured.

- Switch on the furnace with the main switch (red rotary switch to "ON" position).
- Open the furnace chamber with the "Open door" switch until the bottom of the furnace has been lowered completely. It must be ensured that the furnace temperature is below 200°C (see temperature at the controller).
- The ground anterior frameworks are placed on the aluminium oxide plate in the furnace with the labial or lingual surface facing downward – posterior resp. bridge frameworks with the occlusal surface facing downward – in a way to avoid damaging the margins.
- Bridge structures require support if they lie hollow.
- Cover with aluminium oxide crucible. Avoid the formation of gaps.
- Temperature program on prog. 1 (switch to "1").
- Start controller with "RUN" key.
- Close the furnace ("Close door")
- Switch on the heating switch (green switch at the heating)
The sintering program runs automatically:

- **Heat-up rate** 600°C / hour
- **Sintering temperature** 1530°C, holding time 2 hours
- **Cooling phase** approx. 600°C / hour

- Total time of the program cycles including cooling phase approx. 8 hours
- The program can be interrupted or aborted by pressing the "RUN/HOLD" key at the temperature controller approx. 5 sec.

**Important:**
The furnace may only be opened when the furnace temperature is less than 200 °C!

Switch off the furnace with the main switch (red rotary switch to "OFF")

- After sintering, the framework can be fitted on the die.

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**Reworking the sintered framework**

- Surface treatment/processing of dental ceramic materials is crucial for the flexural strength of the material. Reworking of sintered VITA In-Ceram YZ zirconium oxide frameworks with grinding and milling tools must be avoided at any rate. Such work would create microcracks on the surface, which - in particular in the area of the connector - would result in reduction of the strength caused by tensile stress on the completed restoration.

**Important:**
Reworking should be carried out before sintering, if possible. Reworking of sintered objects may only be performed using a wet grinding system and diamond grinding tools while exerting gentle pressure. Additionally, use an extraction unit and work behind a protective screen.

**Hinweis:**
VITA In-Ceram® YZ Cubes for CEREC® must be veneered with VITA Verblendkeramik D 3D-M ASTER (CTE (25 °C - 500 °C)). Please adhere to the respective directions for use.
Assortments - VITA In-Ceram® YZ Cubes for CEREC®

ZrO₂ blocks for **crowns**
Dimensions: 14 x 15 x 20 mm
Designation **YZ-20**

package cont. **5 pieces**
Prod. No. ECYZ205

package cont. **25 pieces**
Prod. No. ECYZ2025

ZrO₂ blocks for **three-unit bridges**
Dimensions: 14 x 15 x 20 mm
Designation **YZ-40**

package cont. **2 pieces**
Prod. No. ECYZ402

package cont. **10 pieces**
Prod. No. ECYZ4010
Literature


Preparation diagrams on page 4 by Dr. Andres Baltzer, CH-Rheinfelden
VITA In-Ceram® all ceramic materials are integrated in the VITA SYSTEM 3D-MASTER. Shade compatibility with all components of VITA SYSTEM 3D-MASTER® is ensured.

The unique VITA SYSTEM 3D-MASTER® allows to systematically determine and entirely reproduce all natural tooth shades.

Please note:
Our products should be used according to the working instructions. We cannot be held liable for damages resulting from incorrect handling or usage. The user is furthermore obliged to check the product before use with regard to its suitability for the intended area of applications. We cannot accept any liability if the product is used in conjunction with materials and equipment from other manufacturers which are not compatible or not authorized for use with our product. Furthermore, our liability for the correctness of this information is independent of the legal ground and, in as far as legally permissible, is limited to the invoiced value of the goods supplied excluding turnover tax.

In particular, as far as legally permissible, we do not assume any liability for profit loss, for indirect damages, for consequential damages or for claims of third parties against the purchaser. Claims for damages based on fault liability (culpa in contrahendo, breach of contract, unlawful acts, etc.) can only be made in the case of intent or gross negligence. The VITA Modulbox is not necessarily a component of the product.

Date of issue of these working instructions: 12/02
With the publication of these working instructions all previous versions become invalid.

The following products mentioned in these directions for use have been certified and bear the CE mark

VITA In-Ceram® YZ CUBES for CEREC®
VITA Verblendkeramik D 3D-MASTER®