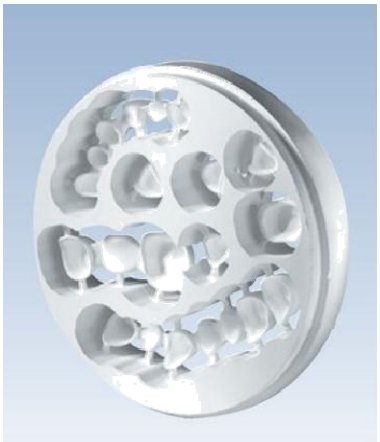
Technical data sheet

Zirconium dioxide

CADstar Zirkon HT Ultra



Manufacturer

H.C. Starck Ceramics GmbH
Lorenz-Hutschenreuther-Str. 81
95100 Selb
Germany

H.C. Starck Ceramics GmbH is certified according to:

- **DIN EN ISO 13485**
- **RL 93/42/ECC (CE 0120)**

Description

Zirconium dioxide ***Starceram® Z-Smile***
Pre-sintered, yttrium oxide-stabilized zirconium dioxide (3Y-TZP-A) DIN EN ISO 6872

Description

The use of technical ceramics (zirconium dioxide) opens up more and more possibilities. Material properties, colour and translucency of this material give the dentures an absolutely natural appearance. In view of the ever-increasing medical and aesthetic requirements for dental prostheses, zirconium dioxide is the material of the future.

Tetragonal stabilised zirconium dioxide with its special properties is the ideal ceramic material for various implants in the human body. Its extremely high strength—coupled with a mother-of-pearl-like, visually pleasing colour—makes zirconium dioxide also the ideal material for crown and bridge substructures.

Allergen-free dentures are only possible due its a ceramic design. Our zirconium dioxide blanks are processed with modern CAD/CAM systems. Thus, we can create accurate, aesthetically demanding substructures for crowns and bridges. Since the natural shade of the tooth can be adjusted perfectly when the dentures are made of ceramic, the dentures act like a natural tooth.

The most important features are:

- excellent bio-compatibility
- high strength values
- consistent shrinkage factor
- exceptional workability
- uniform material properties
- excellent edge stability

Options

CADstar Zirkon HT Ultra - Colour: *white, colouring available in 16 Vita colours (A1 to D4)*

CADstar Zirkon HT Ultra is offered as a (milling) blank, with a diameter of 98 mm and 12, 14, 16, 18, 20 and 25 mm thick.

Indication

CADstar Zirkon HT Ultra is suitable for the production of crowns and bridges as caps, intermediate links and in full anatomic design with max. 3 pontics in the anterior and posterior tooth area.

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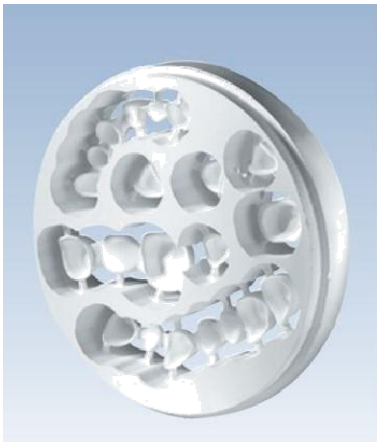

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Contraindication

- if space is insufficient
- patients with parafunctions, e.g., bruxism
- temporary integration
- loosened abutment teeth and extension bridges
- root posts

Modelling

During the construction of crowns, bridge frameworks and primary parts, the following minimum wall thicknesses must be less than their values specified:

- Anterior tooth area: incisal/occlusal 0.7 mm - circular 0.5 mm
- Posterior tooth area: occlusal 0.7 mm - circular 0.5 mm
- Abutment crowns of bridge substructures with 2 pontics incisal/occlusal 1.0 mm - circular 0.7 mm

The connector surface should be at least:

- Anterior tooth framework with one pontic: 7 mm²
- Anterior tooth framework with two pontics: 9 mm²
- Posterior tooth framework with one pontic: 9 mm²
- Posterior tooth framework with two pontics: 12 mm²

When designing the connectors, the **largest possible cross-section** should be taken into consideration. When considering stability, **the height of the connector** is more important than its width. Doubling the width only leads to a doubling of strength, while doubling the height results in 8 times the strength. Therefore, oval connector cross-sections are highly recommended. The goal should be to construct a model that supports the veneer ceramic in the area of the dental tubercle, so that an application with approximately the same layer thickness is possible. **Sharp edges must be avoided on the substructure.**

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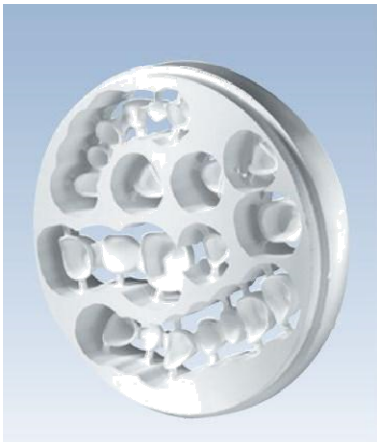

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Processing/further development

After completion of the milling work, the substructure must be visually inspected, after which the following criteria must be met:

- shiny spots on the surface must not be visible
- discolouration are not detectable
- evidence of pitting cannot be found
- cracks are not visible

If one of the above errors occurs, the substructure method must not be used for the production of dental restorations.

Sintering the bridge substructures: Sintering the substructure is a necessary process in which the zirconium dioxide framework is subjected to a precisely defined temperature treatment. Only then does the substructure have the necessary strength to ensure safety and capacity in clinical use. During the sintering process, the bridge substructure shrinks to its final dimension. Dyed substructures must have previously been dried slowly and for a sufficiently long time.

This thermal treatment is crucial to ensure a perfect fit. Sintering takes place in a sintering furnace. The sintering parameters must be set according to the manufacturer's specifications and must not be altered. *Further information in the CADstar manual "Sinterempfehlungen für CADstar Zirkon" (Sintering recommendations for CADstar Zirkon 0*Zirconia*—only available in German).*

Post-processing: After the sintering process, the substructure should only be machined again if this is absolutely necessary. To do this, only water-cooled, diamond-coated tools may be used. Otherwise, local overheating can occur, causing cracks in the material.

Do not use sand blasting! - Radiation can lead to undesirable phase transformations of the zirconium dioxide.

Observe the following general rules when finishing the sanded restorations:

- Finishing should be carried out before sintering
- Ceramic-specific grinding parameters must be used for the processing of the substructure
- the thinner the wall thickness, the greater care is required. According to general guidelines for the use of all-ceramic restorations, the wall thickness should not be less than 0.4 mm. Our in-house »CADstar Guideline« stipulates a minimum wall thickness of 0.55 mm in our house
- Only work with low pressure, do not force the removal
- Only use diamond tools in perfect condition. Poor cutting performance of the tool generates heat. Ideally, tools with grain sizes larger than 100 µm should be used
- Use tools with grain sizes smaller than 100 µm only for careful finishing of the edges, or for fine finishing of the surfaces
- Avoid grinding in the interdental joints, and especially basal notches
- Avoid sharp edges and aim for roundness an
- Areas which are subject to tensile stress in clinical use should not be ground, e.g., this applies in particular to the abutments in bridge constructions.

Veneering the substructure In order to optimise the result, we recommend to apply a ceramic veneer to the sintered substructure. Observe the processing instructions of the respective manufacturers.

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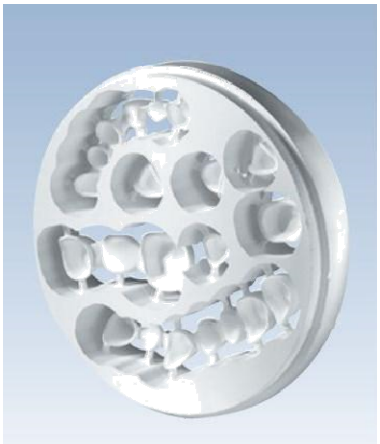

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Chemical composition

ZrO_2 (HfO_2 / Y_2O_3)(in %)	**Al_2O_3** (in %)	**other oxides** (in %)
99 (Y_2O_3: 9.3 ± 0,3% / HfO_2: < 5%)	**< 0.10**	**< 0.10** (Fe_2O_3)

Physical properties (guidelines)

Density **ρ** (after sintering)	> **6.00**	[g/cm³]
Elasticity modulus	**210,000**	[MPa] or [N/mm²]
Flexural strength β_B	**600**	[MPa] or [N/mm2] (± 100)
Vickers hardness **HV 5**	**> 1200**	[MPa] or [N/mm2]
CTE value **α** (Coefficient of thermal expansion) 25 - 500°C)	**10.4**	[10^{-6} K^{-1}] or [10^{-6} C^{-1}]
Open porosity	**none**	

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