Technical data sheet

Zirconium dioxide, translucent

CADstar zirconium oxide HT

Manufacturer

pritidenta GmbH
Meisenweg 37
70771 Leinfelden-Echterdingen
Germany

pritidenta GmbH is certified according to:

- **DIN EN ISO 13485**
- **ISO 9001**
- **RL 93/42/ECC (CE 0483)**

Description

Zirconium oxide ***CADstar zirconium oxide HT (high translucent)***
Pre-sintered, yttrium oxide-stabilized zirconium dioxide (3Y-TZP-A) DIN EN ISO 6872

Description

CADstar Zirconium dioxide HT is a material with reduced Al_2O_3 content and a specific output grain size. Based on these special properties, this material shows an optimum ratio of maximum translucence and good hydrothermal resistance. Since the blanks are pre-dyed with 16 Vita colours (A1 to D4), products made of CADstar Zirconium dioxide HT are no longer treated with dye liquids.

Indication

CADstar Zirconium dioxide HT can be used to manufacture dental crowns, bridges, abutments or primary parts used as dental prostheses. Depending on the indication, the manufacture of bridge substructures as well as of monolithic (fully anatomic) restorations is possible

Contraindication

- If more than two contiguous bridge units are required
- Very deep subgingival preparation
- Patients with severely reduced residual dentition
- Bruxism for veneered structures
- Two and more contiguous extension units
- Any other applications not listed as an indication
- temporary integration
- Using less than the necessary connector and minimum wall thicknesses

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Options

CADstar Zirconium dioxide HT is available in the 16 Vita shades: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3 and D4

Modelling/Design parameters

The design parameters for CADstar Zirconium dioxide HT must not be less than the following values:

Anterior teeth area					
	Crowns	Blogged crowns	3-part bridges	4 and more part bridges with 2 pontics	Cantilever bridges with 1 support
Minimum wall thickness in mm	0.4	0.6	0.6	0.6	0.7
Connector cross section in mm	-	7	7	9	12

Posterior teeth					
	Crowns	Blogged crowns	3-part bridges	4 and more part bridges with 2 pontics	Cantilever bridges with 1 support
Minimum wall thickness in mm	0.6	0.6	0.6	0.7	0.7
Connector cross section in mm	-	9	9	12	12

In the design mode, the tooth shape or the gingiva (incisal, occlusal or basal) should be supported. 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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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 are not 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.

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. *Detailed information can be found in the original manufacturer's instructions (pritidenta GmbH).*

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
- 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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Chemical composition

ZrO_2 / HfO_2 / Y_2O_3 (in %)	**Al_2O_3 and other oxides** (in %)
≥ 99 (Y_2O_3: 5 % / HfO_2: / ZrO_2 94 %)	**≤ 1.00**

Physical properties (guidelines)

Density **ρ** (after sintering)	> **6.035**	[g/cm³]
Elasticity modulus	**210,000**	[MPa] or [N/mm2]
Flexural strength **β_B**	> 1150[MPa] or [N/mm2]	
Vicker hardness	**1,250**	[HV]
CTE value **α** (Coefficient of thermal expansion) 25 - 500°C	**10.0**	[10^{-6} K^{-1}] or [10^{-6} C^{-1}]
Fracture toughness **K_{Ic}**	**7.0**	[MPa*$m_{1/2}$]

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