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inCoris ZI

Zirconium oxide ceramic blocks for inLab
Processing instructions: Framework production for crowns and bridges

English

This product is covered by the following US patent: 7178731

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CE
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1 General

The product inCoris ZI bears the CE mark in accordance with the provisions of Council Directive 93/42/EEC of June 14, 1993 concerning medical devices.

inCoris ZI blocks are intended for use in manufacturing individually designed dental framework structures, which can be polished or veneered after milling and sintering.

2 Material

inCoris ZI ceramics constitute blocks comprised of zirconium oxide ceramics.

The blocks are initially manufactured in a partially sintered state; then, enlarged by the inLab CAD/CAM system, they are individually processed to specification, and finally, densely sintered.

These densely sintered single-unit products are then veneered in the usual manner following reworking.

The advantages of inCoris ZI are:

- High strength
- Resistance to corrosion
- Good biological compatibility of the product,
- Its light color and the coloring of the blocks in five tooth colors,
- Its translucency with thin wall thicknesses

3 Chemical composition

ZrO_2+HfO_2+Y_2O_3	> 99.0%
Al_2O_3	< 0.5%
Other oxides	< 0.5%

4 Technical data

The following specifications apply to material that is densely sintered in an inFire HTC sintering furnace.

Density:	6.05 g cm^{-3}
Fracture toughness KIC	5.9 MPa $m^{1/2}$
Thermal expansion coefficient (20 - 500 °C):	11.0 10^{-6} K^{-1}
Bending strength:	> 1100 MPa

Colors:

The blocks are tinted in the colors:

- F0.5
- F1
- F2
- F3
- F4.5

Therefore it is not necessary to carry out subsequent coloring using a submersion solution or liners.

The color intensity increases from F0.5 to F4.5.

5 Indication and preparation instructions

5.1 Indication

- Crown caps in the anterior and posterior region
- Bridge frameworks in the anterior and posterior regions with max. 2 pontics
- Cone and telescoping crowns

5.2 Contraindications

- Insufficient oral hygiene
- Insufficient preparation results
- Insufficient tooth structure
- Insufficient space available
- Bruxism

5.3 General preparation instructions

- The preparation must be performed with either a chamfer or a shoulder with rounded internal angle.
- The data from the following table should be complied with for the wall thicknesses.
- The vertical preparation angle should be at least 3°. All transitions from the axial to the occlusal or incisal areas must be rounded off. Flat or plane surfaces are advantageous.

5.4 Preparation of premolars and molars

A simplified occlusal relief is recommended for posterior teeth to allow sufficient space for the veneer ceramic. A minimum of 1.5 mm of occlusal substance must be removed.

5.5 Preparation of anterior teeth

Anterior teeth should have an incisal edge removal of least 2 mm.

Indication	Minimum wall thickness in mm Minimum connector area in mm^2
Incisal/occlusal wall thickness Primary parts of double crowns	0.7
Incisal/occlusal wall thickness Single crowns	0.7
Incisal/occlusal wall thickness Abutment crowns - triple anterior tooth bridge	0.7
Incisal/occlusal wall thickness Abutment crowns from bridge frameworks with two pontics	1.0
Circular wall thickness Primary parts of double crowns	0.5
Circular wall thickness Single crowns	0.5 (flip: 0.9 with blocked caps)
Circular wall thickness Abutment crowns of bridge frameworks with one pontic	0.5 (flip: 0.7)
Circular wall thickness Abutment crowns of bridge frameworks with two pontics	0.7
Connector area Anterior tooth bridge framework with one pontic	7 (flip: 9)
Connector area Anterior tooth bridge framework with two pontics	9
Connector area Posterior tooth bridge framework with one pontic	9
Connector area Posterior tooth bridge framework with two pontics	12
Connector area Free-end bridge	12

Connector area: abutment crown – bridge segment connection area

In some cases, other values have to be adhered to for "55/19 flip block" materials (not for MC XL) (see figures in parentheses).

In the case of bridges with 8 or more pontics, the circular wall thickness of the terminal pontic(s) must be 0.7 mm.

6 Production of the framework

6.1 Scanning, designing and milling

Details are documented in the "inLab 3D User Manual".

6.2 Reworking the milled restoration

After the milling process and prior to sintering, a diamond burr milling tool has to be used to separate the restoration and reduce the thickened marginal edges.

6.3 Sintering

inCoris ZI frameworks have to be sintered in dry conditions.

The sintering process should be carried out exclusively in the Sirona inFire HTC. As an alternative, the sintering process can be carried out in the compatible VITA Zyrcomat or Ivoclar Vivadent Sintramat high temperature furnace. In any case, the details in the manuals for the respective furnaces are to be adhered to.

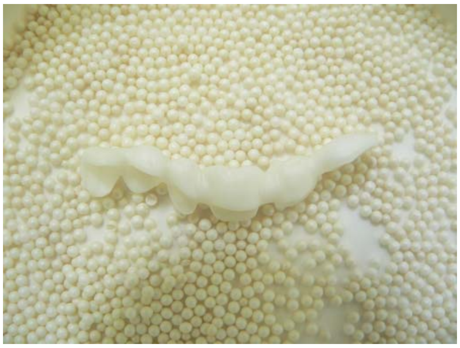
We recommend following the instructions below precisely because, especially in the sintering processes for large and occlusally very curved inCoris bridge framework restorations, the correct bead layer is a decisive factor in subsequent fitting on the model:

Restoration on sintering bead layer

- Only use the sintering trays and beads intended for the respective high temperature furnaces when sintering inCoris ZI frameworks.
- Make sure that the frameworks are lying completely on the bed of beads.
- Remove beads lying interdentally with a probe, so that shrinking is unhindered.
- If several restorations are sintered at the same time, these must not touch the edge of the sintering tray or each other.

"Embedded" bridge restoration

- In order to prevent the sintering beads from sticking (e.g. interdental on the bridge pontic), the inCoris ZI frameworks should not be pressed or "embedded" in the sintering beads too hard.



Very occlusally curved bridge framework lying on buccal restoration side

- Position crown and bridge frameworks on the **occlusal** side of the restoration.
- Very occlusally curved bridge frameworks (e.g. Spee's curve) are always to be placed on the **buccal** / **labial** side of the restoration so that the center bend of the restoration is lying on the sintering beads.
- Use additional sintering beads to support ends of frameworks which lie hollow.

Non-supported (lying with hollow area) bridge framework

- Support every restoration pontic with at least one sintering bead so that bridge frameworks are adequately supported along the entire length of the restoration and do not "lie hollow".
- Bridges with 8 or more pontics should always be sintered with an auxiliary structure (sintering support) (from inLab 3D V3.60). Place the frameworks with the auxiliary structure vertically onto a multi-layered bed of sintering beads (dental arch facing upwards).

6.4 Additional notes: procedure after sintering

In the case of yellow staining of inCoris ZI frameworks after the sintering process, the high-temperature furnace should be cleansed by performing an empty run. The details in the manuals for the respective furnaces are to be adhered to in this case.

Sintering beads that adhere are to be removed carefully.

After the sintering process, the inCoris frameworks must be cooled down to room temperature at atmosphere before further processing.

6.5 Reworking the sintered framework

The surface condition of ceramic materials is decisive for their bending strength. Reworking sintered restorations with milling tools, especially in the connector region, must be avoided at all costs.

For this reason, all corrections to the ground framework should be carried out before sintering, if possible.

However, if reworking should be necessary, comply with the following basic rules:

- Reworking in the sintered condition should be performed with a wet grinding turbine (approx. 2.5 – 3 bar) or rubber polishers (low speed) or for primary telescopes with a grinding unit using water cooling and with low grinding pressure. As an alternative it is possible to rework with soft, diamond rubber polishers and a handpiece at low speed and low pressure. The tool must be applied flat and must not "chatter".
- New diamond burrs with varied grain size should be used if possible.
- Areas that are under tension in clinical use, i.e. primarily the connectors in bridge structures, should not be ground.

The areas of the frameworks to be veneered that are made of inCoris ZI may not be sandblasted. Sandblasting could lead to an undesirable phase transformation of the zirconium dioxide. For the veneer, this would cause complex diffusions of stress along the interface which might lead to cracks or late cracks in the veneer after the restoration is inserted.

6.6 Veneer

Frameworks made of inCoris ZI can be veneered using all standard veneer ceramics for zirconium oxide ceramic.

In this case the manufacturer's processing instructions must be observed without fail.

7 Recommended tools and materials

- Modeling wax
  - Scan wax (Sirona) (suitable for scans with the inLab scanner, not for exposures with inEos)
- Wet grinding turbines:
  - KaVo K-AIR plus (KaVo);
  - IMAGO (Steco-System-Technik GmbH & Co.KG);
  - NSK Presto Aqua (Girrbach);
  - Turbo-Jet (Acurata)
- Grinding tools for reworking with the wet grinding turbine/with handpiece
  - Diamond grinding element sets Ceramic-Line, Telescope-Line (Sirius Dental Innovations).
  - Diamond porcelain polisher for handpiece, green-orange (Hager & Meisinger, Art. No. HP 803 104 372 533 170).
  - Diamond polisher for handpiece (green and orange), EVE Diacera.
- Other:
  - Suitable colored contact materials
- Preparation sets:
  - Preparation set acc. to Küpper (Hager & Meisinger, Art. No. 2560);
  - Preparation set acc. to Baltzer and Kaufmann (Hager & Meisinger, Art. No. 2531);

8 Fastening instructions

Restorations made from inCoris ZI can be fastened non-adhesively with glasionomer or zinc phosphate cements, or adhesively with the self-curing PANAVIA 21 TC composite or the dual-curing PANAVIA F composite (Kuraray). Both products contain the special MDP monomer, which forms a durable chemical compound with the shot blasted surface of the framework without having to silicatize and silanize its surface.

The use of plastic-reinforced or modified glasionomer cements is not advised, since no adequate clinical data is currently available.

Pre-treatment of the restoration before adhesive bonding:

- Sand-blast the internal surfaces of the restoration in the one-way blasting process with maximum 50 µm corundum (Al_2O_3). Pressure < 2.5 bar.
- Do not touch the sandblasted surface if at all possible.

NOTICE

Observe usage information

Etching with hydrofluoric acid does not produce a retentive surface. Silanization is not required

Please observe the information on use of the fastening materials of the corresponding manufacturers.

9 Removal of inserted restorations and Trephination

Removal of inserted restorations

In order to remove a fixed zirconium oxide restoration, it is recommended that a cylinder-shaped diamond tool be used with the maximum amount of water cooling and a speed of 120,000 UpM to separate the restoration.

Trephination

The veneer ceramic is removed with a diamond instrument. The framework can then be trephined with a coarse-grained, conical diamond with maximum water cooling and a speed of 120,000 rpm.

It is recommended in this case that the instrument is applied circularly at an angle of 45° when drilling through the framework.

10 References

10.1 Materials science

Baltzer, A.; Kaufmann-Jinoian, V.: The toughness of VITA In-Ceram. Quintessenz Zahntech 29, 11, 1318-1342 (2003)

Blatz, M.; Sadan, A.; Kern, M.: Adhesive bonding of high-strength full ceramic restorations.
Quintessenz 55, 1, 33- 41 (2004)

Geis-Gerstorfer, J; Päßler, P.: Investigations of the fatigue behavior of dental ceramics – zirconium dioxide TZP and In-Ceram. Dtsch Zahnärztl Z 54, 692-694 (1999)

Kappert, H.F.: On the high strength of dental ceramics. Zm 93, 7, 2003

Kern, M.: Fracture quota lower than the "divorce rate" ZWL 04, 2004,
Luthard, R.; Herold, V et al.: Crowns made of high-performance ceramics. Dtsch Zahnärztl Z 53, 4 280-285 (1998)

Luthard et al.: Comparison of various techniques for the manufacture of crown frameworks from high-performance ceramics. State of the art of the CAD/CAM supported production of full ceramic crowns from oxide ceramics. Swiss Dent, 19, 6 5 -12 (1998)

Marx, R. et al.: Crack parameters and Weibull modules: subcritical crack growth and long-term strength of full ceramic materials.
Dtsch Zahnärztl Z 56, 2 90 - 98 (2001)

Report by DGZMK/DGZPW: Are full ceramic crowns and bridges scientifically recognized? Dtsch Zahnärztl Z 56 10 575 - 576 (2001)

Schweiger, M.: Zirconium oxide. High-strength and break-resistant structural ceramics. Ästh. Zahnmedizin 5, 2004, 248-257

Tinschert, J; Natt, G.; Spiekermann, H.: Current positioning of dental ceramics.
Dental-Praxis XVIII, 9/10 293 - 309 (2001)

Vollmann, M.: Innovative DeguDent full ceramic system as a benchmark for the processing of zirconium oxide. IJCD 2004, 7, 279-291

10.2 CEREC/ inLab

CEREC®/ inLab®

Baltzer, A.; Kaufmann-Jinoian, V.: CAD/CAM in dentistry
CEREC inLab. Dental-Labor, XLIX, Volume 5 (2001)

David, A.: CEREC inLab - The CAD/CAM System with a Difference.
CJDT Spectrum, September/October, 24 - 28 (2002)

Kurbad, A.; Reichel, K.: CEREC inLab - State of the Art.
Quintessenz Zahntech 27, 9, 1056 -1074 (2001)

Kurbad, A.: Manufacturing In-Ceram bridge frameworks with the new CEREC technology.
Quintessenz Zahntech 27, 5, 504 - 514 (2001)

Tsotsos, St.; Giordano, R.: CEREC inLab: Clinical Aspects, Machine and Materials. CJDT Spectrum January/February, 64 - 68 (2003)
Preparation illustrations on p. 5 accd. to Dr. Andres Baltzer, CH-Rheinfelden

Kern, M.: Computer-aided crown and bridge technology with new perspectives. Quint. Zahnt. 30, 9, 966-973 (2004)

Rudolph, H., Quaas, S., Luthard, R.G.: CAD/CAM – New technologies and developments in dentistry. DZZ 58 (2003)10

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