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sirona
The Dental Company

inCoris TZI

Translucent zirconia ceramic blocks and blanks for CEREC and inLab
Processing instructions: Restoration production for crowns and bridges

English

SUPER SPEED authorized

Table of contents

1 General

CE
0123

Rx only

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

inCoris TZI is intended for use in manufacturing individually designed fully anatomical restorations, (crowns and bridges) which can be polished or veneered after grounding/milling and sintering.

CAUTION: According to US Federal Law, this product may be sold only to or by instruction of physicians, dentists, or licensed professionals.

2 Material

In the case of inCoris TZI, blocks and blanks comprised of zirconia ceramics are used.

They 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.

The aesthetic features of inCoris TZI enable application as fully anatomical crowns and bridges.

The advantages of inCoris TZI include:

- High strength
- Resistance to corrosion
- Good biological compatibility of the product,
- Translucency

3 Chemical composition

Component	inCoris TZI
$ZrO_2+HfO_2+Y_2O_3$	≥ 99.0%
Y_2O_3	> 4.5 - ≤ 6.0%
HfO_2	≤ 5%
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 / inFire HTC speed sintering furnace.

Density:	6.08 ± 0.2 g cm^{-3}
Fracture toughness K_{IC}	6.4 MPa $m^{1/2}$
Thermal expansion coefficient (20 - 500 °C):	10 10^{-6} K^{-1}
Bending strength:	> 900 MPa

Block sizes

inCoris TZI blocks are available in the following block sizes:

- mono L = 20 x 19 x 15.5 mm (LxWxD)
- 40/19 = 40 x 19 x 15.5 mm (LxWxD)
- 55/19 = 55 x 19 x 15.5 mm (LxWxD)

Blank sizes

The inCoris TZI blanks all have a diameter of 98.5 mm and are available in the following blank heights:

- 13 mm
- 16 mm
- 22 mm

Block/blank colors

inCoris TZI is not dyed and is bleach white BL. All restorations from inCoris TZI can be dyed with inCoris TZI Coloring Liquids. These are offered in all 16 classical colors A1-D4.

5 Intended use, indications and preparation instructions

5.1 Intended use

Manufacture of individually designed, fully anatomic dental restorations using Sirona CAD/CAM systems CEREC and inLab

5.2 Indications

Classic sintering

- Fully anatomic crowns and bridges in the anterior and posterior tooth region.
- Bridges with a maximum of two pontics.

Speed sintering

- Fully anatomic crowns and bridges in the anterior and posterior tooth region.
- Bridges with a maximum of two pontics.
- Must be sintered without sinter support.

Super speed sintering

- Fully anatomic crowns up to a wall thickness of 2 mm

5.3 Contraindications

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

5.4 General preparation instructions

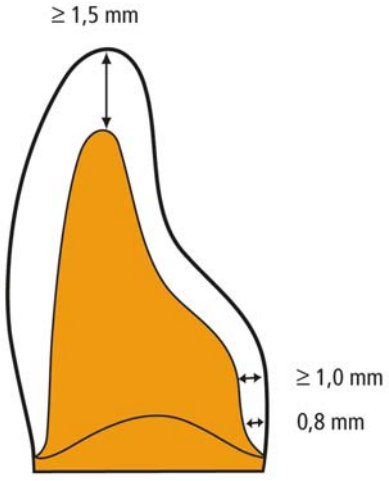
- The preparation must be performed with either a chamfer or a shoulder with rounded internal angle.
- The vertical preparation angle should be at least 3°. All transitions from the axial to the occlusal or incisal areas must be rounded off. Flat or plane surfaces are advantageous.

5.5 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.

5.6 Preparation of anterior and posterior tooth crowns

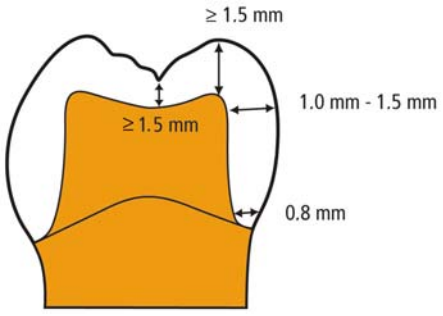
Preparation of anterior teeth



The incisal wall thickness of the ceramics should be at least 1.5 mm, the circular wall thickness at least 1.0 mm.

The tapering crown edge should be 0.8 mm thick.

Preparation of posterior teeth (premolars and molars)



The ceramic thickness should be at least 1.5 mm at the lowest point of the main fissure.

For the cusp design, a ceramic thickness of at least 6.4 mm should be ensured.

The circular ceramic thickness should be 1.0 - 1.5 mm.

The tapering crown edge should be 0.8 mm thick.

Connector surface on …	Minimum connector surface in mm^2
Posterior tooth bridge restoration with a pontic	9
Posterior tooth bridge restoration with two pontics	12
Free-end bridge	12

6 Creating the restoration

6.1 Scanning, designing and milling

inCoris TZI can only be processed with CEREC/inLab software version 4.0 or higher. The inCoris TZI blanks are stored in the material dialog as of inLab SW 15.0 or higher.

Software 4.0 or higher

If you are using software 4.0 or higher, select Sirona/inCoris TZI in the material dialog.

Details are documented in the "CEREC SW / inLab SW" User Manual.

6.2 Rework of the grounded/milled restoration

After the grinding/milling process and prior to sintering, a diamond burr milling tool has to be used to separate the restoration.

To prevent milling residues from remaining in the fissures, the restoration can be briefly steamed off or cleaned with water and a soft toothbrush.

6.3 Pre-drying

To prevent inhomogeneous coloring of the restorations caused by varying liquid penetration characteristics, the restorations need to be dried first of all.

Predrying can be carried out in various ways. We recommend one of the following:

- 30 minutes at 80°C (176°F) in the drying cabinet

or

- 10 minutes at 150 °C (302°F) in the drying cabinet

NOTICE

In the case of high humidity

In an environment with a high level of humidity, the restorations can absorb moisture after drying. For this reason, sintering must take place within a maximum of one hour after drying.

6.4 Coloring

Prior to sintering, the uncolored restorations can be dyed to the desired tooth color using inCoris TZI coloring liquids.

There are two ways to color inCoris TZI crowns and bridges:

- Brush technique (multicoloring)
- Dipping

Items 6.1 - 6.3 of the inCoris TZI processing instructions apply to both of the above possibilities prior to coloring.

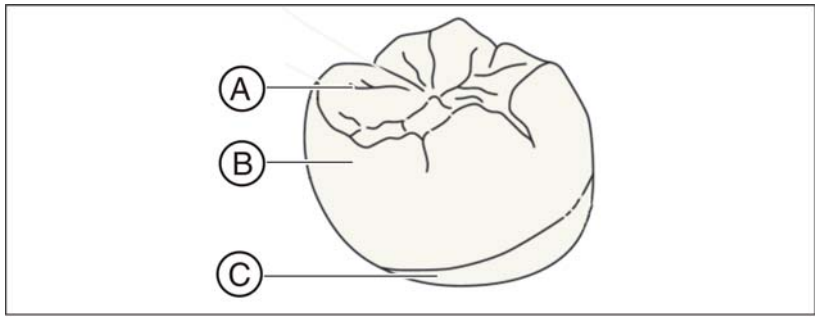
6.4.1 Brush technique (multicoloring)

With dipping you obtain a completely monochrome tooth color. In order to achieve a natural color gradient, it is advisable to brush on inCoris TZI coloring liquids instead of dipping entire restorations.

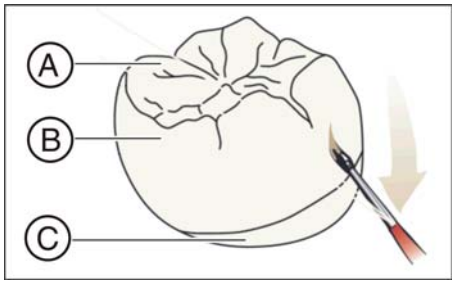
Please take the following points into consideration when using the brush technique:

- Use a size 8 to 10 modeling brush for the overall application and a size 1 to 2 brush for applying the paint to the fissures.
- Use a separate brush for each color or wash the brush out thoroughly after use and then let it dry. Residual moisture influences the coloring.
- Hold the restorations using only a pair of plastic tweezers.
- Never place the restorations on metallic surfaces as this can lead to shifts in the color concentration and therefore discoloration.
- Always move the brush from the occlusal/incisal to the cervical direction.

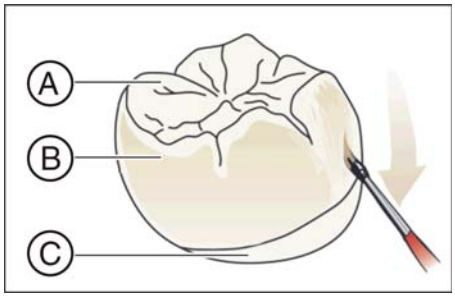
Coloring a posterior tooth



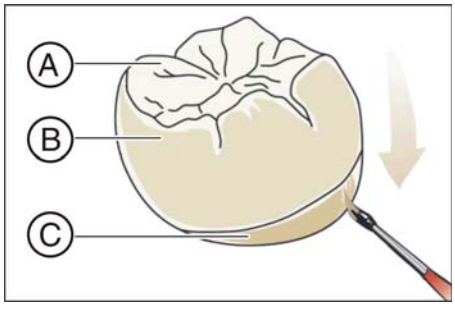
A Occlusal
B Body
C Cervical



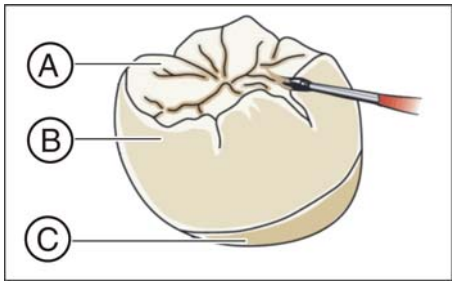
1. Brush the entire tooth **1x**.
   Direction of brush stroke: From the occlusal (A) area across the body (B) to the cervical area (C).



2. Paint the body (B) and the cervical area (C) **5x**. Omit the occlusal surface.
   Direction of brush stroke: From the body (B) to the cervical area (C).
   The colors shown in this figure are only visible after sintering and not during painting.

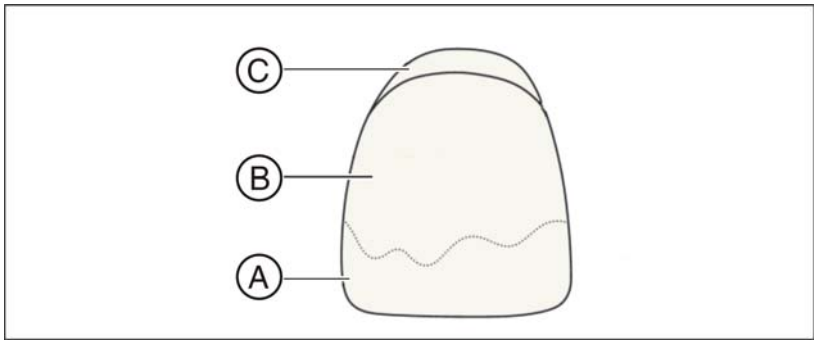


3. **For light colors:** Paint the cervical area (C) **3x**.
   Direction of brush stroke: cervical.
   For dark colors (A3.5, A4, B4, C4, C3, C4): Paint the cervical area (C) **4x**.

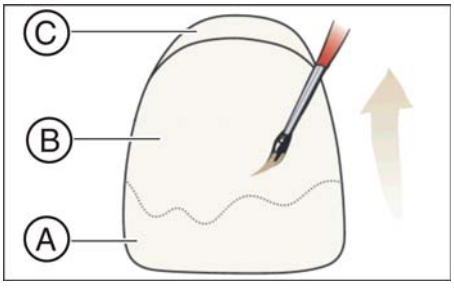


4. Paint the central fissures **1-2x** for a natural color gradient.
5. Treat the palatal surfaces in the same way as the vestibular surfaces.

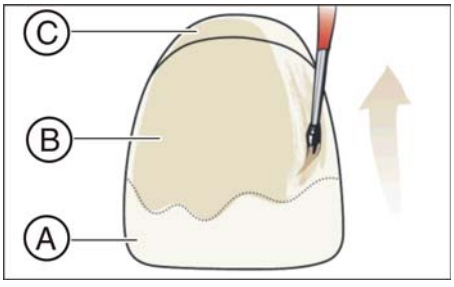
Coloring an anterior tooth



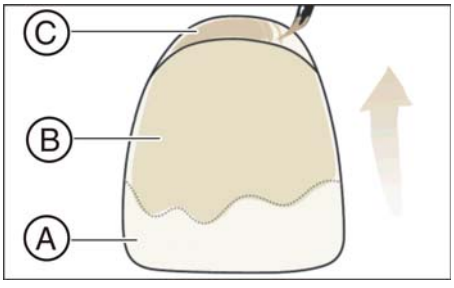
A Incisal
B Body
C Cervical



1. Brush the entire tooth **1x**.
   Direction of brush stroke: From the incisal area (A) across the body (B) to the cervical area (C).



2. Paint the body (B) and the cervical area (C) **5x**. Omit the incisal surface.
   Direction of brush stroke: From the body (B) to the cervical area (C).



3. **For light colors:** Paint the cervical area (C) **3x**.
   Direction of brush stroke: cervical.
   For dark colors (A3.5, A4, B4, C4, C3, C4): Paint the cervical area (C) **4x**.
4. Treat the palatal surfaces in the same way as the vestibular surfaces.

6.4.2 Dipping

NOTICE

With the speed and super speed sintering processes, the restorations are lighter in color than with the classic long-term sintering process.

Recommendation: When using the speed and super speed sintering processes with an inCoris TZI coloring solution, dye the restorations one color level darker than desired.

1. To color the restoration, use a vessel in which the milled restoration can be fully submerged into the coloring solution, e.g. the inCoris TZI dip tanks.
2. Allow the restoration to absorb the coloring solution for five minutes. Leaving it submerged for less than 5 minutes will produce a lighter end result and leaving it for longer will produce a darker result.
3. Then remove the restoration from the vessel using a pair of plastic tweezers.

IMPORTANT

All parts which have come into contact with coloring solution must be cleaned afterwards, as discolorations could result if they are used again. Always keep dip tanks and bottles containing coloring solution closed following use, since the liquid otherwise will evaporate, thus resulting in a higher color concentration.

6.5 Drying before sintering

NOTICE

In the case of high humidity

In an environment with a high level of humidity, the restorations can absorb moisture after drying. For this reason, sintering must take place within a maximum of one hour after drying.

To avoid damage during sintering, the restoration must be dried in the drying cabinet (only required if the restoration has been grounded/milled wet).

- 30 minutes at 80°C (176°F) or
- 10 minutes at 150°C (302°F)

NOTICE

Risk of damaging the restoration

Drying at temperatures above 150°C (302°F) can damage the restoration.

All restorations to be sintered must be dried thoroughly first, especially for super speed sintering. Any residual moisture can cause the parts to burst.

6.6 Sintering

Restorations made from inCoris TZI have to be sintered in dry conditions.

The sintering process should only be performed in Sirona inFire HTC/ inFire HTC speed with the pre-programmed inCoris ZI and inCoris TZI/ TZI C programs. 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.

⚠ WARNING

The "Super Speed" program of the inFire HTC speed furnace can only be used for the following:

- Fully anatomic crowns with a maximum wall thickness of 2 mm and single caps.

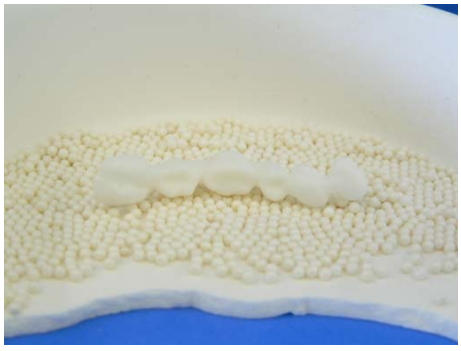
- Materials labeled "SUPER SPEED authorized“.

The classic program for sintering with inCoris TZI is the same as for inCoris ZI and inCoris TZI C. The sintering result from furnaces other than those specified here cannot be guaranteed by Sirona:

Heating rate °C/min	Holding temperature °C	Holding time min
25	800	0
15	1510	120
30	200	0

Since speed and super speed sintering are only permitted in inFire HTC speed furnaces with inCoris ZI and inCoris TZI materials and these programs are permanently installed in the furnace, the programs are not described here. Classic and speed sintering are carried out in the sintering tray provided with the inFire HTC speed furnace. Super speed sintering can only be carried out with the sintering boats specially designed for this process (super speed crucible and super speed cover). The crowns must be placed on these boats at least 1 cm apart.

We recommend following the instructions below precisely because, especially in the sintering processes for occlusally very curved 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 TZI.
- Make sure that the restorations 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 restorations must not be pressed or "embedded" into the sintering beads too hard.

Very occlusally curved bridge restorations lying on buccal restoration side

- Position crown and bridge restorations on the **occlusal** side of the restoration.
- Very occlusally curved bridge restorations (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 restorations which have hollow areas.

Non-supported bridge restoration (with hollow area)

- Support every restoration pontic with at least one sintering bead so that bridge restorations are adequately supported along the entire length of the restoration and do not "lie hollow".

6.7 Additional notes: procedure after sintering

In the case of yellow staining of restorations 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 restorations must be cooled down to room temperature before further processing.

6.8 Rework

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.

Therefore make corrections to the milled restoration if possible before sintering.

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

- Reworking in the sintered condition should be performed with a wet grinding highspeed handpiece (approx. 2.5 – -3 bar) or rubber polishers (low speed) or for primary telescopes with a milling 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 sintered restorations should also be polished prior to applying the enamel coating in order to prevent abrasion to the antagonist following potential loss of shine.

The inCoris TZI can be polished with all standard polishing agents for zirconia ceramics. Subsequent heat treatment (depressurization fire) is not necessary.

6.9 Painting and coating

Restorations made from inCoris TZI can be finalized using all standard paint and gloss colors for zirconia ceramics, e.g. VM9 from Vita. 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 TZI 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 restorations 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 max. 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 restoration, we recommend using a cylinder-shaped diamond tool with the maximum amount of water cooling and a speed of 120,000 rpm to separate the restoration.

Trephination

The restoration can be trephined with a coarse-grained, spherical diamond with ample irrigation and a speed of 120,000 rpm.

In this case, it is recommended that the instrument is applied in a circular motion at an angle of 45° when drilling through the framework.

We reserve the right to make any alterations which may be required due to technical improvements.

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