

New as of:

09.2017

# inCoris TZI

Translucent zirconia ceramic blocks and discs for CEREC and inLab  
Processing instructions: Restoration production for crowns and bridges  
(not valid for USA/Canada)

English



# Table of contents

1	General.....	3
2	Material.....	4
3	Chemical composition .....	5
4	Technical data .....	6
5	Intended use, indications, contraindications and preparation instructions .....	7
	5.1 Intended use .....	7
	5.2 Indications .....	7
	5.2.1 inCoris TZI Blocks .....	7
	5.2.2 inCoris TZI Discs .....	7
	5.3 Contraindications .....	7
	5.4 General preparation instructions .....	8
	5.5 Preparation of anterior and posterior tooth crowns .....	8
6	Producing a restoration .....	9
	6.1 Scanning, designing and milling.....	9
	6.2 Rework of the grounded/milled restoration .....	9
	6.3 Drying prior to coloring .....	9
	6.4 Coloring.....	10
	6.4.1 Brush technique (multicoloring).....	10
	6.4.2 Dipping .....	12
	6.5 Drying before sintering .....	13
	6.6 Sintering .....	14
	6.7 Additional notes: procedure after sintering.....	17
	6.8 Rework .....	17
	6.9 Painting and coating.....	17
7	Recommended tools and materials.....	18
8	Fastening instructions .....	19
9	Removal of inserted restorations and Trephination.....	20



## 1 General

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 glazed after grinding/milling and sintering.

### For the USA only

**USA: Rx only**

**CAUTION:** Federal law (USA) restricts sale of this device to or on the order of a physician, dentist, or licensed practitioner.

## 2 Material

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

These are initially manufactured in a partially sintered state, then enlarged by the inLab and CEREC CAD/CAM systems; 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 and
- Translucency

### 3 Chemical composition

Component	inCoris TZI
$ZrO_2+HfO_2+Y_2O_3$	$\geq 99.0\%$
$Y_2O_3$	$> 4.5 - \leq 6.0\%$
$HfO_2$	$\leq 5\%$
$Al_2O_3$	$\leq 0.5\%$
Other oxides	$\leq 0.5\%$

## 4 Technical data

The following specifications apply to material that is densely sintered in an CEREC SpeedFire, inFire HTC or inFire HTC speed sintering furnace.

Density	$6.08 \pm 0.2 \text{ g cm}^{-3}$
Bending strength	> 900 MPa
Fracture toughness $K_{IC}$	$\geq 5 \text{ MPa m}^{1/2}$
Thermal expansion coefficient (20 - 500°C):	$10 \cdot 10^{-6} \text{ K}^{-1}$
Chemical solubility	$8 \mu\text{g/cm}^2$

### 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 15.5mm (LxWxD)

### Disc sizes

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

- 13 mm
- 16 mm
- 22 mm

### Block/disc colors

inCoris TZI is available undyed and thereby corresponds with the color bleach white BL. inCoris TZI restorations can be dyed the classic colors using the inCoris TZI coloring liquids. The liquids are offered in all 16 classical colors A1 - D4.

## 5 Intended use, indications, contraindications and preparation instructions

### 5.1 Intended use

Manufacturing of individually designed restorations made from inCoris TZI blocks and discs by mean of the Sirona CAD/CAM-Systems CEREC and inLab.

### 5.2 Indications

Indications of the following parts of dentistry:

- Fully anatomically crowns in the anterior and posterior tooth region.
- Fully anatomically bridges in the anterior and posterior tooth region.
- Bridges with max. two pontics.

#### 5.2.1 inCoris TZI Blocks

##### Sinter furnace inFire HTC Speed

- **Classic Sintering:** blocks can be sintered, Restorations are < 8 units.
- **Speed Sintering:** blocks can be sintered, Restorations are < 8 units.
- **Super Speed Sintering:** fully anatomically crowns with a maximum wall thickness  $\leq 2$ mm.

##### Sinter furnace CEREC SpeedFire

the CAD/CAM-Software defines the sintering program according the indication.

#### 5.2.2 inCoris TZI Discs

##### Sinter furnace inFire HTC Speed

- **Classic sintering:** until  $\leq 9$  units and without Sintering Support.
- **Speed sintering:** until  $\leq 9$  units and without Sintering Support.
- **Super Speed Sintering:** no Super Speed sintering.

### 5.3 Contraindications

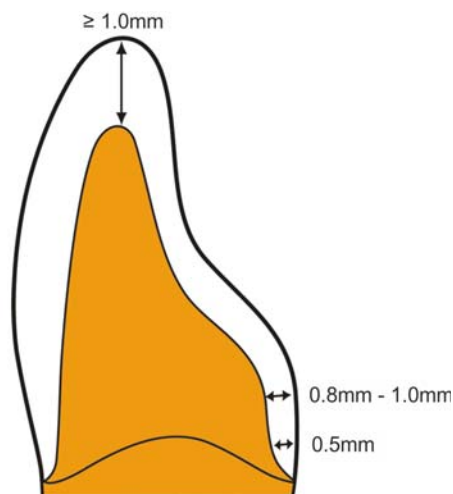
- Insufficient oral hygiene
- Insufficient preparation results
- Insufficient tooth structure
- Insufficient space available

## 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.

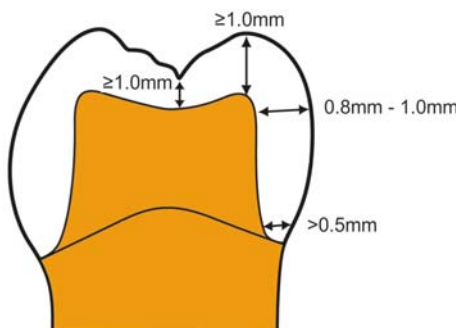
## 5.5 Preparation of anterior and posterior tooth crowns

### Preparation of anterior teeth



The incisal wall thickness of the ceramics should be at least 1.0 mm, the circular wall thickness at least 0.8-1.0 mm.

The tapering crown edge should be 0.5 mm thick.



### Preparation of posterior teeth (premolars and molars)

The ceramic thickness should be at least 1.0 mm at the lowest point of the main fissure.

For the cusp design, a ceramic thickness of at least 1.0 mm should be ensured.

The circular ceramic thickness should be 0.8-1.0 mm.

The tapering crown edge should be 0.5 mm thick.

Connector surface on ...	Minimum connector surface in $\text{mm}^2$
Posterior tooth bridge restoration with a pontic	9
Posterior tooth bridge restoration with two pontics	12
Free-end bridge	12



## 6 Producing a 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 discs 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.

In the case of dry-milled restorations we recommend that these are freed from dust using a ceramic brush or compressed air.

Make sure you do not inhale abrasive dusts. Use a vacuum system and wear a mask.

Block remains and the block holder do not need to be disposed of separately. They can be disposed of as normal household waste.

### 6.3 Drying prior to coloring

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

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

- 30 minutes at 80°C (176°F) in the drying cabinet
- 10 minutes at 150°C (302°F) in the drying cabinet
- The CEREC software makes a drying program available for the CEREC SpeedFire furnace for drying restorations.

#### 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.

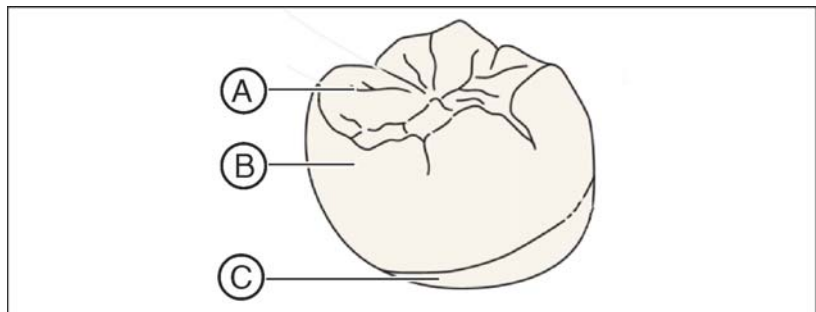
### 6.4.1 Brush technique (multicoloring)

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.

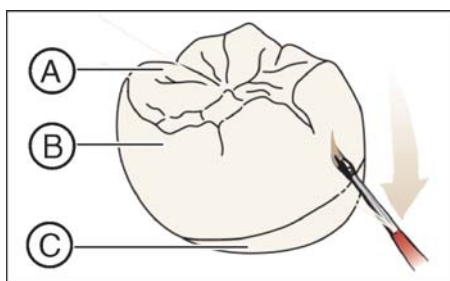
Please take the following points into consideration when using the brush technique:

- 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.

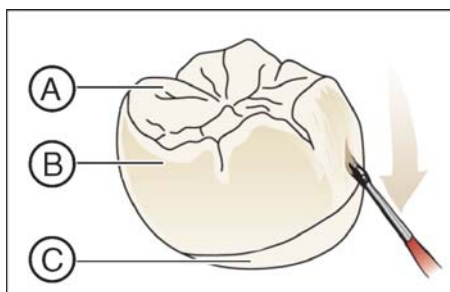
#### Coloring a posterior tooth



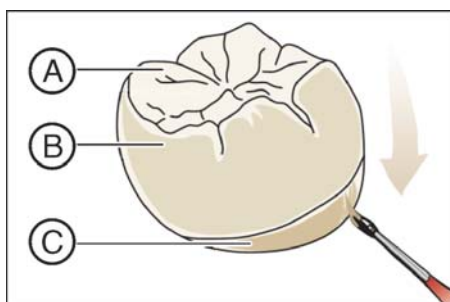
- A Occlusal
- B Body
- C Cervical



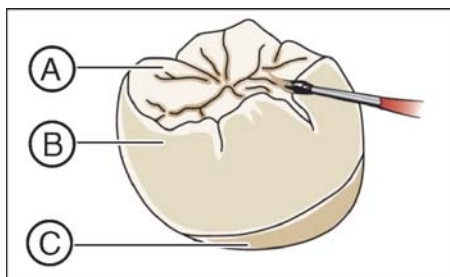
1. Brush the entire tooth **1x**.  
Direction of brush stroke: From the occlusal (A) area across the body (B) to the cervical area (C).



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.

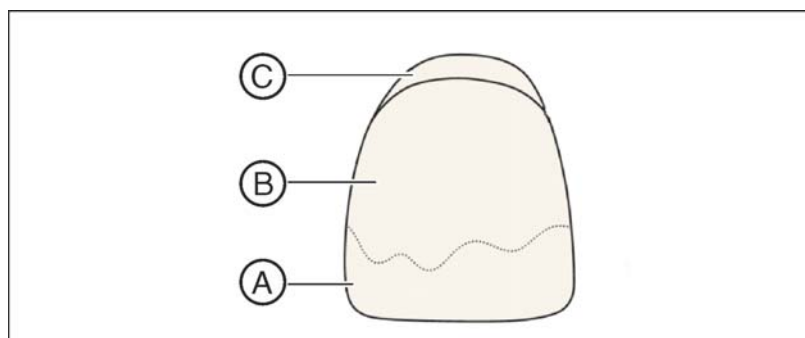


3. **For light colors:** Paint the cervical area (C) **3x**.  
Direction of brush stroke: cervical.  
**For dark colors (A3.5, A4, B4, C4, C3, C4):** Paint the cervical area (C) **4x**.

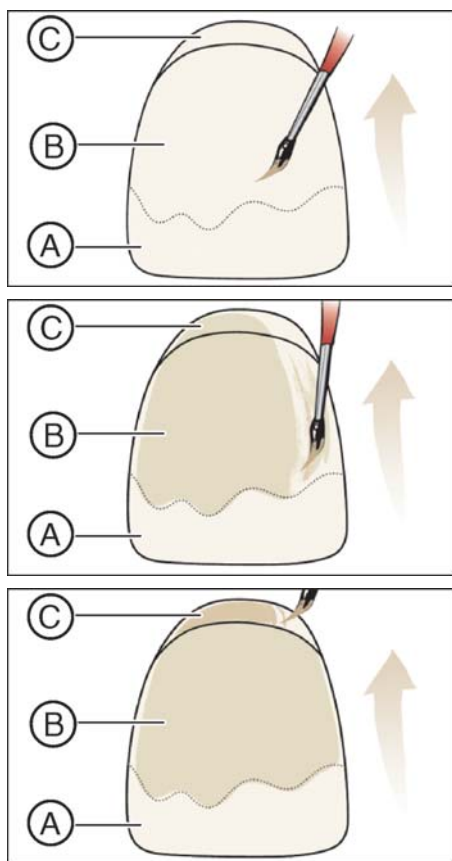


4. Paint the central fissures **1-2x** for a natural color gradient.
5. Treat the palatal surfaces in the same way as the vestibular surfaces.

#### 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: Color the restorations for the speed and super speed sintering processes with an inCoris TZI coloring liquid with a color grade which is darker than the desired one.

1. Use the inCoris TZI submersible vessels and the plastic tweezers to color the restorations. Vessels in which the restorations are fully immersed into the coloring liquid can be used as an alternative.
2. The restorations must be immersed in the coloring liquid for five minutes. Any immersion time of less than five minutes results in a color which is too light and an immersion time of longer than five minutes results in a color that is too dark.
3. Then remove the restoration from the vessel using a pair of plastic tweezers.

#### IMPORTANT

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

## 6.5 Drying before sintering

No drying is required for dry-milled restorations (with no water cooling).

The following alternatives are recommended for all other restorations:

- 30 minutes at 80°C (176°F) in the drying cabinet
- 10 minutes at 150°C (302°F) in the drying cabinet
- The CEREC software makes a drying program available for the CEREC SpeedFire furnace for drying restorations.

### 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.

### 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 in the inFire HTC speed. Any residual moisture can cause the restorations to burst.

## 6.6 Sintering

Restorations made from inCoris TZI have to be sintered in dry conditions. The Sirona inFire HTC, inFire HTC speed, or CEREC SpeedFire sintering furnaces offer programs with a pre-drying function.

The sintering process should only be performed in a Sirona sintering furnace.

When sintering in the inFire HTC/HTC speed (inCoris TZI blocks and discs), use the pre-programmed inCoris ZI / TZI / TZI C programs.

When sintering in the CEREC SpeedFire (inCoris TZI blocks), the CEREC software automatically selects the program. Observe the information in the operating instructions for the furnace.

As an alternative, the sintering process can be carried out in the compatible VITA Zyrcomat or Ivoclar Vivadent Sintramat high temperature furnaces. 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.

## Sintering in CEREC SpeedFire

When sintering in the CEREC SpeedFire furnace, place the restorations with the occlusal surface directly on the top door insulation.

### NOTICE

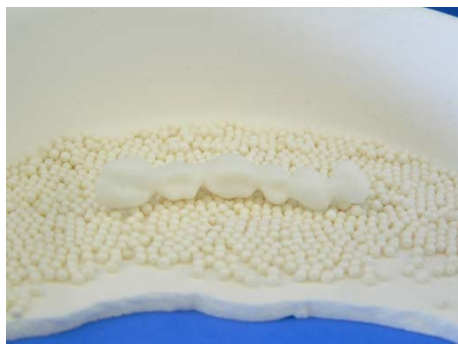
#### Maximum Observe restoration size

Observe the maximum Furnace chamber size when loading the furnace.

- Diameter: 38 mm
- Height: 20 mm

## Sintering in inFire HTC or inFire HTC speed

We recommend following the instructions below precisely because, especially with sintering of 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 furnace 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".

**Notes on sintering in an inFire HTC speed from serial numbers 5000 to 5699**

**NOTICE**

**Reprogramming heat curves**

As a result of a modified component in inFire HTC speed from serial numbers 5000 to 5699, depending on the local power grid your furnace may show signs of an increased heating rate. Please program the following heat curves for inCoris TZI and use this or the "classic" program for sintering.

**For speed sintering "speed":  
On a program station from 20 to 26:**

	Heating speed °C/min	Holding temperature °C	Holding time min
S4	99	750	0
S3	99	1100	0
S2	50	1510	30
S1	99	800	5

**For speed sintering with pre-drying "speed + dry":  
On program station 27 or 28:**

	Heating speed °C/min	Holding temperature °C	Holding time min
S4	99	750	0
S3	50	1510	30
S2	99	800	5
S1	15	80	30

**For speed sintering "speed + air":  
On program station 29 or 30:**

	Heating speed °C/min	Holding temperature °C	Holding time min
S4	99	750	0
S3	99	1100	0
S2	50	1510	30
S1	99	500	0



## 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.

This is not necessary with CEREC SpeedFire due to the different heating concept.

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 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.

Using the CEREC SpeedGlaze spray is recommended for glazing. It is ideally suited to inCoris TZI.

## 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 PANA VIA™ 21 TC composite (Kuraray), the dual-curing PANA VIA™ F composite (Kuraray), or the Calibra® UNIVERSAL cement (Dentsply).

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<sub>2</sub>O<sub>3</sub>). 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 Trepination

### 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.

### Trepination

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.



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

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D3487.201.06.10.02 09.2017

Sprache: englisch  
Ä.-Nr.: 123 967

Printed in Germany

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