VITA All-Ceramics

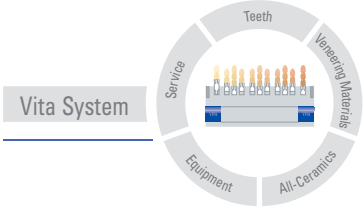
VITA In-Ceram® for inLab®

SPINELL for inLab®
ALUMINA for inLab®
ZIRCONIA for inLab®

Porously sintered oxide ceramic blocks for glass infiltration

Directions for use
Fabrication of the substructure

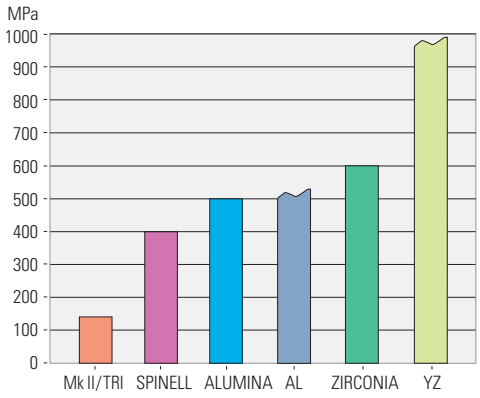
Date of issue: 11-06



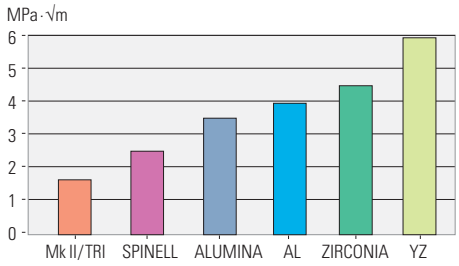
VITA

VITA In-Ceram® for inLab® Table of contents

Material properties



Bending strength



Fracture toughness (SEVNB method)

VITA Materials for CEREC® and inLab®

- VITABLOCS Mark II / TriLuxe } fine-structure feldspar ceramic
- VITA In-Ceram SPINELL
- VITA In-Ceram ALUMINA
- VITA In-Ceram ZIRCONIA } oxide ceramic, glass-infiltrated
- VITA In-Ceram AL
- VITA In-Ceram YZ } oxide ceramic, densely sintered

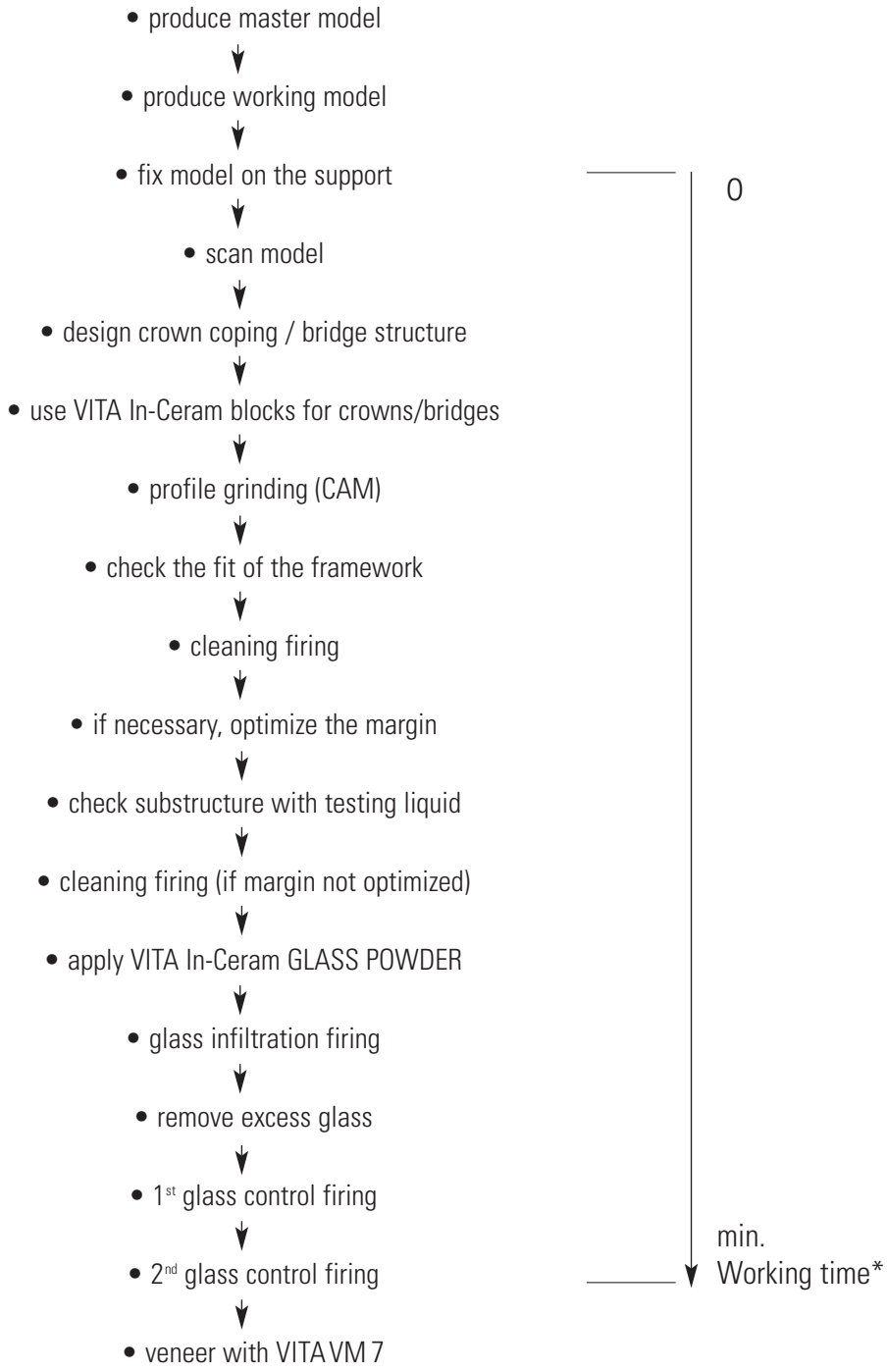
inLab® System

CEREC® 3 System

Information is available from
Sirona Dental Systems GmbH
Fabrikstraße 31 · D-64625 Bensheim
E-mail: contact@sirona.de
http://www.sirona.com

☞ ***Note:***
We strongly recommend participation in a VITA In-Ceram / inLab course. Further information is available from VITA or Sirona.

VITA In-Ceram® SPINELL/ALUMINA/ZIRCONIA
Manufacturing process for inLab®



*Working time: approx. 19 minutes
Waiting time: approx. 2 h 30 min
The calculation is based on the fabrication of the substructure of a VITA In-Ceram ALUMINA single crown without optimizing with glass infiltration in the VITA VACUMAT.

VITA All-Ceramics

VITA In-Ceram SPINELL for inLab®

Directions for use
Fabrication of the crown substructure

VITA All-Ceramics Indication table

	Oxide ceramic					Fine-structure feldspar ceramic	
	Infiltration ceramic			Sinter ceramic			
	VITA In-Ceram SPINELL	VITA In-Ceram ALUMINA	VITA In-Ceram ZIRCONIA	VITA In-Ceram AL	VITA In-Ceram YZ	VITABLOCS Mark II	VITABLOCS TriLuxe
	–	–	–	●	●	–	–
	○	–	–	–	–	●	○
	○	–	–	–	–	●	●
	–	–	–	–	–	●	●
	–	–	–	–	–	●	●
	●	●	○	●	●	●	●
	–	●	●	●	●	–	–
 *	–	–	–	–	●	–	–
	○	●	●	●	●	●	●
	–	–	●	–	●	–	–
 *	–	–	–	–	●	–	–
VENEERING MATERIAL	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 9	VITA VM 9**	VITA VM 9**

● recommended ○ possible * maximum width: 2 pontics ** only for individualization

Spinell ($MgAl_2O_4$) is a natural mineral that is mainly found together with limestone and dolomite, sometimes also with granite or as sediment in sand. Due to the different types of spinell that are found, the composition of natural spinell varies strongly.

Therefore, for industrial purposes, spinell is produced synthetically. Spinell ceramics feature some excellent material properties: high melting point, high stability and low thermal conductivity allow the use as refractory material, e.g. in the form of furnace lining. The jewelry industry takes advantage of the good transparency (see fig. 3).

The combination of high stability, good chemical resistance and high translucency had turned spinell into an interesting material for dental technology as well.

Since 1994 spinell has been available as a component of the VITA In-Ceram slip system. Due to the translucency and aesthetics, the spinell system is perfectly suitable for restorations on vital tooth stumps in the anterior area (fig. 1).

For the first time a material was available for dental use which combined excellent aesthetics with high stability (see fig. 2). Moreover spinell features high chemical resistance and biocompatibility. The grindable, industrially sintered spinell block was already introduced into the market in 1995 as a component of the CELAY system. This material exhibits high homogeneity and outstanding machine processing. It guarantees safe dental handling with short process times which is linked to more intense sintering (necking) of the blanks than in the slip technique.

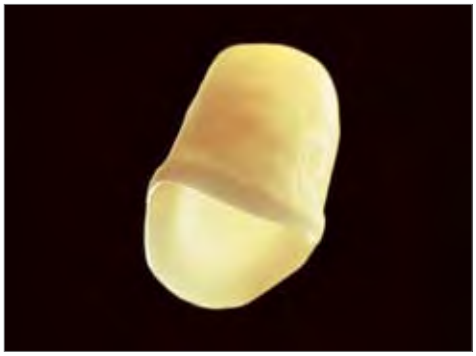
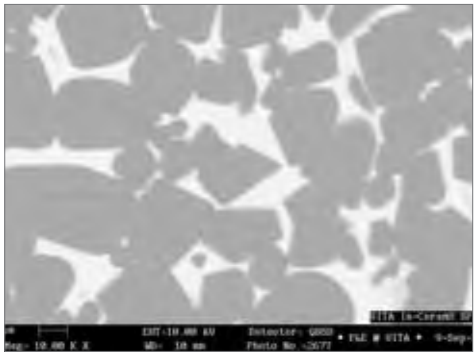


Fig. 1: VITA In-Ceram SPINELL copings feature translucency comparable to that of natural enamel.



VITA In-Ceram SPINELL structure, glass- infiltrated, magnification x 10,000.

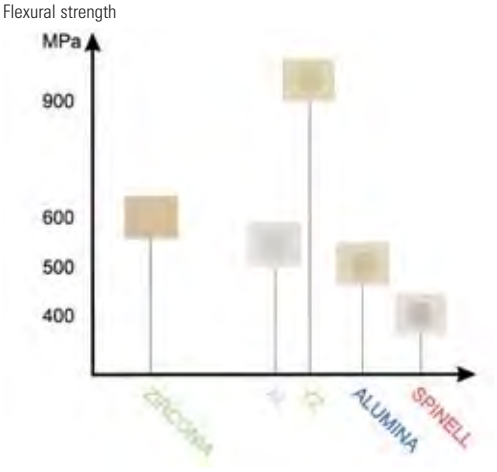


Fig. 2

Fig. 3: Spinell crystallized in the octahedron.

What are the advantages of VITA In-Ceram® SPINELL in conjunction with the inLab® system?

All-ceramic anterior crowns made of VITA In-Ceram SPINELL for inLab have been clinically approved since 1995 and are based on the reliable systems of VITA In-Ceram and inLab. They provide the following advantages:

Advantages for the patient:

- optimum esthetics and excellent biocompatibility, i.e.

  - no retraction of gingiva
  - no exposed metal margin
  - high quality of fit
  - best translucency of all oxide-ceramic materials, hence particularly suitable for anterior restorations
  - withstand high functional stress due to excellent physical values
  - no thermal irritation due to low thermometric conductivity

- positive cost/benefit ratio (e.g. no expenses for alloys)

Advantages for the dentist:

- VITA In-Ceram SPINELL restorations allow adhesive or non-adhesive fixation
- X-ray translucency

Advantages for the dental technician:

- Use of industrially sintered, highly homogeneous VITA In-Ceram SPINELL for inLab.
  The results are:
  extremely reduced process time compared to the slip technique since there is
  - no duplicating
  - no working die
  - no sinter firing required

  - much shorter glass infiltration firing in the conventional ceramic furnace (Inceramat is not required)
  - layering thickness of the structure can be precisely defined with the inLab software
  - minimum processing risk due to safe handling since processing in the fragile condition is no longer required (no slip-sinter structure, no mixing errors)
  - completion in the laboratory (no processes performed outside the laboratory)
  - use of VITA VM 7 fine-structure ceramic as veneering ceramic

When should VITA In-Ceram® SPINELL for inLab® not be used?

- if a functionally appropriate design of the restoration is not ensured
- if sufficient oral hygiene is not present
- in case of strongly discolored dies
- in case of insufficient hard tooth substance
- in case of inadequate/inappropriate tooth preparation
- bruxism

For information on preparation and fixation please refer to booklet "Clinical Aspects" – Publication No. 808E.

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VITA In-Ceram® SPINELL for inLab® Assortment

VITA In-Ceram® SPINELL for inLab® - Assortment
Assortment containing a pack of 10 pieces of VITA In-Ceram SPINELL for inLab CS-11 for crowns and accessories to infiltrate milled VITA In-Ceram SPINELL crown substructures.

Content:
1 x 25 g VITA In-Ceram SPINELL GLASS POWDER S12
1 x 6 ml VITA In-Ceram Testing Liquid
1 x 10 pcs VITA In-Ceram SPINELL for inLab, CS-11
1 brush no. 4, In-Ceram
1 VITA In-Ceram GLASS POWDER shade guide
1 firing tray W for crowns and bridges
1 pack of platinum rods for firing tray W, 6 pcs, assorted
1 VITA In-Ceram SPINELL OPTIMIZER, 10 g
Directions for use VITA In-Ceram for inLab

VITA In-Ceram® SPINELL for InLab®
Porously sintered $MgAl_2O_4$ blocks especially for
anterior crown substructures,
pack cont. 10 pcs
Dimensions: 10 x 11 x 15 mm
Designation: **CS-11** (CROWN SPINELL, size 11)

- VITA VM 7,
  Fine-structure ceramic for veneering
  VITA In-Ceram SPINELL substructures

VITA VACUMAT®
For glass infiltration of VITA In-Ceram SPINELL substructures and for firing the ceramic material VITA VM 7

Fabrication of the substructure for a VITA In-Ceram® SPINELL for inLab® anterior crown

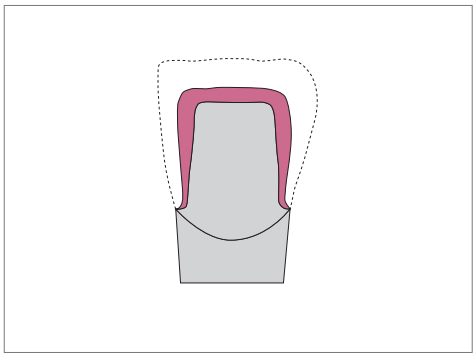
The processing steps from

- **fabrication of the model** to
- **preparing for scanning resp. optical impression**
- **design of the VITA In-Ceram® SPINELL anterior crown coping with the inLab software**

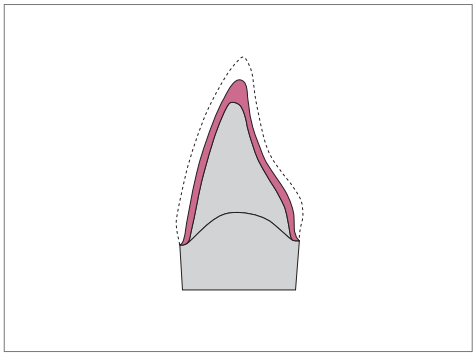
up to

- **checking on the working model**

are carried out analogously to the processing steps of substructure fabrication of a VITA In-Ceram ALUMINA for inLab restoration (see page 23).



- In the VITA In-Ceram SPINELL technique the anterior crown substructure must be designed in such a way that it corresponds to the tooth shape to be replaced in reduced size. When veneering with VITA VM 7 this permits a uniform wall thickness of the ceramic on all sides.



⚠ ***Important:***

Incisal wall thickness: ***0.7 mm***

Circumferential wall thickness: ***0.5 mm***

These values are stored in the inLab FrameWork 3D software.

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☞ ***Note:***
Remove the cooling and lubricating fluid DENTATEC from the crown coping by means of a cleaning firing. Place substructure on a fibrous pad firing support on firing tray W.

Cleaning firing in the VITA VACUMAT®

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	3.00	3.00	33	700	5.00	0.00

- Check the fit of the milled crown substructure on the die using varnish, lipstick, etc.
- Remove premature contacts, check accuracy of fit at the preparation border.
- Adjust the contours using fine-grained diamond abrasives rotating at low speed and exerting minimum pressure.
- If required, remove burrs and excess material at the margin of the structure using rubber polishers.

- Check the material thickness with calipers.
  → Mininum layer thickness: **circumferential: 0.5 mm**
  incisal: 0.7 mm

⚠ ***Important:*** *Contours and function must be checked now as no further adjustments can be performed after the glass infiltration firing.*

- Remove grinding particles.

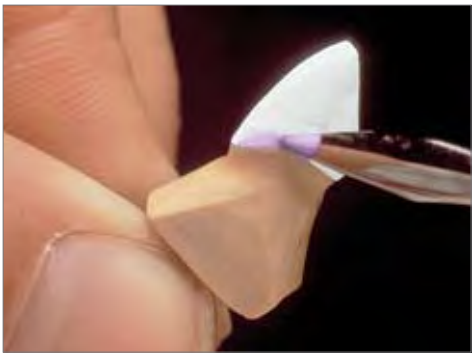
⚠ ***Important note:*** *Since grinding of sintered dental ceramic products produces dust, always wear a face mask or grind when wet. Additionally, use an extraction unit and work behind a protective screen.*

If required, small defective spots in the marginal area can now be filled up with VITA In-Ceram SPINELL OPTIMIZER.

VITA In-Ceram® SPINELL OPTIMIZER

Use of VITA In-Ceram® SPINELL OPTIMIZER

- VITA In-Ceram SPINELL OPTIMIZER is a mixture of $MgAl_2O_4$ powder and wax and is used to fill up small defects in ground and slip-coated VITA In-Ceram SPINELL substructures.



I. Optimizing the marginal seal

- Apply plaster/wax separating agent onto the die and blow completely dry.
- If required, carve back the margin as it is done for a metal-free shoulder.
- Take up VITA In-Ceram SPINELL OPTIMIZER with an electronic wax knife and apply to the crown margin. The wax temperature must be adjusted so that the mixture becomes sufficiently liquid and the wax does not evaporate.
- Surplus VITA In-Ceram SPINELL OPTIMIZER must be carved back.
- Remove the substructure from the die.
- Place the substructure on the model again and check the VITA In-Ceram SPINELL OPTIMIZER material that has been applied.

II. Sintering

- Fix the substructure on a platinum rod or place on fibrous pad so that the VITA In-Ceram SPINELL OPTIMIZER will not come into contact with it.

Sinter firing in the VITA VACUMAT®

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
200	10.00	12.00	78	1140	40.00	0.00

⚠ ***Important note:*** *We strongly recommend the use of ceramic furnaces in which no alloys are fired (risk of contamination).*

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- Check on the working model.

Glass infiltration of the VITA In-Ceram® SPINELL anterior substructures

Checking the substructure

- The ground substructure is checked for possible micro-cracks using the VITA In-Ceram testing liquid.

- Should a micro-crack be found, grind the substructure again.

Glass infiltration

- Mix desired VITA In-Ceram SPINELL GLASS POWDER with distilled water to obtain a thin consistency.

- Apply a rich coat with a thickness of 1-2 mm only to the outer surfaces of the crown substructure using a brush.

- The margin must not be covered.

☞ ***Note:***

Apply only small quantities of wet glass powder.
Approximate value of the required glass quantity: approx. 60 % of the substructure weight so that only minimum sandblasting is required after the infiltration firing.

Determination for VITA In-Ceram® SPINELL GLASS POWDER

VITA SYSTEM 3D-MASTER®/VITA**VM®7**
S12 for all VITA SYSTEM 3D-MASTER shades incl. OM1, OM2 and OM3
for the reproduction of bleached teeth.

VITAPAN® classical/VITADUR® ALPHA
S11, S12 for light shades
S13, S14 for yellowish, brownish shades

Glass infiltration firing in the VITA VACUMAT®

- To obtain translucent crown substructures, glass infiltration firing in the VITA VACUMAT must be performed under vacuum.
- Place coated crown substructures on platinum rods or platinum foil in the firing support W. The margins must not come in contact with the rods or foil to prevent the glass from penetrating into the interior of the restoration.

Glass infiltration firing in the VITA VACUMAT®

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	4.00	12.00	44	1130	20.00	21.00

⚠ ***Important note:*** *We strongly recommend the use of ceramic furnaces in which no alloys are fired (risk of contamination).*

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⚠ ***Important:***
In case of incomplete infiltration (white spots) the infiltration process must be repeated.

- Infiltrated crown coping.

Remove excess glass

- Remove excess glass with a coarse-grained diamond instrument or HEATLESS.

⚠ ***Attention:***
Glass dust consists of sharp particles. Always wear protective glasses and a face mask, use an extraction unit and work behind a protective screen.

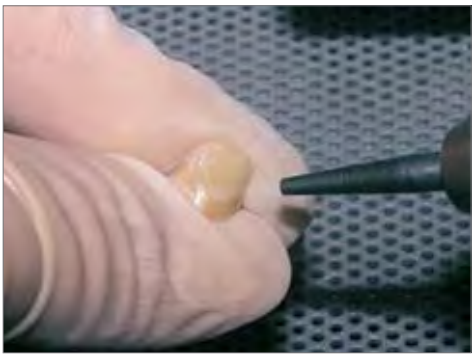
⚠ ***Important:***
Do not grind down to the substructure.

- Sandblast residual SPINELL glass in the sandblasting unit (disposable abrasive blasting technique) using Al_2O_3 (30-50 µm) at a max. pressure of 2.5 - 3 bars.

Glass control firing in the VITA VACUMAT®

Place the crown on platinum rods in the VITA firing support W and carry out glass control firing as follows:

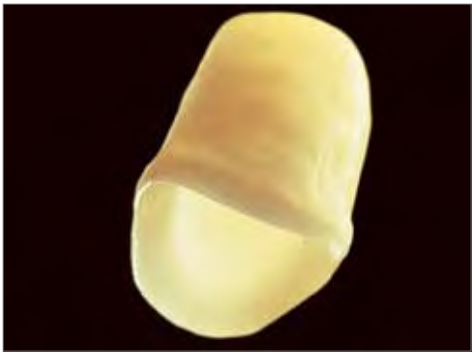
Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	0.00	5.00	80	1000	5.00	0.00



- Glass that has escaped must be removed by sandblasting again.

⚠ ***Important:***
For safety's sake this process must be repeated again until no more glass is visible. This must always be followed by a glass control firing.

- Finished VITA In-Ceram SPINELL anterior crown substructure on the working model.



- VITA In-Ceram SPINELL crown substructures feature excellent translucency and are perfectly suitable for anterior restorations.

Veneering of the VITA In-Ceram® SPINELL anterior substructures

- Crown substructures are veneered with VITA VM 7 according to the directions for use No. 1110E.

⚠ ***Important:***
Unveneered areas of the substructure must be sealed with glaze material.

- Finished VITA In-Ceram SPINELL crown.

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VITA In-Ceram® SPINELL for inLab® in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
Cleaning firing*	600	3.00	3.00	33	700	5.00	0.00
Optimizer firing	200	10.00	12.00	78	1140	40.00	0.00
Glass infiltration firing	600	4.00	12.00	44	1130	20.00	21.00
Glass control firing**	600	0.00	5.00	80	1000	5.00	0.00

* Cleaning firing is generally carried out prior to optimizing and glass infiltration.

** Repeat after sandblasting.

Veneering of VITA In-Ceram® SPINELL restorations with VITA**VM®7** in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
VITA VM 7 MARGIN firing	500	6.00	7.40	60	960	1.00	7.40
VITA VM 7 EFFECT LINER firing	500	6.00	8.11	55	950	1.00	8.11
1st dentine firing	500	6.00	7.27	55	910	1.00	7.27
2nd dentine firing	500	6.00	7.16	55	900	1.00	7.16
Glaze firing	500	0.00	5.00	80	900	1.00	0.00
Glaze firing with VITA Akzent FLUID	500	4.00	5.00	80	900	1.00	0.00
Glaze firing with VITA Akzent glaze	500	4.00	5.00	80	900	1.00	0.00
Glaze firing with VITA SHADING PASTE glaze	500	6.00	7.27	55	900	1.00	0.00
Corrective firing with VITA VM 7 CORRECTIVE	500	4.00	6.00	55	830	1.00	6.00

For personal notes

For personal notes

VITA All-Ceramics

VITA In-Ceram ALUMINA for inLab®

Directions for use
Fabrication of the crown substructure

VITA All-Ceramics Indication table

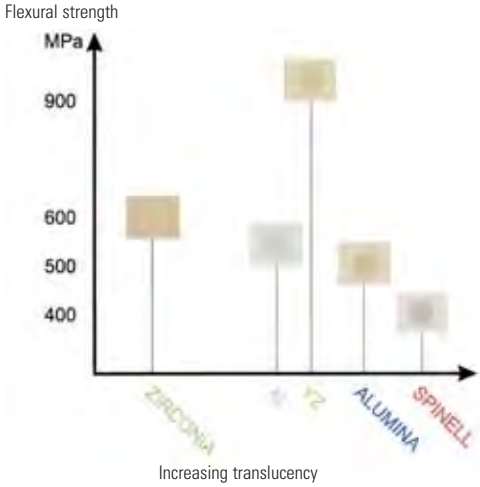
	Oxide ceramic					Fine-structure feldspar ceramic	
	Infiltration ceramic			Sinter ceramic			
	VITA In-Ceram SPINELL	VITA In-Ceram ALUMINA	VITA In-Ceram ZIRCONIA	VITA In-Ceram AL	VITA In-Ceram YZ	VITABLOCS Mark II	VITABLOCS TriLuxe
	–	–	–	●	●	–	–
	○	–	–	–	–	●	○
	○	–	–	–	–	●	●
	–	–	–	–	–	●	●
	–	–	–	–	–	●	●
	●	●	○	●	●	●	●
	–	●	●	●	●	–	–
 *	–	–	–	–	●	–	–
	○	●	●	●	●	●	●
	–	–	●	–	●	–	–
 *	–	–	–	–	●	–	–
VENEERING MATERIAL	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 9	VITA VM 9**	VITA VM 9**

● recommended ○ possible * maximum width: 2 pontics ** only for individualization

Aluminium oxide (α-Al_2O_3) is a naturally occurring mineral (corundum). It features an unusually high Mohs hardness of 9 and a modulus of elasticity of 410 GPa. Due to these properties, this material is perfectly suitable to be used as abrasive material or also to produce high-strength materials (e.g. cutting tools or thread guides in the textile industry). Due to its excellent biocompatibility, it is also used to produce bone replacement (e.g. hip joint balls) in medical techniques. For numerous years crystalline aluminium oxide has also been used to increase the stability of dental ceramics (so-called dispersion strengthening). This was also carried out e.g. in the framework material Hi-Ceram. When VITA In-Ceram was introduced to the dental market in 1989, a new era of all-ceramic restorations began. The technique developed by Dr. Sadoun allowed the production of restorations with an excellent long-term prognosis including a three-unit anterior bridge without the use of metal substructures. The aluminium oxide content of In-Ceram ALUMINA has been increased to 80 % and – by using the infiltration technique with special lanthanum glasses – a stability value of approx. 500 Mpa could be reached for the first time – a value which lies within the range of highly pure aluminium oxide.

Compared to other dental ceramics, the fracture toughness has also been increased (see fig. 2).

By using industrially sintered alumium oxide blocks for the CELAY system in 1993 and for the CEREC system from 1997, it was possible to increase the strength and, above all, the reliability (Weibull modulus). The Weibull modulus is used for estimating the reliability of a material. Fig. 3 shows a comparison of the In-Ceram ALUMINA slip material and the In-Ceram ALUMINA block material with characteristic measuring data. The industrial production of the block material combined with strong sintering (necking) – compared to the slip material – results in a material, which allows excellent machine processing and ensures safe dental handling with short process times (see fig. 4 and 5).



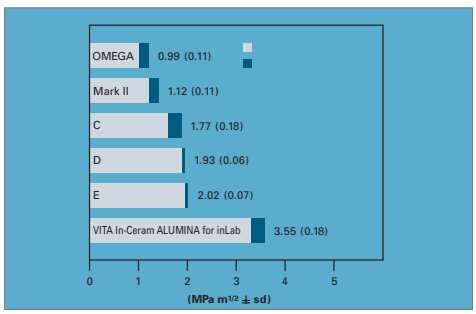


Fig. 2: according to Lüthi, H.: Strength and Toughness of Dental Ceramics. CAD/CIM in Aesthetic Dentistry, CEREC 10 year Anniversary Symposium. Quintessence Publishing Co. 1996; 229-23

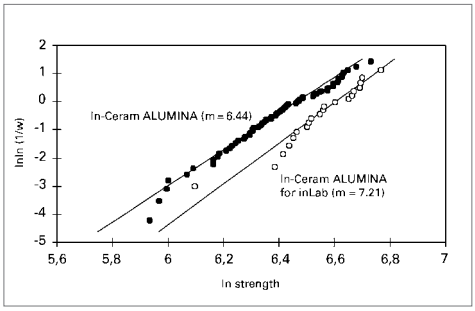


Fig. 3: The lower Weibull modulus of VITA In-Ceram ALUMINA for inLab exhibits reduced variation of stability values (Hornberger, H. PhD Thesis 1996).

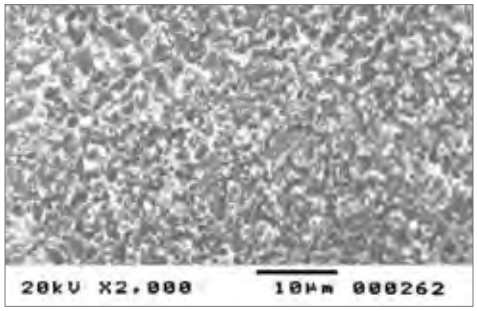


Fig. 4: Structure of a VITA In-Ceram ALUMINA block with homogeneous and random distribution of the particles. Magnification x 2000

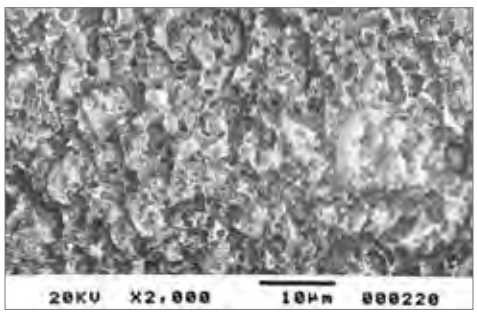


Fig. 5: Structure of a manually slip-coated In-Ceram substructure with clearly stronger variation of the particle size. Magnification: x 2000

What are the advantages of VITA In-Ceram® ALUMINA in conjunction with the inLab® system?

All-ceramic restorations made of VITA In-Ceram ALUMINA for inLab have proved their clinical reliability since 1993 and are based on the dependable systems VITA In-Ceram and inLab.
They provide the following advantages:

Advantages for the patient:

- optimum aesthetics and excellent biocompatibility, i.e.

  - no retraction of gingiva
  - no exposed metal margin
  - high quality of fit
  - favourable translucency
  - withstand high functional stress due to excellent physical values
  - no thermal irritation due to low thermometric conductivity

- positive cost/benefit ratio (no expenses for alloys)

Advantages for the dentist:

- Clinical reliability
- VITA In-Ceram ALUMINA restorations allow adhesive or non-adhesive fixation
- X-ray translucency

Advantages for the dental technician:

- Use of industrially sintered, highly homogeneous VITA In-Ceram ALUMINA for inLab.
  The result is:
  extremely reduced process time compared to the slip technique since there is
  - no duplicating
  - no working die
  - no sinter firing required

  - extremely reduced glass infiltration firing in the conventional ceramic furnace (VITA INCERAMAT is not required)
  - layering thickness of the structure can be precisely defined with the CEREC software
  - minimum processing risk due to safe handling since processing in the fragile condition is no longer required (no slip-sinter structure, no mixing errors)
  - completion in the laboratory (no processes performed outside the laboratory)
  - use of VITAVM 7 fine-structure ceramic as veneering ceramic

When should VITA In-Ceram® ALUMINA for inLab® not be used?

- if a functionally appropriate design of the restoration is not ensured
- if sufficient oral hygiene is not present
- in case of insufficient hard tooth substance
- in case of inadequate/inappropriate tooth preparation
- bruxism

For information on preparation and fixation please refer to booklet "Clinical Aspects" – Publication No. 808E.

AL

VITA In-Ceram® ALUMINA for inLab® Assortment

VITA In-Ceram® ALUMINA assortment for inLab®
Assortment containing a pack of 10 pieces of VITA In-Ceram ALUMINA for inLab CA-12 for crowns and accessories to infiltrate milled VITA In-Ceram ALUMINA crown substructures.

Content:
2 x 25 g VITA In-Ceram ALUMINA GLASS POWDER AL2, AL4
1 x 6 ml VITA In-Ceram Testing Liquid
1 x 10 pcs VITA In-Ceram ALUMINA for inLab, CA-12
1 brush no. 4, In-Ceram
1 VITA In-Ceram GLASS POWDER shade guide
1 firing tray W for crowns and bridges
1 pack of platinum rods for firing tray W, 6 pcs, assorted
1 VITA In-Ceram ALUMINA OPTIMIZER, 10 g
Directions for use VITA In-Ceram for inLab

VITA In-Ceram® ALUMINA for inLab®

- Porously sintered Al_2O_3 blocks for **crown substructures,**
  pack cont. 10 pcs
  Dimensions: 10 x 12 x 15 mm
  Designation: **CA-12** (CROWN ALUMINA, size 12)

- Porously sintered Al_2O_3 blocks zum
  for batch grinding of 4 to 5 crown substructures,
  pack cont. 2 pcs
  Dimensions: 14 x 15 x 40 mm
  Designation: **BA-40** (CROWN ALUMINA, size 40)

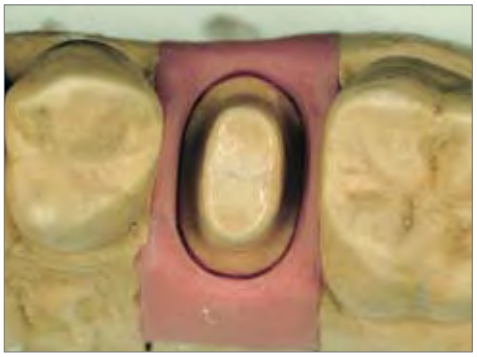
- Porously sintered Al_2O_3 blocks for
  three-unit anterior bridge substructures,
  pack cont. 2 pcs
  Dimensions: 14 x 15 x 28 mm
  Designation: **BA-28** (BRIDGE ALUMINA, size 28)

- VITA VM 7,
  Fine-structure ceramic for veneering
  the VITA In-Ceram ALUMINA substructures

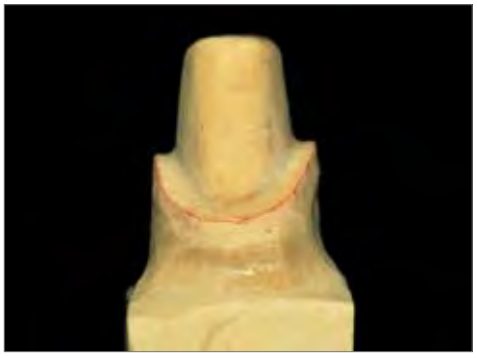
Fabrication of the substructure for a VITA In-Ceram® ALUMINA for inLab® crown and anterior bridge

Model fabrication

- Degrease the model.



- Produce a model with removable dies from a high-quality, dimensionally stable plaster, e.g. CAM-base (Dentona Co.).
- Produce gingival mask.



- Check the sawed die carefully.
- Block out defects and undercuts in the die.
- Mark the preparation margin with a color superpolymer lead.

Preparing for scanning or optical impression

- Apply covering layer of VITA CEREC LIQUID on the die. Blow the excess thin.
- Spray VITA CEREC POWDER in a thin, homogenous layer onto the die.

- The thin, opaque powder layer of powder results in a homogeneous dispersion of light, dazzle effects are prevented and a uniform surface is defined. This is the prerequisite for a sharply contrasting image resp. for perfect digitalization of the die surface.

☞ ***Note:***

When using model material suitable for scanning, the application of VITA CEREC LIQUID and POWDER is not required

AL

Scanning

- Example shown: scanning the working die with the inEos scanner.

Design

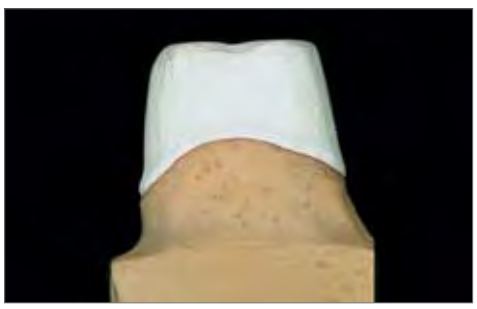
- The design in the inLab system.

- VITA In-Ceram ALUMINA for inLab CA-12.

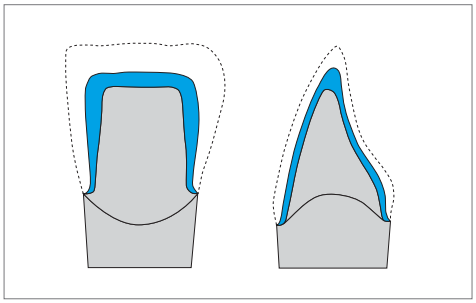
Grinding

- The inner contour of the restoration is ground with the long cone tool, the outer contour with the cylindrical diamond tool.
- The wall thickness of the coping is stored in the inLab software. The value must be adhered to.

- Crown coping immediately after the grinding process (with cut-off lug).

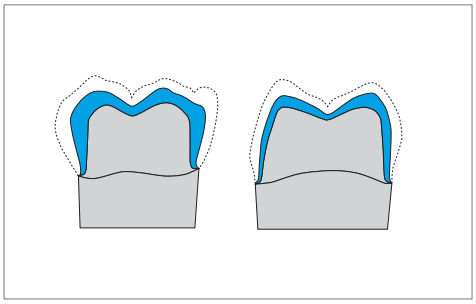


- Ground crown coping on the working die.



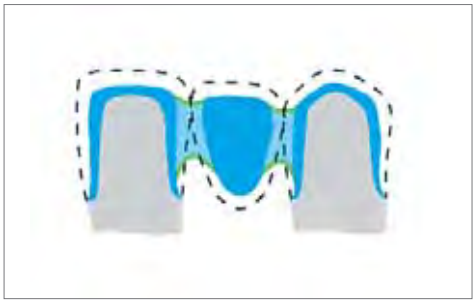
Design of the substructure of a VITA In-Ceram® ALUMINA for inLab® crown / anterior bridge

- When using the VITA In-Ceram ALUMINA technique, the crown substructures must always be designed in such a way that they correspond to the tooth being replaced in a reduced size. Accordingly, homogeneous wall thickness on all sides can be achieved when veneering with VITA VM 7.

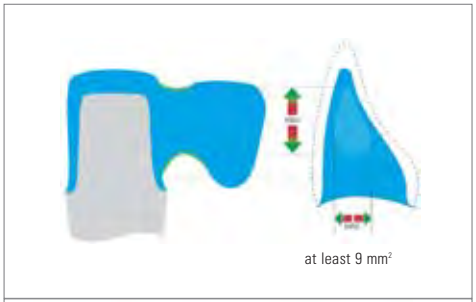


⚠ ***Important:***
Occlusal resp. incisal wall thickness: ***0.7 mm***
Circumferential wall thickness: ***0.5 mm***

These values are stored in the inLab FrameWork 3D software.

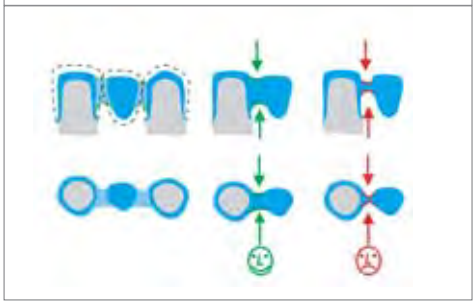


- **3-unit anterior bridge substructures** in the VITA In-Ceram ALUMINA technique must always be designed in a way that they correspond to the teeth being replaced in a reduced size. Accordingly, homogeneous wall thickness on all sides can be achieved when veneering with VITA VM 7.

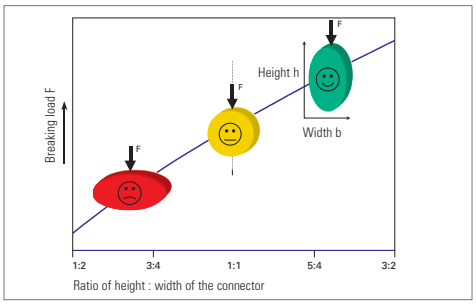


- The junctures (connectors) should be designed as large as possible – making maximum use of the space available.

- The connector areas must be at least 9 mm².



- The junctures must be rounded off concavely. Deep grooves (e.g. with a diamond separating disc) must be avoided since they would inevitably lead to cracks.



⚠ ***Important:***
Aspects for the design of connectors of bridge substructures:
1. The height of the connector should be as large as possible.
2. The height should be equal to or larger than width b.

Stability and function take priority over aesthetics!

AL

Reworking the crown/bridge substructure

☞ ***Note:*** *Remove the cooling and lubricating fluid DENTATEC from the substructure by means of a cleaning firing and place onto a fibrous pad firing support on firing tray W.*

Cleaning firing in the VITA VACUMAT®

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	3.00	3.00	33	700	5.00	0.00

- Check the fit of the milled crown substructure on the die using varnish, lipstick, etc.
- Remove premature contacts, check accuracy of fit at the preparation border.

- Adjust the contours using fine-grained diamond abrasives rotating at low speed and exerting minimum pressure.
- If required, remove burrs and excess material at the margin of the structure using rubber polishers.

- Check the material thickness with calipers.

→ Mininum layer thickness: **circumferential: 0.5 mm**
occlusal resp. incisal: 0.7 mm

⚠ ***Important:*** *Contours must be checked now as no further adjustments can be performed after glass infiltration.*

- Remove grinding dust.

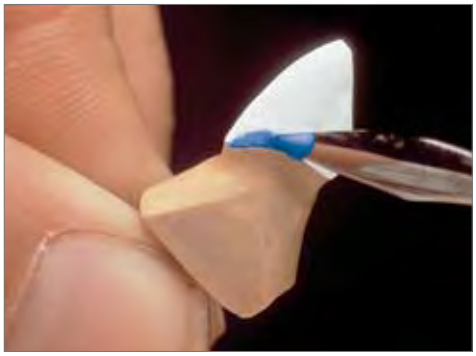
VITA In-Ceram® ALUMINA OPTIMIZER

⚠ ***Important note:***
Since grinding of sintered dental ceramic products produces dust, always wear a face mask or grind when wet. Additionally, use an extraction unit and work behind a protective screen.

- If required, carve back the margin as it is done for a metal-free shoulder.

The use of VITA In-Ceram® ALUMINA OPTIMIZER

- VITA In-Ceram ALUMINA OPTIMIZER is a mixture of Al_2O_3 powder and wax and is used to fill up small defects in ground, slip-coated and sintered VITA In-Ceram ALUMINA substructures.



I. Optimizing the marginal seal

- Apply plaster/wax separating agent onto the die and blow completely dry.
- If required, carve back the margin as it is done for a metal-free shoulder.
- Take up VITA In-Ceram ALUMINA OPTIMIZER with an electronic wax knife and apply to the crown/bridge margin. The wax temperature must be adjusted so that the mixture becomes sufficiently liquid and the wax does not evaporate.
- Surplus VITA In-Ceram ALUMINA OPTIMIZER must be carved back.
- Remove the substructure from the die.
- Place the substructure on the model again and check VITA In-Ceram ALUMINA OPTIMIZER material that has been applied.

II. Sintering

Fix the substructure on a platinum rod or place on a fibrous pad firing support so that the VITA In-Ceram ALUMINA OPTIMIZER will not come into contact with it.

Sinter firing in the VITA VACUMAT®

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
200	10.00	12.00	77	1120	40.00	0.00

⚠ ***Important note:***
We strongly recommend the use of ceramic furnaces in which no alloys are fired (risk of contamination).

- Check on the working model.

AL

Glass infiltration of the VITA In-Ceram® ALUMINA substructures

Check of the substructure

- The ground substructure is checked for possible micro-cracks using the VITA In-Ceram testing liquid.
- Should a micro-crack be detected, the framework must be ground again.

Glass infiltration

- Mix desired VITA In-Ceram ALUMINA GLASS POWDER with distilled water to obtain a thin consistency.
- Apply 1-2 rich coats with a thickness of 1-2 mm only to the outer surfaces of the crown or bridge substructure using a brush.
- At the beginning, apply only half of the glass powder quantity to the bridge substructure.
- The margin must not be covered.

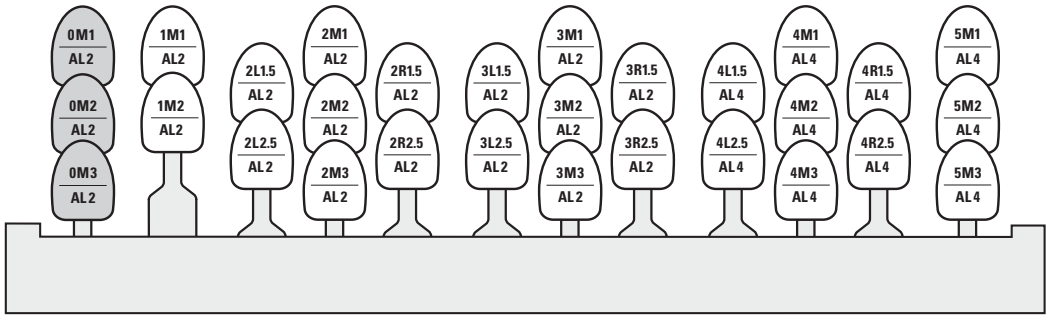
⚠ ***Important:***

During glass infiltration of bridge substructures on platinum foil the basal surface of the pontic – in all infiltration firings – must not be covered with glass powder so that the air can escape from the substructure. Correct glass infiltration is possible only if this is ensured.

☞ ***Note:***

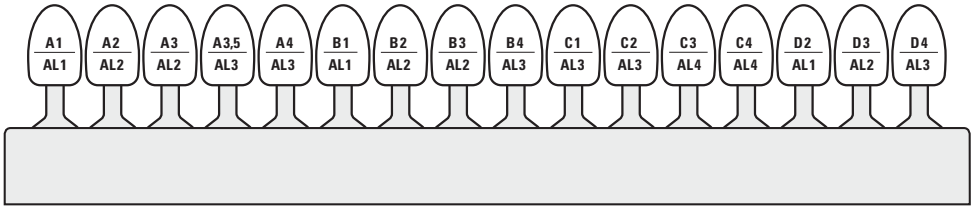
Apply only small quantities of wet glass powder. The required glass quantity is approx. 75 % of the substructure weight so that only minimum sandblasting is required.

VITA SYSTEM 3D-MASTER® / VITA**VM®7**



Shades for the reproduction of bleached teeth

VITAPAN® classical / VITADUR® ALPHA



Glass infiltration firing in the VITA INCERAMAT

- Place the coated crown or bridge substructure on a piece of platinum foil on firing tray W 0.1 mm thick (Pt/Au 95/5 Heraeus Kulzer – available in two sizes: 60 x 100 x 0.1 mm or 60 x 50 x 0.1 mm) in order to carry out the glass infiltration firing. The margins must not come into contact with the platinum foil to prevent the glass from penetrating into the inside of the substructure.

Glass infiltration firing in the VITA INCERAMAT 2 and in the VITA INCERAMAT 3

VITA In-Ceram ALUMINA for inLab **crown substructure**

Time 1 h:min.	Time 2 h:min.	Time 3 h:min.	Time 4 h:min.	Temp. 1 app. °C	Temp. 2 env. °C
0:00	0:00	0:30	1:00	200	1140

Cooling down to 400 °C in the closed furnace.

VITA In-Ceram ALUMINA for inLab **anterior bridge substructure**

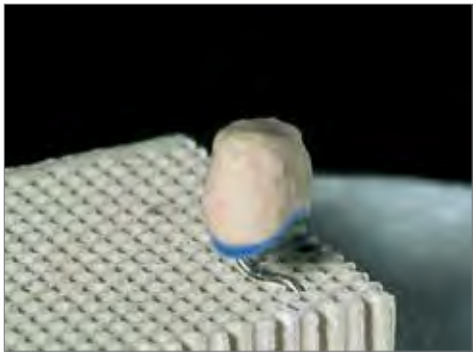
Time 1 h:min.	Time 2 h:min.	Time 3 h:min.	Time 4 h:min.	Temp. 1 approx. °C	Temp. 2 approx. °C
0:00	0:00	0:30	2:00	200	1140

Cooling down to 400 °C in the closed furnace.

Glass infiltration firing in the VITA VACUMAT®

- Alternatively, glass infiltration can also be carried out in the VITA VACUMAT.

⚠ ***Important note:***
We strongly recommend the use of ceramic furnaces in which no alloys are fired (risk of contamination).



- Place coated substructures on platinum rods or platinum foil in the firing support W. The margins must not come in contact with the rods or the foil to prevent the glass from penetrating into the inside of the restoration.

AL

Glass infiltration firing in the VITA VACUMAT®
VITA In-Ceram ALUMINA for inLab, crown substructure

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	1.00	7.00	77	1140	30.00	33.00

☞ ***Note:***
*When firing bridges the object **must** be placed on platinum foil, which is placed onto firing tray W.*

VITA In-Ceram ALUMINA for inLab **anterior bridge,**
at least two infiltration firing processes on **platinum foil.**

- At 1st firing only apply half of the glass quantity.

1st infiltration firing (50% of glass quantity)

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	1.00	7.00	77	1140	40.00	40.00

2nd infiltration firing (50% of glass quantity)

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	1.00	7.00	77	1140	40.00	40.00

⚠ ***Important:***
In the case of incomplete infiltration (white areas in the left coping) the infiltration process must be repeated.

- Infiltrated substructure on platinum foil.

Remove excess glass

- Remove excess glass with a coarse-grained diamond instrument or HEATLESS.

Attention:
Glass dust consists of sharp particles. Always wear protective glasses and a face mask, use an extraction unit and work behind a protective screen.

Important:
Do not grind down to the substructure.

- Sandblast residual ALUMINA glass in the sandblasting unit (disposable abrasive blasting technique) using Al_2O_3 (30-50 µm) at a pressure of 6 bars (cervical: 3 bars).

AL

Glass control firing in the VITA VACUMAT®

Glass control firing on platinum rods in the firing support W as follows:

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	0.00	5.00	80	1000	5.00	0.00

- Glass that has escaped must be removed by sandblasting again.

⚠ ***Important:***
For safety's sake this procedure must be repeated until no more glass is visible. Subsequently, a glass infiltration firing must always be carried out.

- Finished In-Ceram ALUMINA substructures on the working model.

Veneering of the VITA In-Ceram® ALUMINA substructures

- Crown/bridge substructures are veneered with VITA VM 7 according to the directions for use No. 1110E.

⚠ ***Important:***
Unveneered areas of the substructure must be sealed with glave material.

- Finished 3-unit In-Ceram ALUMINA anterior bridge.

VITA In-Ceram® ALUMINA for inLab® Firing charts

VITA In-Ceram® ALUMINA for inLab® crown substructures in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
Cleaning firing*	600	3.00	3.00	33	700	5.00	0.00
Optimizer firing	200	10.00	12.00	77	1120	40.00	0.00
Glass infiltration firing	600	1.00	7.00	77	1140	30.00	33.00
Glass control firing**	600	0.00	5.00	80	1000	5.00	0.00

VITA In-Ceram® ALUMINA for inLab® bridge substructures in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
Cleaning firing*	600	3.00	3.00	33	700	5.00	0.00
Optimizer firing	200	10.00	12.00	77	1120	40.00	0.00
1st glass infiltration firing	600	1.00	7.00	77	1140	40.00	40.00
2nd glass infiltration firing	600	1.00	7.00	77	1140	40.00	40.00
Glass control firing**	600	0.00	5.00	80	1000	5.00	0.00

* Cleaning firing is generally carried out prior to optimizing and glass infiltration.

** Repeat after sandblasting

VITA In-Ceram® ALUMINA for inLab® crown substructures in the VITA INCERAMAT 2 and in the VITA INCERAMAT 3

Time 1 h:min.	Time 2 h:min.	Time 3 h:min.	Time 4 h:min.	Temp. 1 app. °C	Temp. 2 env. °C
0:00	0:00	0:30	1:00	200	1140

Cooling down to 400 °C in the closed furnace.

VITA In-Ceram® ALUMINA for inLab® bridge substructures in the VITA INCERAMAT 2 and in the VITA INCERAMAT 3

Time 1 h:min.	Time 2 h:min.	Time 3 h:min.	Time 4 h:min.	Temp. 1 approx. °C	Temp. 2 approx. °C
0:00	0:00	0:30	2:00	200	1140

Cooling down to 400 °C in the closed furnace.

VITA In-Ceram® ALUMINA for inLab® crown substructures in the VITA INCERAMAT 3T

VITA INCERAMAT	Prog. No.	Time 1	Temp. 1	Time 2	Time 3	Temp. 2	Time 4
Glass infiltration firing	7	0:03	200	0:00	0:30	1140	1:00

Cooling down to 400 °C in the closed furnace.

VITA In-Ceram® ALUMINA for inLab® bridge substructures in the VITA INCERAMAT 3T

VITA INCERAMAT	Prog. No.	Time 1	Temp. 1	Time 2	Time 3	Temp. 2	Time 4
Glass infiltration firing	8	0:03	200	0:00	0:30	1140	2:00

Cooling down to 400 °C in the closed furnace.

AL

Veneering of the VITA In-Ceram® ALUMINA restoration with VITAVM®7 in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
VITA VM 7 MARGIN firing	500	6.00	7.40	60	960	1.00	7.40
VITA VM 7 EFFECT LINER firing	500	6.00	8.11	55	950	1.00	8.11
1st dentine firing	500	6.00	7.27	55	910	1.00	7.27
2nd dentine firing	500	6.00	7.16	55	900	1.00	7.16
Glaze firing	500	0.00	5.00	80	900	1.00	0.00
Glaze firing with VITA Akzent FLUID	500	4.00	5.00	80	900	1.00	0.00
Glaze firing with VITA Akzent glaze	500	4.00	5.00	80	900	1.00	0.00
Glaze firing with VITA SHADING PASTE glaze	500	6.00	7.27	55	900	1.00	0.00
Corrective firing with VITA VM 7 CORRECTIVE	500	4.00	6.00	55	830	1.00	6.00

For personal notes

VITA All-Ceramics

VITA In-Ceram ZIRCONIA for inLab®

Directions for use
Fabrication of the crown substructure

VITA All-Ceramics Indication table

	Oxide ceramic					Fine-structure feldspar ceramic	
	Infiltration ceramic			Sinter ceramic			
	VITA In-Ceram SPINELL	VITA In-Ceram ALUMINA	VITA In-Ceram ZIRCONIA	VITA In-Ceram AL	VITA In-Ceram YZ	VITABLOCS Mark II	VITABLOCS TriLuxe
	–	–	–	●	●	–	–
	○	–	–	–	–	●	○
	○	–	–	–	–	●	●
	–	–	–	–	–	●	●
	–	–	–	–	–	●	●
	●	●	○	●	●	●	●
	–	●	●	●	●	–	–
 *	–	–	–	–	●	–	–
	○	●	●	●	●	●	●
	–	–	●	–	●	–	–
 *	–	–	–	–	●	–	–
VENEERING MATERIAL	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 9	VITA VM 9**	VITA VM 9**

● recommended ○ possible * maximum width: 2 pontics ** only for individualization

Zirconium oxide (ZrO_2) is a mineral that is found in nature in the form of baddeleyite (zirconium earth). It features a Mohs' hardness of 7-9 and – similar to aluminium oxide – is suitable for producing abrasive discs. It has also proved its reliability for household and industrial cutting tools. Due to its high strength and fracture toughness it is also suitable for the production of hip prostheses. It has also been used as opacifier for metal ceramic opaque materials. For this purpose, however, synthetically produced ZrO_2 is used, since the natural material exhibits excessive contamination.

In the case of VITA In-Ceram ZIRCONIA for inLab, fracture toughness and flexural strength could be increased by adding ZrO_2 and a special infiltration glass to the reliable aluminium oxide (see page 5).
The term fracture toughness describes the resistance of a material to crack growth. The strength is further increased by transformation strengthening. The principle of transformation strengthening is illustrated in fig. 1.

The strengthening mechanism is explained by the load-induced transition of the metastable tetragonal zirconium oxide particles to their monoclinic form (see fig. 2). The energy of a crack is reduced by the tetragonal/monoclinic conversion – resulting in a volume increase of approx. 3 % – to such an extent that crack growth is arrested.

The VITA In-Ceram ZIRCONIA system offers the well-known advantages of infiltration ceramics: no shrinkage occurs during solidification, i.e. high precision of fit is also ensured after glass infiltration. In-Ceram ZIRCONIA is perfectly suitable for coating severely discolored dies since it reveals a strong masking capacity.

The use of industrially produced material in block form that is more strongly sintered than for slip application (see fig. 3) allows the perfect combination of machine processing and high strength of the finished material and ensures safe dental technical handling with short process times.

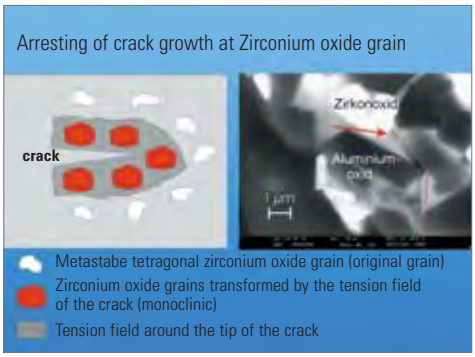


Fig. 1: Principle of transformation strengthening (left) and a scanning electron micrograph of a crack (beside the red line) which runs through the infiltration glass of the substructure material and is stopped by a zirconium oxide particle (white) (tip of arrow).

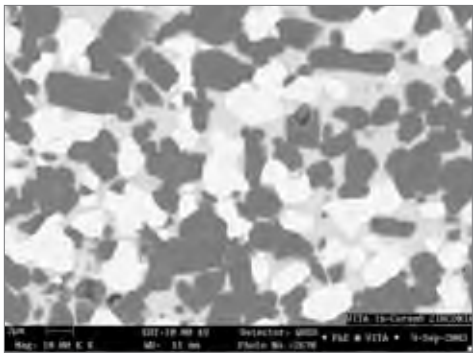


Fig. 3: Scanning electron micrograph of a glass-infiltrated VITA In-Ceram ZIRCONIA substructure. The aluminium oxide particles are irregularly and homogeneously distributed. Magnification x 10,000

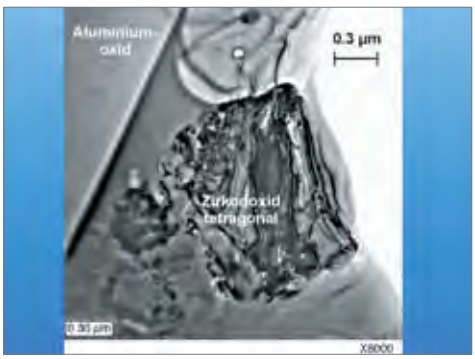


Fig. 2: Transmission electron micrograph (TEM) of an infiltrated In-Ceram ZIRCONIA substructure. X-ray diffraction studies of the zirconium oxide particle in the center of the micrograph showed that it exhibits the desired metastable tetragonal form (Fraunhofer Institute for Silicate Research, Würzburg/Germany). Magnification x 8000

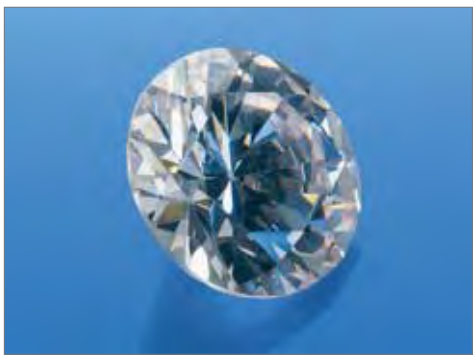


Fig. 4: Ground zirconia gem.

What are the advantages of VITA In-Ceram® ZIRCONIA in conjunction with the inLab® system?

All-ceramic restorations made of VITA In-Ceram ZIRCONIA for inLab are based on the reliable systems of VITA In-Ceram and inLab and provide the following advantages.

Advantages for the patient:

- optimum aesthetics and excellent biocompatibility, i.e.

  - no retraction of gingiva
  - no exposed metal margin
  - superior marginal fit
  - favourable translucency
  - withstand high functional stress thanks to excellent physical values
  - no thermal irritation due to low thermometric conductivity

- positive cost/benefit ratio (no expenses for alloys)

Advantages for the dentist:

- Clinical reliability
- VITA In-Ceram ZIRCONIA restorations allow adhesive or non-adhesive fixation

Advantages for the dental technician:

- Use of industrially sintered, highly homogeneous VITA In-Ceram ZIRCONIA blocks for inLab.
  The result is:
  extremely reduced process time compared to the slip technique since there is
  - no duplicating
  - no working die
  - no sinter firing required

  - much shorter glass infiltration firing in the conventional ceramic furnace (Inceramat is not required)
  - layering thickness of the structure can be precisely defined with the inLab software
  - minimum processing risk due to safe handling since processing in the fragile condition is no longer required (no slip-sinter structure, no mixing errors)
  - completion in the laboratory (no processes performed outside the laboratory)
  - use of VITA VM 7 fine-structure ceramic as veneering ceramic

When should VITA In-Ceram® ZIRCONIA for inLab® not be used?

- If a functionally appropriate design of the restoration is not ensured
- If sufficient oral hygiene is not given
- in case of insufficient hard tooth substance
- in case of inadequate/inappropriate tooth preparation
- bruxism

For information on preparation and fixation please refer to booklet "Clinical Aspects", Publication No. 808E

ZR

VITA In-Ceram® ZIRCONIA for inLab® Assortment

VITA In-Ceram® ZIRCONIA assortment for inLab®
Assortment containing a pack of 10 pieces of VITA In-Ceram ZIRCONIA for inLab Cz-12 for crowns and accessories to infiltrate milled VITA In-Ceram ALUMINA crown substructures.
Content:
1 x 25 g VITA In-Ceram ZIRCONIA GLASS POWDER Z 22N
1 x 10 pcs VITA In-Ceram ZIRCONIA for inLab, CZ-12
1 VITA In-Ceram ZIRCONIA OPTIMIZER, 8 g
Directions for use VITA In-Ceram ZIRCONIA for inLab

VITA In-Ceram® for inLab
- Porously sintered Al_2O_3/ZrO_2 blocks for **crown substructures,** pack cont. 10 pcs
  Dimensions: 10 x 12 x 15 mm
  Designation: **CZ-12** (CROWN ZIRCONIA, size 12)

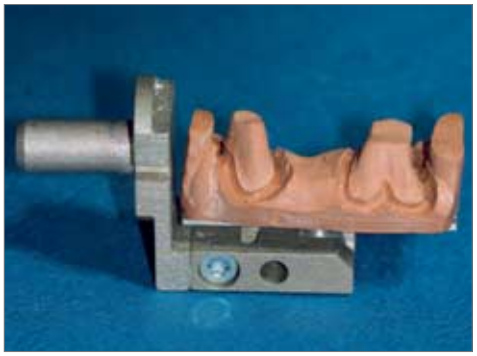
- Porously sintered Al_2O_3/ZrO_2 blocks for **crown substructures,** pack cont. 5 pcs
  Dimensions: 14 x 15 x 18 mm
  Designation: **CZ-18** (CROWN ZIRCONIA, size 18)

- Porously sintered Al_2O_3/ZrO_2 blocks for **three-unit posterior bridge substructures,** pack cont. 2 pcs
  Dimensions: 14 x 15 x 33 mm
  Designation: **BZ-33** (BRIDGE ZIRCONIA, size 33)

- Porously sintered Al_2O_3/ZrO_2 blocks for **three-unit posterior bridge substructures,** pack cont. 2 pcs
  Dimensions: 14 x 15 x 40 mm
  Designation: **BZ-40**
  (BRIDGE ZIRCONIA, size 40)

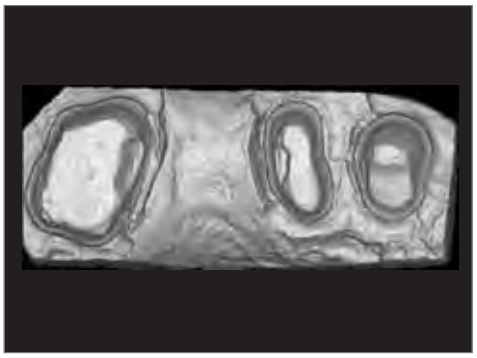
- VITA VM 7 fine-structure ceramic for veneering VITA In-Ceram ZIRCONIA substructures

Fabrication of the substructure for VITA In-Ceram® ZIRCONIA inLab® crowns and posterior bridges

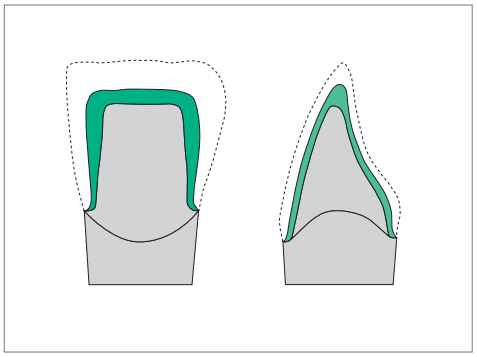


- The processing steps from
- **fabrication of the model** to
- **design of the VITA In-Ceram® ZIRCONIA restoration with the inLab software**
  and
- **checking on the working model** are carried out analogously to the processing steps of substructure fabrication of a VITA In-Ceram ZIRCONIA for inLab restoration.

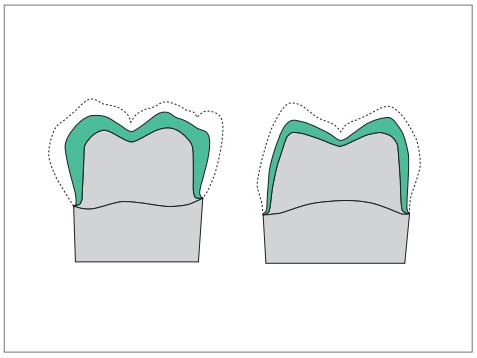
- **Scanning bridge models**
  For scanning bridge models, a special working model without sawcuts must be mounted in the model holder.



- Scanning picture of a model situation for a three-unit bridge of teeth no. 14-16 as well as individual crown on tooth no. 13.



- When using the VITA In-Ceram ZIRCONIA technique, the **crown substructures** must always be designed in such a way that they correspond to the tooth being replaced in a reduced size. Accordingly, homogeneous wall thickness on all sides can be achieved when veneering with VITA VM 7.



⚠ ***Important:***
Wall thickness of **single copings:**

Occlusal wall thickness:	***0.7 mm***
Circumferential wall thickness:	***0.5 mm***

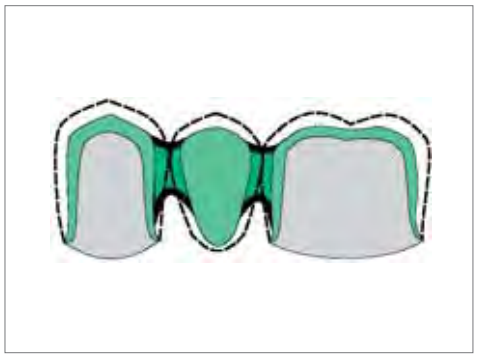
Wall thickness of ***bridge abutment copings:***

Occlusal wall thickness:	***1.0 mm***
Circumferential wall thickness:	***0.7 mm***

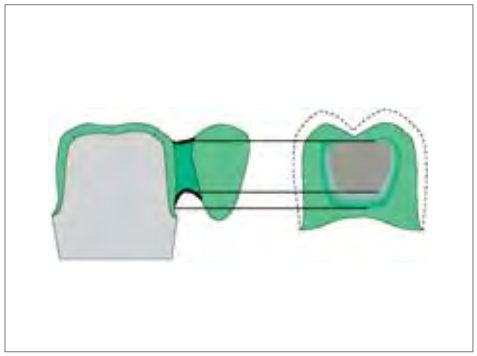
These values are stored in the inLab FrameWork 3D software.

ZR

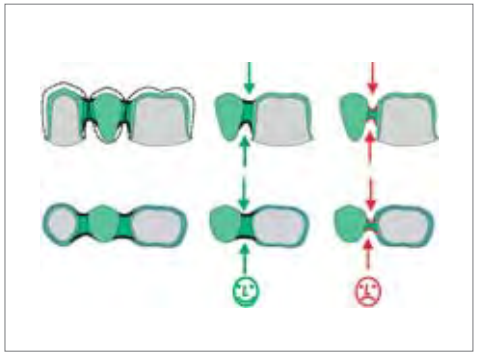
- Grinding a VITA In-Ceram ZIRCONIA crown substructure in the inLab or CEREC Scan.



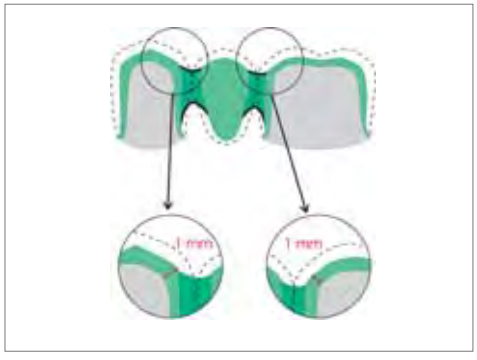
- Three-unit posterior bridge substructures made of VITA In-Ceram ZIRCONIA for inLab must always be designed in such a way that they correspond to the tooth being replaced in a reduced size. Accordingly, homogeneous wall thickness on all sides can be achieved when veneering with VITA VM 7.



- The junctures should be designed as large as possible – making maximum use of the space available. See page 41 on the size definitions for junctures of VITA In-Ceram ZIRCONIA bridges.

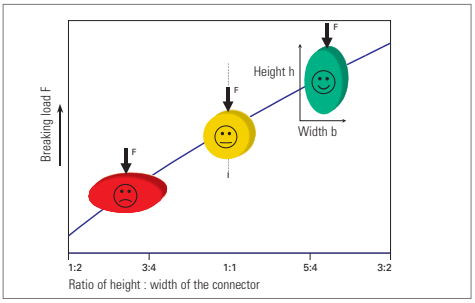


- The junctures must be rounded off concavely.
  Deep grooves (e.g. with a diamond separating disc) must be avoided since they would inevitably lead to cracks.



- **The wall thickness at the occlusal edges must be 1 mm. Circumferential wall thickness: 0.7 mm.**

  All values concerning the thickness of the substructure are stored in the inLab FrameWork 3D software.



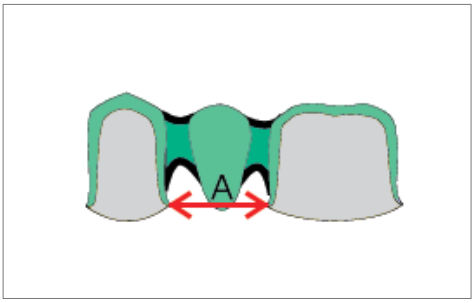
Size definitions for junctures of VITA In-Ceram® ZIRCONIA bridges

⚠ ***Important:***

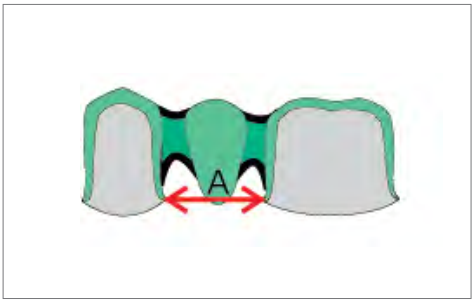
When designing the junctures of abutment copings/pontic, the following three criteria must be observed:

1. *The junctures must be designed in accordance with the span values listed below.*
2. *Maximum value for height h must be selected.*
3. *Height h should be at least as large as or larger than width w.*

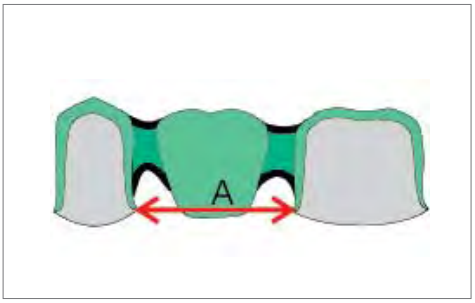
Stability and function take priority over aesthetics!



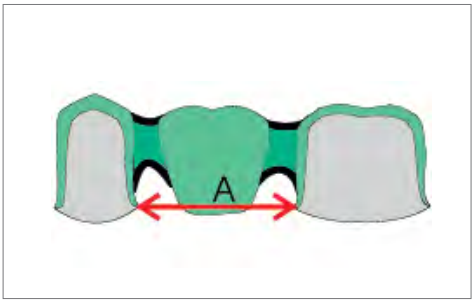
Distance **A ≤ 6 mm**
Juncture: **9 mm²**



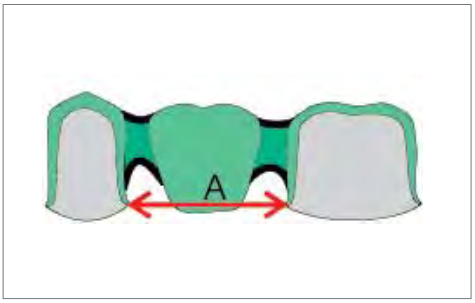
Distance **A ≤ 8 mm**
Juncture: **12.25 mm²**



Distance **A ≤ 10 mm**
Juncture: **16 mm²**



Distance **A ≤ 12 mm**
Juncture: **20.25 mm²**



Distance **A ≤ 14 mm**
Juncture: **25 mm²**

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Reworking the crown/bridge substructure

☞ ***Note:***
Remove the cooling and lubricating fluid DENTATEC from the bridge/crown substructure by means of a cleaning firing.
Place substructure on a fibrous pad firing support on firing tray W.

Cleaning firing in the VITA VACUMAT®

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	3.00	3.00	33	700	5.00	0.00

- Check the fit of the ground milled crown substructure on the die using varnish, lipstick, etc.
- Remove premature contacts, check accuracy of fit at the preparation border.

- Adjust the contours using fine-grained diamond abrasives rotating at low speed and exerting minimum pressure.
- If required, remove burrs and excess material at the margin of the structure using rubber polishers.

- Check the material thickness with calipers.

➞ **Mininum layer thickness:** **Abutment copings:**
circumferential: 0.7 mm
occlusal edges: 1.0 mm
Single copings:
circumferential: 0.5 mm
occlusal: 0.7 mm

⚠ ***Important:***
Contours must be checked now as no further adjustments can be performed after the glass infiltration firing.

Remove grinding dust.

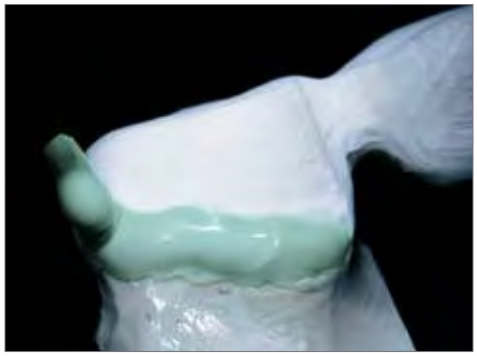
VITA In-Ceram® ZIRCONIA OPTIMIZER

⚠ ***Important note:***
Since grinding of sintered dental ceramic products produces dust, always wear a face mask or grind when wet. Additionally, use an extraction unit and work behind a protective screen.

- If required, small defective spots in the marginal area can now be filled up with VITA In-Ceram ZIRCONIA OPTIMIZER.

Use of the VITA In-Ceram® ZIRCONIA OPTIMIZER

- VITA In-Ceram SPINELL ZIRCONIA is a mixture of Al_2O_3/ZrO_2 powder and wax and is used to fill up small defects in ground VITA In-Ceram ZIRCONIA substructures.



I. Optimizing the marginal seal

- Apply plaster/wax separating agent onto the die and blow completely dry.
- If required, carve back the margin as it is done for a metal-free shoulder.
- Take up VITA In-Ceram ZIRCONIA OPTIMIZER with an electronic wax knife and apply to the crown/bridge margin. The wax temperature must be adjusted so that the mixture becomes sufficiently liquid and the wax does not evaporate.
- Surplus VITA In-Ceram ZIRCONIA OPTIMIZER must be carved back.
- Remove the substructure from the die.
- Place the substructure on the model again and check the VITA In-Ceram ZIRCONIA OPTIMIZER material that has been applied.

II. Sintering

- Put the substructure on a platinum rod or place on fibrous pad so that the VITA In-Ceram ZIRCONIA OPTIMIZER will not come in contact with it.

Sinter firing in the VITA VACUMAT®

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
200	10.00	12.00	77	1120	40.00	0.00

⚠ ***Important note:***
We strongly recommend the use of ceramic furnaces in which no alloys are fired (risk of contamination).

- Try-in on the working model.

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Glass infiltration of the VITA In-Ceram® ZIRCONIA substructures

Checking the substructure

- The ground substructure is checked for possible micro-cracks using the VITA In-Ceram testing liquid.
- Should a micro-crack be found, grind the substructure again.

Glass infiltration

- Mix desired In-Ceram ZIRCONIA GLASS POWDER with distilled water to obtain a thin consistency.
- Apply 1-2 rich coats with a thickness of 1-2mm **only to the outer surfaces** of the crown or bridge substructure using a brush.
- At the beginning, apply only half of the glass powder quantity to the bridge substructure.
- The margin must not be covered.

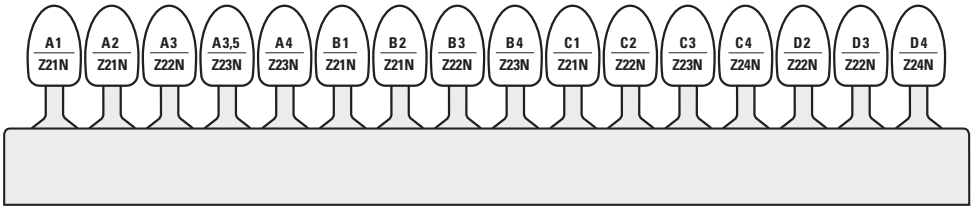
⚠ ***Important:***
During glass infiltration of bridge substructures on platinum foil, the basal surface of the pontic – in all infiltration firings – must ***not*** *be covered with glass powder to enable air to escape from the substructure. Correct glass infiltration is only possible if this is ensured.*

☞ ***Note:***
Apply only small quantities of wet glass powder. Approximate value of the required glass quantity: approx. 75 % of the substructure weight so that only minimum sandblasting is required.

Determination table for VITA In-Ceram® ZIRCONIA GLASS POWDER

VITA SYSTEM 3D-MASTER®/ VITA**VM®7**
Z22N for all VITA SYSTEM 3D-MASTER shades incl. 0M1, 0M2 and 0M3
for the reproduction of bleached teeth

VITAPAN® classical/VITADUR® ALPHA



Glass infiltration firing in the VITA INCERAMAT 2 and in the VITA INCERAMAT 3

- Place the coated crown or bridge substructure onto a piece of platinum foil 0.1 mm thick for the glass infiltration firing (see page 15).
  The margins must not come in contact with the platinum foil to prevent the glass from penetrating into the inside of the restoration.

VITA In-Ceram® ZIRCONIA for inLab®

Time 1 h:min.	Time 2 h:min.	Time 3 h:min.	Time 4 h:min.	Temp. 1 approx. °C	Temp. 2 approx. °C
0:00	0:00	0:50	2:30	200	1140

Cooling down to 400 °C in the closed furnace.

Glass infiltration firing in the VITA VACUMAT®

- Alternatively, glass infiltration can also be carried out in the VITA VACUMAT.

ZR

- Place the coated crown coping on platinum rod or platinum foil on firing tray W. The margins must not come in contact with the rods or foil to prevent the glass from penetrating into the interior of the restoration.

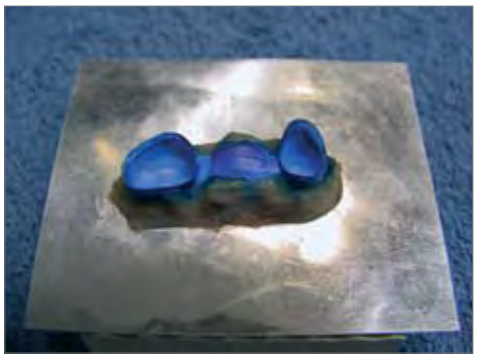
☞ ***Note:***
*In the case of bridges, the glass infiltration firing **must** be carried out on platinum foil which is placed onto firing tray W.*

Glass infiltration firing in the VITA VACUMAT®
VITA In-Ceram ZIRCONIA for inLab **bridge substructure**, at least two infiltration firing processes **on platinum foil**

- Apply only half of the glass quantity during the first firing process.

1st infiltration firing (50% of the glass quantity)

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	1.00	27.00	20	1140	40.00	40.00



2nd infiltration firing (50% of the glass quantity)

Predrying temp.	→ min.	↗ min.	↗ °C/min.	ca. Temp. °C	→ min.	VAC min.
600	1.00	27.00	20	1140	40.00	40.00

VITA In-Ceram ZIRCONIA for inLab **crown** substructure

Predrying temp.	→ min.	↗ min.	↗ °C/min.	ca. Temp. °C	→ min.	VAC min.
600	1.00	27.00	20	1140	30.00	33.00

*** VAC is not necessarily required but results in higher translucency.**

⚠ ***Important note:***
It is vital to make sure that the given infiltration temperature of 1140 °C is adhered to. Infiltration at a temperature which is too low (e.g. 1100 °C) or too high (e.g. 1180 °C) leads to an alteration of the thermal expansion coefficient of the framework. Check the temperature of the furnace with the aid of ceramic testing rings, type PTCR-LTH (available from VITA)! We strongly recommend the use of furnaces in which no alloys are fired (risk of contamination).

⚠ ***Important:***
In case of incomplete infiltration (white spots) the infiltration process must be repeated.

- Infiltrated VITA In-Ceram ZIRCONIA substructure.

Remove excess glass

- Remove excess glass with a coarse-grained diamond instrument or HEATLESS.

ⓘ ***Attention:*** *Glass dust consists of sharp particles. Always wear protective glasses and a face mask, use an extraction unit and work behind a protective screen.*

⚠ ***Important:***
Do not grind down to the substructure.

- Sandblast residual ZIRCONIA glass in the sandblasting unit (disposable abrasive blasting technique) using Al_2O_3 (30-50 µm) at a pressure of 4 bars (cervical: 2.5 bars).

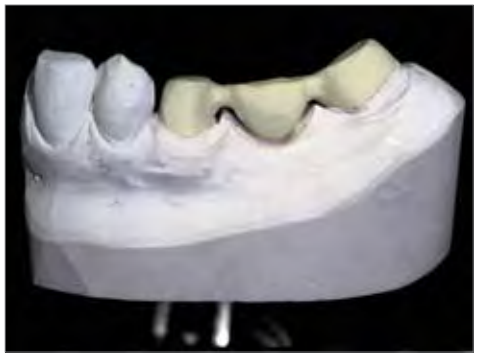
Glass control firing in the VITA VACUMAT®

Glass control firing on fibrous pads in the firing support W as follows:

Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
600	0.00	5.00	80	1000	5.00	0.00

Glass that has escaped must be removed by sandblasting again.

⚠ ***Important:***
For safety's sake this process must be repeated again until no more glass is visible. This must always be followed by a glass control firing.



- Finished VITA In-Ceram ZIRCONIA substructure on the working model.

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Veneering VITA In-Ceram® ZIRCONIA substructures

- Crown/bridge substructure is veneered with VITA VM 7 according to the directions for use 1110E.

⚠ ***Important:***
Unveneered areas of the substructure must be sealed with glaze material.

- Initial situation

- Final situation: three-unit VITA In-Ceram ZIRCONIA for inLab bridge, teeth 24-26

- Initial situation

- Final situation: 4 In-Ceram ZIRCONIA for inLab crowns on teeth 12-22.

VITA In-Ceram ZIRCONIA for inLab crown substructures in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
Cleaning firing*	600	3.00	3.00	33	700	5.00	0.00
Optimizer firing	200	10.00	12.00	77	1120	40.00	0.00
Glass infiltration firing	600	1.00	27.00	20	1140	30.00	33.00
Glass control firing**	600	0.00	5.00	80	1000	5.00	0.00

VITA In-Ceram ZIRCONIA for inLab bridge substructures in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
Cleaning firing*	600	3.00	3.00	33	700	5.00	0.00
Optimizer firing	200	10.00	12.00	77	1120	40.00	0.00
1st glass infiltration firing	600	1.00	27.00	20	1140	40.00	40.00
2nd glass infiltration firing	600	1.00	27.00	20	1140	40.00	40.00
Glass control firing**	600	0.00	5.00	80	1000	5.00	0.00

* Cleaning firing is generally carried out prior to optimizing and glass infiltration.

** Repeat after sandblasting.

VITA In-Ceram® ZIRCONIA for inLab® in the VITA INCERAMAT 2 and in the VITA INCERAMAT 3

Time 1 h:min.	Time 2 h:min.	Time 3 h:min.	Time 4 h:min.	Temp. 1 ca. °C	Temp. 2 ca. °C
0:00	0:00	0:50	2:30	200	1140

Cooling down to 400 °C in the closed furnace.

VITA In-Ceram ZIRCONIA for inLab in the VITA INCERAMAT 3T

VITA INCERAMAT	Prog. No.	Time 1	Temp. 1	Time 2	Time 3	Temp. 2	Time 4
Glass infiltration firing	11	0:03	200	0:00	0:50	1140	2:30

Cooling down to 400 °C in the closed furnace.

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Veneering of the VITA In-Ceram® ZIRCONIA restoration with VITAVM® 7 in the VITA VACUMAT®

VITA VACUMAT	Predrying temp.	→ min.	↗ min.	↗ °C/min.	Temp. approx. °C	→ min.	VAC min.
VITA VM 7 MARGIN firing	500	6.00	7.40	60	960	1.00	7.40
VITA VM 7 EFFECT LINER firing	500	6.00	8.11	55	950	1.00	8.11
1st dentine firing	500	6.00	7.27	55	910	1.00	7.27
2nd dentine firing	500	6.00	7.16	55	900	1.00	7.16
Glaze firing	500	0.00	5.00	80	900	1.00	0.00
Glaze firing with VITA Akzent FLUID	500	4.00	5.00	80	900	1.00	0.00
Glaze firing with VITA Akzent glaze	500	4.00	5.00	80	900	1.00	0.00
Glaze firing with VITA SHADING PASTE glaze	500	6.00	7.27	55	900	1.00	0.00
Corrective firing with VITA VM 7 CORRECTIVE	500	4.00	6.00	55	830	1.00	6.00

For personal notes

VITA Zahnfabrik is certified according to the Medical Device Directive and the following products listed in these directions for use bear the mark CE 0124 :

VITA In-Ceram® ALUMINA for inLab®
VITA In-Ceram® SPINELL for inLab®
VITA In-Ceram® ZIRCONIA for inLab®
VITA In-Ceram® ALUMINA OPTIMIZER
VITA In-Ceram® SPINELL OPTIMIZER
VITA In-Ceram® ZIRCONIA OPTIMIZER
VITA In-Ceram® ALUMINA GLASS POWDER
VITA In-Ceram® SPINELL GLASS POWDER
VITA In-Ceram® ZIRCONIA GLASS POWDER
VITADUR® ALPHA
VITA**VM®7**

The following product requires hazard identification:

VITA In-Ceram® testing liquid, 6 ml

flammable

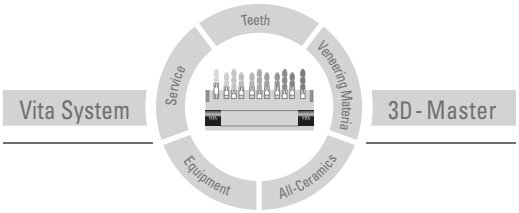
Please refer to the safety data sheet for more detailed information.

These directions for use were prepared with the support of

Dental-Design Giordano Lombardi, Zurich, Switzerland
Dr. Alessandro Devigus, Bülach, Switzerland
Dentallabor Vanik Kaufmann-Jinoian, Liestal, Switzerland
Dr. Andres Baltzer, Rheinfelden, Switzerland
and Dr. Andreas Kurbad, Viersen, Germany

With the unique VITA SYSTEM 3D-MASTER all natural tooth shades are systematically determined and completely reproduced.

The VITA VM 7 veneering material is available in the VITA SYSTEM 3D-MASTER shades. Shade compatibility with all VITA 3D-MASTER® materials is ensured.



Please note: Our products should be used according to the working instructions. We cannot be held liable for damages resulting from incorrect handling or usage. The user is furthermore obliged to check the product before use with regard to its suitability for the intended area of applications. We cannot accept any liability if the product is used in conjunction with porcelains and equipment from other manufacturers which are not compatible or not authorized for use with our product. Furthermore, our liability for the correctness of this information is independent of the legal ground and, in as far as legally permissible, is limited to the invoiced value of the goods supplied excluding turnover tax. In particular, as far as legally permissible, we do not assume any liability for profit loss, for indirect damages, for consequential damages or for claims of third parties against the purchaser. Claims for damages based on fault liability (culpa in contrahendo, breach of contract, unlawful acts, etc.) can only be made in the case of intent or gross negligence.
Date of issue of these directions for use: 11-06
After the publication of these directions for use any previous versions become obsolete.

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