IPS e.max®

ZirCAD Labside
Instructions for Use

All ceramic,
all you need.

ivoclar vivadent®
passion vision innovation

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IPS e.max® system

Given its versatility, its clinical long-term success and its wide range of indications, the IPS e.max® system is the most successful and most widely used all-ceramic system in the world.

It consists of a reliable lithium disilicate glass-ceramic (IPS e.max Press and CAD), an innovative zirconium oxide ceramic (IPS e.max ZirCAD) and a coordinated veneering ceramic (IPS e.max Ceram). The press-on ceramic IPS e.max ZirPress supplements the versatile system.

With the highly esthetic, high-strength IPS e.max materials, all indications for fixed restorations, ranging from thin veneers to multi-unit bridges, can be realized. Hybrid restorations are also possible.

The coordinated shade concept within the system and the individual products enable flexible working procedures from the shade determination up to the material selection.
The ideal restoration shade is optimally reproduced by means of the IPS e.max Shade Navigation App. It facilitates the material selection, leads to results that feature optimum shade match and thus provides efficiency and reliability.

IPS e.max is the comprehensive high-quality all-ceramic system for all indications, esthetic requirements and patient cases: it is **all ceramic, all you need**.

IPS e.max® ZirCAD

IPS e.max® ZirCAD is the impressive zirconium oxide to fulfil your requirements. It unites natural esthetics with mechanical resilience to an outstanding degree. With a perfect balance between thin wall thicknesses and optimal translucency, tooth substance-preserving and natural-looking restorations can be produced.

The comprehensive portfolio provides modern laboratories with versatility and flexibility and therefore allows freedom of individuality and high quality to be achieved.

IPS e.max® ZirCAD Prime

The revolutionary material ensures exceptional quality and esthetics. IPS e.max ZirCAD Prime is distinguished by a combination of two raw materials (3Y-TZP and 5Y-TZP) together with the new innovative manufacturing technology named Gradient Technology.
Gradient Technology is a new manufacturing technology which combines a unique refinement of raw materials with innovative filling technology and high-quality manufacturing.

IPS e.max ZirCAD Prime is characterized by outstanding properties in just one material, making it the "one disc solution":
– **High-end esthetics**
– **All indications** from the single crown to a multi-unit bridge
– **All processing techniques** (staining, cut-back, veneering and infiltration techniques).

Discs and blocks

	Polychromatic	
	IPS e.max ZirCAD Prime	**IPS e.max ZirCAD MT Multi**
Product		
Translucency	 Progressive shade and translucency gradation (medium and high translucency) from the dentin to the incisal	 Shade and translucency gradation (medium and high translucency) from the dentin to the incisal
Description	IPS e.max ZirCAD Prime is the highlight product in the portfolio. The unique composition of raw materials together with the newly developed manufacturing technology GT (Gradient Technology), give the disc high mechanical strength and a seamless gradation of shade and translucency. The extensive spectrum of shades and the high flexibility of IPS e.max ZirCAD Prime complete the range. With this material it is possible to produce highly esthetic, monolithic, partially and fully veneered crowns as well as multi-unit bridges.	IPS e.max ZirCAD MT Multi is ideal for restorations in the anterior and posterior region. The optimized blend of raw materials ensures of improved mechanical properties. The natural shade and translucency gradation gives monolithic crowns and bridges a real esthetic appearance without requiring characterization.
Flexural strength*	650 MPa (Incisal) 1 200 MPa (Dentin)	650 MPa (Incisal) 850 MPa (Dentin)
Fracture toughness	>5.0 MPa • $m^{1/2}$ (Dentin)	3.6 MPa • $m^{1/2}$ (Dentin)
Shades	BL1, BL2, BL3, BL4, A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4	BL1, A1, A2, A3, B1, B2, C2, D2
Disc thicknesses (Ø 98.5 mm)	16 mm 20 mm	16 mm 20 mm
Block sizes	–	C 17, B 45
Applicable processing techniques	– Staining technique – Brush infiltration with LT Colouring and Effect Liquids – Cut-back technique – Layering technique	– Staining technique – Brush infiltration with MT Colouring and Effect Liquids – Cut-back technique
Indications**	– Full-contour crowns – Full-contour 3-unit bridges – Full-contour 4 and multi-unit bridges with max. 2 pontics – Crown frameworks – 3-unit and multi-unit bridge frameworks with max. 2 pontics	– Full-contour crowns – Full-contour 3-unit bridges
Contraindications	– Bridge frameworks with more than 2 connected pontics – Patients with severely reduced residual dentition – Bruxism – Two or more connected end units – Any application not included within the indications – Temporary insertion	– Bridge framworks with more than 3 units – Patients with severely reduced residual dentition – Bruxism – Any application not included within the indications – Temporary insertion

* Typical average value

** In Canada, bridge and framework indications are limited to 6 units with a maximum of 2 connected pontics

Monochromatic		
IPS e.max ZirCAD MT	**IPS e.max ZirCAD LT**	**IPS e.max ZirCAD MO**
		
 Medium translucency	 Low translucency	 Medium opacity
IPS e.max ZirCAD MT is the creative product in the portfolio. Due to the optimized blend of raw materials, this material has good mechanical strength with excellent esthetics. The various processing options provide a high degree of flexibility. The A–D shade concept allows the efficient production of esthetic monolithic or layered restorations. The A-D Colouring Liquids and Effect Liquids ensure that a high level of individual design can be achieved before sintering.	IPS e.max ZirCAD LT is the allrounder in the portfolio. This material has a combination of high mechanical strength with good esthetics. IPS e.max ZirCAD LT allows the production of minimally invasive single-tooth restorations and strong multi-unit frameworks. It is possible to produce monolithic, infiltrated, partially or completely veneered restorations.	IPS e.max ZirCAD MO was produced for classical veneering techniques. Even discoloured preparations and metal substructures can be masked well thanks to the increased level of opacity. With this material it is possible to create individual, highly esthetic restorations.
850 MPa	1200 MPa	1150 MPa
3.6 MPa • $m^{1/2}$	5.1 MPa • $m^{1/2}$	5.1 MPa • $m^{1/2}$
BL, A1, A2, A3, B1, B2, C2, D2	0, 1, 2, 3, 4, sun, sun chroma, BL1, A1, A2, A3, B1, B2, C2, D2	0, 1, 2, 3, 4
14 mm 18 mm	10 mm, 12 mm, 14 mm, 16 mm, 18 mm, 20 mm, 25 mm	14 mm, 16 mm, 18 mm, 20 mm, 25 mm
–	C17, B45	C13, C15, C15L, B40, B40L, B55, B65, B65L-17, B85L-22
– Staining technique – Brush infiltration with MT Colouring and Effect Liquids – Cut-back technique	– Staining technique – Brush infiltration with LT Colouring and Effect Liquids – Cut-back technique – Layering technique	– Layering technique – Press-on technique – CAD-on technique
– Full-contour crowns – Full-contour 3-unit bridges	– Full-contour crowns – Full-contour 3-unit bridges – Full-contour 4 and multi-unit bridges with max. 2 pontics – Crown frameworks – 3-unit and multi-unit bridge frameworks with max. 2 pontics	– Crown frameworks – 3-unit and multi-unit bridge frameworks with max. 2 pontics
– Bridge framworks with more than 3 units – Patients with severely reduced residual dentition – Bruxism – Any application not included within the indications – Temporary insertion	– Bridge frameworks with more than 2 connected pontics – Patients with severely reduced residual dentition – Bruxism – Two or more connected end units – Any application not included within the indications – Temporary insertion	– Bridge frameworks with more than 2 connected pontics – Patients with severely reduced residual dentition – Bruxism – Two or more connected end units – Any application not included within the indications – Temporary insertion

Additional processing restrictions

Failure to observe the following restrictions may compromise the results achieved with IPS e.max ZirCAD:
– Failure to observe the necessary minimum wall thicknesses and connector dimensions
– Milling the discs and blocks in a non-compatible CAD/CAM system
– Sintering in a non-compatible high-temperature furnace

Side effects / warnings

If patients are known to be allergic to any of the ingredients, IPS e.max ZirCAD restorations should not be used.
The processing of IPS e.max ZirCAD discs and blocks produces dust which may irritate the skin and eyes and which may result in lung damage. Make sure that the suction equipment of your milling machine and at your workplace works flawlessly. Do not inhale grinding dust during finishing and wear a dust mask (particle class FFP2) as well as protective goggles.
Observe the information in the Safety Data Sheet (SDS).

General working guidelines

IPS e.max ZirCAD discs and blocks are delivered in their pre-sintered state. In this state, the material is easy to process, but does not yet have the known qualities, which it has as a finished restoration.
Therefore, careful handling is required.

Please check the delivery immediately for:
– Integrity of the package
– Integrity of the product (no disruptions, cracks or shade irregularities must be noticeable).
– The presence of the manufacturer's name, Ivoclar Vivadent, on the packaging as well as the presence of the CE marking.

IPS e.max ZirCAD is best stored…
– in the original packaging
– in a dry place.

When handling the IPS e.max ZirCAD discs and blocks, make sure that they...
– are not exposed to any blows or vibrations.
– are not touched with wet hands.
– only come into contact with liquids that have been approved for the product.
  Tap water, adhesives or pens etc., for example, are unsuitable.
– are not contaminated with foreign particles (e.g. glass-ceramic dusts, metal grinding dust).

Safety information

Carefully read these Instructions for Use before you remove the zirconium oxide discs or blocks from the packaging. They contain important information regarding processing, which serve your safety and that of your patients. If not all the points in these Instructions for Use are observed, IPS e.max ZirCAD discs and blocks must not be used for the fabrication of dental restorations.

Composition

Material / Product	IPS e.max ZirCAD Prime	IPS e.max ZirCAD MT Multi	IPS e.max ZirCAD MT	IPS e.max ZirCAD LT	IPS e.max ZirCAD MO
Zirconium oxide (ZrO_2)	88.0 – 95.5 %	86.0 – 93.5 %	86.0 – 93.5 %	88.0 – 95.5 %	88.0 – 95.5 %
Yttrium oxide (Y_2O_3)	> 4.5 % – ≤ 7.0 %	> 6.5 % – ≤ 8.0 %	> 6.5 % – ≤ 8.0 %	> 4.5 % – ≤ 6.0 %	> 4.5 % – ≤ 6.0 %
Hafnium oxide (HfO_2)	≤ 5.0 %	≤ 5.0 %	≤ 5.0 %	≤ 5.0 %	≤ 5.0 %
Aluminium oxide (Al_2O_3)	≤ 1.0 %	≤ 1.0 %	≤ 1.0 %	≤ 1.0 %	≤ 1.0 %
Other oxides	≤ 1.5 %	≤ 1.0 %	≤ 1.0 %	≤ 1.0 %	≤ 1.0 %

Characteristics

	Specifi-cations	Typical average value	Specifi-cations	Typical average value	Specifi-cations	Typical average value	Specifi-cations	Typical average value	Specifi-cations	Typical average value
CTE (25–500°C) [10^{-6}/K]	10.5 ± 0.5	–	10.4 ± 0.5	–	10.4 ± 0.5	–	10.5 ± 0.5	–	10.5 ± 0.5	–
Flexural strength [MPa]	≥ 900	1200	≥ 700	850	≥ 700	850	≥ 900	1 200	≥ 900	1 150
Chemical solubility [µg/cm²]	< 100	–	< 100	–	< 100	–	< 100	–	< 100	–
Type / class (ISO 6872:2015)	Type II / class 5		Type II / class 4		Type II / class 4		Type II / class 5		Type II / class 5	

Colouring Liquids

	IPS e.max ZirCAD MT Colouring Liquid	IPS e.max ZirCAD LT Colouring Liquid	IPS e.max ZirCAD Colouring Liquid Indicator	IPS e.max ZirCAD Colouring Liquid Diluter
Product				
Description	Infiltration liquids for brush infiltration of IPS e.max ZirCAD MT/MT Multi restorations	Infiltration liquids for brush infiltration of IPS e.max ZirCAD LT/Prime restorations	Marking colours to shade IPS e.max ZirCAD MT/LT Colouring Liquids	Liquid to dilute IPS e.max ZirCAD MT/LT Colouring Liquids
Shades	16 A-D Colouring Liquids 5 Effect Liquids (blue, violet, grey, orange, brown)	16 A-D Colouring Liquids 5 Effect Liquids (blue, violet, grey, orange, brown)	3 Marking colours (red, blue, yellow)	For diluting IPS e.max ZirCAD MT and LT Colouring Liquids.
Indications	IPS e.max ZirCAD MT Colouring Liquids are ready-for-use, aqueous metallic salt solutions for colouring unsintered restorations made from IPS e.max ZirCAD MT/MT Multi using the brush infiltration technique.	IPS e.max ZirCAD LT Colouring Liquids are ready-for-use, aqueous metallic salt solutions for colouring unsintered restorations made from IPS e.max ZirCAD LT/Prime using the brush infiltration technique.	IPS e.max ZirCAD Colouring Liquid Indicators are for temporary colouration of IPS e.max ZirCAD Colouring Liquids.	For diluting IPS e.max ZirCAD MT and LT Colouring Liquids.
Contraindications/ application restrictions	Any application not included within the indications.	Any application not included within the indications.	IPS e.max ZirCAD Colouring Liquid Indicators mixed with IPS e.max ZirCAD Colouring Liquids are not permanent. Therefore, IPS e.max ZirCAD Colouring Liquid Indicators should only be added to the colouring liquids directly before use. They must not be applied to ZrO_2 in a pure state.	Any application not included within the indications.

General working guidelines

Please check the delivery immediately for:

– Integrity of the package
– Integrity of the products (clear liquid without cloudiness or sedimentation)
– The presence of the manufacturer's name, Ivoclar Vivadent, on the packaging as well as the presence of the CE marking.

IPS e.max ZirCAD Colouring Liquids are best stored…

– in the original packaging
– at temperatures ranging from 2°C to 28°C
– protected against direct sunlight

When using IPS e.max ZirCAD Colouring Liquids, the following points should be observed:

– The restoration must be free from dust and grinding residue.
– The colouring liquids may only come into contact with liquids specified for this product. For example, tap water or liquids from other manufacturers are unsuitable.
– The colouring liquids must not become contaminated.
– If the liquid is cloudy, the colouring liquid solution must no longer be used. Cloudiness (precipitation) or sedimentation within the staining solution is increased by contamination.
– Do not refill into or store colouring liquids in metal containers. Contact with metal must be avoided in general.
– IPS e.max ZirCAD Colouring Liquids must be applied to the framework surface using a metal-free clean brush.

Warnings

– When processing the liquids please use the same increased care and hygiene applicable when handling any other chemicals.
– Avoid direct contact with skin, in particular if there is a known allergy to any of the constituents.
After skin contact, wash thoroughly with water. Should the product come into contact with the eye, hold the eyelid open and wash the eye thoroughly with plenty of water and seek medical attention.
– It is recommended to wear gloves, safety goggles and suitable protective clothing.
– IPS e.max ZirCAD Colouring Liquids can stain clothing and other surfaces.

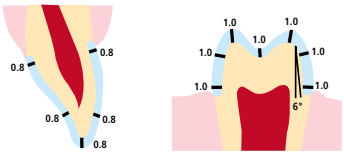
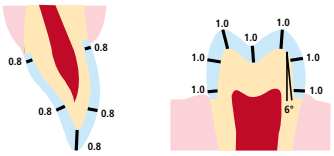
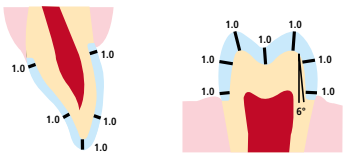
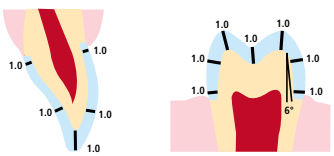
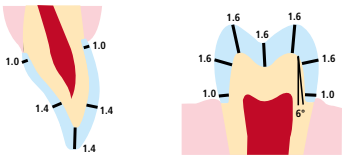
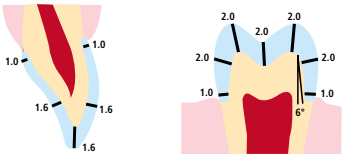
Practical Procedure

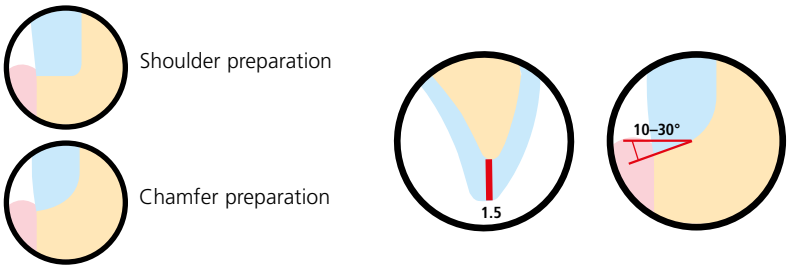
Preparation guidelines

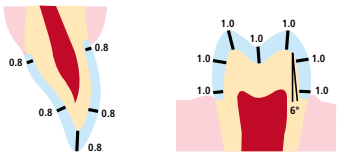
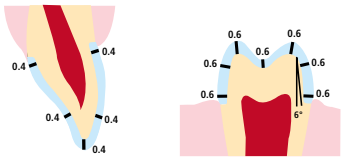
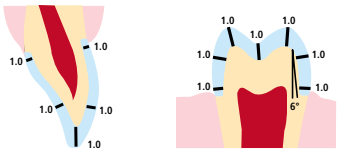
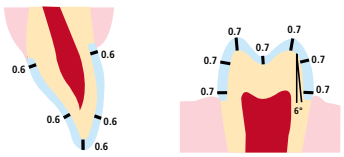
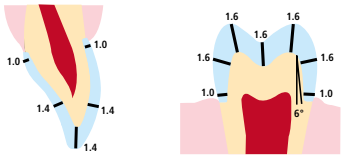
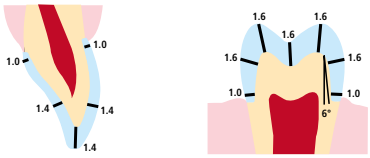
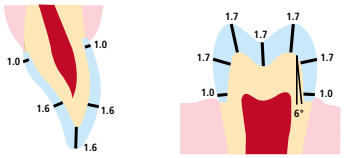
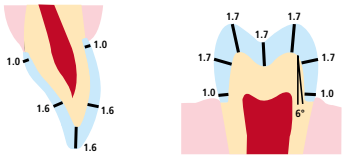
Before you begin with the actual construction, please ensure that the preparation is adequate for a ceramic restoration. Successful results can only be achieved with IPS e.max ZirCAD if the guidelines and minimum layer thicknesses are strictly observed.

Basic preparation guidelines

- Do not prepare any angles and edges
- The ideal preparation is a shoulder preparation with rounded inner edges or a chamfer preparation at an angle of approx. 10°–30°. Width of the shoulder / chamfer, at least 1.0 mm.
- For conventional or self-adhesive cementation, retentive surfaces must be created (preparation height at least 4 mm).
- Preparation angles: 4° – 8° for conventional and self-adhesive cementation, > 6° for adhesive cementation.
- The indicated dimensions reflect the minimum thicknesses for IPS e.max ZirCAD restorations.
- The radius of the edges of the prepared tooth, particularly in anterior teeth, must be at least as large as the radius of the smallest milling instrument to ensure optimum processing by the CAD/CAM unit.
- In monolithic or fully anatomical restorations, the preparation guidelines refer to the minimum material thicknesses

	Polychromatic	
	IPS e.max ZirCAD Prime	**IPS e.max ZirCAD MT Multi**
Product		
Preparation guidelines for monolithic restorations		
 Monolithic anterior and posterior crowns		
 Monolithic bridge abutment crowns in the anterior and posterior region		
Preparation guidelines for cut-back restorations		
	When using the cut-back technique, ...	
Preparation guidelines for veneered restorations		
 Anterior and posterior crown frameworks		–
 Bridge abutment frameworks in the anterior and posterior region		–



Monochromatic		
IPS e.max ZirCAD MT	**IPS e.max ZirCAD LT**	**IPS e.max ZirCAD MO**
		
		–
		–
... ensure that the tooth structure is reduced by another 1.0 mm in the area of the intended veneer.		
–		
–		

Design criteria

The design is an important key element of success for esthetic, durable and clinically successful all-ceramic restorations. Therefore, the following basic rules should be observed:

Framework design

Strive for an anatomical shape when designing frameworks. The design should support the veneering ceramic in the area of the cusps so that they can be built up with an even layer thickness of 1 – 2 mm. The Instructions for Use of the respective layering ceramic have to be observed.

Minimum layer thicknesses and connector dimensions

To achieve clinical success, the following minimum wall thicknesses and connector dimensions should not be underscored when processing IPS e.max ZirCAD discs:

IPS e.max ZirCAD Prime	Indication	Anterior region		Posterior region		Design type
		Minimum layer thickness in mm	Connector dimensions** in mm²	Minimum layer thickness in mm	Connector dimensions** in mm²	
	**Fully or partially anatomical restorations**					
	Crown	0.8	–	1.0	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
	Three-unit bridge	1.0	9	1.0	9	
	Bridge with 4 or more units and max. 2 pontics***	1.0	9	1.0	12*	
	Cantilever bridges with one pontic	1.0	12*	1.0	12*	
	Frameworks, prerequisite: complete positioning in the dentin area (see page 17)					
	Crown	0.4	–	0.6	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
	Three-unit bridge	0.6	9	0.6	9	
	Bridge with 4 or more units and max. 2 pontics***	0.6	9	1.0	12*	
	Cantilever bridges with one pontic	1.0	12*	1.0	12*	

* Height: 4 mm, width: 3 mm
** The specified minimum connector cross-section must be positioned in the dentin area of the disc.
*** In Canada, bridge indications are limited to 6 units with a maximum of 2 connected pontics

IPS e.max ZirCAD MT Multi	Indication	Anterior region		Posterior region		Design type
		Minimum layer thickness in mm	Connector dimensions** in mm²	Minimum layer thickness in mm	Connector dimensions** in mm²	
	Crown	0.8	–	1.0	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
	Three-unit bridge	1.0	12*	1.0	16	

* Height: 4 mm, width: 3 mm
** The specified minimum connector cross-section must be positioned in the dentin area of the disc.

IPS e.max ZirCAD MT	Indication	Anterior region		Posterior region		Design type
		Minimum layer thickness in mm	Connector dimensions in mm²	Minimum layer thickness in mm	Connector dimensions in mm²	
	Crown	0.8	–	1.0	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
	Three-unit bridge	1.0	12*	1.0	16	

* Height: 4 mm, width: 3 mm

IPS e.max ZirCAD LT	Indication	Anterior region		Posterior region		Design type
		Minimum layer thickness in mm	Connector dimensions in mm²	Minimum layer thickness in mm	Connector dimensions in mm²	
	Crown	0.4	–	0.6	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
	Three-unit bridge	0.6	7	0.6	9	
	Bridge with 4 or more units and max. 2 pontics**	0.6	9	0.7	12*	
	Cantilever bridge with one pontic	0.7	12*	0.7	12*	

* Height: 4 mm, width: 3 mm
** In Canada, bridge indications are limited to 6 units with a maximum of 2 connected pontics

IPS e.max ZirCAD MO	Indication	Anterior region		Posterior region		Design type
		Minimum layer thickness in mm	Connector dimensions in mm²	Minimum layer thickness in mm	Connector dimensions in mm²	
	Crown	0.4	–	0.6	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
	Three-unit bridge	0.6	7	0.6	9	
	Bridge with 4 or more units and max. 2 pontics**	0.6	9	0.7	12*	
	Cantilever bridge with one pontic	0.7	12*	0.7	12*	

* Height: 4 mm, width: 3 mm
** In Canada, bridge indications are limited to 6 units with a maximum of 2 connected pontics

Failure to observe the stipulated framework design criteria and minimum thicknesses may result in clinical failures, such as cracks, delamination, and fracture of the restoration.

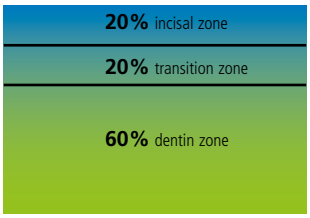
Connector dimensions

- Aim for the largest possible dimensions when designing the connectors.
- The height of the connector is more important for the stability than the width. Doubling the width only results in double the stability, while doubling the height results in up to four times the stability.
- The greater the distance between the abutment teeth, the higher the mechanical stress on the construction and the exerted masticatory forces are going to be. Therefore, IPS e.max ZirCAD MT / MT Multi must not be used for bridge constructions with more than one pontic, while bridge constructions made of IPS e.max ZirCAD Prime / LT / MO must not have more than two pontics.
- For long-span bridge constructions (Prime, LT, MO) in the anterior and posterior region, dimensions of 20 mm^2 are recommended for the connector between two bridge units, if there is enough space. The height of the connector should be larger than the width (e.g. height: 5 mm, width: 4 mm).
- In the case of restorations made of IPS e.max ZirCAD Prime/MT Multi, the specified minimum connector cross-section areas must be positioned in the dentin area of the disc.

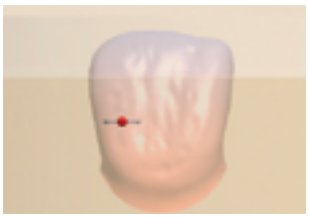
Positioning guidelines

Positioning of restorations made from IPS e.max ZirCAD MT Multi in the disc (CAD software)
In the CAD software, the dentin/incisal shade distribution in the IPS e.max ZirCAD MT Multi is shown according to the integrated shade gradation in the restoration and is indicated by a reference line. This reference line acts as a positioning aid and shows the exact center of the transition zone. Depending on the position of the restoration in the disc – further up or further down – the exact amount of incisal area can be determined. For single-tooth restorations, it is advisable to place the restoration about 1 mm below the top edge of the disc, in order to ensure of a clearly visible incisal area. Bridge restorations must be placed in such a way that the greater part of the connector lies underneath the reference line or within the dentin area.

Positioning examples:

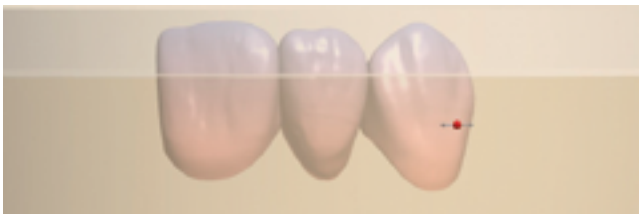


The dentin/incisal distribution in the unsintered IPS e.max ZirCAD MT Multi disc



Positioning a full-contour crown

The height positioning in the disc determines the amount of incisal area in the restoration.



Positioning a full-contour bridge in the CAD software

Make sure that the specified minimum connector cross-section is positioned in the dentin area of the disc.

Positioning of restorations made from IPS e.max ZirCAD Prime in the disc (CAM software)

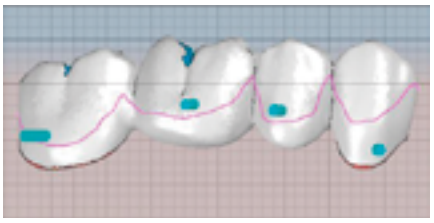
All thicknesses of IPS e.max ZirCAD Prime discs have the same incisal and transition range. The incisal zone is 3 mm, the transition zone is 4 mm. Only the dentin zone varies between 9 and 13 mm depending on the thickness of the disc. The three zones are visualized in the CAM software via two reference lines. The amount of incisal area within the restoration can be precisely adjusted according to the height positioning of the restoration. Single-tooth restorations can be placed higher up or down depending on the required incisal content. Full-contour or partially anatomically reduced bridge restorations must be placed in such a way that the specified minimum connector cross-section lies within the dentin area, i.e. below the lower reference line. Crown and bridge frameworks must be placed completely in the dentin area.

Positioning examples:

The dentin/incisal distribution in the unsintered IPS e.max ZirCAD Prime disc

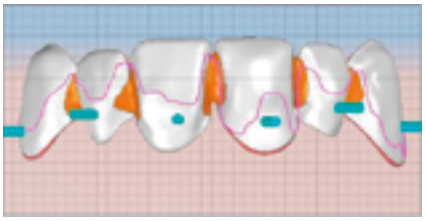
Positioning a full-contour crown

The height positioning in the disc determines the amount of incisal area is in the restoration.



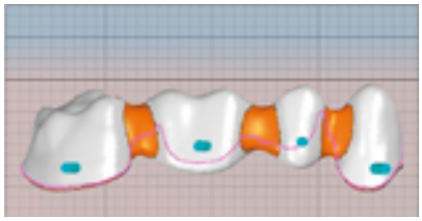
Positioning a full-contour bridge in the CAM software

Make sure that the specified minimum connector cross-section is positioned in the dentin area of the disc.



Positioning a full-contour bridge in the CAM software

Make sure that the specified minimum connector cross-section is positioned in the dentin area of the disc.



Positioning a full-contour bridge in the CAM software

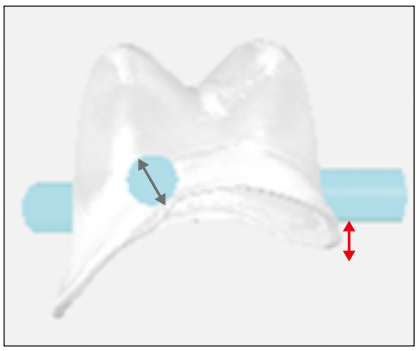
Crown and bridge frameworks must be placed completely in the dentin area.

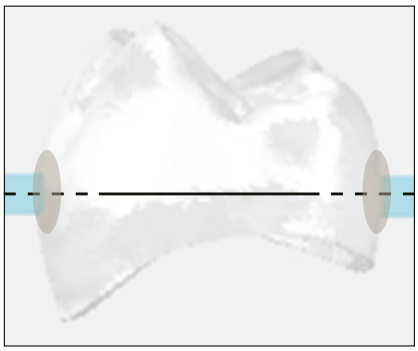
CAM guidelines

General rules for attaching holding bars

- Holding bars must always be attached horizontally.
- The diameter of the holding bar must be at least 2.0 mm.
- The holding bars must be attached at least 1.0 mm above the preparation edge.
- In the case of multi-unit restorations, the holding bars must be attached to the restoration in an oral and a vestibular direction.

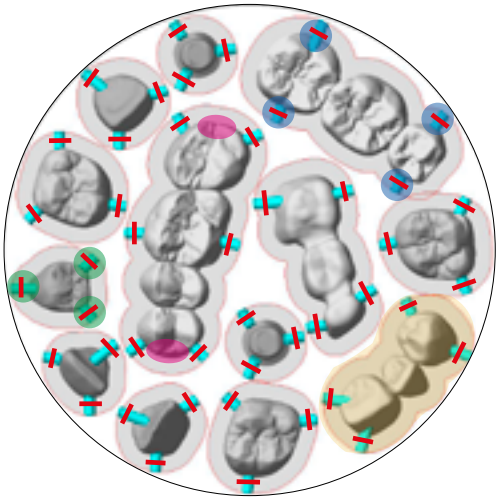
  In the case of full-contour restorations or frameworks with a reduced anatomical shape, the holding bars should be placed at the anatomical equator of the tooth so that no undercuts are created and the restoration can be easily processed from above and below.





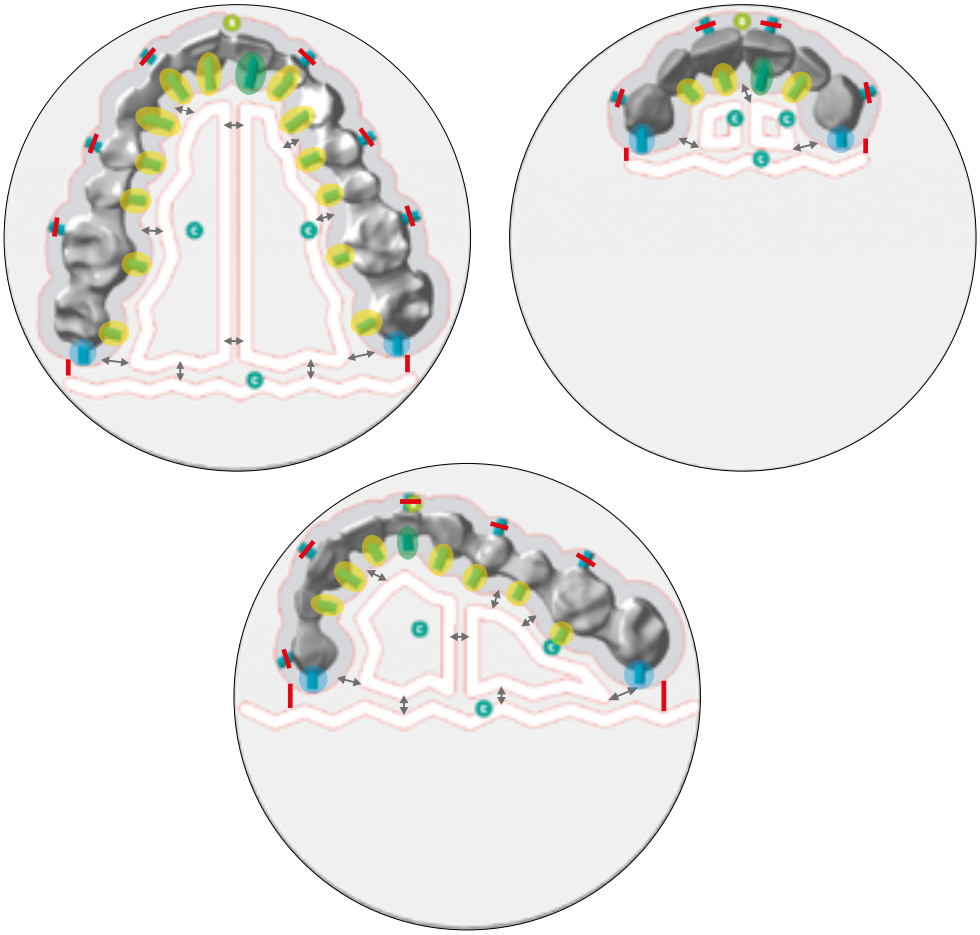
Guidelines for restorations without sintering support structures (≤ 5-unit bridges)

- 3 holding bars must be attached to each single-tooth restoration.
- In multi-unit restorations, end units must have 2 holding bars attached (oral and vestibular). Attach holding bars to other units as required.
- Large milling pieces are to be positioned preferably with the tooth arch parallel to the disc margin.
- The holding bars should not be placed in the interdental area.
- Separate cut-off points before sintering. Smooth out the holding bars marked in this way before sintering.



Guidelines for restorations with sintering support structures (> 5-unit bridges with pronounced curvature)

- Position a holding bar in the extension of the centre strut of the sinter frame and attach to the restoration. Do not place the holding bar in the interdental area.
- Connect all the other units with the sinter frame using a holding bar.
- Provide end units with a holding bar vertical to the sinter base.
- Design the sinter frame in an even thickness (2–5 mm).
- Separate cut-off points before sintering. The marked holding bars must be trimmed before sintering.



Overview working steps

Disc selection

The time-consuming search for a suitable disc is over thanks to the IPS e.max Shade Navigation App. The app takes all the important influential factors into account and thus enables a very precise translucency and shade recommendation. Simply enter the 5 influencing factors to find the suitable solution.

IPS e.max®
Shade
Navigation
App

5 steps
to finding
the correct
shade and
translucency

For more information on function and procedure, please visit **www.ipsemax.com/sna** or go directly to the app.

The app is free for download on Android or iOS Smartphones and tablets from the Google Play Store or Apple App Store.

GET IT ON Google play

Download on the App Store

CAD/CAM processing

IPS e.max ZirCAD must be processed with an authorized CAD/CAM system.
Additional information is available on the Internet from www.ivoclarvivadent.com.

General notes for positioning IPS e.max ZirCAD Prime/MT Multi discs in the milling machine
The discs have to be positioned in the milling machine in such a way that the imprinted side is oriented towards the incisal/occlusal area of the restoration. The imprinted side therefore corresponds with the incisal/occusal area.

General notes for positioning a 12-mm disc in the milling machine
Discs with a thickness of 12 mm only feature one circumferential notch. They have to be positioned in the milling machine in such a way that the circumferential notch is pointing upwards.

General notes for fixing the IPS e.max ZirCAD discs into the disc holder
When fixing the disc into the holder, care must be taken to ensure that the circumferential notch is absolutely clean and that the screws are tightened evenly.

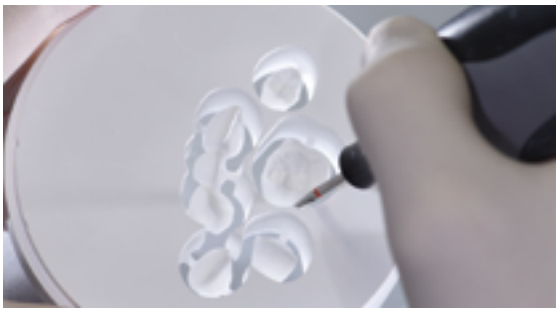
Separating and finishing

The correct choice of grinding instruments is imperative for finishing the restorations. This is true for both sintered and non-sintered objects. The use of unsuitable milling and grinding instruments may lead to local overheating of the material or to damage.

Wear protective gloves before separating the milled restorations. This is particularly recommended for restorations intended to be infiltrated with IPS e.max ZirCAD Colouring Liquids in a further processing step. Contaminated hands may leave a grease film or contaminations on the restorations, which may lead to an undesired shade result.

The following aspects should be taken into consideration when separating the restorations:

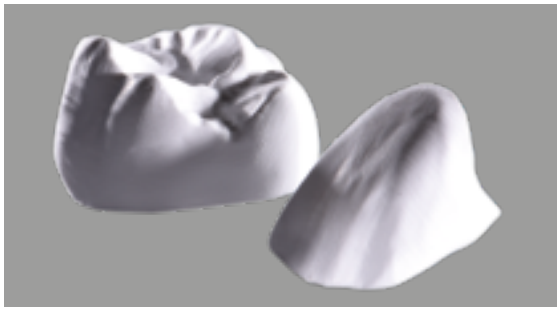
- Non-sintered zirconium oxide restorations are susceptible to damage and fractures. This fact has to be kept in mind during the entire working procedure.
- Any post-processing should be carried out in the non-sintered state.
- In the non-sintered state, any contact with unsuitable liquids and liquids not approved for zirconium oxide (e.g. unpurified water and/or lubricant coolant) and/or contact media (e.g. occlusion spray) must be prevented.
- Use only light pressure for finishing.
- Do not, under any circumstances, post-separate bridge constructions with a separating disc. This may lead to predetermined breaking points in the area of the connectors and reduce the strength of the all-ceramic restoration.
- Rubber polishers should not be used as these condense the surface and cause contamination.
- Make sure that the minimum wall thicknesses of the restorations are maintained during finishing.



Fine tungsten carbide burs or diamond grinding instruments are recommended for separating the restorations. The holding bars have to be notched on one side before the restoration is completely separated.

Fine tungsten carbide burs or diamond grinding instruments are recommended to smooth out the attachment points of the holding bars. Rough tungsten carbide burs and/or grinding instruments are not suitable, as they may cause chipping, among other things.

Thoroughly clean the zirconium oxide dust with a soft brush and then blast it with oil-free compressed air.



Restorations after finishing.

- Clean the restoration thoroughly after finishing. To remove zirconium oxide dust, carefully clean it with a soft brush and then blast with oil-free compressed air.
- Adhering zirconium oxide dust may be sintered to the restoration and lead to fitting inaccuracies.
- The non-sintered restoration must not be cleaned in an ultrasonic bath or with the steam jet.
- The non-sintered restoration must not be blasted.

Brush infiltration

Required materials

IPS e.max ZirCAD MT Colouring Liquids

IPS e.max ZirCAD MT Colouring Liquids are available for the brush infiltration of IPS e.max ZirCAD MT/MT Multi discs.
Shades: 16 A–D, 5 Effect colours

IPS e.max ZirCAD LT Colouring Liquids

IPS e.max ZirCAD LT Colouring Liquids are available for the brush infiltration of IPS e.max ZirCAD LT/ Prime discs.
Shades 16 A–D, 5 Effect colours

IPS e.max ZirCAD Colouring Liquid Indicators

To visualize the colouring liquids, the indicator liquids IPS e.max ZirCAD Colouring Liquid Indicators are available.

IPS e.max ZirCAD Colouring Liquid brushes

Special ZirCAD Colouring Liquid brushes, which dispense liquid evenly, are available for the brush infiltration technique. They come in sizes 1, 3 and 5 according to the size of the restoration and area of application.

IPS e.max ZirCAD Colouring Liquid Jar

The resealable plastic jars are ideal for storing mixed IPS e.max ZirCAD Colouring Liquids. They protect the liquids from contamination, e.g. dust.

The following aspects should be taken into consideration with brush infiltration

– The restoration must be free from dust and grinding residue.
– Restorations produced via wet processing must be completely dried before infiltration.
– The colouring liquids must not be contaminated.
– The colouring liquids have to be sealed when not in use.
– If there is cloudiness or precipitation (e.g. sediments), the colouring liquids should no longer be used. Cloudiness or precipitation of the colouring liquids is promoted by contamination.
– Do not decant and/or store the colouring liquids in metal containers.
– Apply IPS e.max ZirCAD Colouring Liquids with a clean, metal-free brush on the restoration.
– Do not use IPS e.max ZirCAD Colouring Liquid Indicators in an unmixed state.
– IPS e.max ZirCAD Colouring Liquid Indicator colours are not stable for longer periods of time.
– Store mixed solutions in a sealed container and use them within 4 hours. After longer storage, the reproducibility of the tooth shade in the sintered state is no longer ensured.
– Infiltrated restorations must be completely dried before sintering.

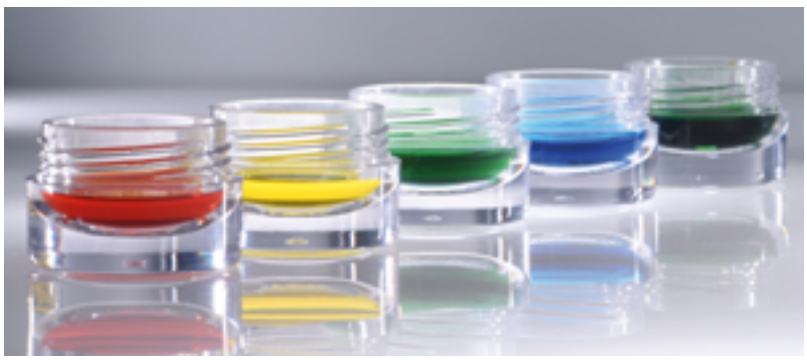
– It is advisable to wear protective gloves during the infiltration process. They help prevent skin irritation caused by the colouring liquids and the formation of a grease film on the restoration, which may compromise the infiltration of the colouring liquids.
– The IPS e.max ZirCAD MT Colouring Liquids and IPS e.max ZirCAD LT Colouring Liquids must not be mixed or combined. They may only be used on the intended zirconium oxide.
– The colouring liquids have been specially developed for the brush infiltration technique and must not be used for the dip-infiltration technique.

Mixing IPS e.max ZirCAD Colouring Liquids and IPS e.max ZirCAD Colouring Liquid Indicators

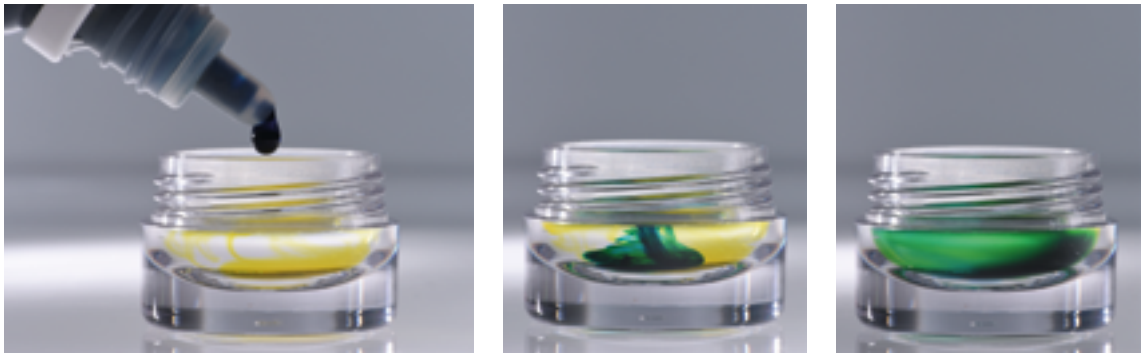
In order to visualize the colouring liquids during the application on the restoration, the colouring liquids are dyed with the IPS e.max ZirCAD Colouring Liquid Indicators (red, blue, yellow). For the dyeing of IPS e.max ZirCAD Colouring Liquids, it is recommended to follow the shade concept of the veneering ceramics. The red indicator liquid is recommended for the infiltration of the dentin area, the blue one for the incisal area. The IPS e.max ZirCAD Colouring Liquid Indicator yellow can be used for individual characterizations. Individual colours can be achieved by mixing the indicator colours. For example, blue and yellow produce a rich green colour. The IPS e.max ZirCAD Colouring Liquid jars are suitable for mixing the colouring liquids.

Ideal mixing ratio:
25 drops of IPS e.max ZirCAD Colouring Liquid with 1 – 2 drops IPS e.max ZirCAD Colouring Liquid Indicator

IPS e.max ZirCAD Colouring Liquid and
IPS e.max ZirCAD Colouring Liquid Indicator



IPS e.max ZirCAD Colouring Liquid Indicators



Example: Mixing the indicator colours (blue + yellow = green)

With higher concentrations of IPS e.max ZirCAD Colouring Liquid Indicators, the IPS e.max ZirCAD Colouring Liquids are more diluted and slightly lighter in colour.

BASIC infiltration

BASIC infiltration is used to colour the restorations in the A–D shades following the shade guide.

BASIC Infiltration example:

25 IPS e.max ZirCAD LT Colouring Liquids (A–D)  + **1** IPS e.max ZirCAD Colouring Liquid Indicator red  = red 

1

1x apply liquid evenly over the entire restoration using brush no. 5.

If a lighter incisal area is desired, infiltration may begin approximately 1 mm below the incisal edge.

2

Crown after the first infiltration step

3

1x apply liquid evenly over the dentin and cervical area, indicating the mamelons using brush no. 5.

4

1x application to the cervical area outside with brush no. 5

For lighter tooth shades, waiving the third infiltration step is recommended, as the restorations may turn out to be too intensively shaded.

5

1x application to the cervical area inside either with brush no. 1 or 3

6

1x application to the dentin area inside without the incisal or occlusal area, either with brush no. 1 or 3

7 Dry and sinter or continue with ADVANCED infiltration

ADVANCED infiltration

ADVANCED infiltration is used for the individual characterization and can be applied after BASIC infiltration.

For a better colour effect on the restoration, a short drying time is recommended between the BASIC and the ADVANCED infiltration, e.g. 10 minutes at 70°C.

The following Effect colours are available:

	IPS e.max ZirCAD MT/LT Colouring Liquid **brown**	IPS e.max ZirCAD MT/LT Colouring Liquid **orange**	IPS e.max ZirCAD MT/LT Colouring Liquid **violet**	IPS e.max ZirCAD MT/LT Colouring Liquid **grey**	IPS e.max ZirCAD MT/LT Colouring Liquid **blue**
The colour of the undiluted liquid after sintering					
Application examples	Characterization of fissures, cervical and inter-dental areas, e.g. to adapt the colour saturation and chroma in the cervical area	Characterization of fissures, cervical and inter-dental areas, e.g. to outline the mamelon structures	Individualization of the incisal or occlusal areas, e.g. for creating areas of absorption in the incisal and cervical third as well as proximally	Individualization of the incisal or occlusal areas, e.g. reducing brightness in the incisal area	Individualization of the incisal or occlusal areas, e.g. to enhance the bluish translucency effect in incisal flanks

It is advisable to dilute the Effect colours in a ratio of 1:1 with the IPS e.max ZirCAD Colouring Liquid Diluter, in order to reduce the intense colour effect of the Effect Liquids.

ADVANCED Infiltration example

25 IPS e.max ZirCAD LT Colouring Liquid grey

+

1x IPS e.max ZirCAD Colouring Liquid Indicator blue + yellow

= green

25 IPS e.max ZirCAD LT Colouring Liquid blue

+

2x IPS e.max ZirCAD Colouring Liquid Indicator blue

= blue

25 IPS e.max ZirCAD LT Colouring Liquid violet

+

2x IPS e.max ZirCAD Colouring Liquid Indicator blue

= blue

8

Natural appearance of depth in the incisal and marginal areas
1x with brush no. 1 or 3

9

Translucency effects with blue in the incisal area

1x with brush no. 1 or 3

10

Translucency effect with violet in the incisal and cervical areas
1x with brush no. 1 or 3

11 Drying and sintering

Cleaning the IPS e.max ZirCAD Colouring Liquid Brushes

– After every infiltration or before every shade change, the infiltration brushes should be cleaned to prevent the shade result from being affected by shade residue of the previous infiltration.
– Clean the brushes under running water or in a glass of water. Subsequently, blot the brushes with an absorbent cloth.



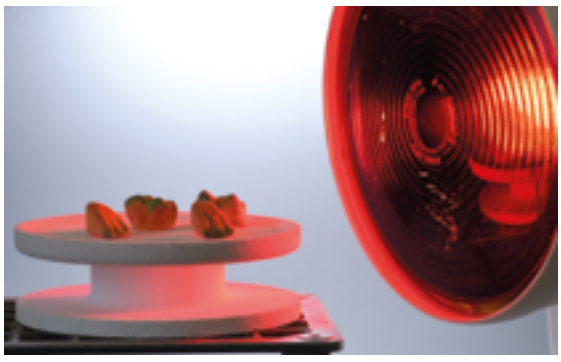
Infiltration of frameworks

Frameworks are infiltrated using the BASIC infiltration technique. As an option, the frameworks can be individualized using the ADVANCED infiltration technique.



Drying the infiltrated restorations

Infiltrated restorations must be completely dried before sintering. For drying, either an infrared lamp or a drying cabinet can be used. The drying time depends on the temperature and the object size. Low temperatures and large objects will delay the drying process. Drying at temperatures over 140°C/284 °F can cause defects. See the table for recommended drying times.



	Temperature 70°C/158°F	Temperature up to 140°C/284°F
Single-tooth restorations	≥ 15 min	5–10 min
Restorations with 2-4 units	≥ 40 min	≥ 25 min
Restorations with 5 or more units	≥ 50 min	≥ 25 min

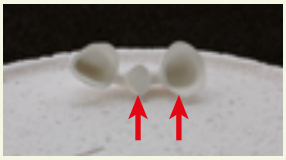
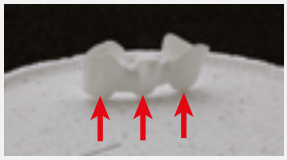
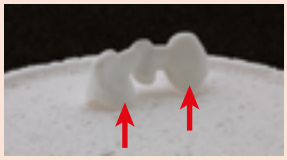
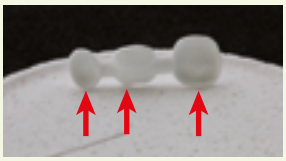
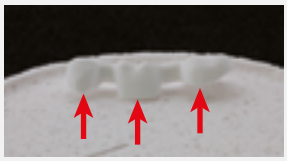
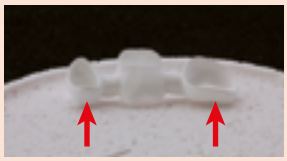
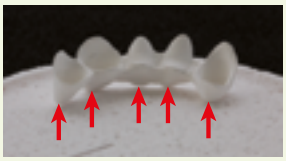
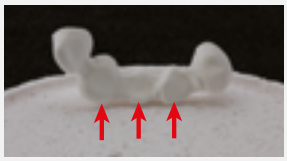
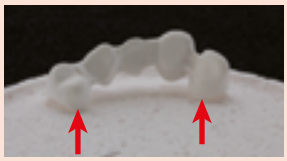
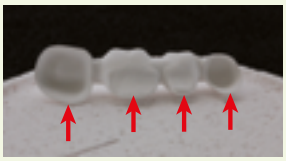
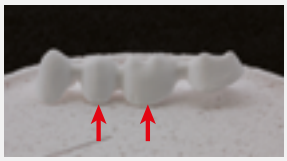
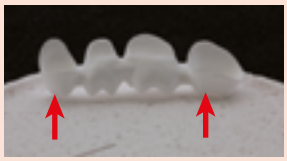
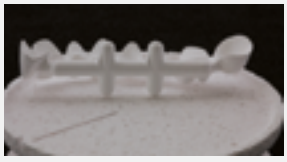
Sintering

Sintering is one of the most important processes during the fabrication of IPS e.max ZirCAD restorations. During this process, the porous white body is turned into a densely sintered restoration by the effect of high temperatures. Only this fabrication step creates the final properties, such as the high strength and translucency. To achieve optimum mechanical and optical properties, it is absolutely mandatory that the defined sintering temperatures and times are observed at all times. Too low or too high sintering temperatures and/or too short or too long sintering times negatively affect the above properties. The sintering programs of the Programat S1/S1 1600 sinter furnace from Ivoclar Vivadent are ideally coordinated with the optical and mechanical properties of IPS e.max ZirCAD restorations and lead to the best possible results.

– Restorations infiltrated with Colouring Liquids must be completely dry to prevent damage to the furnace and/or the object.
– In principle, sintering beads are not recommended for the Programat S1/S1 1600 sinter furnace from Ivoclar Vivadent.
– The restorations must not come into contact with each other during sintering.
– The correct program selection must be observed.
– Always keep the sintering accessories clean and free of dust so that no contamination of the sintered restorations occurs.
– Make sure that the appropriate sintering support structure is selected for the respective furnace system.

In general, the following aspects should be taken into consideration when sintering in the Programat S1/S1 1600:

– The sinter tray can be fully loaded with restorations
– Simultaneous sintering of crown and bridge frameworks as well as restorations with a sintering support structure is possible.
– For sintering without distortions, the restorations must be evenly supported.
– Bridge constructions should not be exclusively supported by the final abutment crowns. Preferably provide support to the pontics. The abutment crowns do not necessarily have to come into contact with the sinter tray.
– Ideally, bridge constructions should be positioned in concentric circles on the sinter tray. **Note:** Do not place any restorations over the groove in the sinter tray!
– Place the loaded sinter tray in the intended position in the centre of the Programat S1/S1 1600 using the sinter fork.

	✓ correct	o.k.	incorrect
Single-tooth anterior restorations	 Place the restorations on their labial surface.	 Place the restorations on their oral surface.	 Do **not** place the restorations on the crown margins.
Single-tooth posterior restorations	 Place the restorations on their occlusal surface.		 Do **not** place the restorations on the crown margins.
Three-unit anterior restorations	 Place the restorations on their labial surface and provide support to the pontic. If the restoration "tilts", select an alternative position.	 Position the restorations on the incisal edges. The pontic must also rest on the sinter tray.	 Do **not** support the restorations exclusively at the marginal edges.
Three-unit posterior restorations	 Place the restorations on the buccal or oral surfaces depending on the curvature. Abutment crowns do not have to come into contact with the sinter tray. The pontic must be supported.	 Do **not** support the restorations exclusively at the crown margins. The pontic must be supported on the basal side.	 If the pontic does not support the restoration, the restoration must **not** be positioned on the occlusal surface.
Anterior restorations with 4 units and more	 Place the restorations on their incisal surfaces. Make sure the pontics are supported.	 Depending on the curvature, the framework can be placed on its labial surfaces. All the pontics must come into contact with the sinter tray. Abutment crowns do not have to come into contact with the sinter tray.	 Do not support the restorations exclusively at the marginal edges on the sinter tray.
Posterior restorations with 4 units and more	 Depending on the curvature, the restorations can be placed on its buccal surfaces. All the pontics must come into contact with the sinter tray. Abutment crowns do not have to be supported on the sinter tray.	 Do not support the restorations exclusively at the crown margins. The pontics must be supported on the basal side.	 If the pontics do not support the restoration, the restoration must not be positioned on the occlusal surface.
Restoration with sintering support structure	 Place the restoration upright on the sinter tray with the sintering support structures resting on the tray.	 The restoration can also be placed on the sintering support structure and/or the incisal or occlusal surfaces of the pontics. Align the sintering support structure with the centre of the sinter tray.	 Do not support the restoration at the crown margins.

↑ Points of contact of the restoration with the sinter tray.

Processing after sintering

After sintering, the restorations can be finished using suitable instruments. If diamond grinding instruments are used for finishing the restoration, water cooling is required to prevent local overheating. Observe the recommendations for grinding instruments suitable for zirconium oxide from Ivoclar Vivadent.

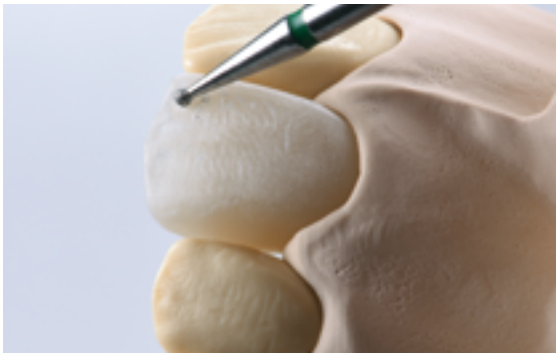
Please observe the Ivoclar Vivadent flow chart "Recommended grinding tools for IPS e.max zirconium oxide".

The following aspects should be taken into consideration:

- Finishing of sintered IPS e.max ZirCAD restorations should be kept to a minimum.
- The restoration should only be mechanically processed if it is absolutely necessary.
- Place IPS e.max ZirCAD restorations on the model, check fit and make slight adjustments, if necessary.
- Check marginal areas and finish, if necessary.
- Use only light pressure and low speed to adjust the restoration.
- Prevent sharp edges when finishing frameworks.
- Bridge connectors must not be post-separated with a separating disc.
- We recommend using a rubber polisher to smooth the basal side of the bridge connectors.
- The material-specific minimum wall thicknesses and connector dimensions must not be underscored during processing.
- Use only immaculate grinding instruments.
- Check the restoration for defects and cracks before and after finishing.
- Remove zirconium oxide dust sintered to the restoration with suitable grinding instruments. As an alternative, zirconium oxide dust sintered to the restoration may be removed by blasting with a jet medium with a grain size of 50 – 110 µm at a maximum pressure of 1.5 bar.
- Clean frameworks under running water or with the steam jet and dry before veneering.

Densely sintered, cooled restorations.

Creating a natural shape and surface structure...

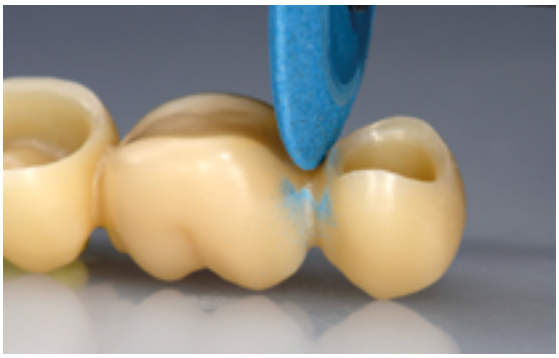


… i.e. growth lines and convex/concave spots – with fine diamond grinding instruments.

Finishing the functional...

…contact and…

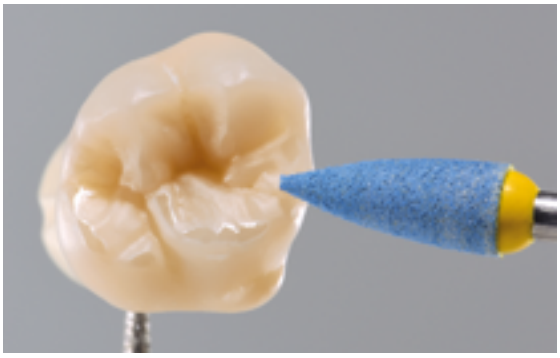
… outer surfaces with a fine diamond grinding instrument.



We recommend using a rubber polisher to smooth the basal side of the bridge connectors.

Polishing the occlusal surfaces of monolithic restorations is very important. Good polishing protects the antagonist from undesired abrasion. Make sure that the occlusal surfaces are carefully polished after functional adjustment by grinding. Commercially available polishers and polishing agents for oxide ceramics are recommended for polishing. Polish contact surfaces to the antagonist to a high gloss and subsequently clean them with the steam jet.

Polish functional contact surfaces…



… to a high-gloss finish.

Staining technique

It is advisible to fabricate dies made from IPS Natural Die Material before staining the restorations. The light-curing IPS Natural Die Material simulates the shade of the preparation. Fabricate a die according to the shade information supplied by the dentist (shade selection), which serves as the optimum basis for a true-to-nature shade reproduction of the given oral situation.

Determine the shade of the prepared tooth using the IPS Natural Die Material shade guide.

IPS Natural Die Material Kit

Paint the inner surfaces of the restoration with IPS Natural Die Material Separator and allow it to react a short time.

Apply IPS Natural Die Material into the restoration and…

…insert the die pin.

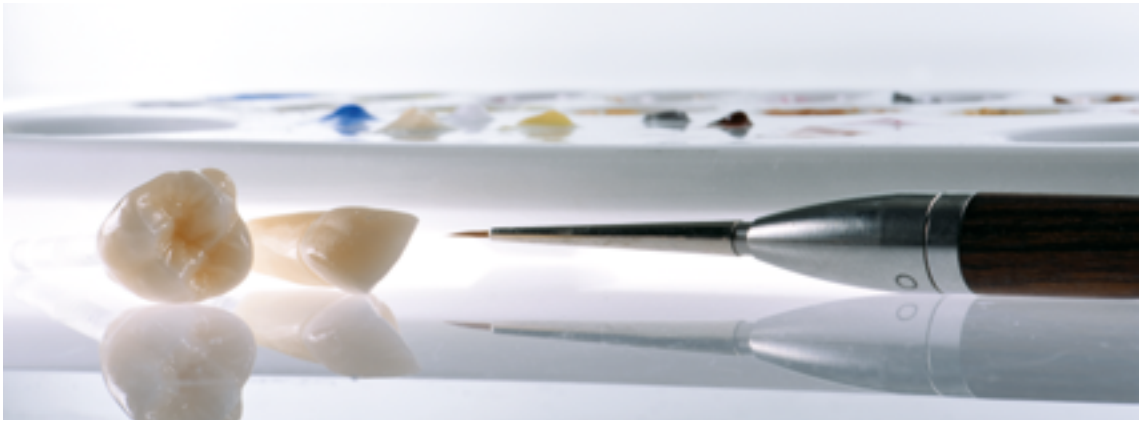
Cure in a conventional light-curing device.

Remove excess die material with a silicone polisher and smooth over the marginal areas.

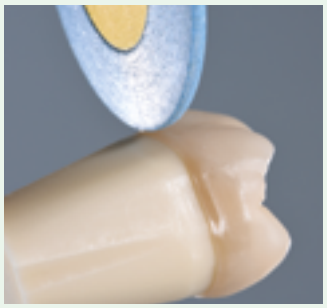
A die made from IPS Natural Die Material provides the optimal base for a natural shade reproduction of the given oral situation.

Stains and Glaze firing with IPS Ivocolor

The Stains firing is carried out with IPS Ivocolor Shades and/or Essences, the Glaze firing with IPS Ivocolor Glaze Powder FLUO or Paste FLUO. These two procedures can be carried out together or separately, depending on the situation. The firing parameter are identical. For further information see IPS Ivocolor Instructions for Use.



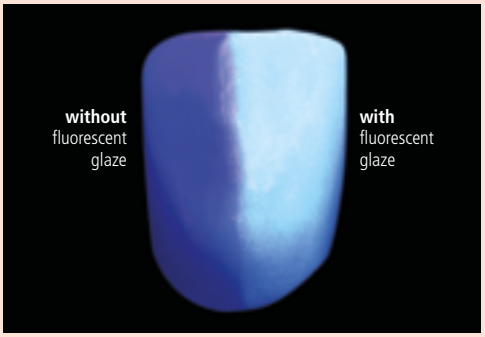
As an option, labial or vestibular surfaces may be polished with rubber burs before staining and glazing to achieve enhanced translucency and shade intensity.



Before the Stains and Glaze firing, the restoration must be free of dirt and grease. Clean the objects with a steam cleaner to remove any contaminations and grease residue. Any contamination after cleaning must be prevented.

Use the fluorescent glaze material, IPS Ivocolor Glaze Powder/Paste FLUO, to give ZrO_2 restorations a natural fluorescence. Apply the glazing material in an even covering layer on the restoration. After the Glaze firing, the homogeneity of the material application can be checked under a fluorescent lamp (wavelength 366 nm) and, if necessary, adjusted.

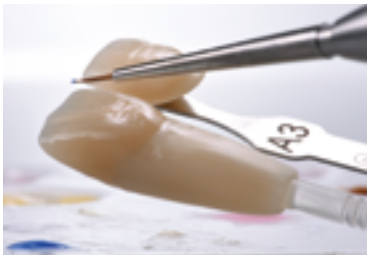
The influence of the glaze on the fluorescence of the ZrO_2 restorations:



Option 1: Separate Stains and Glaze firing

Light charaterization of the labial surfaces with IPS Ivocolor Shade Dentin.

Wet the restoration surface with a IPS Ivocolor Mixing Liquid to enhance the wettability.



To imitate the incisal area and translucency in the incisal or occlusal third, incisal stains (e.g. IPS Ivocolor Shade Incisal) can be used.

Conduct the Stains firing according to the stipulated firing parameters.

Apply the IPS Ivocolor Glaze Paste FLUO in an even covering layer on the restoration.

A correctly mixed glaze will stay on the restoration and won't drip.

By light vibration, the thixotropic glaze material will spread evenly over the entire surface.

The finished IPS e.max ZirCAD MT Multi crown after the Glaze firing.

Option 2: Stains and Glaze in one firing

Apply the glaze in an even covering layer.

If minor shade modifications are necessary, they can be made with IPS Ivocolor Shades on the already applied glaze.

The cusps and fissures of posterior teeth may be individually characterized with IPS Ivocolor Essences stains, such as mahogany, hazel or sunset.

The finished IPS e.max ZirCAD MT crowns after the Stains and Glaze firing.

Weak or missing proximal contacts can be applied with IPS Ivocolor Glaze.

The **Stains and Glaze firing** must be carried out according to the stipulated firing parameters (see **Firing parameters, page 56**).

– More intensive shades are achieved by repeated staining and firing, rather than by applying thicker layers.
– The degree of gloss on the glazed surface is controlled by the consistency of the glaze and the amount of glaze material applied, not by altering the firing temperature. For a higher degree of shine, use less liquid to mix the glaze and/or increase the amount of glaze material!

Layering technique

The most important veneering steps are shown as follows. Detailed information on the nano-fluorapatite layering ceramic and its processing instructions can be found in the IPS e.max Ceram Instructions for Use.

Cut-back veneering

Example: anterior bridge

After re-processing, clean the framework thoroughly under running water or with the steam cleaner and then dry.

Do **not** sandblast the framework with Al_2O_3, as this will damage the surface.

Mix the IPS Ivocolor Shades, Essences and Glaze FLUO with the IPS Ivocolor Liquids to the required consistency and apply a thin, but covering layer to the framework.

Individual characterization can already be carried out at this stage using IPS Ivocolor Shades.

If required, other characterizations can also be carried out in the incisal third, e.g. imitating mamelons with Effect materials.

With a dry brush, sprinkle the IPS e.max Ceram material (e.g. Dentin).

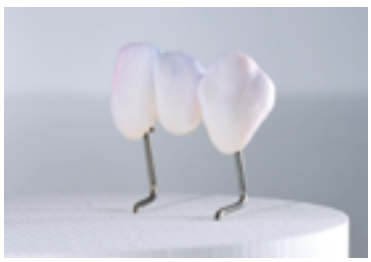
Ensure that no ceramic powder enters the inside of the crown, otherwise there will be fitting problems.

Carefully tap off and/or blow off any excess.

Carry out the Wash firing (foundation) according to the relevant firing parameter (see **Firing parameter, page 57**).

Design the incisal third using Impulse materials (e.g. Opal Effect and Mamelon).

Remove the completed restoration from the model, apply contact points and separate all interdental areas with a scalpel, down to the framework.



Carry out the Dentin/Incisal firing according to the firing parameter (see **Firing parameter, page 57**).

Finished restoration after the Stains and Glaze firing.

Full veneering

Example: anterior tooth

After re-processing, clean the framework thoroughly under running water or with the steam cleaner and then dry.

Do **not** sandblast the framework with Al_2O_3, as this will damage the surface.

If space is limited or to enhance the in-depth chroma, the sprinkle technique can be applied. IPS Ivocolor Shades, Essences and Glaze are mixed with the respective IPS Ivocolor Liquids to the desired consistency and applied in a covering layer on the entire framework. It is also possible to use only IPS Ivocolor Mixing Liquid.

With a dry brush, sprinkle the IPS e.max Ceram material (e.g. Dentin).

The Wash firing can also be carried out without the sprinkling of IPS e.max ceramic powder, e.g. cut-back technique. Simply mix the IPS Ivocolor Shades, Essences and Glaze with the IPS Ivocolor Liquids to the required consistency and apply a thin, but covering layer to the framework.

Carefully tap off and/or blow off any excess

Ensure that no ceramic powder enters the inside of the crown, otherwise there will be fitting problems.

Carry out the Wash firing (foundation) according to the relevant firing parameter (see **Firing parameter, page 57**).

Mix the required IPS e.max Ceram layers with the IPS Build-Up Liquids all-round or soft. Build up the ceramic in layers according to the build-up concept, using IPS e.max Ceram layering materials.

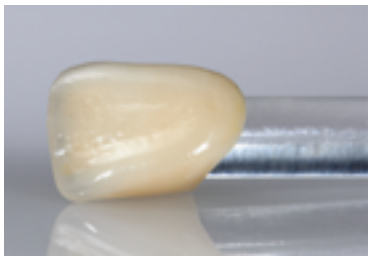
Build up the dentin core and already include an indication of mamelons using dentin layering materials at this stage, or first build up the complete tooth and then reduce the anatomical shape (cut-back technique).

The cut-back technique is recommended for better control of the size and position of the tooth.

Individually enhance the restoration with Transpa and Impulse materials and...

... completely cover with Insical materials.

Remove the built-up ceramic restoration from the model and apply contact points.



Finished restoration after the Stains and Glaze firing.

Example: posterior bridge

After re-processing, clean the framework thoroughly under running water or with the steam cleaner and then dry.

Do **not** sandblast the framework with Al_2O_3, as this will damage the surface.

With ideal space perform Wash firing with the respective IPS e.max Ceram Deep Dentin, Dentin, Transpa Incisal and/or Impulse material. For mixing, use the IPS Build-Up Liquids allround or soft.

Apply the Wash layer in a thin and even covering on the framework and then fire.

Seal and isolate the model before starting the ceramic build-up. This prevents the ceramic materials from sticking to or drying out the model. Seal the plaster die and adjacent model parts with the IPS Model Sealer. Also apply the IPS Ceramic Separating Liquid to the areas on the model beneath the pontics.

Build up the dentin core and include an indication of mamelons using dentin layering materials at this stage, or first build up the shape of the tooth completely and then reduce the anatomical shape (cut-back technique). The cut-back technique is recommended for better control of the size and position of the tooth.

Apply a complete layer of Incisal material.

Remove the completed restoration from the model, apply contact points and separate all interdental areas with a scalpel, down to the framework.

Apply the IPS Separating Liquid to adjacent model parts (e.g. abutment teeth, pontic surfaces). Dry the restoration and complete the missing areas with Dentin and Incisal materials.

Finished restoration ready for the Stains and Glaze firing.

Finished restoration after the Stains...

.... and Glaze firing.

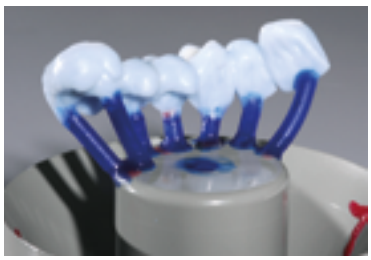
Press-on technique

In the press-on technique, a zirconium oxide framework is overpressed with the fluorapatite glass-ceramic IPS e.max ZirPress.

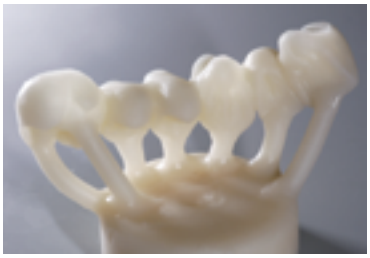
Detailed information on this technique can be found in the IPS e.max ZirPress Instructions for Use.

Apply the IPS e.max ZirLiner and fire.

Full-contour wax-up.



Spure and invest the restoration.



Press and then divest the restoration.

Completed and finished restoration.

CAD-on technique

In the IPS e.max CAD-on technique, a zirconium oxide framework is fused with a milled IPS e.max CAD veneering structure and crystallized.

Detailed information on this technique can be found in the IPS e.max CAD Veneering Solution Instructions for Use.

IPS e.max CAD Veneering Solution restoration in its non-crystallized state.

IPS e.max CAD Veneering Solution restoration in crystallized and finished.

Monolithic IPS e.max ZirCAD MT crown, stained and glazed.

Monolithic IPS e.max ZirCAD MT crown, infiltrated, stained and glazed.

Monolithic IPS e.max ZirCAD MT Multi bridges, stained and glazed.

General Information

Questions and Answers

How do I recognize on which side the occlusal-incisal area is located in an IPS e.max ZirCAD MT Multi disc?

The imprinted side of the disc is the incisal/occusal area.

How does a restoration have to be positioned within an IPS e.max ZirCAD Prime/MT Multi disc so that it shows the desired shade gradation?

The restoration has to be placed as high in the upper area of the disc as possible! Ideally, approximately one mm below the upper edge of the disc. With a bridge it is important to ensure that the connector is in the dentin area.

Can IPS e.max ZirCAD Prime/MT Multi restorations be veneered?

***Yes**. IPS e.max ZirCAD Prime has been approved for the cut-back technique as well as for full veneering. IPS e.max ZirCAD MT Multi has been approved for the cut-back technique.*

Can IPS e.max ZirCAD MT restorations be infiltrated with IPS e.max ZirCAD LT Colouring Liquids?

IPS e.max ZirCAD MT/LT Colouring Liquids can only be used on zirconium oxide with the same translucency level. If restorations are shaded with Colouring Liquids of the other translucency level, the desired tooth shade is not achieved. Colouring Liquids with different translucency levels must not be mixed.

Can restorations of different translucency levels be sintered in one furnace program?

With program no. 1 of the Programat S1 1600 (software 6.0), restorations of all translucency levels can be sintered together.

Can moist frameworks be sintered?

Restorations must be fully dried before they are sintered. The drying time depends on the temperature and the object size. For drying the objects, a temperature of 140°C/284°F must not be exceeded. If moist frameworks are sintered, there is a risk that tears and cracks can form in the restoration.

Can IPS e.max ZirCAD restorations be sandblasted with Al_2O_3 prior to veneering?

The restorations may only be blasted with Al_2O_3 (50 – 110 µm) at max.1.5 bar to remove milling dust sintered to the surface. Intensive blasting with high pressure may lead to surface damage and interfere with the bond between framework and layering ceramic. The surface must be cleaned to enable a good bond. Therefore, the restoration should be cleaned under running water or with the steam jet before veneering. After cleaning, the surface should not be contaminated with foreign substances (e.g. skin lipids, saliva).

Does the surface of a monolithic restoration have to be polished before being inserted in the patient's mouth?

If occlusal contacts have been adjusted via grinding in the patient's mouth, polishing is imperative. Failure to observe this instruction may cause higher abrasion to the antagonist.

Can IPS e.max ZirCAD restorations be conventionally cemented?

IPS e.max ZirCAD restorations can be cemented adhesively, self-adhesively, or conventionally. For conventional cementation, however, an appropriately retentive preparation design must be observed. If this is not possible, adhesive or self-adhesive cementation should be preferred, e.g. with Multilink® Automix or SpeedCEM® Plus. Vivaglass® CEM is available for conventional cementation. It is not advisable to use traditional phosphate cements, as they would negatively influence the light transmission of the all-ceramic and therefore compromise the esthetic appearance of the all-ceramic restorations.

Cementation and aftercare

Cementation options

Esthetic cementation options are decisive for the harmonious shade effect of an all-ceramic restoration. Depending on the indication, IPS e.max restorations can be seated using either adhesive, self-adhesive or conventional cementation.

– For the adhesive cementation of IPS e.max ZirCAD restorations, Multilink® Automix is the ideal composite.
– For the self-adhesive cementation of IPS e.max ZirCAD restorations, SpeedCEM® Plus is available.
– We recommend using Vivaglass® CEM glass-ionomer cement for the conventional cementation of IPS e.max ZirCAD.

Short definition of the different cementation methods:

– **Adhesive cementation**
  With adhesive cementation, the tooth surface is chemically conditioned with a highly liquid bonding agent, which results in a micro-mechnical and chemical bond between the tooth structure and the cementation material after curing. Therefore, retentive preparation, which results in a higher loss of tooth substance, can be waived. The chemical bond between the composite and the restoration can be achieved with the help of a corresponding primer, depending on the cementation material.
– **Self-adhesive cementation**
  The cementation material features self-adhesive properties on the tooth, which is why no additional special conditioning of the tooth surface is necessary. Hence, the adhesion of the restoration is partially achieved by a micro-mechanical and/or chemical bond. In order to achieve sufficient bonding strength values, retentive preparation (preparation angle 4 – 8 °, preparation height at least 4 mm) is recommended. Self-adhesive cementation does not result in increased "(overall) strength" of the all-ceramic restoration.
– **Conventional cementation**
  With conventional cementation, the bond is almost entirely created by static friction between the cementation material and the restoration, as well as between the cementation material and the preparation. In order to obtain the necessary bonding friction, a retentive preparation showing a preparation angle of approximately 4 – 8° is required. Conventional cementation does not result in an increase in "(overall) strength" of the all-ceramic restoration.

Preparing for cementation

Conditioning of the restoration and preparation depends on the cementation method used, as well as the cementation material. The following paragraphs describe the basic working steps to prepare for cementation.

Conditioning the restoration

Conditioning of the ceramic surface in preparation for cementation is decisive for a sound bond between the cementation material and the all-ceramic restoration. Observe the following procedure for IPS e.max ZirCAD restorations.

– Clean the surface of the IPS e.max ZirCAD restoration by sandblasting with Al_2O_3, 25–70 µm, 1 bar or Al_2O_3, 70–110 µm, 1.5 bar.
– Thoroughly clean the IPS e.max ZirCAD restoration with water and blow dry.
– Saliva can easily be removed from the restoration by means of Ivoclean.
– For adhesive cementation, condition the bonding surface using Monobond® Plus.

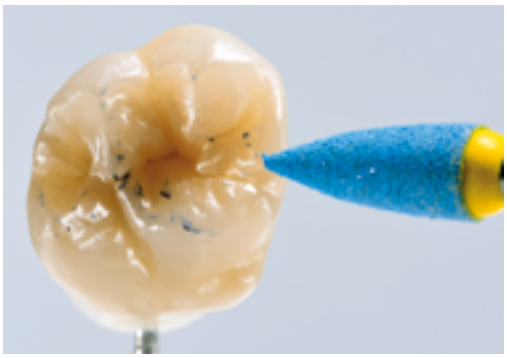
	IPS e.max ZirCAD Prime/MT Multi/MT/LT/MO	
Indication	Crowns and bridges with/without pressed-on shoulder	
Cementation method	Adhesive	Self adhesive/conventional
Sandblasting	Al_2O_3, 25–70 µm, 1 bar or Al_2O_3, 70–110 µm, 1.5 bar	
Cleaning after insertion	Ivoclean	
Conditioning	60 s with Monobond® Plus	–
Cementation system	Multilink® Automix	SpeedCEM® Plus, Vivaglass® CEM PL

Find your way out of the cements maze!
More information under **www.cementation-navigation.com**

Further information on the clinical working steps can be found in the IPS e.max Clinical Guide.

Conditioning the preparation

Before it is conditioned, the restoration is tried-in and the occlusion and articulation are checked. If adjustments of the restoration are required, the restoration must be polished extraorally or intraorally in these areas before final insertion. Saliva can easily be removed from the restoration by means of Ivoclean. Conditioning of the restoration and preparation depends on the cementation material used and is carried out according to the respective Instructions for Use. If adjustment by grinding in the oral cavity of the patient is necessary, the ground-in surfaces have to smoothed and polished.



Care notes

Same as natural teeth, IPS e.max ZirCAD restorations require regular professional care. This is not only beneficial to the health of the gingiva and teeth, but also to the overall esthetic appearance. The pumice-free Proxyt® pink polishing paste is used to care for the surfaces without causing any wear.
The low RDA* value = 7 (*Relative Dentin Abrasion) is a reliable confirmation that a low-abrasion cleaning paste is used. Scientific tests and long-term clinical experience have proved the gentle effect compared to other pastes.

Scientific data

Since the beginning of the development, the IPS e.max system has been monitored by the scientific community. Many renowned experts have contributed to an excellent data base with their studies. The worldwide success story, the ever growing demand, as well as over 150 million fabricated restorations are testament to the success and the reliability of the system. More than 20 clinical *in-vivo* studies to date and even more *in-vitro* studies, as well as the continuously growing number of clinical studies throughout the world show the long-term success of the IPS e.max system in the oral cavities of the patients. The most important study results are compiled in the "IPS e.max Scientific Report Vol. 3". Further scientific data (i.e. strength, wear, biocompatibility) are listed in the Scientific Documentations for the individual IPS e.max products. They can be obtained from Ivoclar Vivadent.

For further information about all-ceramics and IPS e.max, please refer to the Ivoclar Vivadent Report No. 16 and 17. More detailed information on the luting composite Variolink® Esthetic can be found in the "Ivoclar Vivadent Report No. 22" and the "Variolink Esthetic Scientific Documentation", while details on Multilink® Automix are contained in the "Multilink Automix Scientific Report 2/2016" and Monobond Etch & Prime in the "Monobond Etch & Prime Scientific Report, 01/2018".

Further information can be found in the Internet under www.ivoclarvivadent.com!

Sintering programs

Programat® S1/S1 1600, software version V 6.0

Program	Name	Description	Process duration	Programat® Dosto-Tray
1	IPS e.max ZirCAD standard	Standard program for sintering of IPS e.max ZirCAD **Prime/ MT Multi/MT/LT/MO** crowns/bridges up to 14 units and infiltrated, dried restorations.	9 h 50 min	✓
2	IPS e.max ZirCAD Speed – 3 units	Program for the quick sintering of IPS e.max ZirCAD **Prime/MT Multi/MT/LT/MO** crowns/bridges up to 3 units	4 h 25 min	
3	IPS e.max ZirCAD Prime Speed – crown	Program for the quick sintering of IPS e.max ZirCAD **Prime** crowns	2 h 26 min	
4	IPS e.max ZirCAD MT Multi Speed – 3 units	Program for the quick sintering of IPS e.max ZirCAD **MT Multi** crowns/bridges up to 3 units	4 h 25 min	
5	IPS e.max ZirCAD MT Speed – 3 units	Program for the quick sintering of IPS e.max ZirCAD **MT** crowns/bridges up to 3 units	2 h 30 min	
6	IPS e.max ZirCAD LT Speed – crown	Program for the quick sintering of IPS e.max ZirCAD **LT** crowns	2 h 55 min	
7	IPS e.max ZirCAD LT Speed – 14 units	Program for the quick sintering of IPS e.max ZirCAD **LT** bridges with up to 14 units	4 h 30 min	
8	IPS e.max ZirCAD MO Speed – crown	Program for the quick sintering of IPS e.max ZirCAD **MO** crown frameworks	75 min	
9	IPS e.max ZirCAD MO Speed – 4 units	Program for the quick sintering of IPS e.max ZirCAD **MO** bridge frameworks with up to 4 units	90 min	
10	IPS e.max ZirCAD MO Speed – 14 units	Program for the quick sintering of IPS e.max ZirCAD **MO** bridge frameworks with up to 14 units	2 h 45 min	
11	IPS e.max ZirCAD MO standard	Standard program for the sintering of IPS e.max ZirCAD **MO** frameworks	7 h 20 min	✓
12	Regeneration firing	Program for the regeneration of IPS e.max ZirCAD frameworks after excessive working	60 min	
13–24	Zenostar/Zenotec			
25–50	Individual programs			

IPS e.max ZirCAD MT/LT restorations infiltrated and pre-dried with Colouring Liquids must be sintered in the standard program no.1.

Speed sintering can influence translucency and the shade of restoration. In general, the fast sintering programs for the respective product are designed in such a way that translucency and shade are not significantly negatively affected. Depending on the amount of restorations in the furnace, restoration size, volume of solid restoration parts (e.g. large-volume pontics) or temperature inaccuracy in the furnace, a visible effect on translucency or shade can occur. The mechanical strength of the material is usually not significantly affected by the speed sintering.

Standard program for third-party furnaces

Standard program for sintering IPS e.max ZirCAD Prime/MT Multi/MT/LT/MO crowns/bridges up to **14 units** and colour infiltrated, dried restorations.

	Temperature 1 [°C]	Temperature 2 [°C]	Heating-up rate [°C/min]	Holding time [min]
Heating phase	20	900	10	–
Holding phase	900	900	–	30
Heating phase	900	1500	3.3	–
Holding phase	1500	1500	–	120
Cooling phase	1500	900	10	–
Cooling phase	900	300	8.3	–
– switch off–				

Speed program for third-party furnaces

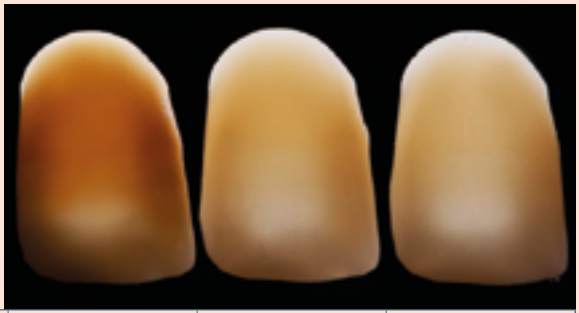
Program for fast sintering of IPS e.max ZirCAD Prime/MT Multi/MT/LT/MO crowns/bridges up to **3 units**.

	Temperature 1 [°C]	Temperature 2 [°C]	Heating-up rate [°C/min]	Holding time [min]
Heating phase	20	1000	60	–
Holding phase	1000	1000	–	10
Heating phase	1000	1530	3	–
Holding phase	1530	1530	–	60
Cooling phase	1530	1100	50	–
Cooling phase	1100	100	60	–
– switch off–				

– When sintering in other furnaces, care must be taken to ensure that the final temperature of the sintering furnace corresponds with the target temperature. Temperature deviations can cause a change in translucency and shade.
– When using sintering base plates, it is necessary to ensure of sufficient atmospherical exchange, and should therefore be used without a cover.

Influence of the end temperature on translucency and shade:

Restorations sintered at different end temperatures



End temperature	Too low	Optimal	Too high
Visual effect	Restoration is too opaque and too colourful	Restoration is optimal and complies with A–D shade guide	Restoration is distinctly pale and somewhat more translucent

Speed sintering can influence translucency and the shade of restoration. In general, the fast sintering programs for the respective product are designed in such a way, that translucency and shade are not significantly negatively affected. Depending on the amount of restorations in the furnace, restoration size, volume of solid restoration parts (e.g. large-volume pontics) or temperature inaccuracy in the furnace, a visible effect on translucency or shade can occur. The mechanical strength of the material is usually not significantly affected by the speed sintering.

Combination tables

IPS e.max® ZirCAD Prime – Staining technique (monolithic restorations)

Tooth shade	IPS e.max ZirCAD Prime	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
			
BL1	BL1	0	1/2/3
BL2	BL2	0	
BL3	BL3	2	
BL4	BL4	2	
A1	A1	1	
A2	A2	2	
A3	A3	2	
A3.5	A3.5	2	
A4	A4	3	
B1	B1	4	
B2	B2	4	
B3	B3	5	
B4	B4	5	
C1	C1	6	
C2	C2	6	
C3	C3	6	
C4	C4	6	
D2	D2	7	
D3	D3	7	
D4	D4	6	

IPS e.max® ZirCAD MT Multi – Staining technique (monolithic restorations)

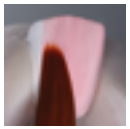
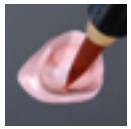
Tooth shade	IPS e.max ZirCAD MT Multi	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
			
BL1	BL1	0	1/2/3
BL2	BL1	0	
BL3	BL1	2	
BL4	BL1	2	
A1	A1	1	
A2	A2	2	
A3	A3	2	
A3.5	A3	2	
A4	A3	3	
B1	B1	4	
B2	B2	4	
B3	B2	5	
B4	A3	5	
C1	B1	6	
C2	C2	6	
C3	C2	6	
C4	C2	6	
D2	D2	7	
D3	D2	7	
D4	C2	6	

IPS e.max® ZirCAD MT – Staining technique (monolithic restorations)

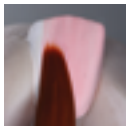
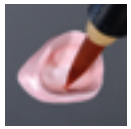
Tooth shade	IPS e.max ZirCAD MT	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
			
BL1	BL	0	1/2/3
BL2	BL	0	
BL3	BL	2	
BL4	BL	2	
A1	A1	1	
A2	A2	2	
A3	A3	2	
A3.5	A3	2	
A4	A3	3	
B1	B1	4	
B2	B2	4	
B3	A3	5	
B4	A3	5	
C1	B1	6	
C2	C2	6	
C3	C2	6	
C4	C2	6	
D2	D2	7	
D3	D2	7	
D4	C2	6	

IPS e.max® ZirCAD LT – Staining technique (monolithic restorations)

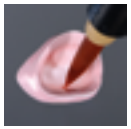
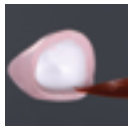
Tooth shade	IPS e.max ZirCAD LT	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
			
BL1	0	0	1/2/3
BL2	0	0	
BL3	0	2	
BL4	1	2	
A1	A1	0	
	1	3	
	sun		
A2	A2	1	
	1	2	
	sun		
A3	A3	2	
	2	3	
	sun		
A3.5	A3	2	
	4		
	sun chroma		
A4	A3	6	
	4		
	sun chroma		
B1	B1	4	
	1	6	
B2	B2	4	
	1		
	sun		
B3	B2	4	
	3	7	
	sun		
B4	B2	4	
	3	5	
	sun		
C1	D2	6	
	1	8	
C2	C2	6	
	2	8	
C3	C2	6	
	2	8	
C4	C2	6	
	4	8	
D2	D2	7	
	2	8	
	sun		
D3	D2	7	
	2		
	sun		
D4	D2	6	
	2	8	

		BASIC infiltration				ADVANCED infiltration	Staining technique	
Tooth shade	IPS e.max ZirCAD MT	IPS e.max ZirCAD MT Colouring Liquids	1x complete*	1x Dentin infiltration	1x cervical**	IPS e.max ZirCAD MT Colouring Liquids	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
								
BL1	BL	–	–	–	–	–	0	1/2/3
BL2		–	–	–	–	–	0	
BL3		–	–	–	–	–	2	
BL4		–	–	–	–	–	2	
A1		A1	1x outer	1x inner 1x outer	1x inner 1x outer	blue, violet, grey, orange, brown	1	
A2		A2					2	
A3		A3					2	
A3.5		A3.5					2	
A4		A4					3	
B1		B1					4	
B2		B2					4	
B3		B3					5	
B4		B4					5	
C1		C1					6	
C2		C2					6	
C3		C3					6	
C4		C4					6	
D2		D2					7	
D3		D3					7	
D4		D4					6	

* If a lighter incisal area is desired, infiltration may begin approximately 1 mm below the incisal edge.
** For lighter tooth shades, waiving the third infiltration step is recommended, as the restorations may turn out to be too intensively shaded.

		BASIC infiltration				ADVANCED infiltration	Staining technique	
Tooth shade	IPS e.max ZirCAD LT	IPS e.max ZirCAD LT Colouring Liquids	1x complete*	1x Dentin infiltration	1x cervical**	IPS e.max ZirCAD LT Colouring Liquids	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
								
BL1	0/BL	–	–	–	–	–	0	1/2/3
BL2		–	–	–	–	–	0	
BL3		–	–	–	–	–	2	
BL4		–	–	–	–	–	2	
A1		A1	1x outer	1x inner 1x outer	1x inner 1x outer	blue, violet, grey, orange, brown	1	
A2		A2					2	
A3		A3					2	
A3.5		A3.5					2	
A4		A4					3	
B1		B1					4	
B2		B2					4	
B3		B3					5	
B4		B4					5	
C1		C1					6	
C2		C2					6	
C3		C3					6	
C4		C4					6	
D2		D2					7	
D3		D3					7	
D4		D4					6	

* If a lighter incisal area is desired, infiltration should begin approximately 1 mm below the incisal edge.
** For lighter tooth shades, waiving the third infiltration step is recommended, as the restorations may turn out to be too intensively shaded.

		BASIC infiltration			ADVANCED infiltration	Staining technique	
Tooth shade	IPS e.max ZirCAD LT	IPS e.max ZirCAD LT Colouring Liquids	1x Dentin infiltration	1x cervical	IPS e.max ZirCAD LT Colouring Liquids	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
							
A1	1	A1	1x outer	–	–	1	1/2/3
A2	1	A2	2x outer	–	–	2	
A3	2	A3	2x outer	–	–	2	
A3.5	2	A3.5	2x outer	–	–	2	
A4	2	A4	2x outer	1x inner 1x outer	blue, violet, grey, orange, brown	3	
B1	1	B1	1x outer			4	
B2	1	B2	2x outer			4	
B3	2	B3	1x outer			5	
B4	2	B4	2x outer			5	
C1	1	C1	2x outer			6	
C2	1	C2	2x outer			6	
C3	1	C3	2x outer			6	
D3	2	D3	2x outer			7	

IPS e.max® ZirCAD Prime – Layering technique

Tooth shade	IPS e.max ZirCAD Prime	IPS e.max Ceram Power Dentin	IPS e.max Ceram Power Incisal	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
					
BL1	BL1	BL1	BL	0	1/2/3
BL2	BL2	BL2	BL	0	
BL3	BL3	BL3	BL	2	
BL4	BL4	BL4	BL	2	
A1	A1	A1	1	1	
A2	A2	A2	1	2	
A3	A3	A3	2	2	
A3.5	A3.5	A3.5	2	2	
A4	A4	A4	3	3	
B1	B1	B1	1	4	
B2	B2	B2	1	4	
B3	B3	B3	1	5	
B4	B4	B4	2	5	
C1	C1	C1	1	6	
C2	C2	C2	3	6	
C3	C3	C3	3	6	
C4	C4	C4	3	6	
D2	D2	D2	1	7	
D3	D3	D3	2	7	
D4	D4	D4	3	6	

IPS e.max® ZirCAD LT – Layering technique

Tooth shade	IPS e.max ZirCAD LT	IPS e.max Ceram Power Dentin	IPS e.max Ceram Power Incisal	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
					
BL1	BL / 0	BL1	BL	0	1/2/3
BL2	BL / 0	BL2	BL	0	
BL3	BL / 0	BL3	BL	2	
BL4	BL / 0	BL4	BL	2	
A1	B1 / 1	A1	1	1	
A2	B1 / 1	A2	1	2	
A3	A2 / 2	A3	2	2	
A3.5	A2 / 2	A3.5	2	2	
A4	C2 / 4	A4	3	3	
B1	B1 / 1	B1	1	4	
B2	B1 / 1	B2	1	4	
B3	B2 / 3	B3	1	5	
B4	B2 / 3	B4	2	5	
C1	C2 / 1	C1	1	6	
C2	C2 / 4	C2	3	6	
C3	C2 / 4	C3	3	6	
C4	C2 / 4	C4	3	6	
D2	C2 / 2	D2	1	7	
D3	C2 / 4	D3	2	7	
D4	C2 / 4	D4	3	6	

IPS e.max® ZirCAD MO – Layering technique

Tooth shade	IPS e.max ZirCAD MO	IPS e.max Ceram Power Dentin	IPS e.max Ceram Power Incisal	IPS Ivocolor Shade Dentin	IPS Ivocolor Shade Incisal
					
BL1	0	BL1	BL	0	
BL2	0	BL2	BL	0	
BL3	0	BL3	BL	2	
BL4	0	BL4	BL	2	
A1	1	A1	1	1	
A2	1	A2	1	2	
A3	2	A3	2	2	
A3.5	2	A3.5	2	2	
A4	4	A4	3	3	
B1	1	B1	1	4	
B2	1	B2	1	4	1/2/3
B3	3	B3	1	5	
B4	3	B4	2	5	
C1	1	C1	1	6	
C2	4	C2	3	6	
C3	4	C3	3	6	
C4	4	C4	3	6	
D2	2	D2	3	7	
D3	4	D3	3	7	
D4	4	D4	3	6	

Firing parameter

Firing zirconium oxide (ZrO_2) supported restorations

In order to achieve optimal firing results, the following must be observed:

– In order to ensure an even thickness of the veneer, the zirconium oxide framework must be designed in such a way that it supports the cusps. Depending on the clinical situation, the results are different wall thicknesses and dimensions in the restoration.
– Since zirconium is a poor heat conductor compared to other materials, a low temperature increase rate is required. This ensures even heat distribution in the bonding area between the framework and the veneer, as well as the outer surfaces of the restoration even with different wall thicknesses. In this way, an optimum bond, as well as even sintering of the layering materials are achieved.
– During cooling of the restorations after firing, stress occurs as a result of the different cooling speeds both outside and within the material. With slow cooling for the final firing cycle, this stress can be reduced and the risk of delamination minimized, particularly in ZrO_2-supported restorations.
– Several units (e.g. multi-unit bridges with bulky pontics) in the furnace impede even and thorough heating of the objects to be fired.
– Even temperature distribution in the firing chamber depends on the type of furnace, as well as the size of the firing chamber.
– The parameters stipulated in the Instructions for Use are coordinated with Ivoclar Vivadent furnaces (tolerance range +/- 10°C).
– If a non-Ivoclar Vivadent furnace is used, temperature adjustments may be necessary.
– At the beginning of the firing procedure, open the furnace and wait for the acoustic signal. Subsequently, place the firing tray with the objects in the centre of the firing table and start the program. When the infrared technology is activated, position objects in such a way that the infrared camera has as wide a view as possible on the objects.
– When the firing procedure has finished (wait for the acoustic signal) remove the IPS e.max objects from the furnace.
– Allow the objects to cool to room temperature in a place protected from draft.
– Do not touch the hot objects with metal tongs.
– Do not blast or quench the objects.

Firing parameter from IPS e.max® ZirCAD in combination with IPS Ivocolor staining technique

	Stand-by temperature **B** [°C/°F]	Closing time* **S** [min]	Heating rate **t** ↗ [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Vacuum 1 1_1 1_2 [°C/°F]	Vacuum 2 2_1 2_2 [°C/°F]	Long-term cooling **L** [°C/°F]
Stains and Glaze firing	403/757	IRT/ 06:00	45/81 15/27	710/1310	01:00	450/842	709/1308	450/842

* IRT Normal mode

– Monolithic IPS e.max ZirCAD single crowns are fired at a heating up rate of 45 °C/min.
– Monolithic IPS e.max ZirCAD bridges with bulky pontics or restorations with gingival masks are fired at a heating rate of 15 °C/min and slowly cooled afterwards. The cooling time depends on the volume of the restoration and should be at least 15 – 25 minutes.

Firing parameters for IPS e.max® ZirCAD in combination with IPS e.max Ceram and IPS Ivocolor in the layering, cut-back and press technology

	Stand-by temperature **B** [°C/°F]	Closing time * **S** [min]	Heating rate **t↗** [°C/°F/min]	Firing temperature **T_1** [°C/°F]	Holding time **H_1** [min]	Heating rate **t↗** [°C/°F/min]	Firing temperature **T_2** [°C/°F]	Holding time **H_2** [min]	Vacuum 1 **1_1** **1_2** [°C/°F]	Vacuum 2 **2_1** **2_2** [°C/°F]	Long-term cooling ** **L** [°C/°F]	Cooling rate **t_l** [°C/°F/min]
ZirLiner firing [1]	403/757	IRT/ 04:00	40/72	960/1760	01:00	–	–	–	450/842	959/1758	0	0
Wash firing (foundation)	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
1st Dentin/Incisal firing	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
2nd Dentin/Incisal firing	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
Stains firing with IPS Ivocolor	403/757	IRT/ 06:00	60/108	710/1310	01:00	–	–	–	450/842	709/1308	450/842	0
Glaze firing with IPS Ivocolor	403/757	IRT/ 06:00	60/108	710/1310	01:00	–	–	–	450/842	709/1308	450/842	0
Add-on with Glaze firing	403/757	IRT/ 06:00	60/108	710/1310	01:00	–	–	–	450/842	709/1308	450/842	0
Add-On after Glaze firing	403/757	IRT/ 06:00	50/90	700/1292	01:00	–	–	–	450/842	699/1290	450/842	0

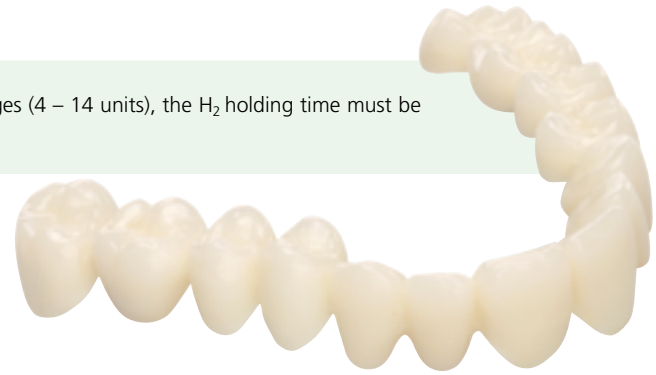
* IRT Normal mode
** Slow cooling after last firing

1) before wax-up and pressing IPS e.max ZirPress

According to the type of furnace used, the firing temperature can change ±5 °C, max. ±10 °C.

For multi-unit ZrO_2 bridges with bulky pontics, the Glaze firing heating rate with IPS Ivocolor must be reduced to 45 °C/min.

For optimal firing results for multi-unit bridges (4 – 14 units), the H_2 holding time must be increased to 3 min.



These firing parameters are guidelines and apply to Ivoclar Vivadent Programat furnaces. When using furnaces from other manufacturers, the firing parameters may need to be adjusted.
Deviations may occur:
– depending on furnace generation
– due to regional differences in voltage or operation of multiple electrical appliances on a circuit.

Ivoclar Vivadent – worldwide

Ivoclar Vivadent AG
Bendererstrasse 2
9494 Schaan
Liechtenstein
Tel. +423 235 35 35
Fax +423 235 33 60
www.ivoclarvivadent.com

Ivoclar Vivadent Pty. Ltd.
1 – 5 Overseas Drive
P.O. Box 367
Noble Park, Vic. 3174
Australia
Tel. +61 3 9795 9599
Fax +61 3 9795 9645
www.ivoclarvivadent.com.au

Ivoclar Vivadent GmbH
Tech Gate Vienna
Donau-City-Strasse 1
1220 Wien
Austria
Tel. +43 1 263 191 10
Fax: +43 1 263 191 111
www.ivoclarvivadent.at

Ivoclar Vivadent Ltda.
Alameda Caiapós, 723
Centro Empresarial Tamboré
CEP 06460-110 Barueri – SP
Brazil
Tel. +55 11 2424 7400
www.ivoclarvivadent.com.br

Ivoclar Vivadent Inc.
1-6600 Dixie Road
Mississauga, Ontario
L5T 2Y2
Canada
Tel. +1 905 670 8499
Fax +1 905 670 3102
www.ivoclarvivadent.us

Ivoclar Vivadent Shanghai Trading Co., Ltd.
2/F Building 1, 881 Wuding Road,
Jing An District
200040 Shanghai
China
Tel. +86 21 6032 1657
Fax +86 21 6176 0968
www.ivoclarvivadent.com

Ivoclar Vivadent Marketing Ltd.
Calle 134 No. 7-B-83, Of. 520
Bogotá
Colombia
Tel. +57 1 627 3399
Fax +57 1 633 1663
www.ivoclarvivadent.co

Ivoclar Vivadent SAS
B.P. 118
74410 Saint-Jorioz
France
Tel. +33 4 50 88 64 00
Fax +33 4 50 68 91 52
www.ivoclarvivadent.fr

Ivoclar Vivadent GmbH
Dr. Adolf-Schneider-Str. 2
73479 Ellwangen, Jagst
Germany
Tel. +49 7961 889 0
Fax +49 7961 6326
www.ivoclarvivadent.de

Ivoclar Vivadent Marketing (India) Pvt. Ltd.
503/504 Raheja Plaza
15 B Shah Industrial Estate
Veera Desai Road, Andheri (West)
Mumbai, 400 053
India
Tel. +91 22 2673 0302
Fax +91 22 2673 0301
www.ivoclarvivadent.in

Ivoclar Vivadent Marketing Ltd.
The Icon
Horizon Broadway BSD
Block M5 No. 1
Kecamatan Cisauk Kelurahan Sampora
15345 Tangerang Selatan – Banten
Indonesia
Tel. +62 21 3003 2932
Fax +62 21 3003 2934
www.ivoclarvivadent.com

Ivoclar Vivadent s.r.l.
Via del Lavoro, 47
40033 Casalecchio di Reno (BO)
Italy
Tel. +39 051 6113555
Fax +39 051 6113565
www.ivoclarvivadent.it

Ivoclar Vivadent K.K.
1-28-24-4F Hongo
Bunkyo-ku
Tokyo 113-0033
Japan
Tel. +81 3 6903 3535
Fax +81 3 5844 3657
www.ivoclarvivadent.jp

Ivoclar Vivadent Ltd.
4F TAMIYA Bldg.
215 Baumoe-ro
Seocho-gu
Seoul, 06740
Republic of Korea
Tel. +82 2 536 0714
Fax +82 2 6499 0744
www.ivoclarvivadent.co.kr

Ivoclar Vivadent S.A. de C.V.
Calzada de Tlalpan 564,
Col Moderna, Del Benito Juárez
03810 México, D.F.
México
Tel. +52 55 50 62 10 00
Fax +52 55 50 62 10 29
www.ivoclarvivadent.com.mx

Ivoclar Vivadent BV
De Fruittuinen 32
2132 NZ Hoofddorp
Netherlands
Tel. +31 23 529 3791
Fax +31 23 555 4504
www.ivoclarvivadent.com

Ivoclar Vivadent Ltd.
12 Omega St, Rosedale
PO Box 303011 North Harbour
Auckland 0751
New Zealand
Tel. +64 9 914 9999
Fax +64 9 914 9990
www.ivoclarvivadent.co.nz

Ivoclar Vivadent Polska Sp. z o.o.
Al. Jana Pawła II 78
00-175 Warszawa
Poland
Tel. +48 22 635 5496
Fax +48 22 635 5469
www.ivoclarvivadent.pl

Ivoclar Vivadent LLC
Prospekt Andropova 18 korp. 6/
office 10-06
115432 Moscow
Russia
Tel. +7 499 418 0300
Fax +7 499 418 0310
www.ivoclarvivadent.ru

Ivoclar Vivadent Marketing Ltd.
Qlaya Main St.
Siricon Building No.14, 2nd Floor
Office No. 204
P.O. Box 300146
Riyadh 11372
Saudi Arabia
Tel. +966 11 293 8345
Fax +966 11 293 8344
www.ivoclarvivadent.com

Ivoclar Vivadent S.L.U.
Carretera de Fuencarral nº24
Portal 1 – Planta Baja
28108-Alcobendas (Madrid)
Spain
Tel. +34 91 375 78 20
Fax +34 91 375 78 38
www.ivoclarvivadent.es

Ivoclar Vivadent AB
Dalvägen 14
169 56 Solna
Sweden
Tel. +46 8 514 939 30
Fax +46 8 514 939 40
www.ivoclarvivadent.se

Ivoclar Vivadent Liaison Office
: Tesvikiye Mahallesi
Sakayik Sokak
Nisantas' Plaza No:38/2
Kat:5 Daire:24
34021 Sisli – Istanbul
Turkey
Tel. +90 212 343 0802
Fax +90 212 343 0842
www.ivoclarvivadent.com

Ivoclar Vivadent Limited
Compass Building
Feldspar Close
Warrens Business Park
Enderby
Leicester LE19 4SD
United Kingdom
Tel. +44 116 284 7880
Fax +44 116 284 7881
www.ivoclarvivadent.co.uk

Ivoclar Vivadent Inc.
175 Pineview Drive
Amherst, N.Y. 14228
USA
Tel. +1 800 533 6825
Fax +1 716 691 2285
www.ivoclarvivadent.us

Rx only

CE 0123

Manufacturer:
Ivoclar Vivadent AG, 9494 Schaan/Liechtenstein
www.ivoclarvivadent.com

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