IPS e.max® CAD

INSTRUCTIONS FOR USE

LABSIDE

CE 0123

ivoclar vivadent® technical

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IPS e.max® System – all you need

IPS e.max is an innovative all-ceramic system which covers the entire all-ceramic indication range – from thin veneers to 10-unit bridges.

IPS e.max delivers high-strength and highly esthetic materials for the Press and the CAD/CAM technologies. The system consists of innovative lithium disilicate glass-ceramics used mainly for single-tooth restorations and high-strength zirconium oxide for large-span bridges.

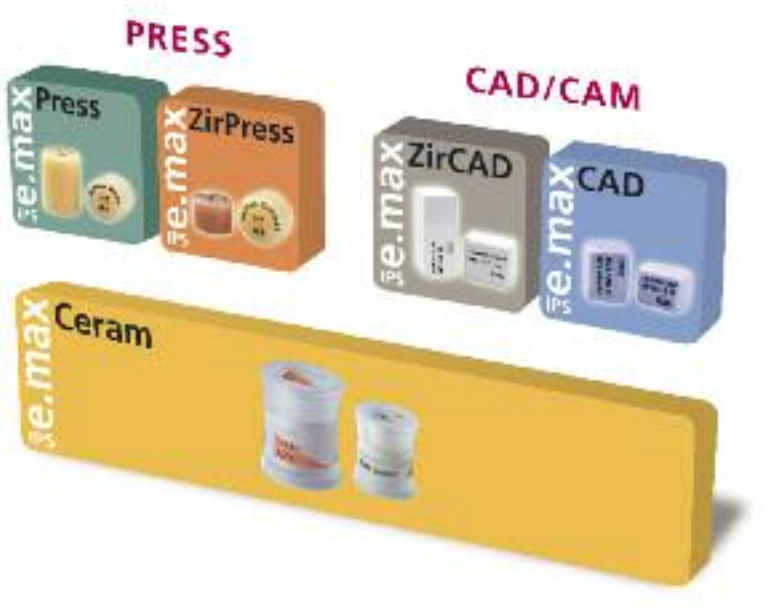
Every patient situation presents its own requirements and objectives. IPS e.max meets these requirements. Due to the system components you obtain exactly what you need.

- The components of the Press technology include the highly esthetic IPS e.max Press lithium disilicate glass-ceramic ingots and the IPS e.max ZirPress fluorapatite glass-ceramic ingots for the fast and efficient press-on-zirconia technique.
- Depending on the case requirements, two types of materials are available for CAD/CAM techniques: the innovative IPS e.max CAD lithium disilicate blocks and the high-strength zirconium oxide IPS e.max ZirCAD.
- The nano-fluorapatite layering ceramic IPS e.max Ceram, which is used to characterize/veneer all IPS e.max components – glass or oxide ceramics – completes the IPS e.max System.

IPS e.max CAD

The shades and translucency levels of the IPS e.max CAD blocks are based on the overarching IPS e.max shade system. The system has a flexible design and can be used in conjunction with the A-D, Chromascop as well as Bleach BL shade guides.

The shades of the Press ingots and CAD/CAM blocks offered in the IPS e.max System are all coordinated with each other. They are available in different degrees of opacity and/or translucency. The selection of the translucency level is based on the clinical requirements (shade of the prepared tooth, desired tooth shade) presented by the patient, as well as the desired processing technique (layering, cut-back, staining technique).
The more opaque HO (only IPS e.max Press) and MO blocks are predominantly suitable for the layering technique, while the more translucent LT and HT blocks are used for the cut-back and also the staining technique.



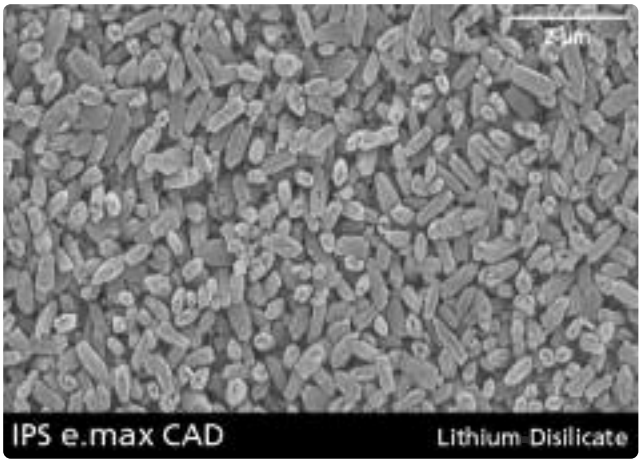
IPS e.max® CAD

Product Information

Material

IPS e.max CAD is a lithium disilicate glass-ceramic block for the CAD/CAM technique. It is fabricated using an innovative process which provides an impressive homogeneity of the material. The block can be processed very easily in a CAD/CAM unit in this crystalline intermediate stage. The typical and striking color of IPS e.max CAD ranges from whitish to blue and bluish-grey. This shade is a result of the composition and the microstructure of the glass-ceramic. The strength of the material in this processable intermediate phase is 130-150 MPa. After the IPS e.max CAD blocks are milled, the restoration is crystallized in an Ivoclar Vivadent ceramic furnace (e.g. Programat® P300, P500, P700). Unlike with some other CAD/CAM ceramics, the approximately 20-31-minute, easy-to-conduct crystallization process neither causes any major shrinkage, nor are any complicated infiltration processes required. The crystallization process at 840-850°C (1544-1562°F) results in a transformation of the microstructure, during which lithium disilicate crystals grow in a controlled manner. The densification of 0.2% is accounted for in the CAD software and taken into account upon milling.

The final physical properties, such as the strength of 360 MPa and the corresponding optical properties, are achieved through the transformation of the microstructure.



CTE (100-400°C) [10^{-6} /K]	10.2
CTE (100-500°C) [10^{-6} /K]	10.5
Flexural strength (biaxial) [MPa]*	360
Fracture toughness [MPa $m^{0.5}$]	2.25
Modulus of elasticity [GPa]	95
Vickers hardness [MPa]	5800
Chem. solubility [µg/cm^2]*	40
Crystallization temperature [°C/°F]	840–850/1544-1562

*according to ISO 6872

Usage

Indications
- Veneers
- Inlays
- Onlays
- Partial crowns
- Crowns in the anterior and posterior region
- Implant superstructures for single-tooth restorations (anterior and posterior region)
- Primary telescope crowns

Contraindications
- Full veneers on molar crowns
- Very deep sub gingival preparations
- Patients with substantially reduced residual dentition
- Bruxism
- Any other use not listed in the indications

Important processing restrictions
Failure to observe the following restrictions may compromise the results achieved with IPS e.max CAD:
- The frameworks must not fall below the required minimum thickness.
- Do not mill the blocks with non-compatible CAD/CAM systems.
- Crystallization must not be conducted in a ceramic furnace that has not been approved and/or recommended.
- Crystallization must not be conducted in a ceramic furnace that has no vacuum function.
- Crystallization must not be conducted in a ceramic furnace that has not been calibrated.
- Crystallization must not be conducted in a high-temperature furnace (e.g. Sintramat).
- Do not mix IPS e.max CAD Crystall./Glaze, Shades and Stains with other dental ceramics (e.g. IPS e.max Ceram Glaze, Stains and Essence).
- Do not layer with a veneering ceramic other than IPS e.max Ceram.

Side effects
If the patient is known to be allergic to any of the components of IPS e.max CAD, the material must not be used to fabricate restorations.

Composition

- **IPS e.max CAD Blocks**
  Components: SiO_2
  Additional contents: Li_2O, K_2O, MgO, Al_2O_3, P_2O_5 and other oxides.

- **IPS e.max CAD Crystall./Glaze, Shades and Stains**
  Components: oxides, glycols

- **IPS e.max CAD Crystall./Glaze Spray**
  Components: oxides, propanol, propellant: isobutane

- **IPS e.max CAD Crystall./Glaze Liquid**
  Components: butandiol

- **IPS e.max CAD Crystall./Add-On**
  Components: oxides

- **IPS e.max CAD Crystall./Add-On Liquid**
  components: water, propylene glycol, butandiol and chloride

- **IPS Object Fix Putty / Flow**
  Components: oxides, water, thickening agent

- **IPS Contrast Spray Labside**
  Components: pigment suspension in ethanol;
  propellant: propane/butane mixture

- **IPS Natural Die Material**
  Components: polymethacrylate, paraffin oil, SiO_2 and copolymer

- **IPS Natural Die Material Separator**
  Components: wax dissolved in hexane

- **IPS Ceramic Etching Gel**
  Components: hydrofluoric acid (approx. 5%)

Warning
- Hexane is highly flammable and detrimental to health. Avoid contact of the material with skin and eyes. Do not inhale vapors and keep away from sources of ignition.
- Do not inhale ceramic dust during finishing – use exhaust air discharge and mouth protection.
- IPS Ceramic Etching Gel contains hydrofluoric acid. Contact with skin, eyes and clothing must be prevented at all costs, since the material is extremely toxic and corrosive. The etching gel is intended for professional use only and must not be applied intra-orally (inside the mouth).
- IPS Contrast Spray Labside must not be used intra-orally.

Scientific Data

Further scientific data (e.g. strength, wear, biocompatibility) are contained in the "Scientific Documentation IPS e.max CAD". The Documentation also provides a set of studies that describe the clinical performance of IPS e.max CAD.
This Scientific Documentation can be obtained from Ivoclar Vivadent.

For further information about all-ceramics and IPS e.max in general, please refer to the Ivoclar Vivadent Reports No. 16 and No. 17.

Block Concept

IPS e.max CAD is available in **three levels of translucency (HT, LT, MO)** and **two sizes (I12, C14)**.
From a processing point of view, basically all restorations can be fabricated from any block.
For reasons of esthetics, however, the following processing techniques and indications are recommended for the individual blocks (translucency levels):

Translucency Level	Processing Technique			Indications					
	Staining Technique	Cut-Back Technique	Layering Technique	Inlays	Onlays	Veneers	Partial Crowns	Anterior Crowns	Posterior Crowns
High **T**ranslucency				✓	✓	✓	✓	✓	✓
Low **T**ranslucency						✓	✓	✓	✓
Medium **O**pacity CR %								✓	✓*

* up to the second premolar

IPS e.max CAD HT (High Translucency)

The HT Blocks are available in **16 A-D** and **4 Bleach BL shades** and **2 sizes (I 12, C 14)**. Given their translucency, they are ideally suitable for the fabrication of small restorations (e.g. inlays, onlays) by means of the staining technique, but they can also be used for the cut-back technique. Restorations made of HT blocks exhibit a true-to-nature chameleon effect and exceptional adaption to the remaining tooth structure. The stain and characterization firing, as well as glaze firing may be conducted with either IPS e.max CAD Crystall./Shades and Stains, Glaze, or IPS e.max Ceram Shades, Essences and Glaze.

IPS e.max CAD LT (Low Translucency)

The LT Blocks are available in **16 A-D** and **4 Bleach BL shades** and **2 sizes (I 12, C 14)**. Given their translucency, they are suitable for the cut-back and also the staining technique. Restorations made of LT blocks exhibit lifelike brightness value and chroma. This prevents the incorporated restorations from graying. The cut-back is supplemented with IPS e.max Ceram Incisal and/or Impulse and characterized using IPS e.max Ceram Essence and Shade.

IPS e.max CAD MO (Medium Opacity)

The MO Blocks are available in **5 group shades (MO 0-MO 4)** in **one size (C 14)**. Given their opacity, they are ideally suitable for the fabrication of frameworks on vital or slightly discolored preparations. The anatomical shape is individually layered using ISP e.max Ceram. Finally, the Stain/Glaze firing with IPS e.max Ceram is conducted.

The entire IPS e.max delivery program can be found at www.ivoclarvivadent.com!

CAD/CAM Partners

IPS e.max CAD can be processed with a system of the CAD/CAM partners. For questions regarding the different systems, please contact the respective cooperation partners.

Information is available from:
Sirona Dental Systems GmbH
Fabrikstrasse 31
64625 Bensheim
Germany
E-mail: contact@sirona.de
www.sirona.com

inLab® is a registered trademark of Sirona Dental Systems GmbH

Information is available from:
KaVo Dental GmbH
Bismarckring 39
88400 Biberach
Germany
E-mail:info@kavo.com
www.kavo-everest.com

Everest® is a registered trademark of KaVo Dental GmbH

Information is available from:
Diadem Digital Solutions LLC
1010 Naughton Drive
Troy, Michigan 48083
USA
1.888.934.2336
www.diadem-ids.com

IPS e.max® CAD

Clinical Working Steps, Fabrication Process

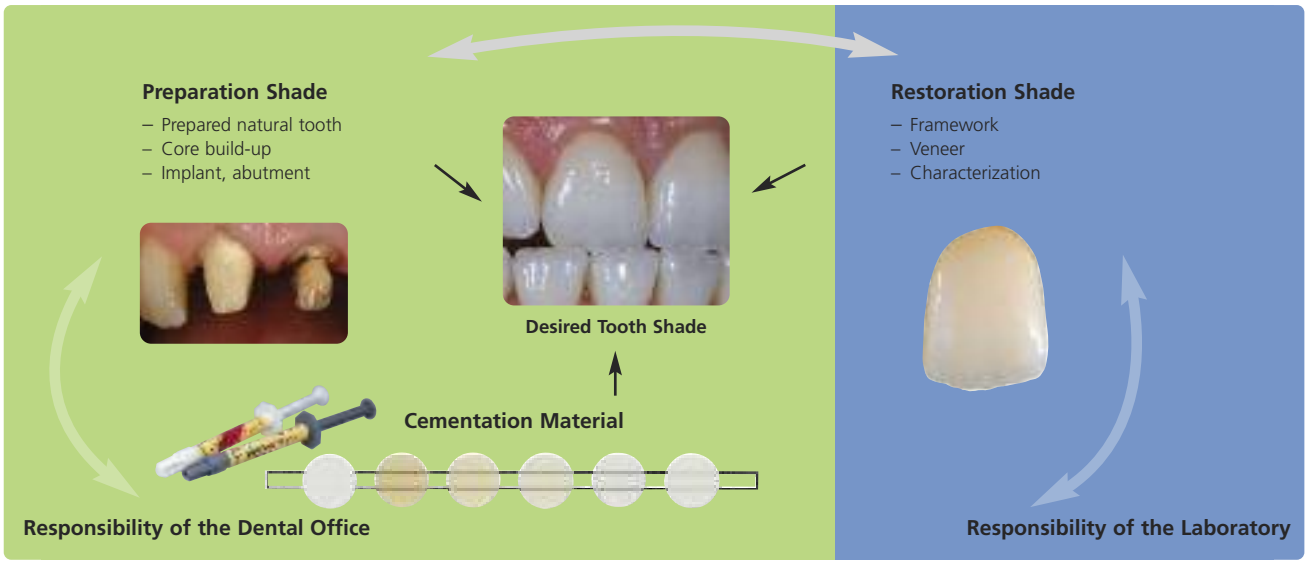
Working Step		Ivoclar Vivadent Products
Practice	Laboratory	
Preparation, Shade Determination Impression Taking		OptraGate, IPS Natural Die Material
Model Fabrication		
CAD/CAM Process		IPS Contrast Spray Labside IPS e.max CAD
Finishing, Check on Model		
Staining Technique Cut-Back Technique Layering Technique		IPS e.max CAD Crystall./Shades, Stains IPS e.max CAD Crystall./Glaze IPS CAD Crystallization Tray and Pins IPS e.max Ceram Layering Materials IPS e.max Ceram Shades, Essences, Glaze
Preparation for Cementation		IPS Ceramic Etching Gel Monobond Plus
Cementation		OptraGate OptraDam Variolink II, Variolink Veneer Multilink Automix SpeedCEM bluephase
Check of Articulation/Occlusion		OptraFine
Recall		Proxyt

Shade Determination — Tooth Shade, Shade of the Prepared Tooth

Optimum integration in the oral cavity of the patient is the prerequisite for a true-to-nature all-ceramic restoration. To achieve this, the following guidelines and notes must be observed by both the dentist and the laboratory.
The overall esthetic result of an all-ceramic restoration is influenced by the following factors:

- **Shade of the preparation** (natural preparation, core build-up, abutment, implant)
- **Shade of the restoration** (framework shade, veneer, characterization)
- **Shade of the cementation material**

The optical effect of the preparation shade must not be underestimated during the fabrication of highly esthetic restorations. For that reason, the shade of the preparation should be determined together with the desired tooth shade in order to select the suitable block. Especially with severely discolored preparations or non-tooth-shaded build-ups, this is of utmost importance. Only if the dentist determines the shade of the preparation and its subsequent transmission to the laboratory may the desired esthetic result be achieved.



Shade determination of the natural tooth

After tooth cleaning, the tooth shade of the non-prepared tooth and/or the adjacent teeth is determined with the help of a shade guide. Individual characteristics have to be considered when determining the tooth shade. If a crown preparation is planned, for example, the cervical shade should also be determined. In order to achieve the best possible true-to-nature results, shade determination should be carried out in daylight. Furthermore, the patient should not wear clothes of intense colors and/or lipstick.

Die shade selection

In order to facilitate the reproduction of the desired tooth shade, the shade of the preparation is determined with the help of the IPS Natural Die Material shade guide. This enables the technician to fabricate a model die similar to the preparation of the patient, on the basis of which the correct shade and brightness values of the all-ceramic restorations may be selected.

Example of the preparation shade effect

Crown made of IPS e.max CAD HT B1 on different preparation shades.

Which block should be used?

The suitable block is selected on the basis of the following criteria:

1. Desired tooth shade
2. Preparation shade or abutment shade
3. Type of restoration
4. Restoration thickness and/or preparation depth
5. Processing technique (staining, cut-back or layering technique)
6. Cementation material

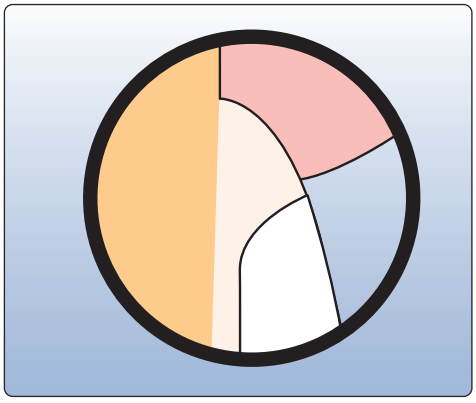
Please refer to the table on page 62 for block selection

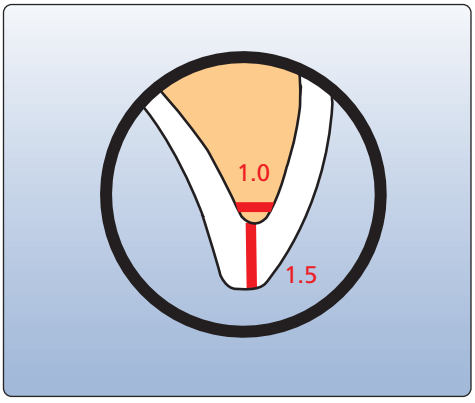
Preparation guidelines

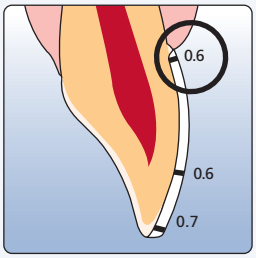
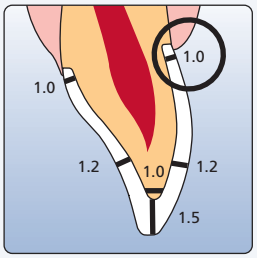
Successful results can only be achieved with IPS e.max CAD if the guidelines and framework thicknesses are strictly observed.

Basic preparation guidelines for all-ceramic restorations

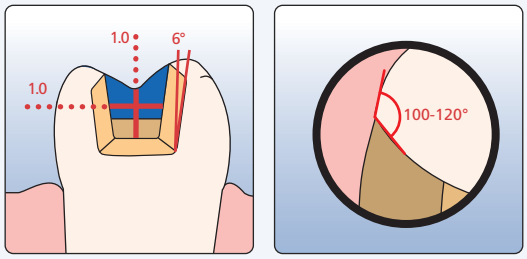
- no angles or sharp edges
- shoulder preparation with rounded inner edges and/or chamfer preparation
- the indicated dimensions reflect the minimum thickness for IPS e.max CAD restorations
- the incisal edge of the preparation, particularly for anterior teeth, should be at least 1.0 mm (milling tool geometry) in order to permit optimum milling during CAD/CAM processing.





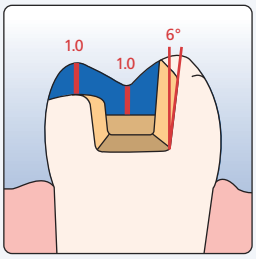
Veneer	Anterior crown
	
– If possible, the preparation should be located in the enamel. – The incisal preparation margins should not be located in the area of static or dynamic enamel contact. – Reduction in the cervical and/or labial area by 0.6 mm, and the incisal edge by 0.7 mm.	– Reduce the anatomical shape and observe the stipulated minimum thickness. Prepare a shoulder with rounded inner edges or a deep chamfer. Width of the shoulder/chamfer at least 1.0 mm. – Reduce the edge by approx. 1.5 mm. – Reduce the labial and lingual area by approx. 1.2 mm. – For conventional and/or self-adhesive cementation, the preparation must demonstrate retentive surfaces

Inlay



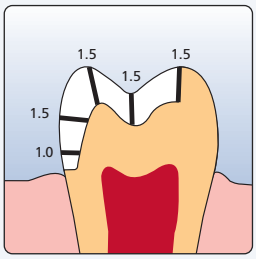
- Static and dynamic antagonist contacts must be taken into consideration.
- The preparation margins must not be located on centric antagonist contacts.
- A preparation depth of at least 1.0 mm and an isthmus width of at least 1.0 mm must be observed in the fissure area.
- Prepare the proximal box with slightly diverging walls and observe an angle of 100°-120° between the proximal cavity walls and the prospective proximal inlay surfaces. For inlays with pronounced convex cavity walls without adequate support by the proximal shoulder, marginal ridge contacts should be avoided.
- Round out internal edges in order to prevent stress concentration within the ceramic material.
- Do not prepare slice-cuts or feather edges.

Onlay



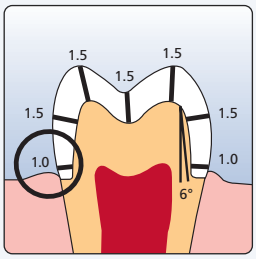
- Static and dynamic antagonist contacts must be taken into consideration.
- The preparation margins must not be located on centric antagonist contacts.
- A preparation depth of at least 1.0 mm and an isthmus width of at least 1.0 mm must be observed in the fissure area.
- Prepare the proximal box with slightly diverging walls and observe an angle of 100°-120° between the proximal cavity walls and the prospective proximal onlay surfaces. For onlays with pronounced convex cavity walls without adequate support by the proximal shoulder, marginal ridge contacts should be avoided.
- Round out internal edges in order to prevent stress concentration within the ceramic material.
- Do not prepare slice-cuts or feather edges.
- Provide at least 1.0 mm of reduction in the cusp areas.

Partial crown



- Static and dynamic antagonist contacts must be taken into consideration.
- The preparation margins must not be located on centric antagonist contacts.
- Provide at least 1.5 mm of reduction in the cusp areas.
- Prepare a circular shoulder with rounded inner edges or a deep chamfer. Width of the shoulder/chamfer should be at least 1.0 mm.

Posterior crown



- Reduce the anatomical shape and observe the stipulated minimum thickness. Prepare a circular shoulder with rounded inner edges or a deep chamfer. Width of the shoulder/chamfer at least 1.0 mm.
- Reduce the incisal crown third by approx. 1.5 mm.
- Reduce the buccal or lingual area by approx. 1.5 mm.
- For conventional and/or self-adhesive cementation, the preparation must demonstrate retentive surfaces

Model and Tooth Preparation

Fabricate a working model with removable segments as usual. The directions of the manufacturers of the different CAD/CAM systems regarding the plaster to be used must be observed.

Important for die preparation:
- Check the radius of the incisal/occlusal edge on the prepared die (maxilla and mandible).
- The prepared incisal edge should be at least as thick as the diameter of the bur used in the cavity during the CAD/CAM process.
- If the incisal edge of the prepared die is thinner than the diameter of the bur, the incisal edge has to be blocked out accordingly.
- Also observe the information provided by the manufacturer of the CAD/CAM system regarding the die geometry.

Inlay/onlay

Veneer and anterior crown

Posterior crown

Anterior crown on a ZrO_2 abutment
(Straumann® Anatomic IPS e.max® Abutment)

Layer thicknesses

The restoration design is key to the success of durable all-ceramic restorations. The more attention is given to the design, the better the final results and the clinical success will turn out to be. The following basic guidelines have to be observed:

- **IPS e.max CAD is the high-strength component of your restoration and must, therefore, always make up at least 50% of the total layer thickness of the restoration.**
- **In large preparations and for veneered or partially veneered restorations, the excess available space must be compensated by the corresponding dimensions of the high-strength IPS e.max CAD component and not by the IPS e.max Ceram layering material.**
- The design of the restoration generated by the software has to be individually adjusted, if necessary, in accordance with the clinical situation using the design tools.
- The areas that support and reinforce the shape and cusps of the restoration are constructed with the integrated design tools of the different types of software used.
- In partially veneered restorations, the transition between the layering material and IPS e.max CAD must not be located in the area of the functional contact points.

The following minimum thicknesses have to be observed to match the tooth shade of the shade guide and to fulfil the requirements given from the preparation guidelines:

		Veneer	Inlay	Onlay	Partial crown	Crowns		
						Anterior	Premolar	Molar
Minimum thickness IPS e.max CAD *Staining technique*	circular	0.6	1.0 isthmus width	1.0	1.5	1.2	1.5	1.5
	incisal/occlusal	0.7	1.0 isthmus width	1.0	1.5	1.5	1.5	1.5
Minimum thickness IPS e.max CAD *Cut-back technique (after reduction)*	circular	0.6	–	–	1.5	1.2	1.5	1.5
	labial/occlusal	0.4	–	–	1.3	0.4	1.0	1.3
Minimum thickness IPS e.max CAD *Layering technique*	circular	–	–	–	–	0.8	0.8	–
	incisal/occlusal	–	–	–	–	0.8	1.0	–
	design type	–	–	–	–	supporting the tooth shape		–

dimensions in mm

For the **cut-back** and **layering techniques** the relationship of the layer thickness between IPS e.max CAD (framework) and IPS e.max Ceram (veneer) must also be observed:

Total layer thickness of the restoration in mm	**0.8**	**1.0**	**1.2**	**1.5**	**1.8**	**2.0**	**2.5**	**3.0**
Minimum layer thickness of the framework ceramic mm	0.4	0.5	0.6	0.8	1.0	1.1	1.3	1.6
Maximum layer thickness of the veneer with IPS e.max Ceram in mm	0.4	0.5	0.6	0.7	0.8	0.9	1.2	1.4

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.

Design guidelines for the restoration

IPS e.max CAD

Veneering with IPS e.max Ceram

Staining Technique

– fully anatomical design

Anterior tooth | Premolar | Molar

Cut-back Technique

– partially reduced, cusp-supporting design

Anterior tooth | Premolar | Molar

Layering Technique

– cusp-supporting design

Anterior tooth | Premolar

CAD/CAM processing

As densification of about 0.2% takes place in IPS e.max CAD during the crystallization process. This factor has been taken into account in the software. Consequently, the milled IPS e.max CAD restorations demonstrate precision of fit after crystallization. The fabrication steps are described in the directions for use and user manuals of the different CAD/CAM systems. The instructions of the manufacturers must be followed:

Sirona – inLab® and inLab® MCXL

KaVo – Everest®

diadem

Diadem Digital Solutions LLC

IPS e.max® CAD –
Staining technique

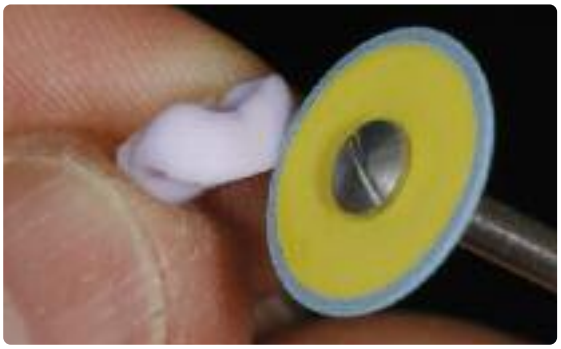
In the staining technique, the milled full-contour restorations are completed by applying stains and glaze materials. Individualized characterizations and glaze can be applied either before or after Crystallization firing. Coordinated materials are available for the different procedures.
In this way, the use of translucent IPS e.max CAD blocks permit the fabrication of very esthetic restorations on only slightly or non-discolored preparations with minimum effort.

Finishing

It is of critical importance to use the correct grinding instruments for finishing and adjusting IPS e.max CAD. If unsuitable grinding instruments are used, chipping of the edges and local overheating may occur (please observe the Ivoclar Vivadent Flow Chart "Recommended grinding tools for PS e.max glass-ceramics".

Observe the following procedure for finishing IPS e.max CAD restorations:
- Carry out adjustments by grinding of IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state, if possible.
- Only use suitable grinding instruments, low rpms and light pressure to prevent delamination and chipping at the edges in particular.
- Overheating of the glass-ceramic must be avoided.
- The restorations are tried in on the dies and carefully finished.
- Check proximal and occlusal contact points.
- Surface-grind the entire occlusal surface with a fine diamond to smooth out the surface structure created by the CAD/CAM procedure.
- Make sure that the minimum thicknesses are maintained even after the minor adjustments.
- Design surface textures.
- Always clean the restoration with ultrasound in a water bath or blast with the steam jet before crystallization.
- Make sure to thoroughly clean the restoration before further processing and to remove any residue of the milling additive of the CAD/CAM milling unit. Residue of the milling additive remaining on the surface may result in bonding problems and discolouration.
- **Do not blast the restorations with Al_2O_3 or glass polishing beads.**

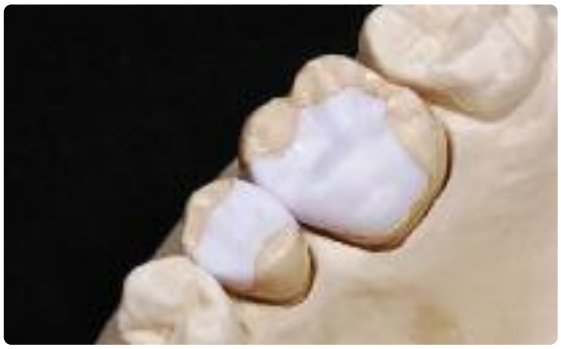
Finish the restoration surface with suitable grinding instruments



Finish margins with suitable polishers

Surface-grind the outer surface, particularly functional areas of the restoration with a fine diamond to smooth out the surface structure created by the CAD/CAM process

IPS e.max CAD LT crown on the model

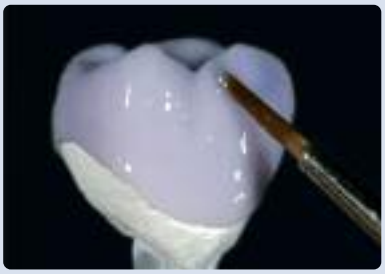


IPS e.max CAD HT inlay/onlay on the model.

Crystallization and Stain/Glaze Firing

Basically, fully anatomically milled restorations made of IPS e.max CAD can be completed in three different ways.

Option A:
Crystallization and Glaze firing with IPS e.max CAD Crystall./Glaze paste



Characterization of the non-crystallized, blue restoration permits quick completion of the restoration with the subsequent combination firing (Crystallization/Glaze HT/LT).

Option B:
Crystallization and Stain/Glaze firing with IPS e.max CAD Crystall./Glaze spray

Characterization of the non-crystallized, blue restoration permits quick completion of the restoration with the subsequent combination firing (Crystallization/Glaze HT/LT).

Option C:
Crystallization and separate Stain/Glaze firing with IPS e.max Ceram Shades, Essences and Glaze

Characterization of the tooth-colored restoration after crystallization.

Option A:

Crystallization and Glaze firing in one step with IPS e.max CAD Crystall./Glaze paste

In this processing technique, crystallization and Glaze firing are performed in one step. Characterizations are applied using IPS e.max CAD Crystall./Shades and Stains.

Preparation for Crystallization and Glaze firing

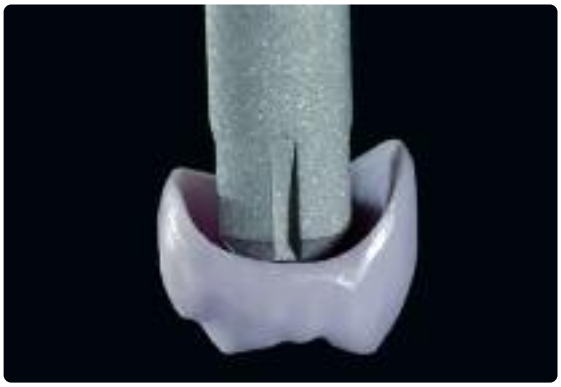
Depending on the type of restoration, they have to be placed on an IPS e.max CAD Crystallization Pin before the Stains and Glaze are applied. Smaller restorations (veneers, inlays, onlays) do not need to be entirely supported.
Either IPS Object Fix Putty or Flow are recommended to secure the restoration on the pin. The Putty demonstrates a denser consistency and thus higher stability. Given its lower viscosity, Flow is suitable for smaller restorations.

with IPS e.max CAD Crystallization Pin	**without** IPS e.max CAD Crystallization Pin
Partial Crown, Anterior Crown, Posterior Crown	**Veneer, Inlay, Onlay**
Use either IPS Object Fix Putty or Flow to secure the restoration on the pin.	To apply Glaze, Shades and Stains, secure the restoration – with an OptraStick, – with diamond tweezers, or – directly on the die **Note**: the restoration must be placed on a Crystallization pin with IPS Object Fix Putty or Flow before firing.

Observe the following procedure for partial crowns and crowns:

- Select the largest possible IPS e.max CAD Crystallization Pin (S, M, L) that best "fills" the inside of the restoration, but does not come into contact with the circular crown walls.
- Fill the inside of the restoration with IPS Object Fix Putty or Flow up to the restoration margin. **Immediately reseal the IPS Object Fix Putty/Flow syringe after extruding the material.** Once removed from the aluminium bag, the syringe is ideally stored in a resealable plastic bag or a container with a humid atmosphere.
- Press the selected IPS e.max CAD Crystallization Pin deeply into the IPS Object Fix Putty or Flow material so that it is adequately secured.
- Smooth out displaced auxiliary firing paste using a plastic spatula so that the pin is securely in place and the restoration margins are optimally supported.
- Prevent contamination of the outer restoration surface. Clean off contamination with a brush dampened with water and dry.

IPS Object Fix Flow and IPS Object Fix Putty



Select the largest possible IPS e.max CAD Crystallization Pin

Fill the inside of the crown with IPS Object Fix Putty or Flow.

Press the selected IPS e.max CAD Crystallization Pin deeply into the IPS Object Fix Putty or Flow material

Smooth out displaced IPS Object Fix Putty or Flow with a plastic spatula from the margin towards the spport pin so that the pin is secured in the paste and the crown wall is exactly supported

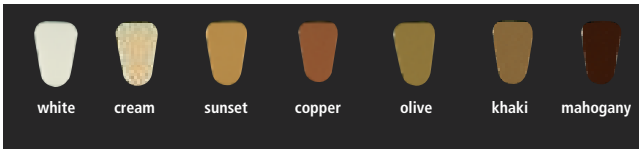
Clean off any possible residue adhering to the outer surface of the crown with a brush dampened with water and dry

Combination firing (Crystallization and Stain/Glaze firing in one step)

Before crystallization, IPS e.max CAD Crystall./Glaze, Shades and Stains are applied.

- IPS e.max CAD Crystall./Shades are ready-to-use "Dentin and Incisal" stains in syringes
- IPS e.max CAD Crystall./Stains are ready-to-use intensive stains in syringes
- IPS e.max CAD Crystall./Glaze Paste is a ready-to-use glazing paste

IPS e.max CAD Crystall./Shades



IPS e.max CAD Crystall./Stains

Please observe the following procedure:

- Hold the restoration by the firing pin and apply IPS e.max CAD Crystall./Glaze Paste evenly on the entire restoration using a brush.
- Hold inlays, onlays or veneers with an OptraStick or diamond tweezers when applying IPS e.max CAD Crystall./Glaze Paste, or directly apply paste while the restoration is seated on the die.
- If a slight thinning is desired, the glaze may also be mixed with a little IPS e.max CAD Crystall./Glaze Liquid.
- Avoid applying too thick a glaze layer. Avoid pooling, especially on the occlusal surface.
- Too thin a glaze layer may lead to an unsatisfactory gloss.
- If characterizations are desired, the restoration can be individualized using IPS e.max CAD Crystall./Shades and Stains before Crystallization firing.
- Extrude Shades and Stains from the syringe and mix thoroughly.
- The Shades and Stains may be slightly thinned using IPS e.max CAD Crystall./Glaze Liquid. However, the consistency should still remain pasty.
- Apply mixed Shades and Stains directly into the unfired glaze layer using a fine brush.

Procedure for partial crowns, anterior crowns, posterior crowns

Hold the restoration by the firing pin and apply IPS e.max CAD Crystall./Glaze Paste evenly on the blue restoration

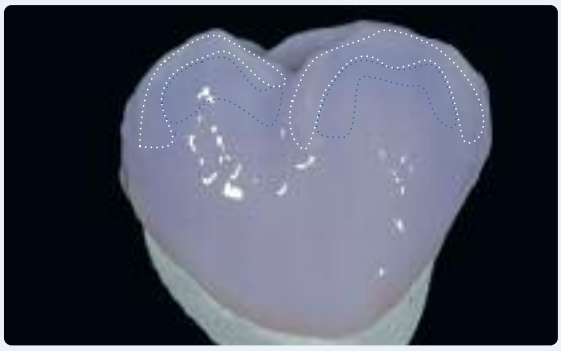
Apply the mixed IPS e.max CAD Crystall./Shades and Stains directly into the unfired IPS e.max CAD Crystall./Glaze Paste

Procedure for veneers, inlays, onlays

Secure inlays, onlays on an OptraStick for the application of IPS e.max CAD Crystall./Glaze Paste, Shades and Stains

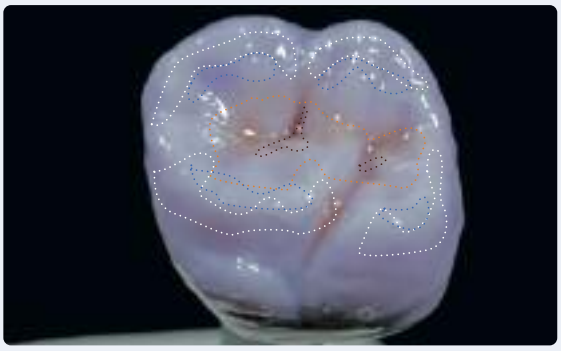
Example: Individualized characterizations are applied using IPS e.max CAD Crystall./Shades and Stains on the blue restoration; shade A2

Buccal view



Slight characterizations on the buccal surfaces using IPS e.max CAD Crystall./Shades and Stains

Occlusal view



Occlusal characterizations using IPS e.max CAD Crystall./Shades and Stains

- Cusp inclinations: Shade Incisal I1
- Fissures: Stains mahogany
- Cusps, marginal ridges: Stains white/cream
- Reinforcing the chroma: Stains sunset/copper

Example of IPS e.max CAD Crystall./Shades and Stains applied too thickly

Too thick a layer of IPS e.max CAD Crystall./Shades

Too thick a layer or IPS e.max CAD Crystall./Shades and Stains

Place the restoration in the center of the IPS e.max CAD Crystallization Tray and fire using the stipulated parameters

After glazing and staining, the Combination firing (crystallization/glaze) is conducted in a compatible ceramic furnace (e.g. Programat® P700). When placing the objects into the furnace and setting the firing parameters, observe the following points:

– Place the restoration including the pin into the center of the IPS e.max CAD Crystallization Tray.
– Place veneers, inlays and onlays directly on the IPS e.max CAD Crystallization Pin with a small amount of IPS Object Fix Flow.
– A maximum of 6 restorations can be positioned on the firing tray and crystallized using the Combination firing with IPS e.max CAD Crystall./Glaze Paste.
– Conduct the Combination firing (Speed Crystallization/Glaze LT/HT) using the stipulated parameters.

Firing parameters Crystallization/Glaze LT/HT

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	7:00	550/820 1022/1508	820/840 1508/1540	700/1292	0

Please note:
– **Crystallization/Glaze HT/LT can only be used for IPS e.max CAD HT and LT.**
– **IPS e.max Ceram materials (Essences, Shades etc.) must not be used in combination with IPS e.max CAD Crystall./Glaze, Shades and Stains.**

Note
Cooling after firing
– **Remove IPS e.max CAD objects from the furnace after completion of the firing cycle (wait for the acoustic signal of 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.**

If additional characterizations or adjustments are required after crystallization, a corrective firing using IPS e.max CAD Crystall./Shades, Stains and Glaze can be conducted. Conduct the corrective firing also on the IPS e.max CAD Crystallization Tray.

For minor shape adjustments (e.g. proximal or occlusal contact points), IPS e.max CAD Crystall./Add-On is available . The adjustments may be made with both Crystallization/Glaze and Corrective firing.
The detailed procedure is described on page 30.

Firing parameters for the Corrective firing

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	3:00	550/820 1022/1508	820/840 1508/1540	700/1292	0

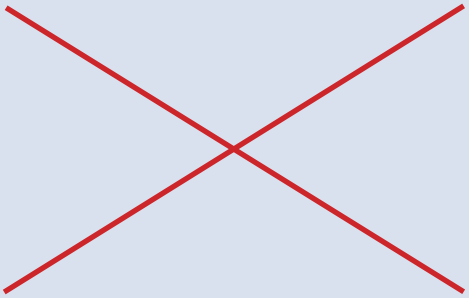
Option B:

Crystallization and Stain/Glaze firing in one step with IPS e.max CAD Crystall./Glaze Spray

IPS e.max CAD Crystall./Glaze Spray is used instead of IPS e.max CAD Crystall./Glaze Paste. The spray should only be used if IPS Object Fix auxiliary firing paste is adapted up to the margins.

Preparation for Crystallization and Glaze firing

If IPS e.max CAD Crystall./Glaze Spray is used, all the restorations, irrespective of their geometry, have to be placed on the IPS e.max CAD Crystallization Pin with the help of IPS Object Fix Putty or Flow.

with IPS e.max CAD Crystallization Pin	**without** IPS e.max CAD Crystallization Pin
Veneers, inlays, onlays, partial crowns, anterior crowns, posterior crowns Exactly adapt IPS Object Fix Putty or Flow to the restoration margin so that the Glaze Spray is prevented from reaching the inner aspects.	

Procedure:

- Secure the restoration on a suitable IPS e.max CAD Crystallization Pin as described in Option A.
- Make sure that the auxiliary firing paste (IPS Object Fix Putty or Flow) is flush with the restoration margin. If veneers, inlays, and onlays are glazed with Glaze Spray, they also have to be enclosed in firing paste exactly to the restoration margin.

Combination firing (Crystallization and Stain/Glaze firing in one step)

- Before starting the characterization and glazing procedure, make sure the outside of the restoration is free of auxiliary firing paste.
- If characterizations are desired, the restoration can be individualized using IPS e.max CAD Crystall./Shades and IPS e.max CAD Crystall./Stains before Crystallization firing.
- Extrude ready-to-use Shades and Stains from the syringe and mix thoroughly.
- The Shades and Stains may be slightly thinned using IPS e.max CAD Crystall./Glaze Liquid. However, the consistency should still remain pasty.
- Apply mixed Shades and Stains directly on the blue restoration using a brush.

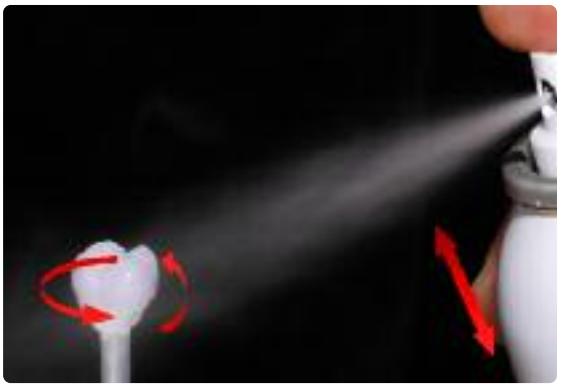
Extrude IPS e.max CAD Crystall./Shades and Stains from the syringe and mix thoroughly. If required, thin with IPS e.max CAD Crystall./Glaze Liquid

Apply mixed Shades and Stains directly on the blue restoration

Please observe the following procedure for the application of the IPS e.max CAD Crystall./Glaze Spray:

– Hold the restoration by the IPS e.max CAD Crystallization Pin. Do not spray the restoration while it is placed on the IPS e.max CAD Crystallization Tray, as it would also be coated with glaze.
– Shake the spray can well immediately before use until the mixing ball in the container is moving freely (approximately 20 seconds). If the spray is not sufficiently shaken, mainly the propellant is discharged with a spraying burst. This, in turn, results in insufficient application of the glazing powder.
– Observe a distance of approx. 10 cm between the nozzle and the surface to be sprayed.
– Hold the spray can as upright as possible during spraying.
– Spray the restoration from all sides with short bursts while simultaneously rotating the restoration so that an even, covering layer is created. Shake the spray can again between individual bursts.
– Spray the restoration a second time from all sides with short bursts while simultaneously rotating the restoration so that an even, covering layer is created. Shake the spray can again between individual bursts.
– Wait briefly until the glaze layer is dry and has assumed a whitish color.
– Areas that do not show an even layer have to be sprayed again.
– Place the restoration in the center of the IPS e.max CAD Crystallization Tray.
– Conduct the Combination firing (Crystallization/Glaze LT/HT) using the stipulated parameters.

Hold the restoration by the IPS e.max CAD Crystallization Pin.



Spray the IPS e.max CAD Crystall./Glaze Spray directly on the unfired IPS e.max CAD Crystall./Shades and Stains. Spray the restoration from all sides while simultaneously rotating it.

Shake the spray can again between individual bursts.

Spray an even layer onto the restoration.

Allow the IPS e.max CAD Crystall./Glaze Spray to dry briefly until a whitish layer has formed. If required, spray the restoration again to achieve an even Glaze Spray layer on the IPS e.max CAD restoration.

Place the restoration in the center of the IPS e.max CAD Crystallization Tray and fire using the stipulated parameters.

Firing parameters Crystallization / Glaze LT/HT

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	7:00	550/820 1022/1508	820/840 1508/1540	700/1292	0

Please note:

- **Crystallization/Glaze HT/LT can only be used for IPS e.max CAD HT and LT.**
- **If only max. two restorations are crystallized at the same time, the closing time S can be reduced to 1:30 min. This reduced time is only for Glaze Spray. Glaze Paste may not be used.**
- **IPS e.max Ceram materials (Essences, Shades etc.) must not be used in combination with IPS e.max CAD Crystall./Glaze, Shades, Stains.**

Note

Cooling after firing

- **Remove IPS e.max CAD objects from the furnace after completion of the firing cycle (wait for the acoustic signal of 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.**

If additional characterizations or adjustments are required after crystallization, a corrective firing using IPS e.max CAD Crystall./Shades and Stains and Glaze can be conducted. Conduct the corrective firing also on the IPS e.max CAD Crystallization Tray.

For minor shape adjustments (e.g. proximal or occlusal contact points), IPS e.max CAD Crystall./Add-On is available. The adjustments may be made with both Crystallization/Glaze and Corrective firing.
The detailed procedure is described on page 30.

Firing parameters for the Stain and Correction firing

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	3:00	550/820 1022/1508	820/840 1508/1540	700/1292	0

Example of incorrect Glaze Spray application

Problem/Cause	Before Firing Application of the Glaze Spray	After Firing Detailed view of the surface
Problem: **Not enough Glaze Spray** on the restoration **Possible cause:** – Distance between the spray can and the restoration too far – Spraying too short – Spray can not shaken sufficiently – Spray can held not upright during spraying	 Insufficient application of IPS e.max CAD Crystall./Glaze Spray	 Insufficient gloss or imcomplete glossy layer
Problem: **Too much Glaze Spray** on the restoration **Possible cause:** – Distance between the spray can and the restoration too close – Too much Glaze Spray applied	 Too much IPS e.max CAD Crystall./Glaze Spray applied	 Loss of texture and too glossy surface

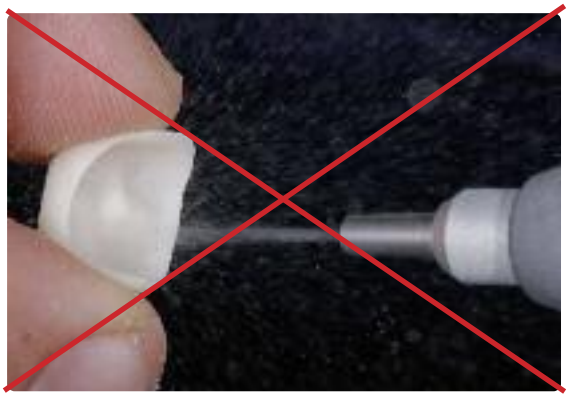
Once the IPS e.max CAD restoration has cooled to room temperature, proceed with the following steps:

– Remove the restoration from the hardened IPS Object Fix Putty or Flow..
– Remove any residue with ultrasound in a water bath and/or with steam.
– **Do not blast the framework with Al_2O_3 or glass polishing beads.**
– Place the restoration on the model, check fit and make slight adjustments, if necessary.
– If adjustments by grinding of the restoration are required, make sure that no overheating of the ceramic occurs.
– If the restoration is ground, manually polish the corresponding areas to a high gloss after grinding.

Remove the cool restoration from the hardened IPS Object Fix Putty or Flow.

Remove residue with ultrasound in a water bath…

… or with steam



Do not blast the restoration with Al_2O_3

IPS e.max CAD LT crown on the model after Combination firing

Onlay and inlay made of IPS e.max CAD HT after Combination firing

Optional

Adjustments with IPS e.max CAD Crystall./Add-On

For minor shape adjustments (e.g. proximal or occlusal contact points), IPS e.max CAD Crystall./Add-On is available . The adjustments may be made with both Crystallization/Glaze and Corrective firing.

Processing:

- Mix IPS e.max CAD Crystall/Add-On with IPS e.max CAD Crystall/Add-On Liquid to an easy-to-contour consistency.
- Ensure even mixing of the add-on material and the liquid in order to achieve an optimum firing result.
- Apply the mixed add-on material directly on the unfired Glaze Paste and/or Shades and Stains in the areas to be adjusted and fire.
- If the Glaze Spray is used, apply the Shades and Stains first. Subsequently, supplement the missing areas using Add-On. Apply the Glaze Spray immediately after the application of the Add-On and fire.
- Conduct the Combination firing (crystallization/glaze HT/LT) after the application of Add-On on the "blue", non-crystallized restoration.
- Conduct the Corrective firing if Add-On is applied on an already crystallized restoration.

Mix IPS e.max CAD Crystall/Add-On with IPS e.max CAD Crystall/Add-On Liquid to an easy-to-contour consistency

Application of the mixed Add-On on the blue restoration before crystallization

Application of the mixed Add-On on the crystallized restoration

Firing parameters Crystallization / Glaze HT/LT

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°Fmin]	Firing temperature T_2 [°C]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t_l [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	7:00	550/820 1022/1508	820/840 1508/1544	700/1292	0

Firing parameters for the Corrective firing

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°Fmin]	Firing temperature T_2 [°C]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t_l [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	3:00	550/820 1022/1508	820/840 1508/1544	700/1292	0

Option C:

Crystallization and separate Stain/Glaze firing

In this processing technique, the IPS e.max CAD restorations are crystallized in a first step without applying any Stains and Glaze materials. Subsequently, the Stain and Glaze firing of the tooth-colored restoration is conducted.

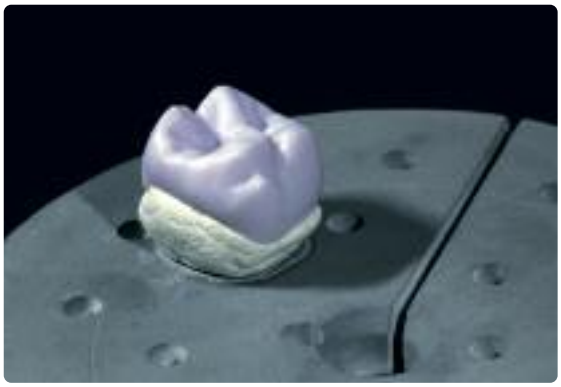
For this technique, the IPS e.max Ceram Shades, Essences and Glaze materials are required.

IPS e.max CAD Crystall./ Shades, Stains, Glaze and IPS e.max Ceram Shades, Essence, Glaze must not be mixed with one another!

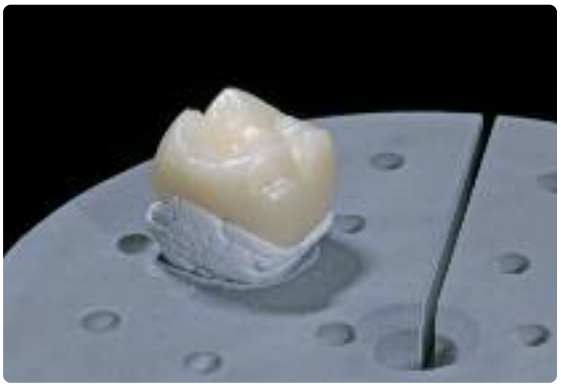
Crystallization

Observe the following procedure for the crystallization of IPS e.max CAD restorations:

- Always clean the restoration with ultrasound in a water bath or blast with the steam jet before crystallization.
- **Do not blast the restoration with Al_2O_3 or glass polishing beads.**
- Use only IPS Object Fix Putty or Flow as an auxiliary firing paste to ideally place the restoration on the firing tray.
- Slightly overfill the restoration with the auxiliary firing paste so that there is a reservoir.
- Place the restoration in the center of the IPS e.max CAD Crystallization Tray and fire using the stipulated parameters.
- Use only the IPS e.max CAD Crystallization Tray from Ivoclar Vivadent, since it stores the heat necessary for slow and above all tension-free cooling of the restoration.



Fill the entire cavity with IPS Object Fix Putty or Flow and place the restoration on the IPS e.max CAD Crystallization Tray



Remove the crystallization tray from the furnace once the crystallization program has been completed. and allow it to cool

Firing parameters Crystallization / Glaze HT/LT

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	7:00	550/820 1022/1508	820/840 1508/1540	700/1292	0

Please note:

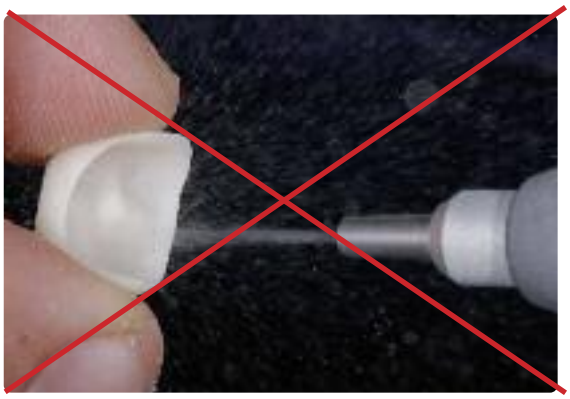
- **Crystallization/Glaze HT/LT can only be used for IPS e.max CAD HT and LT.**
- **If only max. <u>two</u> restorations are crystallized at the same time, the closing time S can be reduced to 1:30 min.**

Once the IPS e.max CAD restoration has cooled to room temperature, proceed with the following steps:

– Remove the restoration from the hardened IPS Object Fix Putty or Flow.
– Remove any residue with ultrasound in a water bath and/or with steam.
– **Do not blast the framework with Al_2O_3 or glass polishing beads.**
– Place the restoration on the model, check fit and make slight adjustments, if necessary.
– If adjustments by grinding of the restoration are required, make sure that no overheating of the ceramic occurs.

Remove residue with ultrasound in a water bath…

… or with steam.



Do not blast the restoration with Al_2O_3 or glass polishing beads

Die fabrication with IPS Natural Die Material

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. Please observe the following procedure:

- Coat the inner surfaces of the ceramic restoration with IPS Natural Die Material Separator and allow it to react for a short time.
- Apply the selected IPS Natural Die Material on the inner aspects of the restoration using the IPS Condenser. Make sure that the entire inner aspect is covered and filled.
- Insert the IPS Die Holder into the material and adapt excess around the die holder. Make sure that there is no gap at the restoration margins.
- Cure the IPS Natural Die Material die in a customary light polymerization device for 60 seconds.
- If necessary, the die can be further finished and smoothed after polymerization.

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

Apply IPS Natural Die Material in the restoration and place the die holder.

Cure in a customary light polymerization device.

Stain and Glaze firing

After the restoration has been cleaned, the Stain and Glaze firing is conducted. Use IPS e.max Ceram Shades, Essences and Glaze for these firing procedure.

– IPS e.max Shades are ready-to-use stains in syringes.
– IPS e.max Ceram Essences are intensively shaded powdered stains, which are mixed with IPS e.max Ceram Glaze and Stain Liquid.
– IPS e.max Ceram Glaze Paste is a ready-to-use glaze paste supplied in a syringe.
– IPS e.max Ceram Glaze Spray is a ready-to-use glaze spray.

Please observe the following procedure:
– Depending on the situation, the Stain and Glaze firing may be conducted together or separately one after the other. A separate Stain firing permits exact shade match with the given clinical situation.
– If more pronounced characterizations are required, a separate Stain and Characterization firing is recommended, rather than the application of a thicker stains layer. Conduct it as a second firing after Glaze firing.

Application of IPS e.max Ceram Essences and Shades before the Stain and Characterization firing.

Application of IPS e.max Ceram Glaze before Glaze firing.

Firing parameters for the Stain and Characterization firing, Glaze firing

IPS e.max Ceram on IPS e.max CAD ***Staining Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V1** [°C/°F]	**V2** [°C/°F]
Stain and Characterization firing	403/757	6:00	60/108	770/1418	1:00-2:00	450/842	769/1416
Glaze firing	403/757	6:00	60/108	770/1418	1:00-2:00	450/842	769/1416

Completed IPS e.max CAD LT crown after Glaze firing

IPS e.max® CAD
Cut-Back Technique

In the cut-back technique, IPS e.max Ceram Impulse and Incisal materials are applied in the incisal and/or occlusal area of the milled, reduced IPS e.max CAD. Subsequently, the Stain and Glaze firing is conducted. The limited application of layering material permits achieving highly esthetic restoration in an efficient manner.

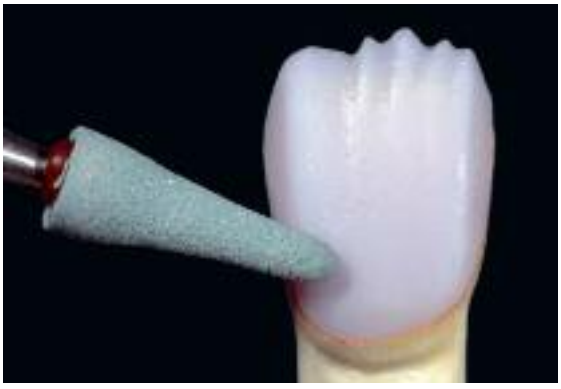
Finishing and Preparation for Crystallization

It is of critical importance to use the correct grinding instruments for finishing IPS e.max CAD. If unsuitable grinding instruments are used, chipping of the edges and local overheating may occur (please observe the Ivoclar Vivadent Flow Chart "Recommended grinding tools for PS e.max glass-ceramics".

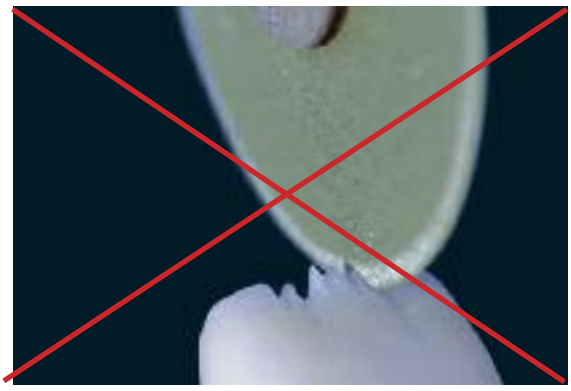
Observe the following procedure for finishing IPS e.max CAD restorations:
- Carry out adjustments by grinding of IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state, whenever possible.
- Only use suitable grinding instruments, low rpms and light pressure to prevent delamination and chipping at the edges in particular.
- Overheating of the glass-ceramic must be avoided.
- The restorations are tried in on the dies and carefully finished.
- Depending on the type of reduction, check contact points and occlusion and adjust by grinding in accordance with the given clinical situation.
- Make sure that the minimum thicknesses are maintained even after the minor adjustments.
- Refrain from designing extreme morphologies with undercuts for mamelons.
- Always clean the restoration with ultrasound in a water bath or blast with the steam jet before crystallization.
- **Do not blast the framework with Al_2O_3 or glass polishing beads.**

Try in the milled restoration on the model.
Tooth 11: anterior crown with cut-back
Tooth 21: fully anatomical veneer

Make sure that the minimum layer thickness of the restoration is maintained during finishing



Finish the restoration surface with suitable grinding instruments



Refrain from designing extreme morphologies with undercuts for mamelons

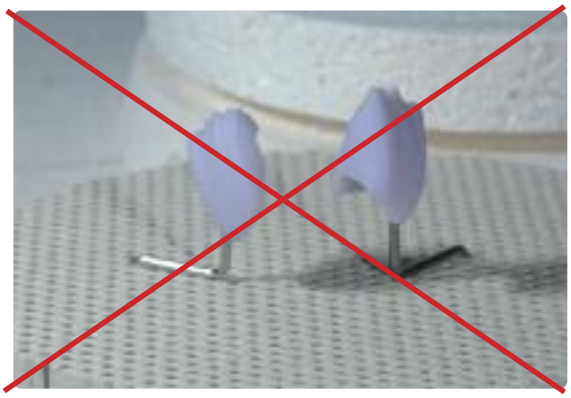
Veneer and anterior crown on dies

Anterior crown on ZrO_2 abutment (Straumann® Anatomic IPS e.max® Abutment)

Crystallization

The following points should be observed for the crystallization:

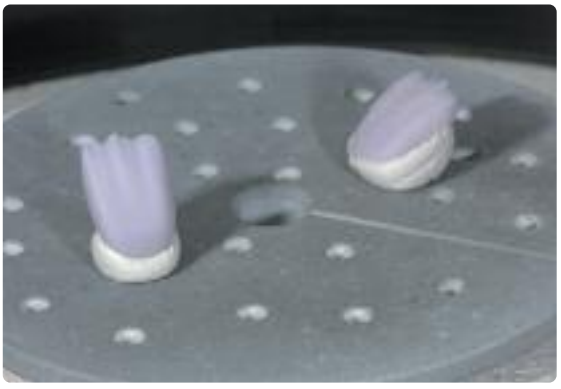
- Crystallization should be carried out in an Ivoclar Vivadent furnace (e.g. Programat P300, P500 or P700).
- Use only IPS Object Fix Putty or Flow as an auxiliary firing paste to ideally place the restoration on the firing tray.
- Slightly overfill the restoration with the auxiliary firing paste so that there is a reservoir.
- Use only the IPS e.max CAD Crystallization Tray, since it stores the heat necessary for slow and above all tension-free cooling of the restoration.



Do not place the IPS e.max CAD restoration on metal pins and do not use a honey-combed firing tray

Slightly overfill the restoration cavity with IPS Object Fix Putty or Flow

Place the restoration on the IPS e.max CAD Crystallization Tray



Place the firing tray in the furnace and start the crystallization with the respective parameters

Firing parameters Crystallization/Glaze HT/LT

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t [°C/°F/min]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	7:00	550/820 1022/1508	820/840 1508/1540	700/1292	0

Please note:

- **Crystallization/Glaze HT/LT can only be used for IPS e.max CAD HT and LT.**
- **If only max. two restorations are crystallized at the same time, the closing time S can be reduced to 1:30 min.**

Note

Cooling after firing

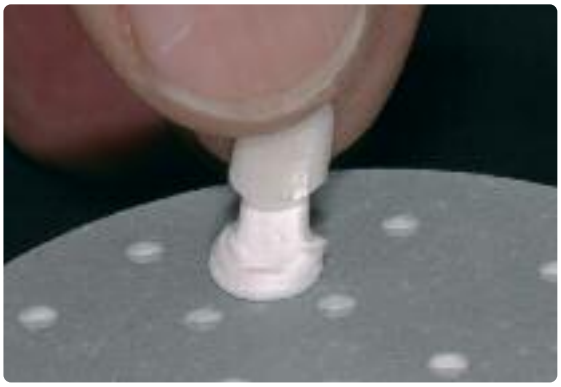
- **Remove IPS e.max CAD objects from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).**
- **Allow the objects to cool to room temperature in a place protected from draft.**
- **Do not touch the hot objects with metal tongs.**
- **Do not blast or quench the objects.**

Preparing for veneering

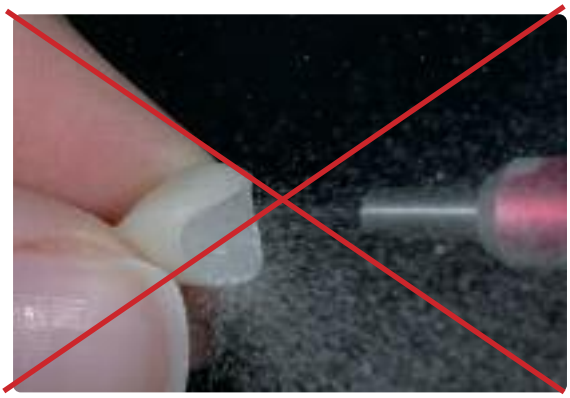
Once the IPS e.max CAD restoration has cooled to room temperature, proceed with the following steps:

- Remove the restoration from IPS Object Fix Putty or Flow.
- Remove any residue with ultrasound in a water bath and/or with steam.
- **Do not blast the framework with Al_2O_3 or glass polishing beads.**
- Place the restoration on the model, check fit and make slight adjustments, if necessary.
- Check margins and finish with rubber wheels, if required.
- Make sure that the minimum thicknesses are maintained even after the minor adjustments.
- Before veneering, clean the framework with the steam jet.
- **Do not blast the restoration with Al_2O_3 or glass polishing beads.**

Remove the crystallization tray from the furnace once the crystallization program has been completed and allow it to cool to room temperature



Remove the restoration from the hardened auxiliary firing paste



Do not blast the restoration with Al_2O_3

Remove residue with ultrasound in a water bath…

… or with steam

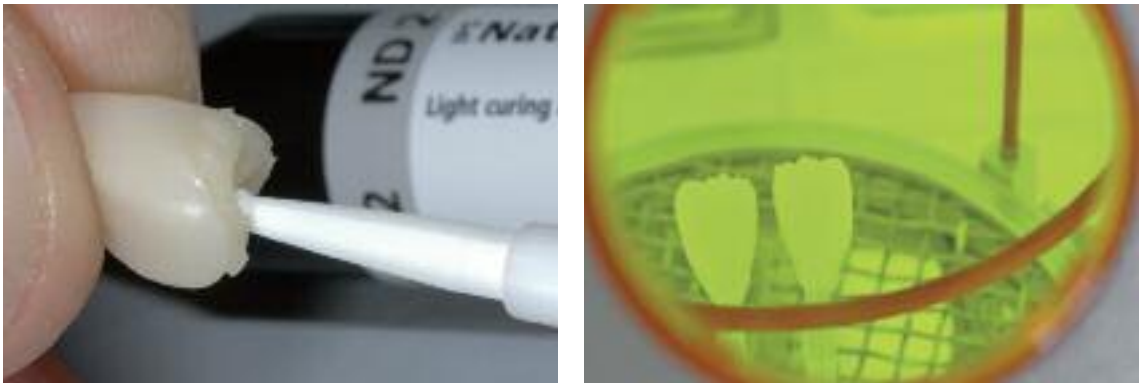
Reduced IPS e.max CAD framework prepared for veneering

Die fabrication with IPS Natural Die Material

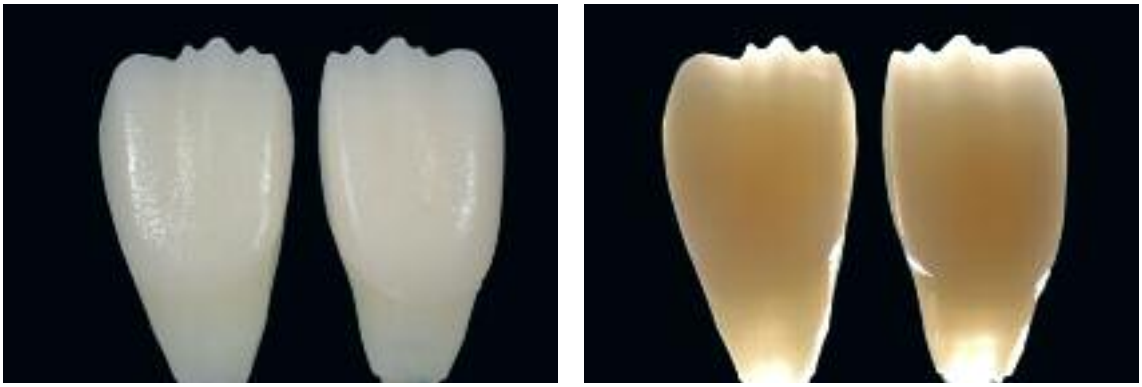
The light-curing IPS Natural Die Material simulates the shade of the preparation. Fabricate a die according to the shade information supplied by the dentist (shade selection), which serves as the optimum basis for a true-to-nature shade reproduction of the given oral situation. Please observe the following procedure:

- Coat the inner surfaces of the ceramic restoration with IPS Natural Die Material Separator and allow it to react for a short time.
- Apply the selected IPS Natural Die Material on the inner aspects of the restoration using the IPS Condenser. Make sure that the entire inner aspect is covered and filled.
- Insert the IPS Die Holder into the material and adapt excess around the die holder. Make sure that there is no gap at the restoration margins.
- Cure the IPS Natural Die Material die in a customary light-polymerization device for 60 seconds.
- If necessary, the die can be further finished and smoothed after polymerization.

Coat the inner surfaces of the ceramic restoration with IPS Natural Die Material Separator and allow it to react for a short time

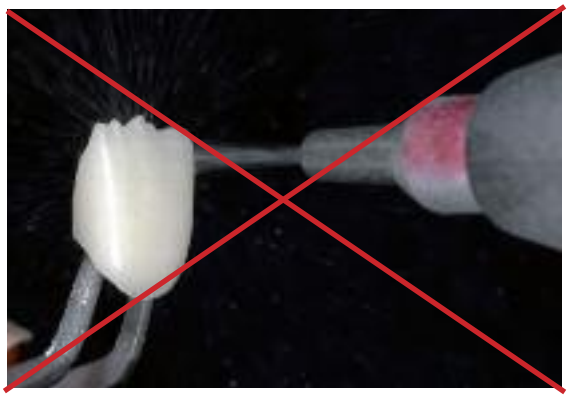


Completely fill the restoration, insert the IPS Die Holder into the material, adapt excess around the die holder, and cure in a customary light polymerization device



A die made of IPS Natural Die Material provides the optimum basis for true-to-nature all-ceramic restorations

Before veneering, clean the framework with running water or the steam jet



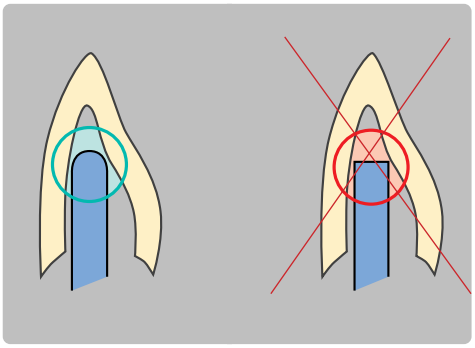
Do not blast the framework with Al_2O_3 or glass polishing beads.

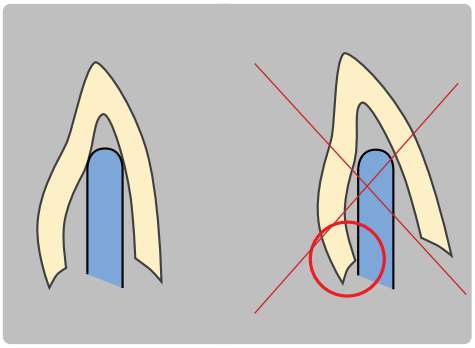
Veneering with IPS e.max Ceram

The following paragraphs will explain the most important veneering steps. For further information on the nano-fluorapatite layering ceramic and its processing, please refer to the IPS e.max Ceram Instructions for Use.

Firing tray and pins

Use a honey-combed firing tray (e.g. IPS® UniTray) and the corresponding support pins to fire the restorations (do not use IPS e.max CAD Crystallization Tray or IPS e.max CAD Crystallization Pins). Round the top edges of the support pin to prevent the restoration from sticking to the pin. Another method of reducing this risk is to cover the pins with platinum foil or a small amount of IPS Object Fix Putty or Flow. Regularly clean the support pins. Do not use contaminated pins.





Wash firing (foundation)

The restoration must be free of dirt and grease before the wash firing is done. Any contamination after cleaning must be prevented. Wash firing is carried out with IPS e.max Ceram Incisal and Impulse materials or Shades and Essences.

Option A: Powder

Conduct the wash firing with the required IPS e.max Ceram Incisal and/or Impulse materials. Use the IPS e.max Ceram Build-Up Liquids allround or soft to mix the materials. If a more plastic consistency is desired, IPS e.max Ceram Glaze and Stain Liquid allround or longlife can be used. Apply the wash in a thin coat on the entire framework.

Apply the wash using Incisal and/or Impulse materials…

…and fire using the indicated firing parameters

Option B: Glaze, Shades and Essence

To enhance the in-depth chroma effect or for individualized internal characterizations, the wash firing can be conducted with Glaze, Shades and Essence. Mix the paste or powder with the IPS e.max Ceram Glaze and Stain Liquids allround or longlife to the desired consistency. Apply the wash in a thin coat on the entire framework.

Apply the wash using Glaze, Shades, and Essence…

…and fire using the indicated firing parameters

Firing parameters for the Wash firing (foundation firing)

IPS e.max Ceram on IPS e.max CAD ***Cut-Back Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V_1** [°C/°F]	**V_2** [°C/°F]
Wash firing (foundation)	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380

Layering materials must not be applied on unfired wash layers (powders and pastes), since this will result in a delamination of the layering ceramic. The wash (foundation) must be fired before the actual layering procedure is started.

Incisal firing

With the Incisal firing, the anatomical shape is completed and the individual esthetic appearance achieved. The layering procedure is conducted with IPS e.max Ceram Transpa and Impulse materials. To achieve the desired consistency, the IPS e.max Ceram Build-Up Liquid allround and soft can be used.
If a different consistency is desired, the liquids can also be mixed in any ratio.

Design the incisal edge using Impulse and Transpa materials

Complete the layering procedure with Incisal and Transpa materials

Fire with the firing parameters for Incisal firing

Firing parameters for the Incisal firing

IPS e.max Ceram on IPS e.max CAD ***Cut-Back Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V_1** [°C/°F]	**V_2** [°C/°F]
Incisal firing	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380

Due to the thin material layer and the thus resulting limited shape change during firing, the cut-back technique also allows to complete the restoration with one firing cycle. If a second Incisal firing is required, however, it can be conducted using the same firing parameters.

Finishing and preparing for the Stain and Glaze firing

Before the Stain and Glaze firing, the restoration has to be finished as follows:

– Finish the restoration using diamonds and give it a true-to-nature shape and surface structure, such as growth lines and convex/concave areas.
– If gold and/or silver dust was used to visualize the surface texture, the restoration has to be thoroughly cleaned with steam. Make sure to remove all gold or silver dust in order to avoid any discoloration.

Finish the restoration with diamonds and give it a true-to-nature shape and surface structure

Stain and Glaze firing

Stain firing is conducted with IPS e.max Ceram Essence and IPS e.max Ceram Shades, while Glaze firing is carried out with IPS e.max Ceram Glaze powder or paste. Depending on the situation, the Stain and Glaze firings may be conducted together or separately one after the other. The firing parameters are identical.
In order to achieve an even gloss during Glaze firing of cut-back restorations veneered with IPS e.max Ceram, two different procedures are possible:

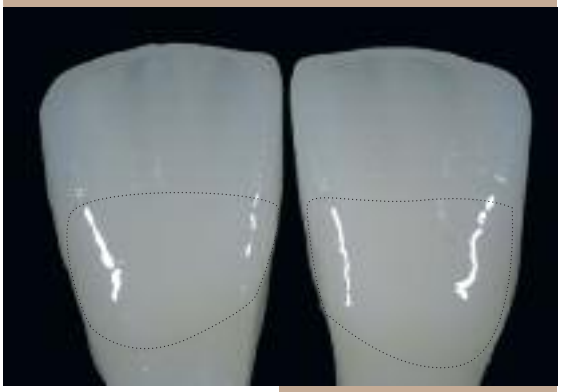
Standard
(high-gloss appearance)

- Prepolish unlayered areas (IPS e.max CAD) using rubber wheels.
- Rub the surface with moist ceramic (layering material) in order to improve the wetting properties of the surface.
- Clean the restoration with steam.
- Apply IPS e.max Ceram Glaze on the entire restoration.

Apply IPS e.max Ceram Glaze on the entire restoration

Option
(true-to-nature appearance)

- Prepolish unlayered areas (IPS e.max CAD) using rubber wheels.
- Rub the surface with moist ceramic (layering material) in order to improve the wetting properties of the surface.
- Clean the restoration with steam.
- Use Self-Glaze for veneered areas.
- Apply IPS e.max Ceram Glaze only on unlayered areas (IPS e.max CAD LT).
- Subsequently, adjust the level of gloss by manually polishing the restoration.



Apply IPS e.max Ceram Glaze only on unlayered areas

Firing parameters for the Stain and Glaze firing

IPS e.max Ceram on IPS e.max CAD ***Cut-Back Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V_1** [°C/°F]	**V_2** [°C/°F]
Stain firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Glaze firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335

Completed IPS e.max CADLT veneer and anterior crown after Glaze firing

IPS e.max CAD LT anterior crown on a Straumann® Anatomic IPS e.max® Abutment

IPS e.max® CAD – Layering Technique

In the layering technique, the IPS e.max Ceram layering materials are fired onto the framework made of IPS e.max CAD MO. This enables very individualized design possibilities. The opacity of IPS e.max CAD MO permits the design of highly esthetic restorations even on discolored dies as well as metal core build-ups or Ti abutments.

Finishing and Preparation for Crystallization

It is of critical importance to use the correct grinding instruments for finishing and adjusting IPS e.max CAD. If unsuitable grinding instruments are used, chipping of the edges and local overheating may occur (please observe the corresponding Ivoclar Vivadent Flow Chart "Recommended grinding tools for IPS e.max glass-ceramics".

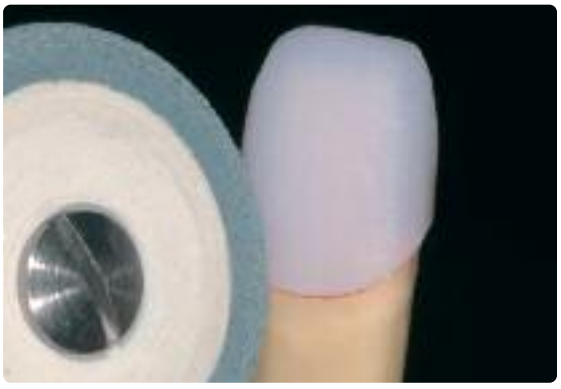
Observe the following procedure for finishing IPS e.max CAD restorations:

- Carry out adjustments by grinding of milled IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state whenever possible.
- Only use suitable grinding instruments, low rpms and light pressure to prevent delamination and chipping at the edges in particular.
- Overheating of the glass-ceramic must be avoided.
- The frameworks are tried in on the dies and carefully finished.
- Make sure that the minimum thicknesses are maintained even after the minor adjustments.
- Always clean the framework with ultrasound in a water bath or blast with the steam jet before crystallization.
- **Do not blast the framework with Al_2O_3 or glass polishing beads.**

Try in the milled framework on the model and check fit

Finish the framework with suitable grinding instruments

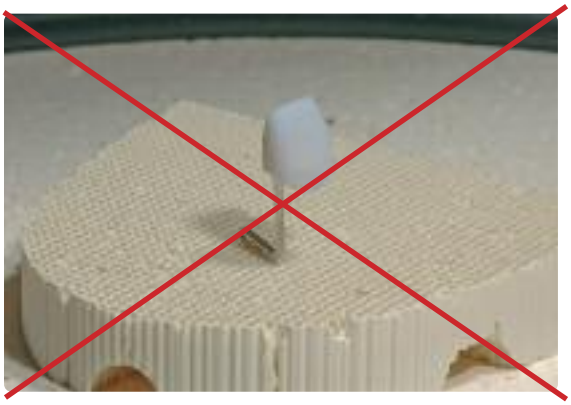
Make sure that the minimum thicknesses are maintained even after finishing



Finish the margins with suitable grinding instruments

Crystallization

The following points should be observed for the crystallization:
- Crystallization should be carried out in an Ivoclar Vivadent ceramic furnace (e.g. Programat P300, P500 or P700).
- Use only IPS Object Fix Putty or Flow as an auxiliary firing paste to ideally place the restoration on the firing tray.
- The cavity of the restoration must be entirely filled with IPS Object Putty or Flow and extended so that there is a reservoir.
- IPS e.max CAD restorations must neither be placed on metal firing pins nor a honey-combed tray for crystallization.
- Use only the IPS e.max CAD Crystallization Tray, since it stores the heat necessary for slow and above all tension-free cooling of the restoration.
- Always allow the restoration to cool to room temperature after crystallization before further processing.



Do not place the IPS e.max CAD restoration on metal pins and do not use a honey-combed firing tray

Fill the entire cavity with IPS Object Fix Putty or Flow and extend

Place the restoration supported with IPS Object Fix Putty or Flow on the IPS e.max CAD Crystallization Tray

Place the firing tray in the furnace and start crystallization

Crystallization MO

Furnace	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t [°C/°F/min]
P300 P500 P700	403/757	6:00	60/108	770/1418	0:10	30/54	850/1562	10:00	550/770 1022/1418	770/850 1418/1562	700/1292	0

Please note:
- **IPS e.max CAD HT and LT may also be crystallized with this program.**
- **If only max. <u>two</u> restorations are crystallized at the same time, the closing time S can be reduced to 1:30 min.**

Preparing for veneering

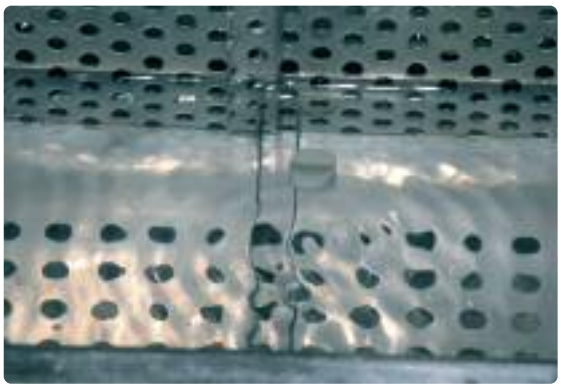
Once the IPS e.max CAD restoration has cooled to room temperature, proceed with the following steps:

- Remove the restoration from IPS Object Fix Putty or Flow.
- Remove any residue with ultrasound in a water bath and/or with steam.
- **Do not blast the framework with Al_2O_3 or glass polishing beads.**
- Place the restoration on the model, check fit and make slight adjustments, if necessary.
- Check margins and finish with rubber wheels, if required.
- Make sure that the minimum thicknesses are maintained even after the minor adjustments.
- Before veneering, clean the framework with the steam jet.
- **Do not blast the restoration with Al_2O_3 or glass polishing beads.**

Remove the crystallization tray from the furnace once the crystallization program has been completed and allow the IPS e.max CAD restoration to cool to room temperature

Remove the restoration from the hardened IPS Object Fix Putty or Flow

Do not blast the framework with Al_2O_3 or glass polishing beads



Remove any residue with ultrasound in a water bath and/or with steam

Check marginal areas and slightly finish, if necessary

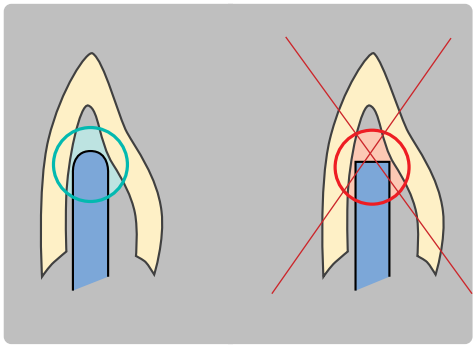
Completed IPS e.max MO framework

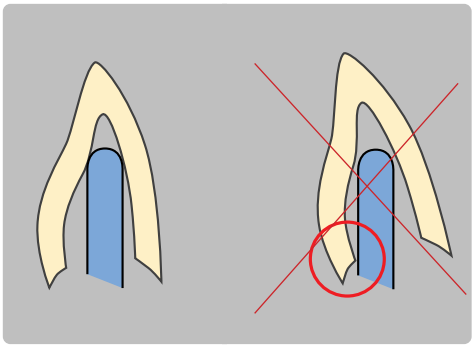
Veneering with IPS e.max Ceram

The following paragraphs will explain the most important veneering steps. For further information on the nano-fluorapatite layering ceramic and its processing, please refer to the IPS e.max Ceram Instructions for Use.

Firing tray and pins

Use a honey-combed firing tray (e.g. IPS® UniTray) and the corresponding support pins to fire the restorations (do not use IPS e.max CAD Crystallization Tray or IPS e.max CAD Crystallization Pins). Round the top edges of the support pin to prevent the restoration from sticking to the pin. Another method of reducing this risk is to cover the pins with platinum foil or a small amount of IPS Object Fix Putty or Flow. Regularly clean the support pins. Do not use contaminated pins.





Wash firing (foundation)

The restoration must be free of dirt and grease before the wash firing is done. Any contamination after cleaning must be prevented.

Please observe the following procedure for the wash firing:
- Clean the framework (free of dirt and grease).
- Conduct the wash firing with Deep Dentin or Dentin materials.
- Use the IPS e.max Ceram Build-Up Liquids allround or soft to mix the materials.
- If a more plastic consistency is desired, IPS e.max Ceram Glaze and Stain Liquid allround or longlife can be used.
- Apply the wash in a thin coat on the entire framework.
- Conduct the wash firing on a honey-combed tray with the corresponding parameters.

Apply the wash using Dentin and/or Deep Dentin materials…

…and fire using the indicated firing parameters

Firing parameters for the Wash firing (foundation firing)

IPS e.max Ceram on IPS e.max CAD ***Layering Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V_1** [°C/°F]	**V_2** [°C/°F]
Wash firing (foundation)	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380

Optional

Wash firing (foundation) characterization

IPS e.max Ceram Essence is used for individualized characterization. Especially if space is limited, this allows to give thin areas a true-to-nature design. Use the IPS e.max Ceram Glaze and Stain Liquids allround or longlife to mix the materials.

Apply individualized characterization using Essence.

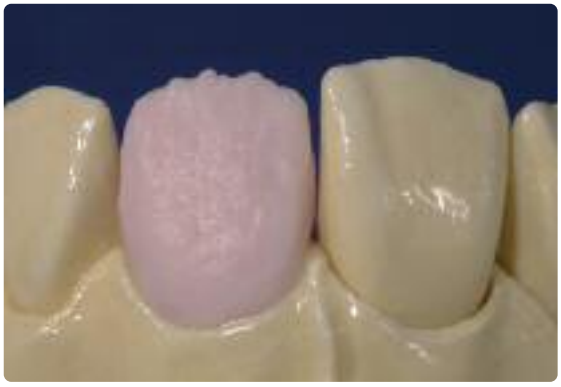
Firing parameters for the Wash firing (foundation firing) characterization

IPS e.max Ceram on IPS e.max CAD ***Layering Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V_1** [°C/°F]	**V_2** [°C/°F]
Wash firing (foundation) characterization	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380

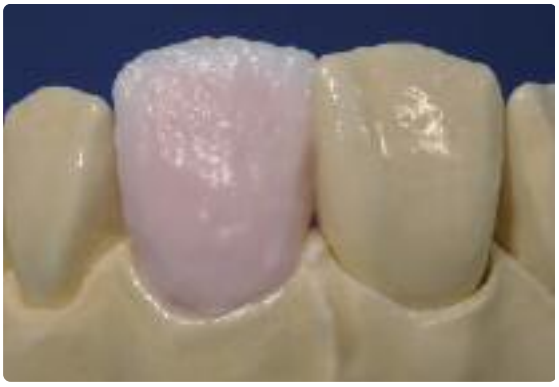
Layering materials must not be applied on unfired wash layers (powders and pastes), since this will result in a delamination of the layering ceramic. The wash (foundation) must be fired before the actual layering procedure is started.

1st Dentin and Incisal firing

Perform the layering in accordance with the layering diagram (see IPS e.max Ceram Instructions for Use). Use the IPS e.max Ceram Build-Up Liquids allround or soft to mix the layering materials. If a different consistency is desired, the liquids can also be mixed in any ratio.



Contour the tooth shape with Dentin material



Cut-back and build-up of the incisal area with incisal extension

Design the incisal third using Impulse materials

Complete the layering procedure with Incisal and Transpa materials

Then the restoration is fired using the firing parameters for the 1st Dentin and Incisal firing

Firing parameters for the 1st Dentin and Incisal firing

IPS e.max Ceram on IPS e.max CAD *Layering Technique*	B [°C/°F]	S [min]	t↗ [°C/°F/min]	T [°C/°F]	H [min]	V_1 [°C/°F]	V_2 [°C/°F]
1st Dentin and Incisal firing	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380

2nd Dentin and Incisal firing (Corrective firing)

Compensate for the shrinkage and complete the missing areas.

Compensate for the shrinkage with Dentin, Transpa and Incisal materials

Then the restoration is fired using the firing parameters for the 2nd Dentin and Incisal firing

Firing parameters for the 2nd Dentin and Incisal firing

IPS e.max Ceram on IPS e.max CAD ***Layering Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V_1** [°C/°F]	**V_2** [°C/°F]
2nd Dentin and Incisal firing	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380

Stain and Glaze firing

Stain firing is conducted with IPS e.max Ceram Essence and IPS e.max Ceram Shades, while Glaze firing is carried out with IPS e.max Ceram Glaze (powder, paste or spray). Depending on the situation, the Stain and Glaze firings may be conducted together or separately one after the other. The firing parameters are identical.

Completed, stained and glazed IPS e.max CAD MO restoration

Firing parameters for the Stain and Glaze firing

IPS e.max Ceram on IPS e.max CAD ***Layering Technique***	**B** [°C/°F]	**S** [min]	**t↗** [°C/°F/min]	**T** [°C/°F]	**H** [min]	**V_1** [°C/°F]	**V_2** [°C/°F]
Stain firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Glaze firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335

IPS e.max® CAD –
Seating and Follow-Up Care

Possibilities for Cementation

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

– For the adhesive cementation of IPS e.max CAD restorations, Variolink® II, Variolink® Veneer or Multilink® Automix are the ideal cements.
– For the self-adhesive cementation of IPS e.max CAD restorations, SpeedCEM is available.

Definition

- **Adhesive cementation**
  With adhesive cementation, the bond is also created by static friction, but primarily by the chemical and/or micro-mechanical bond between the luting material and the restoration, as well as between the luting material and the preparation. Given the chemical and/or micromechanical bond, retentive preparation is not required. Irrespective of the cementation material, special adhesive systems are used on the preparation to generate the micromechanical bond with the dentin and/or enamel.
  Adhesive cementation results in enhanced "(overall) strength" of the seated all-ceramic restoration.
- **Self-adhesive cementation**
  The cementation material features self-etching properties to the tooth, but not to the restoration, which is why no additional special conditioning of the tooth surface is necessary. Hence, the adhesion of the restoration is partially achieved by a micromechanical and/or chemical bond. In order to achieve sufficient bonding strength values, retentive preparation is recommended.
- **Conventional cementation**
  In the conventional cementation technique, the bond is achieved nearly exclusively through mechanical friction between the cementation material and the restoration as well as between the cementation material and the preparation. To achieve the necessary static friction, retentive preparation with a preparation angle of approximately 4-6° is required.
  Conventional cementation does not result in enhanced "(overall) strength" of the all-ceramic restoration.

Cementation possibilities for the different indications

		Adhesive Cementation	Self-Adhesive Cementation	Conventional Cementation
IPS e.max CAD	Veneers	✓	—	—
	Inlays, Onlays, Partial Crowns	✓	—	—
	Anterior Crowns	✓	✓	✓
	Posterior Crowns	✓	✓	✓

Preparing for Cementation

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

a. Conditioning of the restoration

Conditioning of the ceramic surface in preparation for cementation is decisive for generating a sound bond between the cementation material and the all-ceramic restoration. The following steps must be observed:

- **Do not blast IPS e.max CAD with Al_2O_3 or glass polishing beads before incorporation.**
- Ideally, conduct the clinical try-in before etching in order not to contaminate the etched surface.
- Thoroughly clean the restoration with water and blow dry.
- Condition the restoration:
  - Generally etch the bonding surface with 5% hydrofluoric acid gel (IPS Ceramic Etching Gel).
  - For adhesive or self-adhesive cementation, silanize the bonding surface of the restoration using Monobond Plus.

Do **not** blast IPS e.max CAD restorations

Etch for 20 s with IPS Ceramic Etching Gel

Let Monobond Plus react for 60 seconds and blow dry

Material	**IPS e.max CAD**		
	Lithium disilicate glass-ceramic		
Indication	**Veneers, inlays, onlays, partial crowns**	**Anterior and posterior crowns**	
Cementation method	adhesive	adhesive	self-adhesive / conventional *
Blasting	—		
Etching	20 sec with IPS Ceramic Etching Gel		
Conditioning / silanization	60 sec with Monobond® Plus		
Cementation system	Variolink® Veneer, Variolink® II, Multilink® Automix	Variolink® II, Multilink® Automix	SpeedCEM

* Conventional cementation is done without conditioning

Please observe the corresponding Instructions for Use.

a. Conditioning of the preparation
Thoroughly clean the preparation once the temporary has been removed. Before it is conditioned, the restoration is tried in and the occlusion and articulation checked. If adjustments are required, the restoration may be polished extraorally in these areas before final incorporation.

Condition the preparation in accordance with the selected cementation material.

Care notes

Same as natural teeth, high-quality IPS e.max CAD restorations require regular professional care. This is beneficial for both the health of the gingiva and teeth, as well as the overall 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 to use a cleaning paste that is only a little abrasive. Scientific investigations and long-term clinical experience have proved the gentle effect compared to other pastes.

Application of Proxyt

IPS e.max® CAD – Frequently Asked Questions

Why is it important to determine the shade of the preparation?

Depending on the translucency level of the block used, the shade of the preparation influences the seated all-ceramic restoration. Therefore, knowing the shade of the preparation is imperative. A corresponding tooth-colored die is then fabricated with the help of IPS Natural Die Material. It is used to achieve an optimum match of the restoration shade to the given clinical situation.

When are IPS e.max CAD HT blocks used?

Given their high translucency, HT blocks are ideally suitable for the fabrication of smaller restorations (e.g. inlays and onlays). Restorations made of HT blocks exhibit a true-to-nature chameleon effect and the exceptional adaption to the remaining tooth structure. When used for larger restorations (e.g. crowns), the brightness level of translucent blocks may decrease. In such cases, a block with a lower translucency (IPS e.max CAD LT) is required.

When are IPS e.max CAD LT blocks used?

Given their high brightness value compared to the HT blocks, LT blocks are ideally suitable for the fabrication of larger restorations (e.g. anterior and posterior crowns). Restorations made of IPS e.max CAD LT exhibit a lifelike brightness value and chroma. This prevents the incorporated restorations from graying.

Is IPS e.max CAD LT also suitable for the fabrication of frameworks for subsequent veneering?

The shading and translucency of the IPS e.max CAD LT material is designed for restorations fabricated in the staining and cut-back technique. If frameworks are made of IPS e.max CAD LT and subsequently fully veneered with IPS e.max Ceram (Dentin and Incisal materials), the shade and brightness values are slightly mismatched and the tooth shade might differ from the shade guide.

Which type of plaster should be used to fabricate the models?

The instructions for the manufacturer of the CAD/CAM system in use should be observed in the fabrication of the models. The following basic rule applies: Depending on the CAD/CAM system and equipment, special plasters may have to be used for the fabrication of models and dies to ensure the quality of the scan. If a special scanning plaster is unavailable, models and dies can be fabricated with high-strength stone, which is sprayed with IPS Contrast Spray Labside immediately before the scanning procedure.

What kind of preparation requirements must the die demonstrate in order to produce accurately fitting restorations?

The traditional preparation guidelines for all-ceramic resotrations apply to IPS e.max CAD. The thickness of the incisal edge of prepared anterior teeth (upper and lower) requires special attention. The prepared incisal edge should be at least as thick as the diameter of the bur used in the cavity. The corresponding instructions of the manufacturer regarding the dimensions of the grinding instruments must be observed during preparation.

Can an incisal edge which has become too thin during preparation be adjusted prior to scanning to avoid complicating the try-in procedure after machining?

In cases such as these, we recommend blocking out the incisal edge of the prepared die until the thickness matches that of the bur. These areas will be filled with luting cement when the restoration is seated.

How can the accuracy of fit of IPS e.max CAD restorations be adjusted?

If the accuracy of fit on the die is to be adjusted, this can be achieved by changing the parameters in the corresponding CAD software. Additionally, there is the possibility to change the dimensions of the occlusal and proximal contacts

When should manual adjustments with grinding instruments be done?

All grinding adjustments of milled IPS e.max CAD restorations should be made in the pre-crystallized (blue) state. It is important to note that the framework in its pre-crystallized state should be ground only with suitable grinding instruments, low rpms and light pressure to prevent delamination and chipping, particularly at the margins.

Do IPS e.max CAD restorations require occlusal adjustment after the CAD/CAM process?

Yes. *Surface-grind the outer surface, particularly functional areas with antagonist contact, with a fine diamond to smooth out the surface structure created by the CAD/CAM process.*

Can machined IPS e.max CAD restorations in the pre-crystallized (blue) state be completely finished and then crystallized and veneered?

Milled IPS e.max CAD restorations can be tried in on the die and all areas fully finished in the pre-crystallized (blue) state.
Thin margins only after crystallization (silicone polishers), since margins that are too thin tend to round during crystallization.

Do IPS e.max CAD restorations shrink during crystallization?

No. During the crystallization process, the microstructure becomes transformed and a densification of 0.2 % takes place. The milling software takes the densification factor into account. Therefore, the milled IPS e.max CAD restorations demonstrate precision of fit after crystallization. No further manual adjustments are necessary.

Why does the auxiliary firing paste IPS Object Fix Putty or Flow have to be used during the crystallization process?

In order to prevent distortion of the IPS e.max CAD restoration during crystallization, IPS Object Fix Putty or Flow are used. They support the restoration in an optimum manner and thus ensure exact accuracy of fit after crystallization. Smaller restorations may be placed directly on the IPS e.max CAD Crystallization Pin with a small amount of IPS Object Fix Flow.

Can firing pastes other than IPS Object Fix Putty or Flow be used in the crystallization process?

IPS Object Fix Putty and Flow has been specially developed for the crystallization of IPS e.max CAD restorations. The expansion behavior has been optimally coordinated with IPS e.max CAD. In other words, the consistency before and after the crystallization allows the paste to be easily applied and cleanly removed. Given their composition, pastes of other manufacturers may cause damage to IPS e.max CAD. Furthermore, easy removal may not always be possible.

How are contaminations with IPS Object Fix Putty or Flow on the outer surface of the restorations best removed before crystallization?

A short-hair brush or cotton swab dampened with water can be used for cleaning. It must be made sure that any residue has been removed before Shades, Stains or Glaze are applied in order to prevent the residue from being burned in.

How can premature drying of the IPS Object Fix Putty or Flow in the syringe be prevented?

In order to avoid a premature loss of moisture of the firing pastes, remove the syringe from the aluminium bag only directly before initial use. Close the syringe immediately after usage. If the syringe is not used for a longer period of time, it can be stored in a resealable plastic bag together with a moist paper tissue.

Can other firing trays, e.g. honey-combed trays, be used for the crystallization of IPS e.max CAD?

***No other** firing trays should be used. The IPS e.max CAD Crystallization Tray contained in the assortment stores the heat necessary for slow and above all tension-free cooling of the glass-ceramic. Other firing trays, e.g. honey-combed tray, cannot store the heat and therefore cool down too quickly.*

Can furnaces other than the ones from Ivoclar Vivadent be used to crystallize IPS e.max CAD restorations?

The crystallization of IPS e.max CAD is specially coordinated with the Ivoclar Vivadent ceramic furnaces (e.g. Programat P300, P500 or P700). If you would like to use other, untested ceramic furnaces, please consult Ivoclar Vivadent about their compatibility with IPS e.max CAD. It is important to note that not every ceramic furnace can be used for crystallization. Ceramic furnaces that, for instance, do not feature controlled long-term cooling mode or vacuum cannot be used for this purpose.

What must be considered after the firing of IPS e.max CAD?

In order to prevent tensions within the ceramic, remove the restoration from the furnace only after the firing cycles have been completed (wait for the acoustic signal of the ceramic furnace). Allow the objects to cool to room temperature in a place protected from draft and do not touch them with metal tongs during that time. Do not blast or quench the objects.

Which materials should be used if additional shade adjustments are necessary after Combination firing (Crystallization and Glaze firing in one step)?

Since the characterizations have already been carried out using IPS e.max CAD Crystall./Shades and Stains for the Combination firing, IPS e.max CAD Crystall./Shades and Stains have to be used again for any corrective firing.

Can IPS e.max CAD Crystall./ Shades, Stains, Glaze and IPS e.max Ceram Shades, Essences, Glaze be used with one another?

***No**. Since the IPS e.max CAD Crystall. and the IPS e.max Ceram materials have to be fired in a different manner, the materials cannot be mixed or applied at the same time.*

Can IPS Empress Universal Shades, Stains and Glaze be used for IPS e.max CAD?

*IPS Empress Universal Shades, Stains and Glaze were specially developed for and coordinated with the IPS Empress System and are therefore **not** suitable for IPS e.max products.*

Can the quality of crystallization of IPS e.max CAD restorations be checked?

Optical inspection by means of the enclosed materials shade guide can be conducted. If the shade and opacity of the restoration match the material shade guide, crystallization was successful. The shade comparison must always be conducted on a neutral-colored background and with incident light, rather than transmitted light.
If the shade and opacity of the restoration deviate from that of the materials shade guide, e.g. too translucent, the restoration must be milled again. Crystallization cannot be repeated.

Can IPS e.max Ceram Margin materials be used with IPS e.max CAD?

*IPS e.max Ceram Margin materials **must not** be used on glass-ceramics (IPS e.max Press and CAD), since the reduction for the shoulder would weaken the restoration.*

Can IPS e.max CAD frameworks be blasted with Al_2O_3 or glass polishing beads before they are veneered or after their completion (on the cavity side)?

*IPS e.max CAD restorations **must never** be blasted with Al_2O_3 or polishing beads, as this would damage the ceramic surface and reduce the outstanding physical properties.*

How must the internal (bonding) surface of the IPS e.max CAD restorations be conditioned before cementation?

The internal (bonding) surfaces of IPS e.max CAD restorations must always be etched with hydrofluoric acid etching gel (IPS Ceramic Etching Gel) for 20 seconds, whether they are cemented with adhesive, self-adhesive, or conventional methods. The resulting retentive pattern enables an enhanced bond both with adhesives and self-adhesives as well as conventional bonding agents. After etching, the glass-ceramics are silanized using Monobond Plus when adhesive and self-adhesive cementation is used. With conventional cementation, silanizing is not necessary.

Can IPS e.max CAD restorations also be conventionally cemented?

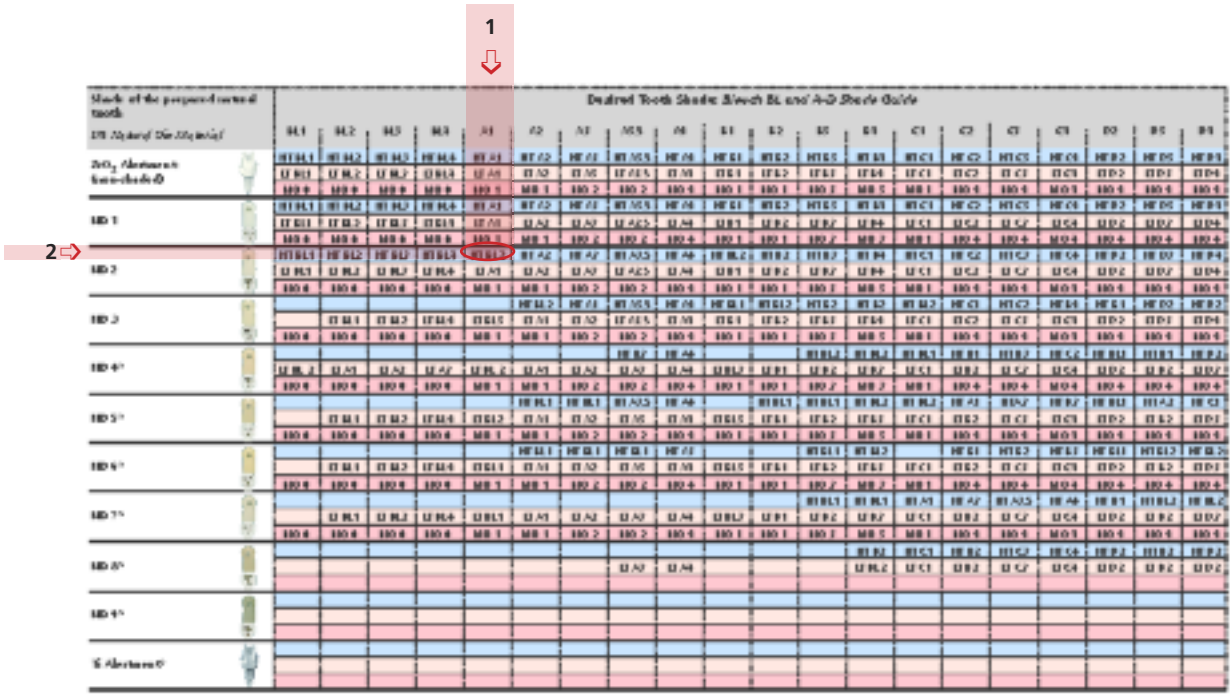
IPS e.max CAD restorations can be cemented adhesively, self-adhesively or conventionally. If the restoration is to be conventionally cemented, however, an appropriately retentive preparation design must be observed (preparation angle of 4°-6°). If this is not possible, adhesive luting is preferred, e.g. Variolink® II and Multilink® Automix.
It is not advisable to use classical phosphate cements, as they would negatively influence the light transmission of the all-ceramic and therefore compromise the esthetic appearance of all-ceramic restorations.

IPS e.max® CAD –
Table on Block Selection

The blocks are selected on the basis of the desired tooth shade (Bleach BL or A-D), the determined die shade (ND 1-ND 9), and/or abutment shade, as well as the desired processing technique. The following procedure results in the selection of the appropriate block:

1. Select the column with the desired tooth shade.
2. Select the line with the shade of the preparation.
3. Select the adequate block in accordance with the desired processing technique (staining, cut-back, or layering technique) in the intersection field.
4. If a certain combination is not possible (e.g. HT block on a dark preparation), select a block with a lower translucency.

- **The recommendations for the block selection correlate with the indications as well as the preparation guidelines and minimum layer thicknesses.**
- **In case of shade deviations, adjust the restoration shade by means of characterization with Shades and/or Stains or Essence.**
- **If (highly) translucent blocks are used, the layer thickness and die shade must be carefully observed.**
- **With thicker layers, a block with lower translucency must be selected to prevent a loss in brightness (graying).**



Shade of the prepared natural tooth *IPS Natural Die Material*	Desired Tooth Shade: *Bleach BL and A-D Shade Guide*																			
	BL1	BL2	BL3	BL4	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
ZrO_2 Abutment (non-shaded)	HT BL1	HT BL2	HT BL3	HT BL4	HT A1	HT A2	HT A3	HT A3.5	HT A4	HT B1	HT B2	HT B3	HT B4	HT C1	HT C2	HT C3	HT C4	HT D2	HT D3	HT D4
	LT BL1	LT BL2	LT BL3	LT BL4	LT A1	LT A2	LT A3	LT A3.5	LT A4	LT B1	LT B2	LT B3	LT B4	LT C1	LT C2	LT C3	LT C4	LT D2	LT D3	LT D4
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 1	HT BL1	HT BL2	HT BL3	HT BL4	HT A1	HT A2	HT A3	HT A3.5	HT A4	HT B1	HT B2	HT B3	HT B4	HT C1	HT C2	HT C3	HT C4	HT D2	HT D3	HT D4
	LT BL1	LT BL2	LT BL3	LT BL4	LT A1	LT A2	LT A3	LT A3.5	LT A4	LT B1	LT B2	LT B3	LT B4	LT C1	LT C2	LT C3	LT C4	LT D2	LT D3	LT D4
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 2	HT BL1	HT BL2	HT BL3	HT BL4	HT BL2	HT A2	HT A3	HT A3.5	HT A4	HT BL2	HT B2	HT B3	HT B4	HT C1	HT C2	HT C3	HT C4	HT D2	HT D3	HT D4
	LT BL1	LT BL2	LT BL3	LT BL4	LT A1	LT A2	LT A3	LT A3.5	LT A4	LT B1	LT B2	LT B3	LT B4	LT C1	LT C2	LT C3	LT C4	LT D2	LT D3	LT D4
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 3						HT BL2	HT A1	HT A3.5	HT A4	HT BL1	HT BL2	HT B2	HT B2	HT BL2	HT C1	HT C2	HT B4	HT B1	HT D2	HT D2
		LT BL1	LT BL2	LT BL4	LT BL3	LT A1	LT A2	LT A3.5	LT A4	LT B1	LT B2	LT B3	LT B4	LT C1	LT C2	LT C3	LT C4	LT D2	LT D3	LT D4
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 4*								HT B3	HT A4			HT BL2	HT BL2	HT BL1	HT B1	HT B3	HT C2	HT BL1	HT B1	HT D2
	LT BL 2	LT A1	LT A2	LT A3	LT BL 2	LT A1	LT A2	LT A3	LT A4	LT BL3	LT B1	LT B2	LT B3	LT C1	LT B2	LT C3	LT C4	LT D2	LT B2	LT D3
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 5*						HT BL1	HT BL1	HT A3.5	HT A4		HT BL1	HT BL1	HT BL2	HT BL2	HT A1	HTA3	HT B3	HT BL1	HT A2	HT C1
		LT BL1	LT BL2	LT BL4	LT BL2	LT A1	LT A2	LT A3	LT A4	LT BL3	LT B1	LT B2	LT B3	LT C1	LT B2	LT C3	LT C4	LT D2	LT B2	LT D3
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 6*						HT BL1	HT BL1	HT BL1	HT A3			HT BL1	HT BL2		HT B1	HT B2	HT B3	HT BL1	HT BL2	HT BL2
		LT BL1	LT BL2	LT BL4	LT BL1	LT A1	LT A2	LT A3	LT A4	LT BL3	LT B1	LT B2	LT B3	LT C1	LT B2	LT C3	LT C4	LT D2	LT B2	LT D3
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 7*												HT BL1	HT BL1	HT A1	HT A3	HT A3.5	HT A4	HT B1	HT BL2	HT BL2
		LT BL1	LT BL2	LT BL4	LT BL1	LT A1	LT A2	LT A3	LT A4	LT BL3	LT B1	LT B2	LT B3	LT C1	LT B2	LT C3	LT C4	LT D2	LT B2	LT D3
	MO 0	MO 0	MO 0	MO 0	MO 1	MO 1	MO 2	MO 2	MO 4	MO 1	MO 1	MO 3	MO 3	MO 1	MO 4	MO 4	MO 4	MO 4	MO 4	MO 4
ND 8*													HT B2	HT C1	HT B2	HT C3	HT C4	HT D2	HT B2	HT D2
								LT A3	LT A4				LT BL2	LT C1	LT B2	LT C3	LT C4	LT D2	LT B2	LT D2
ND 9*																				
Ti Abutment*																				

* With MO blocks, the brightness and chroma are controlled by means of the wash firing.
If no combination is possible, the dark shade of the preparation should be brightened or IPS e.max CAD MO should be used.

IPS e.max® CAD – Crystallization Parameters

The following points should be observed for **ceramic furnaces**, used for the crystallization of IPS e.max CAD:

- Crystallization should be carried out in an Ivoclar Vivadent ceramic furnace (e.g. Programat P300, P500, or P700).
- If you would like to use other, untested ceramic furnaces, please consult Ivoclar Vivadent about their compatibility with IPS e.max CAD.
- Basically, the following applies:
  Ceramic furnaces **without**
  - function for controlled (long-term) cooling
  - vacuum function

  cannot be used.
- Before the first crystallization and every six months after that, the ceramic furnace must be calibrated.
- Depending on the mode of operation, more frequent calibration should be required. Follow the instructions for the manufacturer.

The following aspects should be observed **for conducting the crystallization**:

- Use only IPS Object Fix Putty or Flow as an auxiliary firing paste to place the restoration directly on the IPS e.max CAD Crystallization Tray.
- IPS e.max CAD restorations must not be directly placed on the IPS e.max CAD Crystallization Tray and Pins, e.g. without auxiliary firing paste, for crystallization.
- Use only the IPS e.max CAD Crystallization Tray and the corresponding Pins, since they store the heat necessary for slow and above all tension-free cooling of the glass-ceramic.
- Always conduct the crystallization under vacuum.
- Remove IPS e.max CAD objects from the furnace after completion of the firing cycle (wait for the acoustic signal of 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.

Crystallization of IPS e.max CAD MO

Furnace	Closing time S min.	Stand-by temperature B °C/°F	Heating rate t_1 °C/°F/min	Firing temperature T_1 °C/°F	Holding time H_1 min.	Heating rate t_2 °C/°F/min	Firing temperature T_2 °C/°F	Holding time H_2 min.	Long-term cooling L °C/°F	Cooling rate t_l °C/°F/min	Vacuum 1 1_1 1_2 °C/°F	Vacuum 2 2_1 2_2 °C/°F
P80	6:00	403/757	–	–	–	30/54	850/1562	10:00	700/1292	–	–	550/1022 850/1562
P100 **P200**	6:00	403/757	60/108	770/1418	0:10	30/54	850/1562	10:00	700/1292	–	550/1022 770/1418	770/1418 850/1562
P300 **P500** **P700**	6:00	403/757	60/108	770/1418	0:10	30/54	850/1562	10:00	700/1292	0	550/1022 770/1418	770/1418 850/1562
PX1	6:00	403/757	60/108	770/1418	0:10	30/54	850/1562	10:00	775/1427 1:30 min 700/1292 0:20 min	–	550/1022 770/1418	770/1418 850/1562
EP 600	6:00	403/757	60/108	770/1418	0:10	30/54	850/1562	10:00	700/1292	–	550/1022 770/1418	770/1418 850/1562
EP 3000 **EP 5000**	6:00	403/757	60/108	770/1418	0:10	30/54	850/1562	10:00	700/1292	0	550/1022 770/1418	770/1418 850/1562

Only the program memories 65-69 can be used with the Programat P100.

Please note:

- **IPS e.max CAD HT and LT may also be crystallized with this program.**
- **If only max. <u>two</u> restorations are crystallized at the same time, the closing time S can be reduced to 1:30 min.**

Crystallization/Glaze HT/LT

IPS e.max CAD HT/LT with or without application of IPS e.max CAD Crystall./Glaze, Shades, Stains, and Add-On

Furnace	Closing time S min.	Stand-by temperature B °C/°F	Heating rate t_1 °C/°F/min	Firing temperature T_1 °C/°F	Holding time H_1 min.	Heating rate t_2 °C/°F/min	Firing temperature T_2 °C/°F	Holding time H_2 min.	Long-term cooling L °C/°F	Cooling rate t_l °C/°F/min	Vacuum 1 1_1 1_2 °C/°F	Vacuum 2 2_1 2_2 °C/°F
P100 P200	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	7:00	700/1292	–	550/1022 820/1508	820/1508 840/1544
P300 P500 P700	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	7:00	700/1292	0	550/1022 820/1508	820/1508 840/1544
PX1	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	7:00	775/1427 1:30 min 700/1292 0:20 min	–	550/1022 820/1508	820/1508 840/1544
EP 600	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	7:00	700/1292	–	550/1022 820/1508	820/1508 840/1544
EP 3000 EP 5000	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	7:00	700/1292	0	550/1022 820/1508	820/1508 840/1544

Only the program memories 65-69 can be used with the Programat P100.

- **Crystallization/Glaze HT/LT can only be used for IPS e.max CAD HT and LT.**
- **IPS e.max CAD MO cannot be crystallized with this program, since it does not crystallize completely.**
- **If only max. two restorations are crystallized at the same time, the closing time S can be reduced to 1:30 min. This reduced time is only for Glaze Spray. Glaze Paste may not be used.**

Correction firing

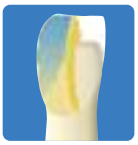
with IPS e.max CAD Crystall./Glaze, Shades, Stains, or Add-On

Furnace	Closing time S min.	Stand-by temperature B °C/°F	Heating rate t_1 °C/°F/min.	Firing temperature T_1 °C/°F	Holding time H_1 min.	Heating rate t_2 °C/°F/min	Firing temperature T_2 °C/°F	Holding time H_2 min.	Long-term cooling L °C/°F	Cooling rate t_l °C/°F/min	Vacuum 1 1_1 1_2 °C/°F	Vacuum 2 2_1 2_2 °C/°F
P80	6:00	403/757	–	–	–	30/54	840/1544	3:00	700/1292	–	–	550/1022 840/1544
P100 P200	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	3:00	700/1292	–	550/1022 820/1508	820/1508 840/1544
P300 P500 P700	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	3:00	700/1292	0	550/1022 820/1508	820/1508 840/1544
PX1	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	3:00	775/1427 1:30 min 700/1292 0:20 min	–	550/1022 820/1508	820/1508 840/1544
EP 600	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	3:00	700/1292	–	550/1022 820/1508	820/1508 840/1544
EP 3000 EP 5000	6:00	403/757	90/162	820/1508	0:10	30/54	840/1544	3:00	700/1292	0	550/1022 820/1508	820/1508 840/1544

Only the program memories 65-69 can be used with the Programat P100.

IPS e.max® CAD – Firing parameters

- Use a honey-combed tray and the corresponding pins for firing.
- Ceramic pins must not be used, since they may fuse to the restoration.
- The processing temperatures must be observed. An increase in the firing temperature results in severe vitrification between the framework and the veneering ceramic, which may lead to cracks later. An decrease in the firing temperature causes the ceramic to be underfired and very brittle, which may lead to delamination.
- 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 corrections may be necessary.
- Remove IPS e.max CAD objects from the furnace after completion of the firing cycle (wait for the acoustic signal of 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.



IPS e.max Ceram on IPS e.max CAD – Staining Technique

IPS e.max Ceram on IPS e.max CAD *Staining Technique*	B °C/°F	S min.	t↗ °C/°F/min	T °C/°F	H min.	V_1 °C/°F	V_2 °C/°F
Stain and Characterization firing	403/757	6:00	60/108	770/1418	1:00-2:00	450/842	769/1416
Glaze firing	403/757	6:00	60/108	770/1418	1:00-2:00	450/842	769/1416
Add-On after Glaze Firing	403/757	6:00	50/90	700/1292	1:00	450/842	699/1290

IPS e.max Ceram on IPS e.max CAD-Cut – Back Technique

IPS e.max Ceram on IPS e.max CAD *Cut-Back Technique*	B °C/°F	S min.	t↗ °C/°F/min	T °C/°F	H min.	V_1 °C/°F	V_2 °C/°F
Wash firing (foundation)	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380
Incisal firing	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380
Stain firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Glaze firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Add-On with Glaze Firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Add-On after Glaze firing	403/757	6:00	50/90	700/1292	1:00	450/842	699/1290

IPS e.max Ceram on IPS e.max CAD – Layering Technique

IPS e.max Ceram on IPS e.max CAD *Layering Technique*	B °C/°F	S min.	t↗ °C/°F/min	T °C/°F	H min.	V_1 °C/°F	V_2 °C/°F
Wash firing (foundation)	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380
Wash firing (foundation) characterization	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380
1. Dentin / Incisal Firing	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380
2. Dentin / Incisal Firing	403/757	4:00	50/90	750/1382	1:00	450/842	749/1380
Stain Firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Glaze Firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Add-On with Glaze Firing	403/757	6:00	60/108	725/1337	1:00	450/842	724/1335
Add-On after Glaze Firing	403/757	6:00	50/90	700/1292	1:00	450/842	699/1290

- **The firing parameters listed represent standard values and apply to the Ivoclar Vivadent furnaces P200, P300, P500, P700. For Ivoclar furnaces of an older generation, e.g. P20, P80, P90, P95, P100, PX1 and EP600 Combi, these temperatures are also valid as standard values. However, depending on the age of the heating muffle, the values may deviate by approximately ± 10 °C.**
- **If a non-Ivoclar Vivadent furnace is used, temperature corrections may be necessary.**
- **Regional differences in the power supply or the operation of several electronic devices by means of the same circuit may render adjustments of the temperatures necessary.**

Clinical Pictures:

Unless mentioned otherwise, the depicted cases were fabricated by Jürgen Seger, Liechtenstein.

IPS e.max CAD LT crown (cut-back technique) on a ZrO_2 abutment (Dr A. Kurbad, Germany)

IPS e.max CAD LT crown (cut-back technique) (Dr A. Kurbad, Germany)

IPS e.max CAD HT partial crown (staining technique) (Dr A. Peschke, Liechtenstein)

IPS e.max CAD HT crown (staining technique) (Dr A. Peschke, Liechtenstein)

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