

**IPS[®]
e.max[®]
CAD**

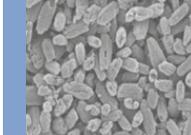
CAD

Monolithic Solutions LABSIDE
Instructions for Use



**all ceramic
all you need**

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Symbols in the Instructions for Use



Important



Information



Tips & Tricks



Contraindication



Note on firing

IPS e.max® System

IPS e.max is an innovative all-ceramic system which covers the entire all-ceramic indication range – from thin veneers to 14-unit bridges.

IPS e.max comprises highly esthetic high-strength materials for the PRESS and the CAD/CAM technologies. The system consists of innovative lithium disilicate glass-ceramics for smaller restorations and high-strength zirconium oxide for long-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.

- For the field of **Press technology** there is the **IPS e.max Press**, a highly esthetic **lithium disilicate glass-ceramic** and **IPS e.max ZirPress** a **fluor apatite glass-ceramic ingot** for the quick and efficient press-on technique on zirconium oxide.
- For **CAD/CAM technology**, depending on the case requirements, either the **IPS e.max CAD**, an innovative **lithium disilicate block**, or the high-strength **zirconium oxide IPS e.max ZirCAD** can be used.
- The **nano-fluorapatite layering ceramic IPS e.max Ceram**, which is used to characterize and/or veneer all IPS e.max components – glass or oxide ceramics – completes the IPS e.max System.



Three solutions for maximum flexibility

IPS e.max[®] CAD Solutions

IPS e.max CAD stands for individuality. Depending on the indication, users may select from three approaches: This ensures maximum flexibility in the digital work process.

IPS e.max[®] CAD Monolithic Solutions

Efficient fabrication of full-contour restorations with high strength (≥ 360 MPa) ranging from thin veneers to three-unit bridges.



IPS e.max[®] CAD Veneering Solutions

Digitally fabricated high-strength veneering structures for zirconium oxide frameworks (ZrO_2) – for tooth- and implant-retained crowns and long-span bridges (CAD-on).



IPS e.max[®] CAD Abutment Solutions

Individual CAD/CAM-fabricated hybrid restorations for implants – for single-tooth restorations in the anterior and posterior region.



IPS e.max CAD is the innovative lithium disilicate glass-ceramic (LS_2) for the CAD/CAM technology. It is unique and combines an outstanding esthetic appearance with high user friendliness. The digitally fabricated restoration is selected from a comprehensive range of indications, which is only offered by IPS e.max CAD. A multitude of translucency levels, shades and block sizes enables flexible working. Proven and coordinated cementation materials ideally supplement the range of products.

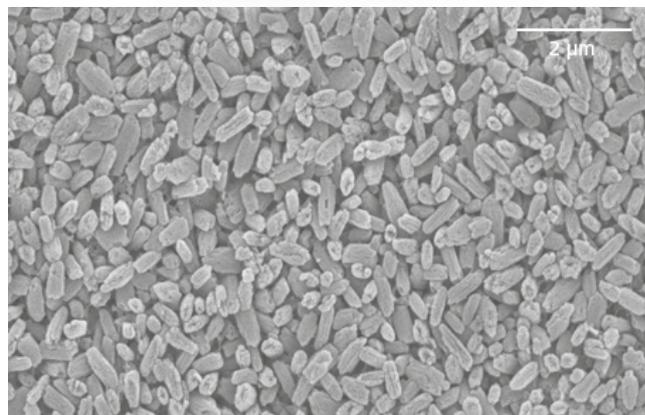
These Instructions for Use describe the fabrication of **IPS e.max CAD Monolithic Solutions**. There are separate Instructions for Use for **IPS e.max CAD Veneering Solutions** and **IPS e.max CAD Abutment Solutions**.

IPS e.max[®] CAD Monolithic Solutions

Material

IPS e.max[®] CAD

IPS e.max CAD is a lithium disilicate glass-ceramic block for the CAD/CAM technology. 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 colour 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 MPa. After the IPS e.max CAD blocks are milled, the restoration is crystallized in an Ivoclar Vivadent ceramic furnace (z.B. Programat[®] P510). Unlike with some other CAD/CAM ceramics, the easy-to-conduct crystallization process neither causes any major shrinkage, nor are any complicated infiltration processes required. The crystallization process leads to a change in the microstructure in the IPS e.max CAD material, during which lithium disilicate crystals grow. The densification of 0.2% is compensated 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.



IPS e.max CAD	Lithium-Disilicate
CTE (25–500°C) [$10^{-6}/K$]	10.2 ± 0.5
Flexural strength (biaxial) [MPa]	≥ 360
Chem. solubility [$\mu g/cm^2$]	< 100

according to ISO 6872:2015

Classification: ceramic materials Type II / Class 3

Uses

Indications

- Thin veneers
- Veneers
- Inlays
- Onlays
- Partial crowns
- Crowns in the anterior and posterior region
- 3-unit bridges in the anterior region
- 3-unit bridges in the premolar region up to the second premolar as the terminal abutment

Contraindications

- Inlay-retained bridges
- Cantilever bridges
- Maryland bridges
- Pontic width anterior region > 11 mm
- Pontic width premolar region > 9 mm
- Temporary incorporation of IPS e.max CAD restorations
- Fully veneered molar crowns
- Very deep subgingival preparations
- Patients with severely 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:

- Falling short of the required minimum thickness
- Milling the blocks in a non-compatible CAD/CAM system
- Crystallization must not be conducted in a ceramic furnace that has not been approved and/or recommended
- Crystallization in a non-calibrated ceramic furnace.
- Crystallization in a high-temperature furnace (e.g. Programat S1)
- Do not mix IPS e.max CAD Crystall./Glaze, Shades and Stains with other dental ceramics (e.g. IPS e.max Ivocolor Glaze, Shades and Essences).
- Veneering ceramics other than IPS e.max Ceram must not be used.

Warnings

- IPS Natural Die Material Separator contains hexane. Hexane is highly flammable and detrimental to health. Avoid contact of the material with skin and eyes. Do not inhale vapours and keep away from sources of ignition.
- Do not inhale ceramic dust during finishing – use extraction equipment and wear a face mask.
- IPS Contrast Spray Labside must not be used intraorally.
- Observe the Safety Data Sheet (SDS).

Scientific data

Since the beginning of the development, the IPS e.max System has been monitored by the scientific community. Many renowned experts have contributed to an excellent data base with their studies. The worldwide success story, the ever growing demand, as well as over 70 million (as per 2013) fabricated restorations are testament to the success and the reliability of the system. More than 20 clinical *in-vivo* studies to date and even more *in vitro* studies, as well as the continuously rising number of clinical studies throughout the world show the long-term success of the IPS e.max System in the oral cavities of the patients. The most important study results are compiled in the "IPS e.max Scientific Report".

Further scientific data (i.e. strength, wear, biocompatibility) is contained in the "Scientific Documentation IPS e.max CAD". This can be obtained from Ivoclar Vivadent.

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



CAD/CAM partners

IPS e.max CAD has to be processed with an authorized CAD/CAM system. For questions regarding the different systems, please contact the respective cooperation partners.

Further information are available on the Internet from www.ivoclarvivadent.com.

Block concept

IPS e.max CAD blocks are available in **four translucency levels (MO, LT, MT, HT)** and **special Impulse shades** in **different sizes**. Basically, all blocks are made of the same material and feature the same outstanding properties. For reasons of aesthetics, however, the following processing technique and indication are recommended for the individual blocks (translucency levels):

Translucency Level	Processing Technique					Indications								
	Polishing Technique	Staining Technique	Cut-Back Technique	Layering Technique	CAD-on Technique	Thin veneer 1)	Veneer	Inlay and Onlay	Partial Crown	Anterior and Posterior Crown	3-Unit Bridge	Multi-Unit Bridge	Hybrid Abutment	Hybrid Abutment Crown
HT High Translucency	✓	✓	✓			✓	✓	✓	✓					
					✓					✓ CAD-On	✓ CAD-On	✓ CAD-On		
MT Medium Translucency	✓	✓	✓			✓	✓		✓	✓				
LT Low Translucency	✓	✓	✓				✓		✓	✓	✓ ²⁾		✓	✓
MO Medium Opacity				✓						✓ ³⁾			✓	
I Impulse	✓	✓	✓			✓	✓							

¹⁾ The cut-back technique must not be used for the fabrication of thin veneers

²⁾ Only up to the second premolar as the distal abutment

³⁾ Up to the second premolar



IPS e.max CAD HT (High Translucency)

The HT blocks are available in **A-D** and **Bleach BL shades** and in **different sizes**. Given their high translucency that is similar to that of natural enamel, they are ideal for the fabrication of small restorations (e.g. inlays, onlays). Restorations made of HT blocks convince users with their true-to-nature chameleon effect and the exceptional adaption to the remaining tooth structure. Restorations made from HT blocks are ideally suitable for the "polishing technique", "staining technique", "cut-back technique", but also for the "CAD-on technique".



IPS e.max CAD MT (Medium Translucency)

The MT blocks are available in **A-D** and **Bleach BL shades**. They demonstrate medium translucency and are used for restorations that require more brightness than HT restorations and more translucency than LT restorations. Restorations made of MT blocks are ideally suitable for the "polishing technique", "staining technique", but also for the "cut-back technique".



IPS e.max CAD LT (Low Translucency)

The LT blocks are available in **A-D** and **Bleach BL shades** and in **different sizes**. Given their low translucency that is similar to that of natural dentin, they are ideal for the fabrication of larger restorations (e.g. posterior crowns). Restorations made from LT blocks convince users with their lifelike brightness value and chroma. This prevents the incorporated restorations from graying. LT ingots are ideally suitable for processing in the "cut-back technique", but they can also be used in the "polishing technique" and the "staining technique".



IPS e.max CAD MO (Medium Opacity)

The MO blocks are available in **group shades MO 0-MO 4**. Given their opacity, they are ideally suitable for the fabrication of frameworks on slightly discoloured preparations. The anatomical shape is subsequently individually built-up using IPS e.max Ceram ("layering technique").



IPS e.max CAD Impulse

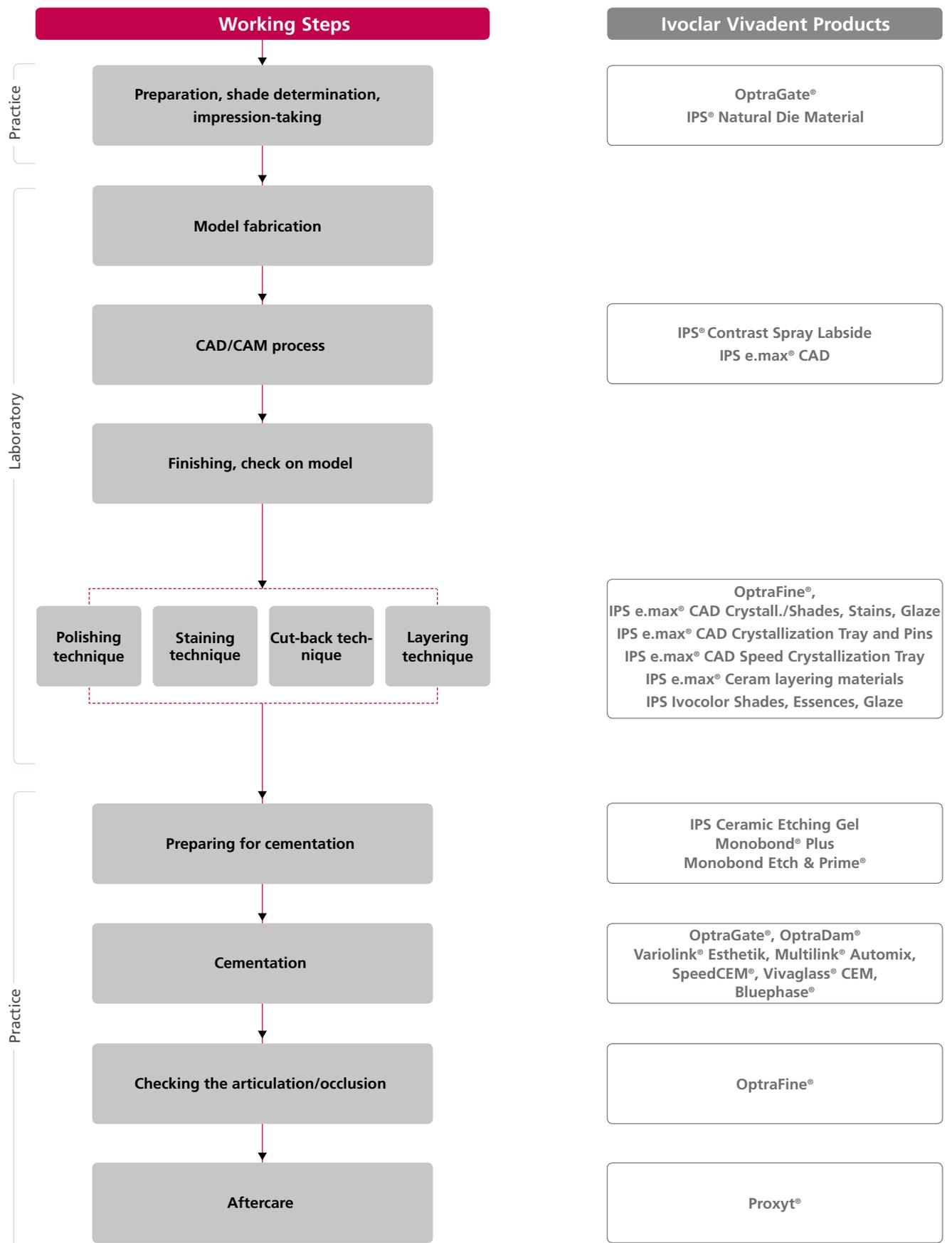
The Impulse blocks enable the fabrication of restorations with pronounced opalescent properties. The **opalescent blocks** are available in **two versions with different opalescence values (Opal 1, Opal 2)**. The blocks are suitable for veneers in light tooth shades, for which an opalescent effect is needed.



Detailed information on the available blocks sizes and shades can be found in the "CAD/CAM Block Overview" at www.ivoclarvivadent.com!



Overview of the Clinical Working Steps, Fabrication Process



The range of available products may vary from country to country

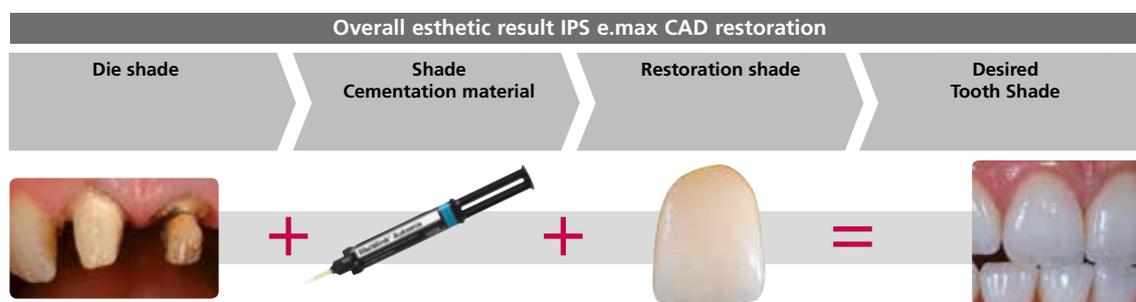
Shade determination – tooth shade, shade of the preparation

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

The visual 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. This is of utmost importance in particular with severely discoloured preparations or non-tooth-coloured abutments. The desired esthetical appearance can only be achieved if the dentist takes the shade of the prepared tooth and passes the information on to the laboratory.



Shade determination of the natural tooth

The tooth shade is determined on the non-prepared tooth or adjacent teeth after cleaning. 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 as lifelike results as possible, shade determination should be carried out at daylight. Furthermore, the patient should not wear clothes with intensive colours and/or lipstick.

For a flawless reproduction of the determined tooth shade, taking an additional digital photograph of the starting situation is recommended.

Another option for shade determination is provided by the Programat® P710. The integrated image processing software DSA (Digital Shade Assistant) compares three preselected shade guide teeth with the tooth to be analyzed and automatically indicates the closest matching tooth shade.

You can find additional information about this topic in the Operating Instructions "Programat P710 with DSA Function".



Die shade determination

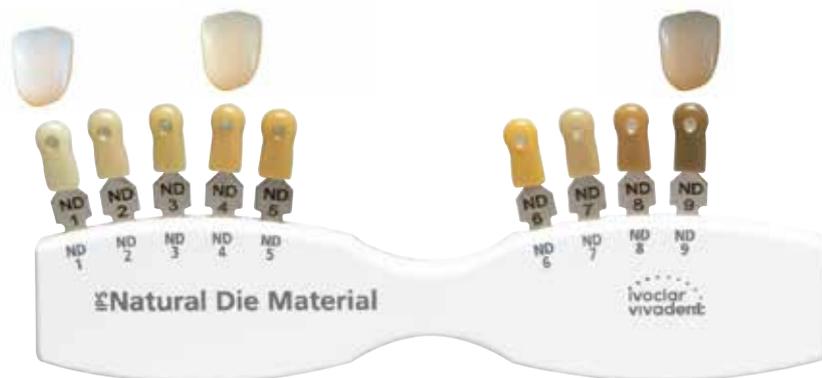
In order to facilitate the reproduction of the desired tooth shade, the shade of the preparation is determined with the help of the IPS Natural Die Material shade guide.

This enables the technician to fabricate a model die similar to the patient's prepared tooth, on which the correct shade and brightness values of the all-ceramic restorations may be reproduced.



Example of the die shade effect

Crown made of IPSe.max CAD HT B1 on different die shades.



Which block should be used?

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

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



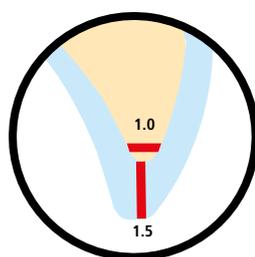
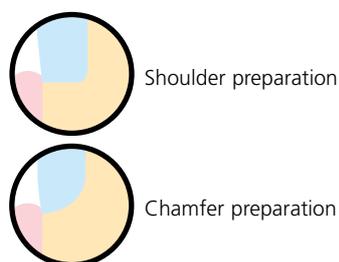
Please refer to page 63 for further details about block selection

Preparation guidelines

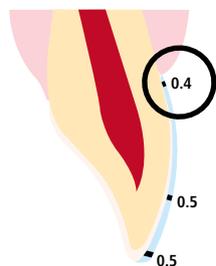
Successful results can only be achieved with IPS e.max CAD if the guidelines and minimum layer thicknesses are strictly observed.

Basic preparation guidelines for all-ceramic restorations

- No angles or edges
- Shoulder preparation with rounded inner edges and/or chamfer preparation
- The indicated dimensions reflect the minimum layer 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.

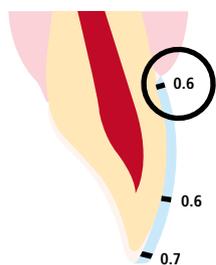


Thin veneer



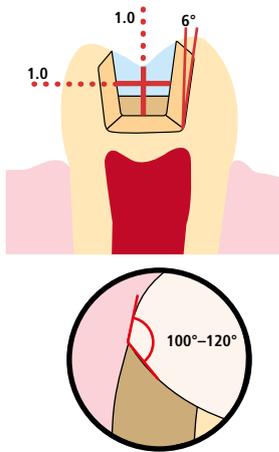
- If possible, the preparation should be located in the enamel.
- The incisal preparation margins should not be located in the area of the abrasion surfaces or dynamic occlusal surfaces.
- The minimum layer thickness of the thin veneer in the cervical and labial area is 0.4 mm. A restoration thickness of 0.5 mm must be planned at the incisal edge.
- If there is enough space, preparation is not necessary.

Veneer



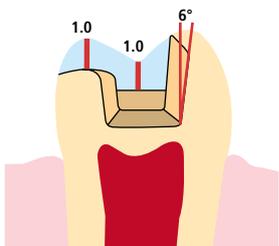
- If possible, the preparation should be located in the enamel.
- The incisal preparation margins should not be located in the area of the abrasion surfaces or dynamic occlusal surfaces.
- Reduce the cervical and/or labial area by 0.6 mm, and the incisal edge by at least 0.7 mm

Inlay



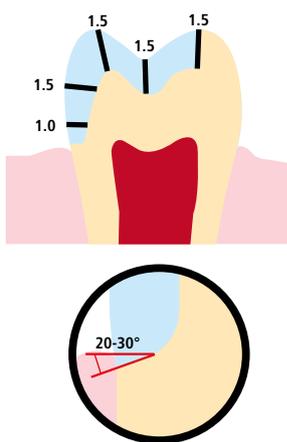
- Static and dynamic antagonist contacts must be taken into consideration.
- The preparation margins must not be located on centric antagonist contacts.
- A preparation depth of at least 1.0 mm and an isthmus width of at least 1.0 mm must be observed in the fissure area.
- Prepare the proximal box with slightly diverging walls (preparation angle 6°) and observe an angle of 100°–120° between the proximal cavity walls and the prospective proximal surfaces of the inlay. For inlays with pronounced convex cavity walls without adequate support by the proximal shoulder, marginal ridge contacts should be avoided.
- Round out internal edges and transitions in order to prevent stress concentration within the ceramic material.
- Do not prepare slice-cuts or feather edges.

Onlay



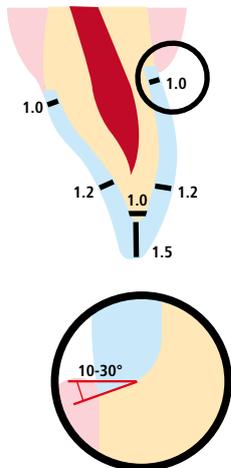
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- Prepare the proximal box with slightly diverging walls (preparation angle 6°) and observe an angle of 100°–120° between the proximal cavity walls and the prospective proximal surfaces of the inlay. For onlays with pronounced convex cavity walls without adequate support by the proximal shoulder, marginal ridge contacts should be avoided.
- Round out internal edges and transitions 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 space in the cusp areas.

Partial crown



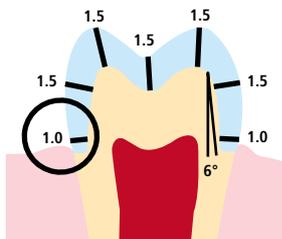
- Static and dynamic antagonist contacts must be taken into consideration.
- The preparation margins must not be located on centric antagonist contacts.
- Provide at least 1.5 mm of space in the cusp areas.
- Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 20°–30°. Width of the shoulder/chamfer at least 1.0 mm.

Anterior crown / bridge abutment in the anterior region



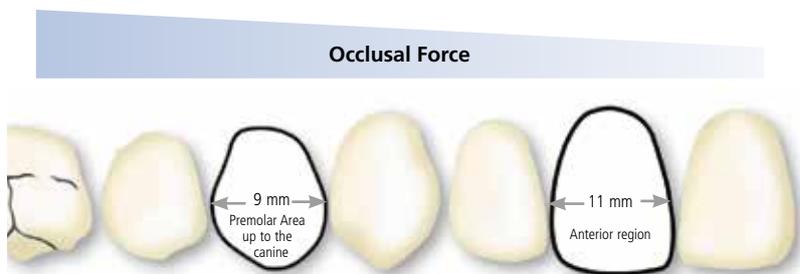
- Reduce the anatomical shape and observe the stipulated minimum layering thickness. Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 10°– 30°. Width of the circular shoulder/chamfer at least 1.0 mm.
- Reduce the incisal crown third by at least 1.5 mm.
- Reduce the vestibular and/or oral area by approx. 1.2 mm.
- For conventional and/or self-adhesive cementation, the preparation must demonstrate retentive surfaces and sufficient preparation height

Posterior crown / bridge abutment in the posterior region



- Reduce the anatomical shape and observe the stipulated minimum layering thickness. Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 10°– 30°. Width of the circular shoulder/chamfer at least 1.0 mm. Preparation angle 6°
- Reduce the occlusal crown third by at least 1.5 mm.
- Reduce the vestibular and/or oral area by approx. 1.5 mm.
- For conventional and/or self-adhesive cementation, the preparation must demonstrate retentive surfaces and sufficient preparation height

Maximum width of bridge pontics in the anterior and premolar region



Given the different masticatory forces, the maximum acceptable pontic width is different in the anterior and premolar region.

The pontic width is determined on the unprepared tooth.

- In the anterior region the bridge pontic width should not exceed 11 mm.
- In the premolar region (canine up to the second premolar), the bridge pontic width should not exceed 9 mm.

Minimum 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 **minimum layer thicknesses** for the **polishing, staining, cut-back** as well as **layering technique** must be observed to achieve the tooth shade of shade guide and meet the **requirements put forth in the preparation guide-lines** (page 13 – 15).

Polishing and staining technique

In the polishing and staining technique, no layering materials are applied to the IPS e.max CAD restoration. The minimum layer thicknesses thus refer to the layer thickness of IPS e.max CAD.



the connector design should be extended in the vertical direction, rather than in the horizontal direction. Especially in anterior bridges, it is not always possible to establish the necessary connector dimensions in the sagittal (long-vestibular) direction. In such cases, the connector dimensions must always be extended in the vertical (incisal-cervical) direction

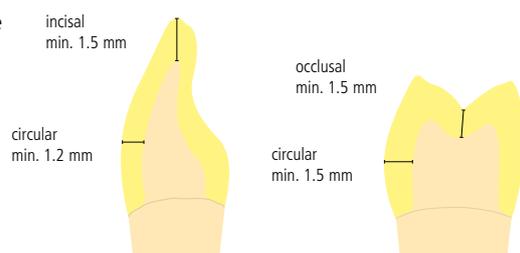
Minimum layer thicknesses for IPS e.max CAD restorations (depending on the indication) in the polishing and staining technique

		Thin veneer	Veneer	Inlay	Onlay	Partial Crown	Crown			Bridge	
							Anterior Tooth	Premolar	Molar	Anterior Region	Premolar Region
Minimum layer thickness IPS e.max CAD polishing technique	incisal/occlusal	0.5	0.7	1.0 Fissure depth	1.0	1.5	1.5	1.5	1.5	–	–
	circular	0.4	0.6	1.0 Isthmus width	1.0	1.5	1.2	1.5	1.5	–	–
Minimum layer thickness IPS e.max CAD staining technique	incisal/occlusal	0.5	0.7	1.0 Fissure depth	1.0	1.5	1.5	1.5	1.5	1.5	1.5
	circular	0.4	0.6	1.0 Isthmus width	1.0	1.5	1.2	1.5	1.5	1.2	1.5
	Connector dimensions	–	–	–	–	–	–	–	–	16 mm ² In general the following applies: Height ≥ Width	

Dimensions in mm

Example:

Minimum layer thicknesses for anterior and posterior crowns in the polishing and staining technique



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.

Cut-back and layering technique

In the cut-back technique or the layering technique, a reduced tooth shape-supporting framework is built-up to the full tooth shape by means of IPS e.max Ceram layering materials. When designing the restoration, the following guidelines regarding the IPS e.max CAD framework and the IPS e.max Ceram veneer have to be observed:



- 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.
- If possible, the connector design should be extended in the vertical direction, rather than in the horizontal direction. In particular in anterior bridges, it is not always possible to establish the necessary connector dimensions in the sagittal (long-vestibular) direction. In such cases, the connector dimensions must always be extended in the vertical (incisal-cervical) direction

Minimum layer thicknesses of the IPS e.max CAD framework (depending on the indication) in the cut-back and layering technique

		Thin veneer	Veneer	Inlay	Onlay	Partial Crown	Crown			Bridge	
							Anterior Tooth	Premolar	Molar	Anterior Region	Premolar Region
Minimum layer thickness IPS e.max CAD cut-back technique	incisal/occlusal	–	0.4	–	–	1.3	0.8	1.0	1.3	0.8	1.0
	circular	–	0.6	–	–	1.5	1.2	1.5	1.5	1.2	1.5
	Connector dimensions	–	–	–	–	–	–	–	–	16 mm ² In general the following applies: Height ≥ Width	
Minimum layer thickness IPS e.max CAD layering technique	incisal/occlusal	–	–	–	–	–	0.8	1.0	–	–	–
	circular	–	–	–	–	–	0.8	0.8	–	–	–
	Design type	–	–	–	–	–	Supporting the tooth shape		–	–	–

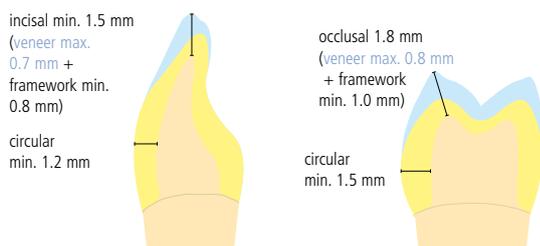
IPS e.max CAD is the high-strength component of your restoration and must therefore always make up at least 50% of the total layer thickness of the restoration. The overall thickness of the restoration (depending on the indication) is derived as follows:

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

Dimensions in mm

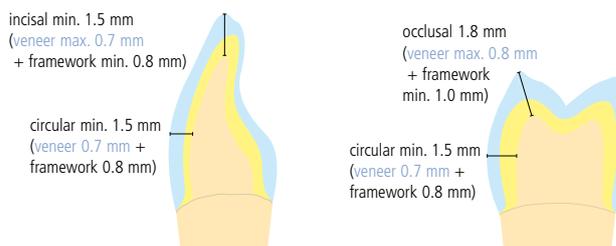
Example:

Minimum layer thicknesses for anterior and premolar crowns in the cut-back technique



Example:

Minimum layer thicknesses for anterior and premolar crowns in the layering technique



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.

Model and tooth preparation

Fabricate a working model with removable segments as usual. The manufacturer's instructions of the different CAD/CAM systems must be observed regarding the type of plaster to be used.



- Check the radius of the incisal/occlusal edge on the prepared dies (maxilla and mandible).
- The prepared incisal edge should be at least as thick as the diameter of the cutter used in the cavity during the CAD/CAM process..
- If the incisal edge of the prepared die is thinner than the diameter of the cutter, 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 and onlay



Veneer and anterior crown



Posterior crown



Practical Procedure Overview of the Processing Techniques

IPS e.max CAD restorations can be completed using different processing techniques. **Keep in mind** that some processing techniques depend on the indication (see page 8).

Efficiency		Esthetics					
Technique	Polishing technique (self glaze)	Staining technique on the "blue" restoration			Staining technique on the "tooth-coloured" restoration	Cut-back technique	Layering technique
Description	 <p>Polishing of the "blue" restoration, followed by crystallization without individual characterization and glaze.</p>	Variant A  <p>Glazing with IPS e.max CAD Crystall./Glaze Spray on the blue restoration followed by Speed Crystallization (Speed Crystallization and Glaze firing in one step).</p>	Variant B  <p>Staining and glazing with IPS e.max CAD Crystall./Glaze Paste on the blue restoration followed by Crystallization and the Stain/Glaze firing in one step.</p>	Variant C  <p>Staining and glazing with IPS e.max CAD Crystall./Glaze Spray on the blue restoration followed by Crystallization and the Stain/Glaze firing in one step.</p>	 <p>Crystallization without the application of materials. Stain/Glaze firing on the tooth-coloured restoration either with IPS e.max CAD Crystall./ or IPS Ivocolor materials.</p>	 <p>Crystallization without the application of materials. Incisal firing with IPS e.max Ceram materials. Stain/Glaze firing with IPS Ivocolor materials.</p>	 <p>Crystallization without the application of materials. Dentin/Incisal firing with IPS e.max Ceram materials. Stain/Glaze firing with IPS Ivocolor materials.</p>
Firing cycles and times	<p>Speed Crystallization without staining and glazing (max. 2 units) approx. 14:55 min</p> <p>or</p> <p>Crystallization without staining and glazing approx. 25 min</p>	<p>Speed Crystallization with IPS e.max CAD Crystall./Glaze Spray (max. 2 units) approx. 14:55 min</p>	<p>Crystallization with IPS e.max CAD Crystall./Shades, Stains and Glaze paste approx. 25 min</p>	<p>Crystallization with IPS e.max CAD Crystall./Shades, Stains and Glaze spray approx. 25 min</p>	<p>Crystallization without staining and glazing approx. 25 min</p> <p>Stain/Glaze firing with IPS e.max CAD Crystall./ materials approx. 14:30 min or IPS Ivocolor approx. 12 min</p>	<p>Crystallization without staining and glazing approx. 25 min</p> <p>Wash firing with IPS e.max Ceram materials. approx. 14 min or IPS Ivocolor approx. 12 min</p> <p>Incisal firing with IPS e.max Ceram materials. approx. 14 min</p> <p>Stain/Glaze firing with IPS Ivocolor approx. 12 min</p>	<p>Crystallization without staining and glazing approx. 35 min (MO, Impulse)</p> <p>Wash firing with IPS e.max Ceram materials. approx. 14 min or IPS Ivocolor approx. 12 min</p> <p>1st/2nd Dentin/Incisal firing with IPS e.max Ceram materials. 2x approx. 14 min</p> <p>Stain/Glaze firing with IPS Ivocolor approx. 12 min</p>
Total firing time	 <p>14:55 min Or 25:00 min</p>	 <p>14:55 min</p>	 <p>25:00 min</p>	 <p>25:00 min</p>	 <p>37:00 min</p>	 <p>63:00 min</p>	 <p>87:00 min</p>
	Page 20	Page 26	Page 28	Page 35	Page 40	Page 44	Page 51

Practical Procedure

Polishing Technique (Self-Glaze)



If no staining and glazing is desired, there is the option to polish the "blue" restoration manually and then crystallize it. Please note that polishing causes slight wear.

Finishing

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 (observe the Ivoclar Vivadent flow chart "Recommended grinding instruments for IPS e.max glass-ceramic").

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

- If possible, carry out grinding adjustments of IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state.
- Only use suitable grinding instruments, low speed and light pressure to prevent delamination and chipping at the margins in particular.
- Overheating of the glass-ceramic must be avoided.
- The restorations are fitted on the dies and carefully finished.
- Check proximal and occlusal contact points.
- Surface-grind the entire occlusal surface with a fine diamond instrument to smooth out the surface structure created by the CAD/CAM procedure.
- Make sure that the minimum layer thicknesses are maintained even after the minor adjustments.
- Do **not** blast restorations with Al_2O_3 or glass polishing beads!

Polishing

Please observe the following procedure for polishing the pre-crystallized (blue) finished restoration:

- Clean the restoration with ultrasound in a water bath or a steam cleaner to remove any contaminations and grease residue.
- Any overheating of the glass-ceramic must be avoided during polishing. Observe the manufacturer's recommendations for use of the grinding tools.
- Pre-polishing is performed with a diamond rubber polisher (e.g. OptraFine® F).
- Fine polishing is done with a high-gloss rubber polisher (e.g. OptraFine® P).
- Clean the restoration with ultrasound in a water bath or the steam jet.



Smooth out the attachment point of the holder and finish the restoration using suitable grinding instruments.

Pre-polishing with e.g. OptraFine F. Prevent the glass-ceramic from overheating.

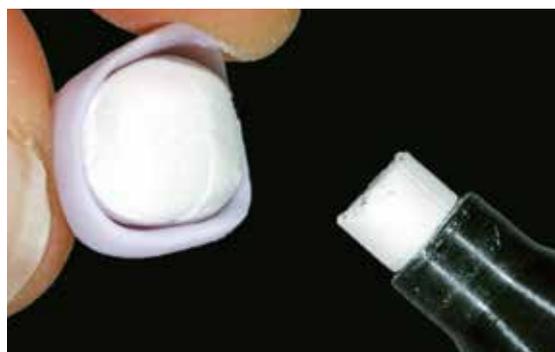
High-gloss polishing with e.g. OptraFine P. Overheating of the glass-ceramic must be prevented.

Speed crystallization or crystallization

- 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 firing paste 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 re-sealable 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 firing paste using a plastic spatula so that the pin is securely in place and the restoration margins are optimally supported. They can be placed directly on the IPS e.max CAD Crystallization Pin with a small amount of IPS Object Fix Flow.
- Smaller restorations (veneers, inlays, onlays) do not need to be entirely supported.
- Prevent contamination of the outer restoration surface. Clean off any contamination with a brush dampened with water and dry.
- Place the restoration in the IPS e.max CAD (Speed) Crystallization Tray and position the tray in the centre of the firing chamber.
- Select the firing program suitable for the materials and the chosen firing tray.



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.



Place the restoration in the centre of the IPS e.max CAD Crystallization Tray and crystallize using the stipulated firing parameters.



- **Observe the firing parameters for IPS e.max CAD MO Impulse and IPS e.max CAD HT, MT, LT.**
- **Speed Crystallization is to be exclusively conducted on an IPS e.max CAD Speed Crystallization Tray.**



Conduct the **Speed Crystallization** or **Crystallization** on an IPS e.max CAD (Speed) Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 66.**



- If a restoration made from IPS e.max CAD MO or Impulse and one made from IPS e.max CAD HT, MT or LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO / Impulse must be used!
- If a maximum of 2 restorations (made from LT, MT or HT) are crystallized at the same time, Speed Crystallization can be used. Observe the requirements for Speed Crystallization on page 26.

- Remove restoration 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.
- Remove the restoration from the set IPS Object Fix Putty/Flow.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do **not** remove residue with Al_2O_3 or glass polishing beads.
- Place the restoration on the die and check the fit.
- **If grinding adjustments are required, make sure that no overheating of the ceramic occurs.**
- Subsequently, polish the adjusted areas to a high gloss.



Completed, polished and crystallized IPS e.max CAD restoration.

Practical Procedure

Staining Technique

In the staining technique, the milled full-contour restorations are completed by applying stains and glazing materials. Individualized characterizations and glaze can be applied either before or after Crystallization firing. Coordinated materials are available for the different procedures.

By using translucent IPS e.max CAD blocks, highly esthetic restorations can be fabricated easily on only slightly or non-discoloured preparations.

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 (observe the Ivoclar Vivadent flow chart "Recommended grinding instruments for IPS e.max glass-ceramic").

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

- If possible, carry out grinding adjustments of IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state.
- Only use suitable grinding instruments, low speed and light pressure to prevent delamination and chipping at the margins in particular.
- Overheating of the glass-ceramic must be avoided.
- The restorations are fitted on the dies and carefully finished.
- Check proximal and occlusal contact points.
- Surface-grind the entire occlusal surface with a fine diamond instrument to smooth out the surface structure created by the CAD/CAM procedure.
- Make sure that the minimum layer 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 restorations with Al_2O_3 or glass polishing beads!

Thin veneers



Carefully separate the thin veneer from the block using a diamond-coated separating disk.



Smooth out attachment point and finish the restoration.



Finish margins with suitable instruments.

Inlays, onlays, crowns



Smooth out attachment point.



Finish the outer surfaces



...and margins using suitable grinding instruments.



Surface-grind the functional areas in particular with a fine diamond instrument to smooth out the surface structure created by the CAD/CAM procedure.



Fitted IPS e.max CAD LT crown



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

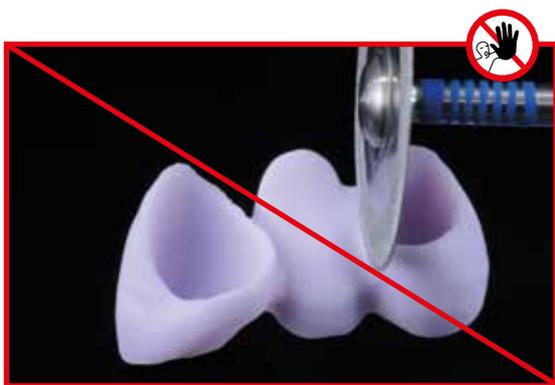
Bridges



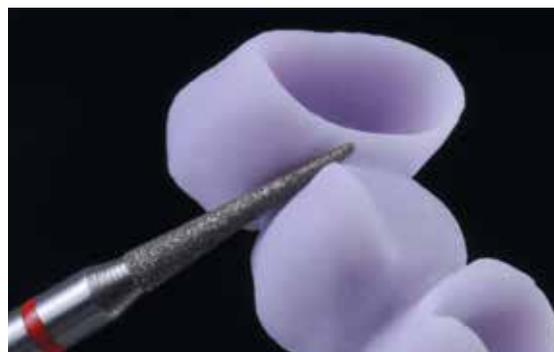
Bridge after the CAD/CAM process.



Smooth out the attachment point and take proximal contacts into account.



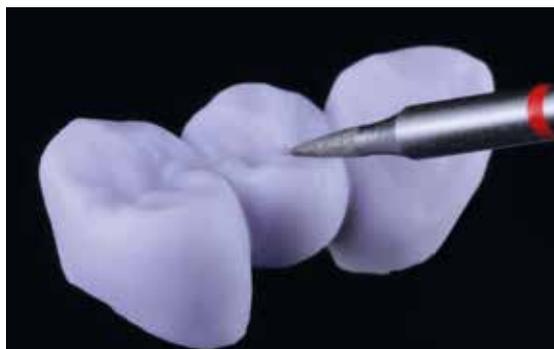
Do not use a diamond disk to finish the interdental areas, as this will initiate predetermined breaking points.



Finish interdental areas with fine diamond instruments (grain size 40–50 μm), pay attention to the connector dimensions.



Check the occlusion, articulation and proximal contact points.



Finish the outer surface, particularly the functional areas of the restoration with a fine diamond instrument to smooth out the surface structure created by the CAD/CAM process.

Variant A

Speed Crystallization and Glaze firing in one step with glazing spray



Glazing with IPS e.max CAD Crystall./ Glaze spray on the "blue" restoration followed by Crystallization.

Only IPS e.max CAD Crystall./Glaze Spray must be used for this processing technique. Crystallization and Glaze firing are performed in one step. The requirements for Speed Crystallization must be observed.

Required materials

- **IPS e.max CAD Crystall./Glaze Spray** is a ready-to-use glazing spray.
- **IPS e.max CAD Speed Crystallization Tray** is a special firing tray for the Speed Crystallization of IPS e.max CAD.



Requirements for Speed Crystallization

Speed Crystallization is independent of the translucency and indication. The following table must be observed:

IPS e.max CAD	Indication	max. 2 units IPS e.max CAD Crystall./Glaze Spray
HT High Translucency	Thin veneers, veneers, inlays, onlays, partial crowns, crowns	✓
MT Medium Translucency	Thin veneers, veneers, inlays, onlays, partial crowns, crowns	✓
LT Low Translucency	Veneers, inlays, onlays, crowns	✓
	Hybrid abutment crowns, 3-unit bridges	—
MO Medium Opacity	Hybrid abutments, crowns (framework)	—
I Impulse	Thin veneers, veneers	—

Preparation for Speed Crystallization

Procedure:

- Secure the restoration on a suitable IPS e.max CAD Crystallization Pin as described in **Variante B** (pages 29–30).
- Make sure that the 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 must also be enclosed with firing paste exactly up to the restoration margin.

Speed Crystallization (Speed Crystallization and Glaze firing in one step).

- Before glazing, make sure that the outer surface of the restoration is dry and free of firing paste.
- IPS e.max CAD Crystall./Glaze Spray is applied as described in **Variant C** (pages 36–38).
- Place a maximum of 2 units in the centre of the IPS e.max CAD Speed Crystallization Tray.
- Conduct Speed Crystallization firing using the stipulated firing parameters (Speed Crystallization).



Speed Crystallization is to be exclusively conducted on an IPS e.max CAD Speed Crystallization Tray.



Conduct the **Speed Crystallization** on the IPS e.max CAD Speed Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 66**

- Remove restoration 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.
- Remove the restoration from the set IPS Object Fix Putty/Flow.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do **not** remove residue with Al₂O₃ or glass polishing beads.
- Place the restoration on the die and check the fit.
- **If grinding adjustments are required, make sure that no overheating of the ceramic occurs.**
- Finally, polish the adjusted areas to a high gloss.



Secure the restoration on a suitable IPS e.max CAD Crystallization Pin as described in Variant B and C and apply IPS e.max CAD Crystall./Glaze Spray.



Position the IPS e.max CAD Speed Crystallization Tray with max. two IPS e.max CAD HT/MT/LT in the furnace and fire using the parameters for the Speed Crystallization firing.



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



Remove residue with ultrasound in a water bath....



... or with the steam jet.



Do **not** remove residue with Al₂O₃ or glass polishing beads.



Completed IPS e.max CAD LT crown after Speed Crystallization.

Staining technique on the "blue" restoration

Variant B

Crystallization and Stain/Glaze Firing in one step with glazing paste



Staining and glazing with IPS e.max CAD Crystall./ Shades, Stain and Glaze spray on the "blue" restoration followed by Crystallization.

The following paragraphs will explain the steps for staining and glazing with IPS e.max CAD Crystall./Shades, Stains and Glaze. In this processing technique, Crystallization and the Stain/Glaze firing are performed in one step. Characterizations are applied using IPS e.max CAD Crystall./Shades and Stains.

Required materials

- **IPS e.max CAD Crystall./Shades** are ready-to-use "Dentin" 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./Glaze Liquid** is a special liquid for mixing with Shades, Stains and Glaze.



Preparation for Crystallization and the Stain/Glaze firing in one step

Depending on the type of restoration, they must be placed on an IPS e.max CAD Crystallization Pin before the Stains and Glaze are applied. Smaller restorations (thin veneers, 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



**Partial crowns, anterior crowns,
posterior crowns, bridges**

Use either IPS Object Fix Putty or Flow to secure the restoration on the pin.

without (optional)
IPSe.max CAD Crystallization Pin



Thin veneers, veneers, inlays, onlays

To apply Glaze, Shades, and Stains, secure the restoration

- with an OptraStick,
- with diamond tweezers, or
- directly on the die.

Observe the following procedure for positioning the restoration on the IPS e.max Crystallization Pin:

- 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 restoration walls.
- Fill the inside of the restoration with IPS Object Fix Putty or Flow firing paste 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 re-sealable 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 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 any possible contamination with a brush dampened with water and then dry.

Thin veneers – veneers (optional)



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



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



Adapt IPS Object Fix Putty to the pin and restoration margin. Remove any contamination from the outer surface.

Crowns – inlays, onlays (optional)



IPS Object Fix Flow and IPS Object Fix Putty



Select the largest possible IPS e.max CAD Crystallization Pin.



Fill the inside of the restoration 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.



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



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

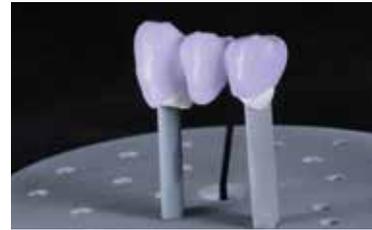
Bridges



Select the largest possible IPS e.max CAD Crystallization Pin.



Fill the inner aspects of the crowns of the cleaned bridge with IPS Object Fix Putty or Glow and press the suitable IPS e.max CAD Crystallization Pin into it.



Immediately place the bridge on the IPS e.max CAD Crystallization Tray.



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



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

Crystallization and Stain/Glaze firing in one step

The following procedure must be observed:

- Apply IPS e.max CAD Crystall./Glaze Paste evenly to the entire outer surface of the restoration.
- If a slight thinning is desired, the ready-to-use glazing material may be mixed with a small amount of IPS e.max CAD Crystall./Glaze Liquid.
- Do not apply the glaze layer too thickly. 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 or IPS e.max CAD Crystall./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.

Thin veneers, veneers, inlays, onlays

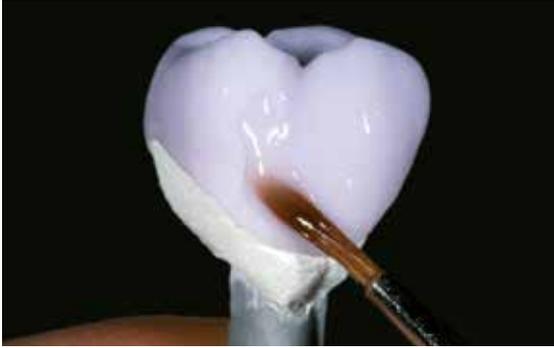


Individualized characterization with IPS e.max CAD Crystall./Shades, Stains and Glaze.



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

Crowns, bridges



Apply IPS e.max CAD Crystall./Glaze Paste evenly on the blue restoration.



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

Characterization Guide

With the IPS e.max CAD Crystall./Shades and IPS e.max CAD Crystall./Stains, it is possible to characterize the restoration whilst it is in the "blue" state prior to Crystallization. The following Shades and Stains are available for characterization:

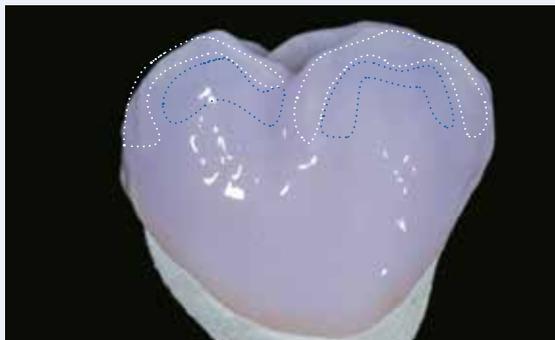
IPS e.max CAD Crystall./Shades



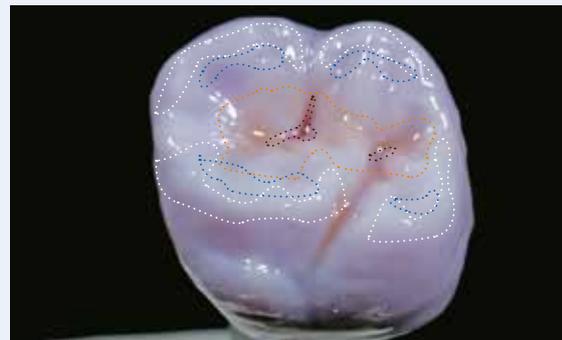
IPS e.max CAD Crystall./Stains



Depending on the individual patient situation, the characterizations may be applied as follows (example: shade A2):



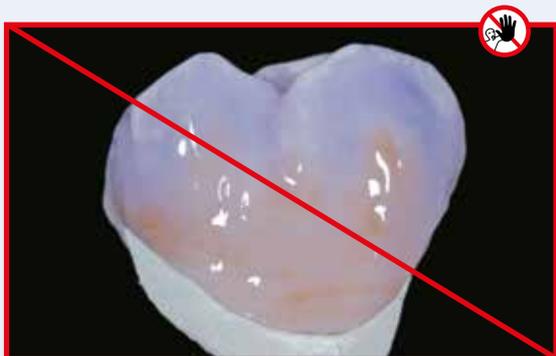
Minor characterizations on the buccal surface using IPS e.max CAD Crystall./Shade Incisal and Stains.



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
- Enhancing 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 and Stains

After glazing and staining, Crystallization is conducted in a compatible ceramic furnace (e.g. Programat® P710). When placing the objects into the furnace and setting the firing parameters, observe the following points:

- Place the restoration in the centre 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 units can be positioned on the firing tray and crystallized with IPS e.max CAD Crystall./Glaze Paste.



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



- **Observe the firing parameters for IPS e.max CAD MO Impulse and IPS e.max CAD HT, MT, LT.**
- **Speed Crystallization must not be used for this processing technique.**



Conduct the **crystallization** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 66.**



If a restoration made from IPS e.max CAD MO or Impulse and one made from IPS e.max CAD HT, MT or LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO / Impulse must be used!

Optional:

- 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 contact points), IPS e.max CAD Crystall./Add-On is available. The adjustments may be made with both Crystallization and with a corrective firing cycle.
- The detailed procedure is described on page 39.



- Remove restoration 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.
- Remove the restoration from the set IPS Object Fix Putty/Flow.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do not remove residue with Al₂O₃ or glass polishing beads.
- Place the restoration on the die and check the fit.
- **If grinding adjustments are required, make sure that no overheating of the ceramic occurs.**
- Finally, polish the adjusted areas to a high gloss.



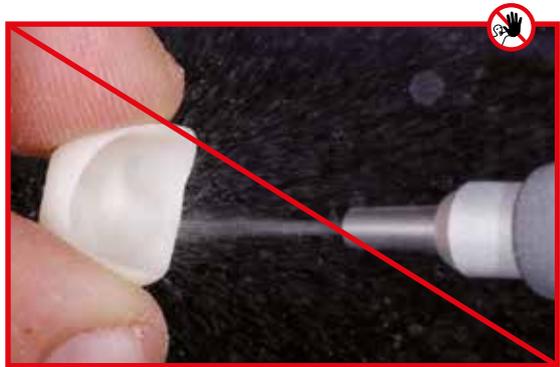
Remove the cool restoration from the set IPS Object Fix Putty or Flow.



Remove residue with ultrasound in a water bath....



... or with the steam jet.



Do **not** remove residue with Al_2O_3 or glass polishing beads.



IPS e.max CAD LT crown after crystallization.



Onlay and inlay made of aus IPSe.max CAD HT after Crystallization.



IPS e.max CAD LT bridge after Crystallization.

Variant C:

Crystallization and Stain/Glaze Firing in one step with glazing spray



Staining and glazing with IPS e.max CAD Crystall./ Shades, Stains and Glaze Spray on the "blue" restoration followed by Crystallization.

In this processing technique, IPS e.max CAD Crystall./Glaze Spray is used instead of IPS e.max CAD Crystall./Glaze Paste. Crystallization and the Stain/Glaze firing are performed in one step. Characterizations are applied using IPS e.max CAD Crystall./Shades and Stains.

The spray should only be used if IPS Object Fix auxiliary firing paste is adapted up to the margins.

Required materials

- **IPS e.max CAD Crystall./Shades** are ready-to-use "Dentin" stains in syringes.
- **IPS e.max CAD Crystall./Stains** are ready-to-use intensive stains in syringes.
- **IPS e.max CAD Crystall./Glaze Spray** is a ready-to-use glazing spray.



Preparation for Crystallization and the Stain/Glaze firing in one step

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.

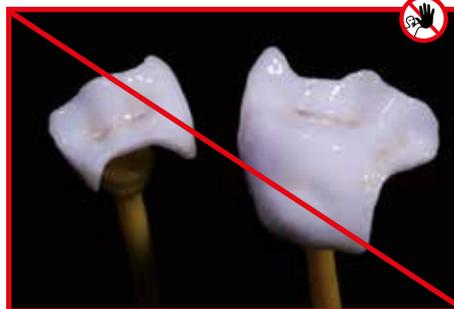
with
IPS e.max CAD Crystallization



**Thin veneers, veneers
Inlays, onlays, partial crowns, anterior crowns,
Posterior crowns**

Adapt IPS Object Fix Putty or Flow exactly up to the restoration margin so that the glazing spray does not touch the inner areas.

without
IPS e.max CAD Crystallization Pin



Procedure:

- Secure the restoration on a suitable IPS e.max CAD Crystallization Pin as describe in **Variant B** (pages 29–30).
- Make sure that the firing paste (IPS Object Fix Putty or Flow) is flush with the restoration margin. If veneers, inlays, and onlays are glazed with Glaze Spray, ensure that they are also enclosed with firing paste exactly to the restoration margin.

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 firing paste.
- If characterizations are desired, the restoration can be individualized using IPSe.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 this would then also be coated with glaze.
- Shake the Glaze Spray can well immediately before use until the mixing ball in the container is moving freely (approximately 20 seconds). If the can is not shaken sufficiently, the spray will contain mainly propellant. This means there will be an insufficient coverage of glazing powder.
- Observe a distance of 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 colour.
- Areas that do not show an even layer have to be sprayed again.
- Place the restoration in the centre of the IPS e.max CAD Crystallization Tray and fire using the stipulated firing parameters.



Thoroughly shake the Glaze Spray can before application.



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 centre of the IPS e.max CAD Crystallization Tray and fire using the stipulated firing parameters.



- Observe the firing parameters for IPS e.max CAD MO Impulse and IPS e.max CAD HT, MT, LT.
- Speed Crystallization must not be used for this processing technique.



Conduct the **Crystallization** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 66.**



If a restoration made from IPS e.max CAD MO or Impulse and one made from IPS e.max CAD HT, MT or LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO / Impulse must be used!

Optional:

- 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 contact points), IPS e.max CAD Crystall./Add-On is available. The adjustments may be made with both Crystallization and with a corrective firing cycle.
- The detailed procedure is described on page 39.



- Remove restoration 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.
- Remove the restoration from the set IPS Object Fix Putty/Flow.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do **not** remove residue with Al₂O₃ or glass polishing beads.
- Place the restoration on the die and check the fit.
- **If grinding adjustments are required, make sure that no overheating of the ceramic occurs.**
- Finally, polish the adjusted areas to a high gloss.



Example of incorrect Glaze Spray application

Problem/Cause	Before Firing Application of the Glaze Spray	After Firing Detailed view of the surface
<p>Problem:</p> <p>Not enough Glaze Spray on the restoration</p> <p>Possible cause:</p> <ul style="list-style-type: none"> - Distance between the spray can and the restoration too far - Spraying too short - Spray is not shaken sufficiently - Spray can held not upright during spraying 	 <p data-bbox="596 1093 948 1149">Insufficient application of IPS e.max CAD Crystall./Glaze Spray.</p>	 <p data-bbox="975 1093 1327 1149">Insufficient gloss or incomplete glaze layer.</p>
<p>Problem:</p> <p>Too much Glaze Spray on the restoration</p> <p>Possible cause:</p> <ul style="list-style-type: none"> - Distance between the spray can and the restoration too small - Too much Glaze Spray applied 	 <p data-bbox="596 1449 948 1498">Too much IPS e.max CAD Crystall./Glaze Spray was applied.</p>	 <p data-bbox="975 1449 1327 1498">Loss of texture and too glossy surface.</p>

Optional:

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

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



Procedure:

- 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 if Add-On is applied on the "blue" uncrystallized restoration.
- Conduct the Corrective firing if Add-On is applied on an already crystallized restoration.



Mixing 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.

Staining technique on the "tooth-coloured" restoration

Crystallization and Separate Stain/Glaze firing



Crystallization without application of any materials; separate Stain/Glaze firing either with IPS e.max CAD Crystall./ or IPS Ivocolor materials.

The following paragraphs will explain the steps for staining and glazing with IPS e.max CAD Crystall./Shades, Stains and Glaze. In this processing technique, Crystallization and the Stain/Glaze firing are performed in one step. Characterizations are applied using IPS e.max CAD Crystall./Shades and Stains.

Required materials

- **IPS e.max CAD Crystall./Shades** are ready-to-use "Dentin" 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./Glaze Liquid** is a special liquid for mixing with Shades, Stains and Glaze.



or

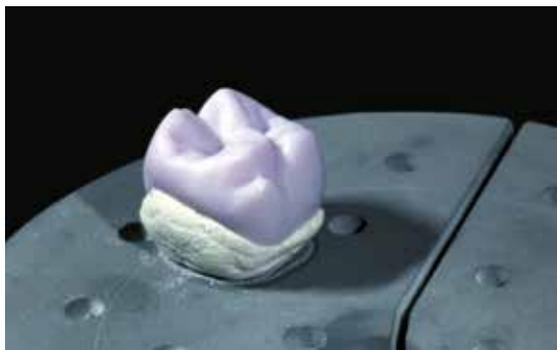
- **IPS Ivocolor Essences** are intensively shaded stains in powder form.
- **IPS Ivocolor Shades** are ready-to-use stains in syringes.
- **IPS Ivocolor Glaze Paste/FLUO, Glaze Powder/FLUO** are glazing materials in paste and powder forms.
- **IPS Ivocolor Mixing Liquids** (allround, longlife) to mix the materials in powder form (Essences, Glaze), as well as to thin paste materials (Shades, Glaze).
- **IPS Ivocolor Essence Fluid** to mix the Essences in powder form to a pasty consistency.



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.
- The restorations must **not** be blasted with Al_2O_3 or glass polishing beads.
- Use only IPS Object Fix Putty or Flow as firing paste to ideally place the restoration on the firing tray.
- Slightly overfill the restoration cavity with the firing paste so that there is a reservoir.
- Place the restoration in the centre of the IPS e.max CAD Crystallization Tray and fire using the stipulated firing parameters.
- 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.



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.



Observe the firing parameters for IPS e.max CAD MO Impulse and IPS e.max CAD HT, MT, LT.



Conduct the **Crystallization** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 66.**



If a restoration made from IPS e.max CAD MO or Impulse and one made from IPS e.max CAD HT, MT or LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO / Impulse must be used!

- Remove restoration 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.
- Remove the restoration from the set IPS Object Fix Putty/Flow.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do **not** remove residue with Al_2O_3 or glass polishing beads.
- Place the restoration on the die and check the fit.
- **If grinding adjustments are required, make sure that no overheating of the ceramic occurs.**
- Finally, polish the adjusted areas to a high gloss.



Remove residue with ultrasound in a water bath....



... or with the steam jet.



Do **not** remove residue 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. With the shade information provided by the dentist (shade determination), a control die is fabricated that serves as the optimum basis for lifelike shade reproduction of the given oral situation.

The following procedure must be observed:

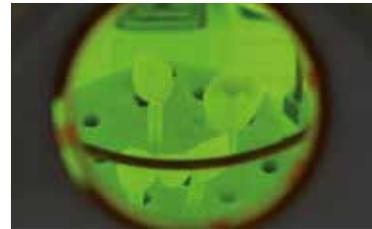
- Coat the inner surfaces of the ceramic restoration with IPS Natural Die Material Separator and allow it to react for a short time.
- Apply the IPS Natural Die Material in the appropriate shade on the inner aspects of the restoration. Make sure that the entire inner aspect is embraced and filled.
- 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 insert the die holder.



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.

Stain and Glaze firing

Once the restoration has been cleaned, the Stain and Glaze firing is conducted with IPS e.max CAD Crystall./ or IPS Ivocolor materials.

Observe the following notes for conducting the Stain/Glaze firing with

IPS e.max CAD Crystall./ materials:

- Extrude the ready-to-use IPS e.max CAD Crystall./Glaze Paste from the syringe and mix thoroughly.
- If a slight thinning is desired, the ready-to-use glazing material may be mixed with a small amount of IPS e.max CAD Crystall./Glaze Liquid.
- Apply IPS e.max CAD Crystall./Glaze Paste evenly on the areas to be glazed using a small brush. Do not apply the glaze layer too thickly. Avoid "pooling", especially on the occlusal surface of the crown.
- Too thin a glaze layer may lead to an unsatisfactory gloss.
- Apply characterizations with IPS e.max CAD Crystall./Shades and/or IPS e.max CAD Crystall./Stains. For that purpose, extrude the Shades and Stains from the syringe and mix. If necessary, slightly thin them 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. More intensive shades are achieved by several staining procedures and repeated firing, not by applying thicker layers.
- To imitate the incisal area and translucency of the crown in the incisal and/or occlusal third, IPS e.max CAD Crystall./Shades Incisal may be used. The cusps and fissures can be individualized using Stains





IPS e.max CAD Crystall./Shades, Stains, Glaze and IPS Ivocolor Shades, Essence, Glaze must not be mixed with each other, nor applied one after the other!



Conduct the **Corrective/Stain/Glaze firing** of **IPS e.max CAD Crystall./ materials** on an IPS e.max CAD Crystallization Tray using the stipulated firing parameters.
Firing parameters see page 66.

Observe the following notes for conducting the Stain/Glaze firing with **IPS Ivocolor materials**:

- Clean the finished restoration with the steam jet to remove any dirt and grease residue. Any contamination after cleaning must be prevented.
- To improve the wettability of the stains, a small quantity of IPS Ivocolor Mixing Liquid may be slightly rubbed into the area that needs to be characterized.
- Mix IPS Ivocolor Shades and Essences with the corresponding IPS Ivocolor Liquids to the desired consistency.
- More intensive shades are achieved by several staining procedures and repeated firing, not by applying thicker layers.
- To imitate the incisal area and translucency of the crown in the incisal and/or occlusal third, IPS Ivocolor Shade Incisal may be used. The cusps and fissures can be individualized using Essences.
- Secure the restoration on the firing pin of the honey-comb tray with a little IPS Object Fix Putty or Flow for firing.



IPS e.max CAD Crystall./Shades, Stains, Glaze and IPS Ivocolor Shades, Essence, Glaze must not be mixed with each other, nor applied one after the other!



Conduct the **Stain and Glaze firing** of **IPS Ivocolor** on the honey-comb firing tray using the stipulated firing parameters. **Firing parameters see page 67.**



Application of IPS Ivocolor Glaze before Glaze firing.



Application of IPS Ivocolor Essences and Shades before the Stain and Characterization firing.



Completed IPS e.max CAD LT crown after Glaze firing

Practical Procedure

Cut-back technique



Crystallization without the application of materials. Incisal firing with IPS e.max Ceram materials. Stain/Glaze firing with IPS Ivocolor materials.

In the cut-back technique, IPS e.max Ceram Impulse and Incisal materials are layered in the incisal and/or occlusal area of the crystallized, reduced IPS e.max CAD restoration. Subsequently, the Stain and Glaze firing is conducted. The minimal amount of build-up material required means that highly esthetic restorations can be fabricated within only a few working steps.

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 (observe the Ivoclar Vivadent flow chart "Recommended grinding instruments for IPS e.max glass-ceramic").

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

- Carry out grinding adjustments of milled IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state, when ever possible.
- Only use suitable grinding instruments, low speed and light pressure to prevent delamination and chipping at the margins in particular.
- Overheating of the glass-ceramic must be avoided.
- The restorations are fitted 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 layer 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.
- The framework must **not** be blasted with Al_2O_3 or glass polishing beads.



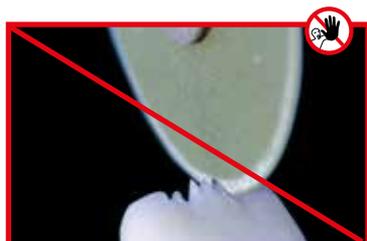
Fit the milled restoration on the model.
Tooth 11: Anterior crown with cut-back
Tooth 21: Full-contour veneer



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



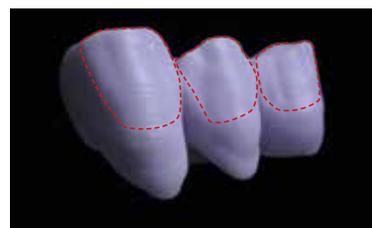
Finish the restoration surface with suitable grinding instruments.



Refrain from designing extreme morphologies with undercuts for mamelons.



Veneer and anterior crown with cut-back on dies.

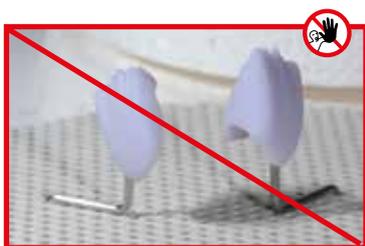


Bridge with cut-back.

Crystallization

Observe the following points for crystallization:

- Crystallization should be carried out in an Ivoclar Vivadent furnace (e.g. Programat® P310, P510 or P710).
- Use only IPS Object Fix Putty or Flow as 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.



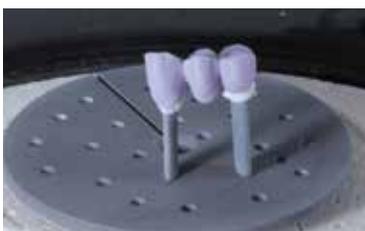
Slightly overfill the restoration cavity with IPS Object Fix Putty or Flow.



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



Fill the inner aspects of the crowns of the cleaned bridge with IPS Object Fix Putty or Flow and press the suitable IPS e.max CAD Crystallization Pin into it. Immediately place the bridge on the IPS e.max CAD Crystallization Tray.



Place the firing tray in the furnace and start the Crystallization with the respective parameters.



Observe the firing parameters for IPS e.max CAD MO Impulse and IPS e.max CAD HT, MT, LT.



Conduct the **Crystallization** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 66.**



If a restoration made from IPS e.max CAD MO or Impulse and one made from IPS e.max CAD HT, MT or LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO / Impulse must be used!

Preparation for veneering

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

- Remove the restoration from the set IPS Object Fix Putty or Flow..
- Remove any residue with ultrasound in a water bath and the steam jet.
- Do **not** remove residue 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 suitable rubber wheels, if required.
- Make sure that the minimum layer thicknesses are maintained even after the minor adjustments.
- Before veneering, clean the framework with the steam jet.
- The restorations must **not** be blasted 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 set firing paste.



Do **not** remove residue with Al_2O_3 or glass polishing beads.



Remove residue with ultrasound in a water bath....



... or with the steam jet.



Reduced IPS e.max CAD frameworks prepared for veneering.

Die fabrication with IPS Natural Die Material

The light-curing IPS Natural Die Material simulates the shade of the preparation. With the shade information provided by the dentist (shade determination), a control die is fabricated that serves as the optimum basis for lifelike shade reproduction of the given oral situation.

The following procedure must be observed:

- 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 insert the die holder.



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.

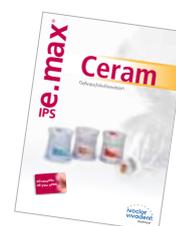


Before veneering, clean the framework under running water or with the steam jet.

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

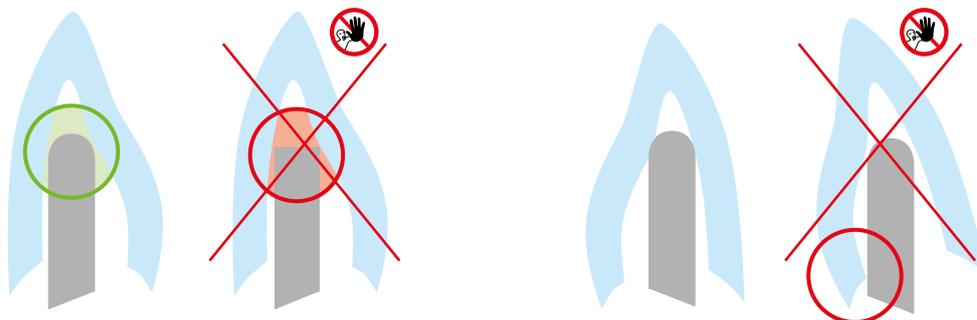
Veneering with IPS e.max Ceram

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 (Programat® firing tray) 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 from 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 IPS Ivocolor Shades and Essences.

Variant A: Wash firing with IPS e.max Ceram

If there is an ideal amount of space available, conduct the Wash firing with the required IPS e.max Ceram Incisal and/or Impulse material. Use the IPS Build-Up Liquids allround or soft to mix the materials. Apply the wash in a thin, covering coat on the entire framework.



Apply the wash using Incisal and/or Impulse materials...



...and fire using the stipulated firing parameters.

Variant B: Wash firing with IPS Ivocolor

With limited space or to enhance the in-depth chroma effect, the Wash firing can be conducted with IPS Ivocolor Shades, Essences and Glaze. Mix the paste or powder with the IPS Ivocolor Mixing Liquid allround or longlife to the desired consistency and apply the material in a thin, covering layer on the entire framework.



Apply the wash using Glaze, Shades, and Essence...



...and fire using the stipulated firing parameters.



Finish the full-contour areas of the IPS e.max CAD bridge with diamond grinding instruments and create a true-to-nature shape and surface texture.



Apply IPS Ivocolor Glaze on the entire bridge and individually characterize the bridge using IPS Ivocolor Shades and Essences.



The wash must be fired before the actual layering procedure is started. Place the honey-comb firing tray in the furnace and conduct the Wash firing (foundation) using the stipulated firing parameters.



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.



Conduct the **Wash firing (foundation)** on a honey-comb firing tray suitable for the ceramic furnace. **Firing parameters see page 67.**

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 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 the Incisal firing.



Complete the anatomical shape using IPS e.max Ceram Incisal and Transpa materials. Do not veneer the connectors or separate the interdental space.



Place the honey-comb firing tray in the furnace and conduct the Incisal firing using the stipulated firing parameters.



Restoration after the Incisal firing.



Conduct the **Incisal firing** using the parameters for the **1st Dentin/Incisal firing** on the honey-comb firing tray suitable for the ceramic furnace. **Firing parameters see page 67.**



Due to the thin material layer and therefore the limited shape change during firing, the cut-back technique allows the restoration to be completed in one firing cycle. If a second Incisal firing cycle 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:

- Create the anatomical shape and surface texture, such as growth lines and convex/concave areas, by finishing the restoration with suitable grinding instruments.
- If gold and/or silver dust was used to design the surface texture, the restoration has to be thoroughly cleaned with the steam jet. Make sure to remove all gold or silver dust in order to avoid any discolouration.



Finish the restoration with diamond grinding instruments and give it a true-to-nature shape and surface structure.

Stain and Glaze firing

The Stain firing is conducted with IPS Ivocolor Shade and/or Essences and the Glaze firing with IPS Ivocolor Glaze Powder/FLUO or Paste/FLUO. Depending on the situation, the firing cycles may be conducted together or separately. The firing parameters are identical.



Detailed information on the processing of IPS Ivocolor Shade, Essence and Glaze can be found in the IPS Ivocolor Instructions for Use.



- Thoroughly clean the restoration with the steam jet and dry with oil-free air.
- Mix IPS Ivocolor Shades and Essences with the corresponding IPS Ivocolor Liquids to the desired consistency.
- For better wettability of the stains and glazing materials, the surface can be wetted with a little IPS Ivocolor Mixing Liquid.
- Apply the glazing material in an even layer on the entire restoration.
- The cusps and fissures can be individualized using IPS Ivocolor Essence.
- If minor shade modifications are necessary, they can be applied with IPS Ivocolor Shades on the glazing material already in place.
- IPS e.max Ceram Add-On materials can be used for further adjustments (see IPS e.max Ceram Instructions for Use).



- More intensive shades are achieved by several staining procedures and repeated firing, not by applying thicker layers.
- The degree of gloss of the glazed surface is controlled via the consistency of IPS Ivocolor Glaze and the applied quantity, not by means of the firing temperature. For a higher degree of gloss, use less liquid for mixing the glaze material and/or increase the quantity of glaze material.



Conduct the **Stain/Glaze firing** with **IPS Ivocolor** on the honey-comb firing tray suitable for the corresponding furnace. **Firing parameters see page 67.**



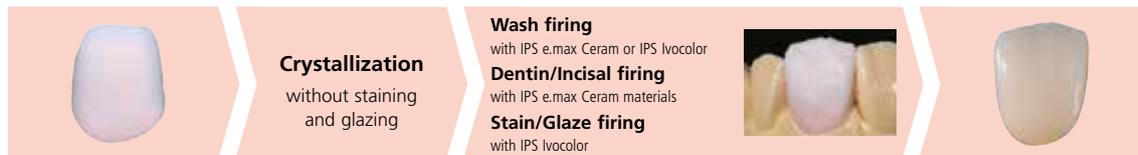
IPS e.max CAD LT veneer and anterior crown after Glaze firing.



Completed IPS e.max CAD LT bridge after Glaze firing.

Practical Procedure

Layering technique



Crystallization without the application of materials. Dentin/Incisal firing with IPS e.max Ceram materials. Stain/Glaze firing with IPS Ivocolor materials.

In the layering technique, the IPS e.max Ceram layering materials are fired onto the framework made from IPS e.max CAD MO. This enables very individualized design possibilities. The opacity of the IPS e.max CAD MO framework permits the fabrication of highly esthetic restorations on discoloured dies as well as metal core build-ups and 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 (observe the Ivoclar Vivadent flow chart "Recommended grinding instruments for IPS e.max glass-ceramic").

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

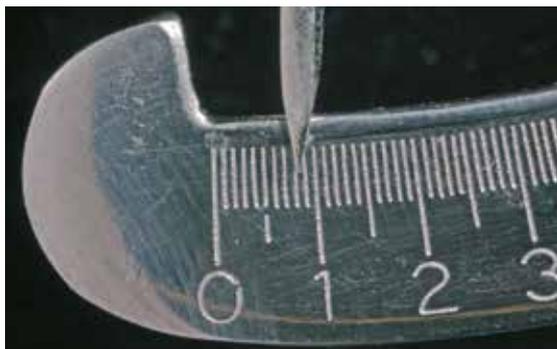
- Carry out grinding adjustments of milled IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state.
- Only use suitable grinding instruments, low speed and light pressure to prevent delamination and chipping at the margins in particular.
- Overheating of the glass-ceramic must be avoided.
- The frameworks are fitted on the dies and carefully finished.
- Make sure that the minimum layer 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.
- The framework must **not** be blasted with Al_2O_3 or glass polishing beads.



Place the milled framework on the model and check fit.



Finish the framework with suitable grinding instruments.



Make sure that the minimum layer thicknesses are maintained even after the minor adjustments.

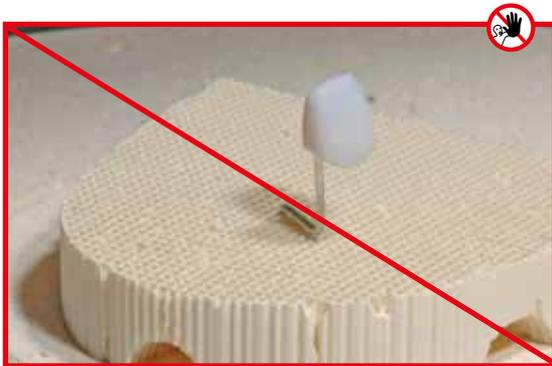


Finish the margins with suitable grinding instruments.

Crystallization

Observe the following points for crystallization:

- Crystallization should be carried out in an Ivoclar Vivadent ceramic furnace (e.g. Programat P310, P510 or P710).
- Use only IPS Object Fix Putty or Flow as 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-comb 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 firing pins and do not use a honey-comb firing tray for crystallization.



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.



Observe the firing parameters for IPS e.max CAD MO Impulse and IPS e.max CAD HT, MT, LT.



Conduct the **Crystallization** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 66.**



If a restoration made from IPS e.max CAD MO or Impulse and one made from IPS e.max CAD HT, MT or LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO / Impulse must be used!

Preparation for veneering

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

- Remove the restoration from the set IPS Object Fix Putty or Flow.
- Remove any residue with ultrasound in a water bath and the steam jet.
- Do **not** remove residue 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 suitable rubber wheels, if required.
- Make sure that the minimum layer thicknesses are maintained even after the minor adjustments.
- Before veneering, clean the framework with the steam jet.
- The restorations must **not** be blasted with Al_2O_3 or glass polishing beads.



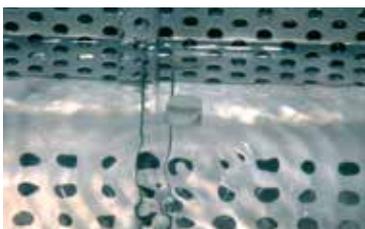
Remove the crystallization tray from the furnace once the Crystallization program has been completed and allow the IPS e.max CAD restoration to cool to room temperature.



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



Do **not** remove residue with Al_2O_3 or glass polishing beads.



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



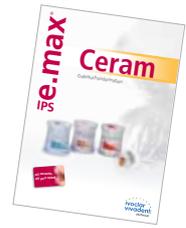
Check marginal areas and slightly finish, if necessary.



Finished IPS e.max CAD MO framework.

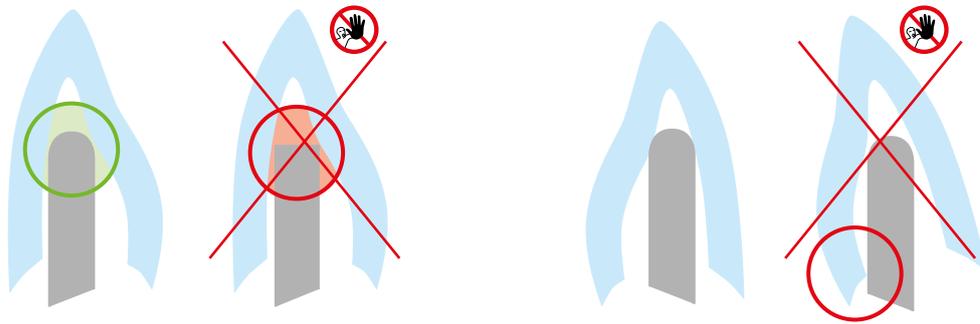
Veneering with IPS e.max Ceram

The following paragraphs will explain the most important steps required for the build-up. 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-comb firing tray (Programat firing tray) and the corresponding support pins to fire the restorations (do not use an 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 carried out. Any contamination after cleaning must be prevented.

The Wash firing is carried out with IPS e.max Ceram Incisal and Impulse materials or IPS Ivocolor Shades and Essences.

Variant A: Wash firing with IPS e.max Ceram

If there is an ideal amount of space available, conduct the Wash firing with the required IPS e.max Ceram Deep Dentin, Dentin, Transpa Incisal and/or Impulse materials. Use the IPS Build-Up Liquids allround or soft to mix the materials. Apply the wash in a thin, covering coat on the entire framework.



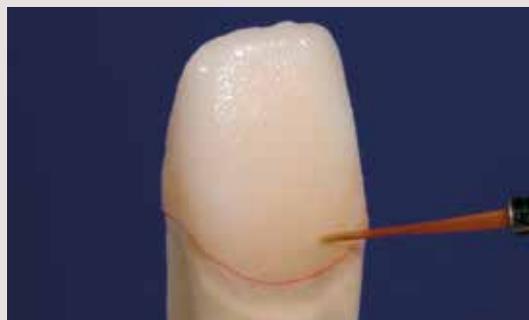
With ideal space, apply the wash layer with the required IPS e.max Ceram Deep Dentin, Dentin, Transpa Incisal and/or Impulse materials....



...and fire using the stipulated firing parameters.

Variant B: Wash firing with IPS Ivocolor

With limited space or to enhance the in-depth chroma effect, the Wash firing can be conducted with IPS Ivocolor Shades, Essences and Glaze. Mix the paste or powder with the IPS Ivocolor Mixing Liquid allround or longlife to the desired consistency and apply the material in a thin, covering layer on the entire framework.



Apply the wash using Glaze, Shades, and Essence....



...and fire using the stipulated firing parameters.



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.



Conduct the **Wash firing (foundation)** on a honey-comb firing tray suitable for the ceramic furnace. **Firing parameters see page 67.**

1st Dentin/Incisal firing

Build the tooth up according to the layering diagram (see IPS e.max Ceram Instructions for Use). Use the IPS 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.



Subsequently, the restoration is fired using the firing parameters for the 1st Dentin/Incisal firing.



Conduct the **1st Dentin/Incisal firing** on a honey-comb firing tray suitable for the ceramic furnace. **Firing parameters see page 67.**

2nd Dentin/Incisal firing (Corrective firing)

Complete the missing areas and compensate for the shrinkage.



Compensate for the shrinkage using Dentin, Transpa and Incisal materials.



Subsequently, the restoration is fired using the firing parameters for the 2nd Dentin/Incisal firing.



Conduct the **2nd Dentin/Incisal firing** on a honey-comb firing tray suitable for the ceramic furnace. **Firing parameters see page 67.**

Stain and Glaze firing

The Stain firing is conducted with IPS Ivocolor Shade and/or Essences and the Glaze firing with IPS Ivocolor Glaze Powder/FLUO or Paste/FLUO. Depending on the situation, the firing cycles may be conducted together or separately. The firing parameters are identical.



Detailed information on the processing of IPS Ivocolor Shade, Essence and Glaze can be found in the IPS Ivocolor Instructions for Use.



- Thoroughly clean the restoration with the steam jet and dry with oil-free air.
- Mix IPS Ivocolor Shades and Essences with the corresponding IPS Ivocolor Liquids to the desired consistency.
- For better wettability of the stains and glazing materials, the surface can be wetted with a little IPS Ivocolor Mixing Liquid.
- Apply the glazing material in an even layer on the entire restoration.
- The cusps and fissures can be individualized using IPS Ivocolor Essence.
- If minor shade modifications are necessary, they can be applied with IPS Ivocolor Shades on the glazing material already in place.
- IPS e.max Ceram Add-On materials can be used for shape adjustments (see IPS e.max Ceram Instructions for Use).



- More intensive shades are achieved by several staining procedures and repeated firing, not by applying thicker layers.
- The degree of gloss of the glazed surface is controlled via the consistency of IPS Ivocolor Glaze and the applied quantity, not by means of the firing temperature. For a higher degree of gloss, use less liquid for mixing the glaze material and/or increase the quantity of glaze material.



Conduct the **Stain/Glaze firing** with IPS Ivocolor on the honey-comb firing tray suitable for the corresponding furnace. **Firing parameters see page 67.**



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

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-coloured 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) as well as for veneering structures in the CAD-on technique. Restorations made of HT blocks convince users with their 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 MT, LT) is recommended.

When are IPS e.max CAD MT blocks used?

MT blocks demonstrate medium translucency and are used for restorations that require more brightness than HT restorations and more translucency than LT restorations. They are ideally suitable for the polishing, staining and cut-back technique.

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, 3-unit bridges). Restorations made of IPS e.max CAD LT convince users with their lifelike brightness value and chroma. This prevents the incorporated restorations from graying.

Can IPS e.max CAD LT also be used 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 from 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.

When should manual grinding adjustments be performed?

All manual grinding adjustments of milled IPS e.max CAD restorations should be made in the precrystallized (blue) state. It is important to note that the framework in its precrystallized state should be ground only with suitable grinding instruments, low speed 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. To smooth the surface relief created by the CAD/CAM process, the occlusal surface, particularly the function areas with antagonist contact, must be surface-ground with a fine diamond instrument.

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

The instructions of the manufacturer of the CAD/CAM system in use should be observed for 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 stone is unavailable, models and dies can be fabricated with high-strength stone, which is sprayed with IPS Contrast Spray Lapside 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 restorations 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 milling instrument used for the cavity. The corresponding manufacturer's instructions 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 fitting procedure after milling?

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

Why does the 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. The material supports the restoration in an optimum manner and thus ensures 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 for the crystallization process?

IPS Object Fix Putty and Flow has been specially developed for the crystallization of IPS e.max CAD restorations. The expansion behaviour 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.

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

Milled IPS e.max CAD restorations can be fitted on the dies 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?

During the crystallization process, the microstructure transforms and densifies by 0.2%. The milling software takes the densification factor into account. Therefore, the milled IPS e.max CAD restorations demonstrate precision of fit after crystallization.

How can premature drying out 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. Once removed from the aluminium bag, the syringe is ideally stored in a re-sealable plastic bag (e.g. Minigrip) or a container with a humid atmosphere.

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

Other firing trays **must not** be used. The IPS e.max CAD (Speed) 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-comb 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 P310, P510, or P710). 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 any ceramic furnace can be used for crystallization. Ceramic furnaces which, for example, do not feature a controlled (long-term) cooling mode or vacuum function cannot be used for this purpose.

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.

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

In order to prevent tension 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 Crystallization and Glaze firing?

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

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

No. As the IPS e.max CAD Crystall./ and IPS Ivocolor materials have different firing requirements, they 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 the crystallization of IPS e.max CAD restorations be verified?

Visual inspection by means of the enclosed material 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-coloured 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 Empress CAD frameworks be blasted with Al₂O₃ 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 Al₂O₃ or polishing beads, as this would damage the ceramic surface and reduce the outstanding physical properties.

Can IPS Ivocolor also be used for the crystallization firing of of IPS e.max CAD restorations?

IPS Ivocolor is **not** suitable for the staining and glazing of "blue" IPS e.max CAD restorations. After the crystallization firing, IPS Ivocolor can be used for the individualized characterization and glazing.

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

The inner aspect of the IPS e.max CAD restorations must always be conditioned, irrespective of the cementation protocol used, i.e. adhesive, self-adhesive or conventional. You may choose between two options:

Option 1:

Etching and silanization in one step with Monobond Etch & Prime®.

Option 2:

Separate etching with IPS Ceramic Etching Gel and subsequent silanization with Monobond Plus. With conventional cementation, silanizing is not necessary.

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 firing temperatures are too high and the reduction for the shoulder would weaken the restoration.

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°–8°, preparation height of at least 4 mm). If this is not possible, adhesive cementation should be preferred, e.g. with Variolink® Esthetic and Multilink® Automix.

It is not advisable to use traditional phosphate cements, as they would negatively influence the light transmission of the all-ceramic and therefore compromise the esthetic appearance of all-ceramic restorations.

Cementation and Aftercare

Cementation options

Esthetic cementation options are decisive for the harmonious shade effect of an all-ceramic restoration.

Depending on the indication, IPS e.max CAD restorations can be seated using either adhesive, self-adhesive or conventional cementation.

- For the adhesive cementation of IPS e.max restorations, Multilink® Automix or Variolink Esthetic® are the ideal composite cements.
- SpeedCEM® is available for the self-adhesive cementation of IPS e.max Press restorations.
- The glass ionomer cement Vivaglass® CEM is recommended for the conventional cementation of IPS e.max restorations.

Short definition of the different cementation methods:

– 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-adhesive properties on the tooth, which is why no additional special conditioning of the tooth surface is necessary. Hence, the adhesion of the restoration is partially achieved by a micromechanical and/or chemical bond. In order to achieve sufficient bonding strength values, retentive preparation (preparation angle 4–8°, preparation height at least 4 mm) is recommended. Self-adhesive cementation results in enhanced “(overall) strength” of the seated all-ceramic restoration.

– Conventional cementation

With conventional cementation, the bond is almost entirely created by static friction between the cementation material and the restoration, as well as between the cementation material and the preparation. In order to obtain the necessary mechanical friction, a retentive preparation showing a preparation angle of approximately 4–8° is required. Conventional cementation results in enhanced «(overall) strength» of the seated all-ceramic restoration.

Cementation possibilities for the different indications

Cementation possibilities for the different indications		Adhesive Cementation	Self-Adhesive Cementation	Conventional Cementation
IPS e.max CAD	Thin veneers, veneers	✓	–	–
	Inlays, onlays, partial crowns	✓	–	–
	Anterior and posterior crowns	✓	✓	✓
	3-Unit Bridges up to the 2 nd Premolar	✓	✓	✓



www.cementation-navigation.com



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

Care Notes

As with natural teeth, high-quality IPS e.max 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 that a low-abrasion cleaning paste is used. Scientific investigations and long-term clinical experience have proved the gentle effect compared to other pastes.



Block Selection

The blocks are selected on the basis of the desired tooth shade (Bleach BL or A-D), the determined die shade (ND1–ND9), and/or abutment shade, as well as the desired processing technique. The IPS e.max Shade Selection Wheel is used to determine the recommended block.

- Input: Determined tooth shade (A-D shade guide).
- Input: Shade of the preparation defined with the IPS Natural Die Material shade guide
- Output: Display of the recommended block (levels of translucency).
- Selection: Selection of the suitable block (level of translucency) depending on the indication and the desired processing technique.



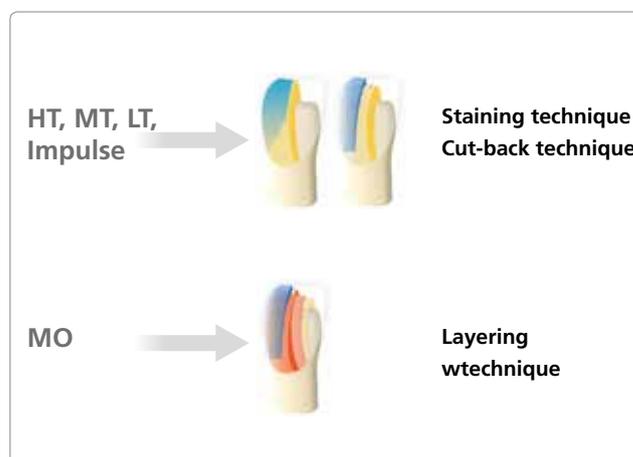
1. Input: Determined tooth shade (A-D shade guide).



2. Input: Shade of the preparation defined with the IPS Natural Die Material shade guide



3. Output: Display of the recommended block (levels of translucency).



4. Selection: Selection of the suitable block (level of translucency) depending on the indication and the desired processing technique.



The IPS e.max Shade Selection Wheel is also available as an online version at www.ivoclarvivadent.com or as App for iPad.



- 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 to the clinical situation, adjust the restoration shade by means of characterization with IPS Ivocolor Shades and Essences.
- 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 (greying).

Shade Combination Tables

Individual characterizations and shade adjustments of IPS e.max CAD restorations are achieved with IPS e.max CAD Crystall./Shades or IPS Ivocolor Shades and Essences.



IPS e.max Crystall./Shades, Stains

To be used on "blue" and "tooth-coloured" IPS e.max CAD restorations

A-D tooth shade	BL1	BL2	BL3	BL4	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
IPS e.max CAD Crystall./Shade																				
IPS e.max CAD Crystall./Shade Incisal																				
IPS e.max CAD Crystall./Stains																				

IPS Ivocolor Shades, Essences

To be used on "tooth-coloured" IPS e.max CAD restorations



A-D tooth shade	BL1	BL2	BL3	BL4	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
IPS Ivocolor Shade																				
IPS Ivocolor Shade Incisal																				
IPS Ivocolor Essence																				

Crystallization and Firing 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 P310, P510 or P710).
- If you 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 calibrations may be required. Observe the manufacturer's instructions.

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

- Use only IPS Object Fix Putty or Flow as a 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 exclusively the IPS e.max CAD Crystallization Tray or IPS e.max Speed Crystallization Tray and the corresponding pins.
- 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.



These firing parameters are guidance values. They are valid for the Programat furnaces from Ivoclar Vivadent. If furnaces from other manufacturers are used, the firing parameters have to be adjusted accordingly, as the case may be.

Deviations may occur:

- Depending on the furnace generation
- In case of regional differences in the power supply or if several electrical devices are operated on the same circuit.

Due to the IPS e.max Crystallization Tray, the firing temperatures vary depending on the furnace used.





Crystallization and Firing Parameters

Crystallization MO, Impulse, LT, MT, HT

with or without application of [IPS e.max CAD Crystall./ materials](#)



Furnaces Programat	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 _f [°C/°Fmin]
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
P310 P510 P710	403/757	6:00	60/108	780/1436	0:10	30/54	860/1580	10:00	550/780 1022/1436	780/860 1436/1580	710/1310	0
CS/CS2/CS3	Program 7											

Crystallization LT, MT, HT

with or without application of [IPS e.max CAD Crystall./ materials](#)



Furnaces Programat	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 _f [°C/°Fmin]
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
P310 P510 P710	403/757	6:00	90/162	830/1526	0:10	30/54	850/1562	7:00	550/830 1022/1526	830/850 1526/1562	710/1310	0
CS/CS2/CS3	Program 1											

Speed Crystallization (Observe the notes on page 26)

A maximum of 2 units with or without application of [IPS e.max CAD Crystall./Glaze Spray](#) on an IPS e.max CAD **Speed** Crystallization Tray



Furnaces Programat	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 _f [°C/°Fmin]
P300 P500 P700	403/757	1:00	110/198	800/1472	0:00	50/90	850/1562	3:00	690/800 1274/1472	800/850 1472/1562	700/1292	40/72
P310 P510 P710	403/757	0:30	120/216	850/1562	0:00	70/126	870/1598	3:30	690/850 1274/1562	850/870 1562/1598	705/1301	0
CS/CS2/CS3	Program 3											

Corrective firing – Stain/Glaze firing

with [IPS e.max CAD Crystall./ materials](#)



Furnaces Programat	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 _f [°C/°Fmin]
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
P310 P510 P710	403/757	6:00	90/162	830/1526	0:10	30/54	850/1562	3:00	550/830 1022/1526	830/850 1526/1562	710/1310	0
CS/CS2/CS3	Program 2											

Firing parameters for the Staining Technique

with IPS Ivocolor Shade, Essence, Glaze



	Stand-by temperature B [°C/°F]	Closing time: S [min]	Heating rate t_r [°C/°F/min]	Firing temperature T [°C/°F]	Holding time H [min]	Vacuum 1 V₁ [°C/°F]	Vacuum 2 V₂ [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t₁ [°C/°F/min]
Stain/Glaze firing	403/757	IRT 6:00	60/108	710/1310	1:00	450/842	709/1308	0	0

* IRT standard mode

** If the layer thickness is more than 2 mm on the IPS e.max CAD object, long-term cooling (L) to 500°C/932°F is required.



If the layer thickness is more than 2 mm on the IPS e.max CAD object, long-term cooling (L) to 500°C/932°F is required.

Firing parameters for the Cut-back and Layering Technique

with IPS e.max Ceram/IPS Ivocolor Shade, Essence, Glaze



	Stand-by temperature B [°C/°F]	Closing time: S [min]	Heating rate t_r [°C/°F/min]	Firing temperature T [°C/°F]	Holding time H [min]	Vacuum 1 V₁ [°C/°F]	Vacuum 2 V₂ [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t₁ [°C/°F/min]
Wash firing (foundation)	403/757	IRT/ 04:00	50/90	750/1382	01:00	450/842	749/1380	0	0
1 st /2 nd Dentin/ Incisal firing	403/757	IRT/ 04:00	50/90	750/1382	01:00	450/842	749/1380	0	0
Stain/Glaze firing	403/757	IRT 06:00	60/108	710/1310	01:00	450/842	709/1308	0	0
Add-On with Glaze firing	403/757	IRT 06:00	60/108	710/1310	01:00	450/842	709/1308	0	0
Add-On after Glaze firing	403/757	IRT 06:00	50/90	700/1292	01:00	450/842	699/1290	0	0

* IRT standard mode



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