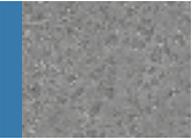


IPS Empress® CAD

Monolithic Solutions CHAIRSIDE
Instructions for Use



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Symbols in the Instructions for Use



Important



Information



Tips & Tricks



Contraindication

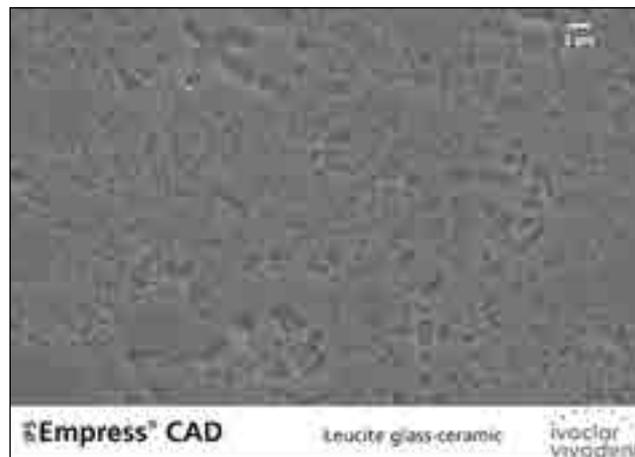


Note on firing

IPS Empress® CAD

Material

IPS Empress® CAD is suitable for the fabrication of highly esthetic, full-contour single tooth restorations using the CAD/CAM technology. IPS Empress CAD blocks are made of a leucite-reinforced glass-ceramic which consists of a glass and a crystal phase. Leucite crystals of few microns evenly grow in a multi-stage process directly from the amorphous glass phase. During the fabrication of the blocks, the semi-finished product in powder form is pressed to blocks in a fully automated procedure, which enables a maximum of homogeneity. Given the difference in the coefficients of thermal expansion (CTE) between the glass phase and the crystal phase (leucite), cooling after sintering produces compressive stress in the glass phase. This mechanism results in an increase in strength and enables IPS Empress CAD to achieve an average flexural strength of 185 MPa. This type of material has been successful, as well as proven for decades. The milled restorations exhibit an outstanding accuracy of fit and a homogeneous surface structure. The restorations can be individually veneered using IPS Empress Esthetic Veneer, if required. The “chairside” IPS e.max® CAD Crystall./ materials are used for individual characterization and glaze.



Property	Specification	Typical average value
CTE (25–500°C) [10 ⁻⁶ /K]	17.5 ± 0.5	–
Flexural strength (biaxial) [MPa]	≥ 100	185
Chemical solubility [µg/cm ²]	< 100	–
Type/Class	Type II/Class 2a	

according to ISO 6872:2015

Uses

Indications

- Veneers
- Inlays
- Onlays
- Partial crowns
- Crowns in the anterior and posterior region
- If desired, restorations can be partially reduced (cut-back technique) and individualized using IPS Empress Esthetic Veneer layering materials.

Contraindications

- Bridge reconstructions
- Fully veneered (circular) anterior and posterior crowns with IPS Empress Esthetic Veneer
- Conventional cementation
- Temporary cementation
- 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 Empress CAD:

- The required minimum thickness for IPS Empress CAD full-contour restorations must be observed
- IPS Empress CAD restorations must not be stained or glazed using other materials than the approved ones
- Do not mix IPS Empress Universal Shades, Stains, Glaze with IPS e.max CAD Crystall./ Shades, Stains, Glaze Paste, Glaze Spray
- You must not use IPS e.max CAD Crystall./Add-On
- Powder materials must not be mixed with paste materials
- The blocks must not be milled in a non-compatible CAD/CAM system

Side effects

If patients are known to be allergic to any of the components of IPS Empress CAD, the material 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 grinding dust during finishing.
- Use suction equipment and a face mask.
- Observe the Safety Data Sheet (SDS).

Scientific data

Since the beginning of the development, IPS Empress has been monitored by the scientific community. The most important study results and additional scientific data (e.g. strength, wear, biocompatibility) are compiled in the Scientific Documentation about IPS Empress 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 Empress CAD has to be processed with an authorized CAD/CAM system. For questions regarding the different CAD/CAM systems, please contact the respective system manufacturer.



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

Block concept

IPS Empress CAD blocks are available in **three translucency levels (Multi, HT, LT)** and in different sizes.



IPS Empress® CAD Multi

Because of the smooth shade transition between the dentin and incisal areas, restorations made of IPS Empress CAD Multi blocks thus provide maximum esthetics and true-to-nature appearance. The translucency and fluorescence transition enables a multitude of esthetic possibilities. Given the combination of true-to-nature transition of shade, translucency, and fluorescence, highly esthetic restorations are fabricated in an easy way.



IPS Empress® CAD HT (High Translucency)

Given their high translucency that is similar to that of natural enamel, HT blocks are ideal for the fabrication of small restorations (e.g. inlays, onlays). Restorations made from 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" and "staining technique".



IPS Empress® CAD LT (Low Translucency)

Given their low translucency that is similar to that of natural dentin, LT blocks 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 blocks are ideally suitable for processing in the "cut-back technique", but they can also be used in the "polishing technique" and the "staining technique".



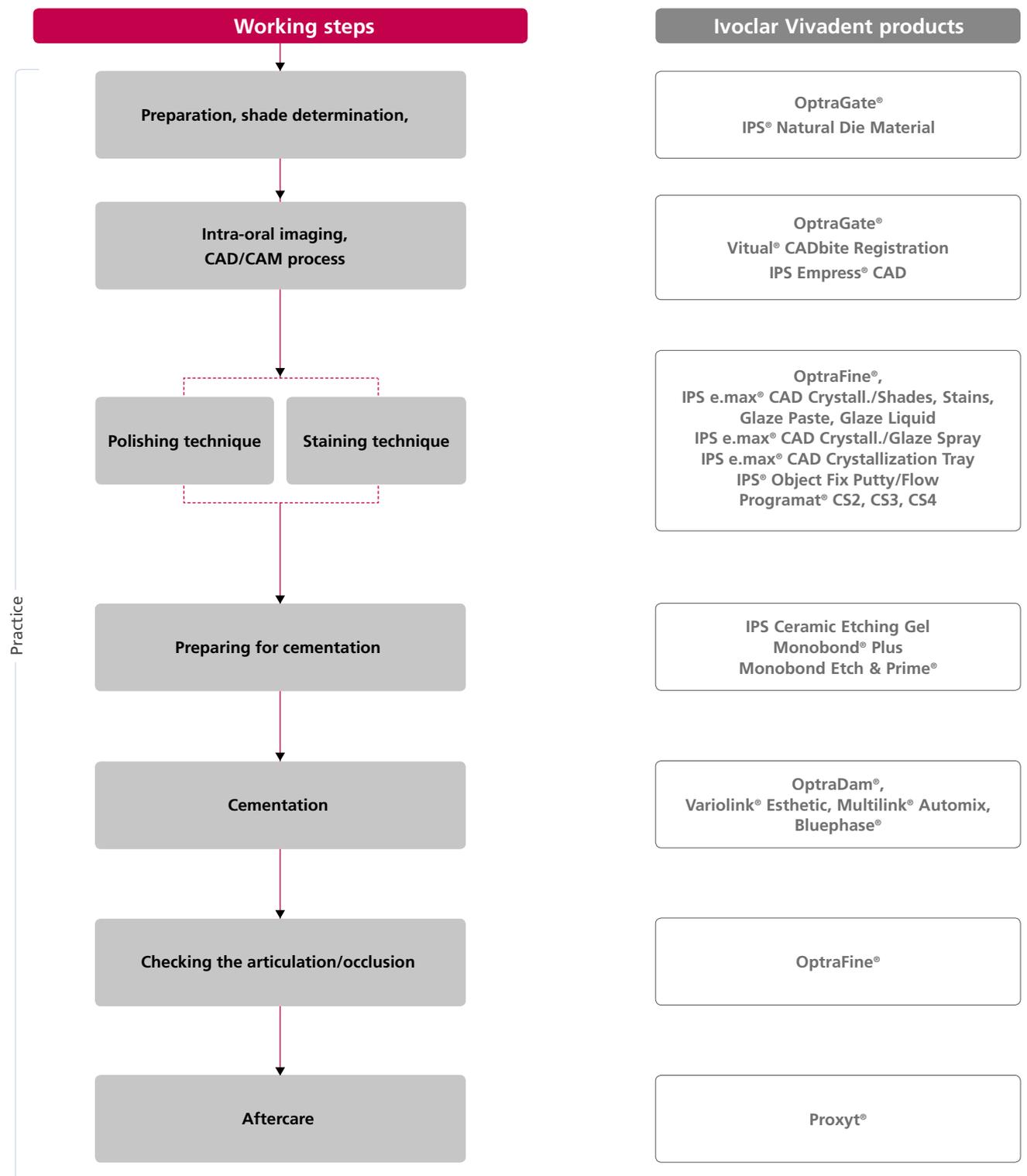
Detailed information on the available block sizes and shades can be found in the "CAD/CAM Block Overview" at www.ivoclarvivadent.com!



Basically, all blocks are made of the same material and feature the same outstanding properties. For reasons of esthetics, however, the following processing techniques and indications are recommended for the individual blocks (translucency levels):

Translucency level	Processing technique			Indications			
	Polishing technique 	Staining technique 	Cut-back technique 	Veneer	Inlay and onlay	Partial crown	Anterior and posterior crown
Multi	✓	✓		✓		✓	✓
HT High Translucency	✓	✓		✓	✓		
LT Low Translucency	✓	✓	✓	✓		✓	✓

Overview of the Clinical Working Steps, Fabrication Process



The range of available products may vary from country to country.

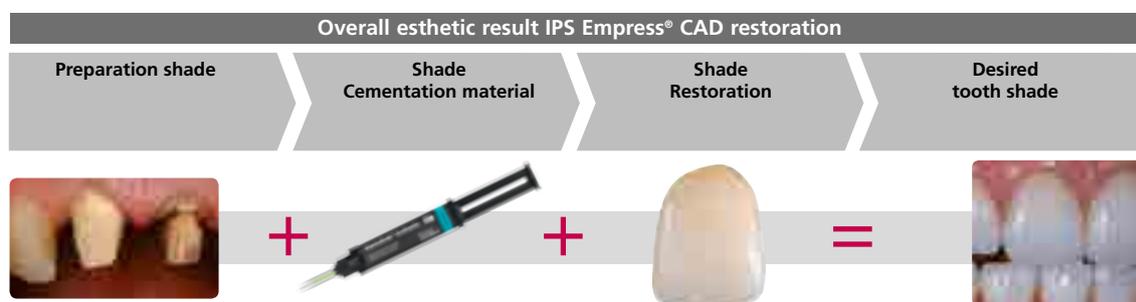
Shade determination – tooth shade, preparation shade

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

The optical effect of the preparation shade must not be underestimated during the fabrication of highly esthetic restorations. For that reason, the shade of the preparation should be determined together with the desired tooth shade in order to select the suitable block. Especially with severely discoloured preparations or non-tooth-shaded build-ups, this is of utmost importance.



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 of 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 or CS3. 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 for Programat P710 and CS3.



Selecting the die shade

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 fabrication of a model die similar to the preparation of the patient, on the basis of which the correct shade and brightness values of the all-ceramic restorations may be selected.

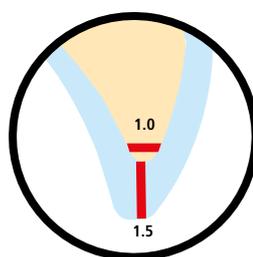
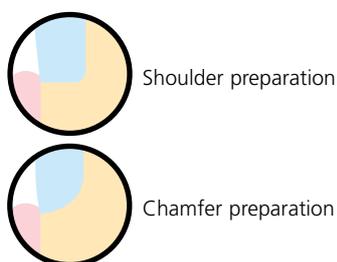


Preparation guidelines

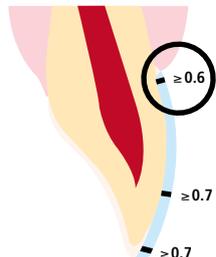
Successful results can only be achieved with IPS Empress CAD if the guidelines and minimum layer thicknesses are strictly observed.

Basic preparation guidelines for all-ceramic restorations

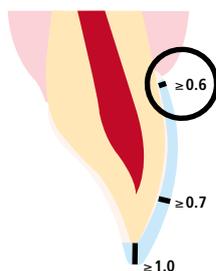
- No angles or edges
- Shoulder preparation with rounded inner edges and/or chamfer preparation
- The indicated dimensions reflect the minimum layer thickness for IPS Empress CAD restorations
- The thickness of the preparation edge, particularly for anterior teeth, should be at least 1.0 mm in order to permit optimum milling during CAD/CAM processing.



Veneer

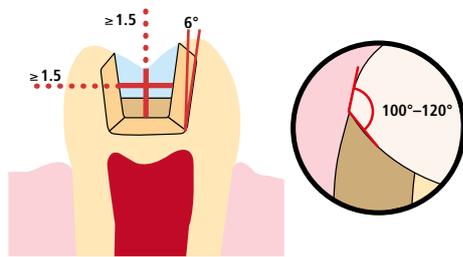


- If possible, the preparation should be located in the enamel.
- The incisal preparation margins should not be located in the area of abrasion surfaces or dynamic occlusal surfaces.
- Reduce the cervical area by at least 0.6 mm, the labial area by at least 0.7 mm and the incisal edge by at least 0.7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



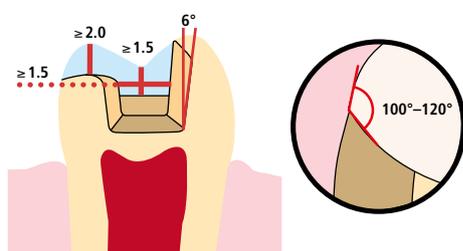
- For preparations with reduction of the incisal edge (labial/incisal reduction), the preparation depth should be at least 0.6 mm in the cervical area and 0.7 mm in the labial area.
- The incisal edge must be reduced by 1.0 mm.
- The extent of the incisal reduction depends on the desired translucency of the incisal area to be built up.
- The more transparent the incisal edge of the intended veneer, the more extensive the reduction should be.

Inlay



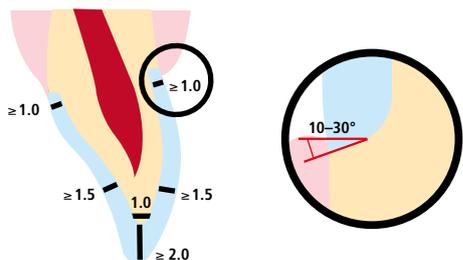
- Static and dynamic antagonist contacts must be taken into consideration.
- The preparation margins must not be located on centric antagonist contacts.
- A preparation depth of at least 1.5 mm and an isthmus width of at least 1.5 mm must be observed in the fissure area.
- Prepare the proximal box with 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 proximal surfaces 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



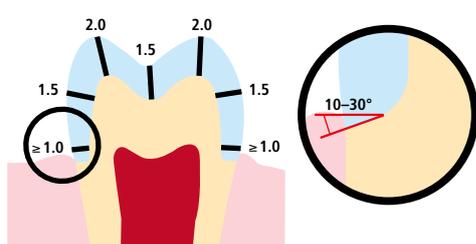
- Static and dynamic antagonist contacts must be taken into consideration.
- The preparation margins must not be located on centric antagonist contacts.
- A preparation depth of at least 1.5 mm and an isthmus width of at least 1.5 mm must be observed in the fissure area.
- Prepare the proximal box with 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 onlay.
- For onlays with pronounced convex proximal surfaces 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 2.0 mm of space in the cusp areas.

Anterior crown



- Reduce the anatomical shape and observe the stipulated minimum layer 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 2.0 mm.
- Reduce the vestibular and/or oral area by at least 1.5 mm.
- The thickness of the preparation edge, particularly for anterior teeth, should be at least 1.0 mm (milling tool geometry) in order to permit optimum milling during CAD/CAM processing.

Posterior crown



- Reduce the anatomical shape and observe the stipulated minimum layer 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 occlusal crown third by 2.0 mm.
- Reduce the vestibular and/or oral area by at least 1.5 mm.

Minimum layer thicknesses

The restoration design is key to the success of durable all-ceramic restorations. The more attention given to the design, the better the final results and the clinical success will turn out to be. The following minimum layer thicknesses must be observed to meet the requirements put forth in the preparation guidelines (page 11 et seq.).

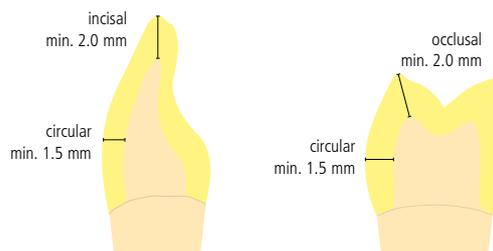
Minimum layer thicknesses for IPS Empress® CAD restorations (depending on the indication)

		Veneer with- out reduction of the incisal edge	Veneer with reduction of the incisal edge	Inlay	Onlay	Crown	
						Anterior tooth	Molar
 Minimum layer thickness IPS Empress CAD	incisal/ occlusal	0.7	1.0	1.5 Fissure depth	2.0 Cusp area	2.0	2.0
	circular	0.7	0.7	1.5 Isthmus width	1.5 Fissure depth	1.5	1.5

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.

Practical Procedure

Polishing technique



In the polishing technique, after grinding the restoration in a CAD/CAM system, it is pre-polished, inserted and intraorally polished to a high gloss. In the process, the desired degree of the surface lustre is achieved by manual polishing. This processing technique is very efficient and leads to an esthetic result quickly and easily.

Finishing

It is of critical importance to use the correct grinding instruments for finishing and adjusting glass-ceramic materials. If unsuitable grinding instruments are used, chipping at the edges and local overheating may occur.

Observe the following procedure for finishing IPS Empress CAD restorations:

- Only use suitable, fine-grained (grain size <math>< 60 \mu\text{m}</math>), ceramic-bonded grinding instruments or diamonds at a speed of up to 20,000 rpm and little pressure.
- Carefully finish the restoration margins using rubber and silicone polishers (speed: <math>< 10,000 \text{ rpm}</math>). Overheating the glass-ceramic must be prevented.
- Smooth out the attachment point of the holder and take the proximal contact points into account.
- If necessary, carry out individual shape adjustments.
- Try in and adjust occlusion/articulation, if necessary.
- Prior to cementation, polish the proximal surface and large areas extraorally, e.g. with OptraFine® (Ivoclar Vivadent).



Smooth out attachment point of the holder and take the proximal contact points into account.



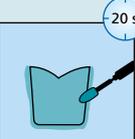
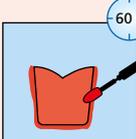
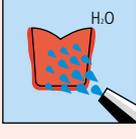
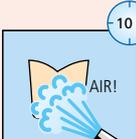
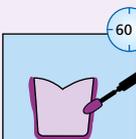
Polish proximal areas and large surfaces extraorally.

Adhesive cementation

Preparing the IPS Empress CAD restorations

To prepare the IPS Empress CAD restoration for adhesive cementation, it must be conditioned. Either Monobond Etch & Prime® or IPS® Ceramic Etching Gel/Monobond® Plus may be used for conditioning. In this context, the corresponding Instructions for Use have to be observed.

Process steps: Conditioning IPS Empress® CAD

Monobond Etch & Prime®	IPS® Ceramic Etching Gel/Monobond® Plus
	Clean with water spray
	Dry with water- and oil-free air
 <p>Apply Monobond Etch & Prime and agitate it into the surface for 20 seconds using low pressure.</p> <p>Allow Monobond Etch & Prime to react for 40 seconds.</p>	 <p>Etch with IPS Ceramic Etching Gel for 60 seconds.</p>
 <p>Subsequently thoroughly rinse off the Monobond Etch & Prime with water, until the green colour is removed. In case any residue remains in the microporosities after rinsing, clean the restoration with ultrasound in a water bath for 5 minutes.</p>	 <p>Thoroughly rinse off the etching gel with water, until the red colour is removed. In case any residue remains in the microporosities after rinsing, clean the restoration with ultrasound in a water bath for 5 minutes.</p>
	 <p>Dry the restoration with a strong jet of water- and oil-free air for approximately 10 seconds.</p>
	 <p>Then, apply Monobond Plus and let it react for 60 seconds.</p>
	 <p>Dry the restoration with a strong jet of water- and oil-free air for approximately 10 seconds.</p>



Intraoral cementation of IPS Empress CAD restorations

Information on the clinical procedure for the adhesive cementation can be found in the "Cementation Navigation System".



www.cementation-navigation.com

Polishing (intraoral)

After the restoration has been adhesively cemented, the occlusion / articulation is adjusted with suitable grinding instruments. Subsequently, the restoration is polished. In order to achieve a lifelike surface gloss, follow the instructions below:

- For polishing, we recommend OptraFine, the high-performance, chairside diamond polishing system.
- Always pay attention to the contact points and restoration margins during polishing!
- Use the corresponding speed and little pressure to avoid heat development.

Step 1: Finish/smooth out the surfaces using the Finisher F (speed: max. 15,000 rpm, water cooling).

Step 2: Polish the restoration using the Polisher P (speed: max 15,000 rpm, water cooling).

Step 3: Polish the restoration to a high gloss using the high-gloss brush and diamond polishing paste HP (speed: max. 15,000 rpm).



The occlusion / articulation is adjusted with fine diamonds.



The surfaces are finished /smoothed out using the Finisher F (light blue).



The restoration is polished with Polisher P (dark blue).



The restoration is polished to a high gloss using the high-gloss brush and the diamond polishing paste HP.

Practical Procedure

Staining technique



In the staining technique, the milled full-contour restorations are completed by applying stains and glaze materials. By using translucent IPS Empress CAD blocks, highly esthetic restorations can be fabricated easily on only slightly or non-discoloured preparations.

If more intensive and excessive shade adjustments are desired, we recommend conducting them in several working steps. To reproduce the tooth shade easily and reliably, an individual control die may be fabricated using the IPS Natural Die Material.



Finishing

It is of critical importance to use the correct grinding instruments for finishing and adjusting glass-ceramic materials. If unsuitable grinding instruments are used, chipping of the edges and local overheating may occur.

Observe the following procedure for finishing IPS Empress CAD restorations:

- Only use suitable, fine-grained (grain size < 60 µm), ceramic-bonded grinding instruments or diamonds at a speed of up to 20,000 rpm and little pressure.
- Overheating the glass-ceramic must be prevented.
- Smooth out the attachment point of the holder and take the proximal contact points into account.
- If necessary, carry out individual shape adjustments.
- Design the surface structure somewhat more pronounced, if necessary, since it will be toned down by the glazing procedure.



Adjusting the individual shape and natural surface structure

Optional:

Die fabrication with IPS Natural Die Material

The light-curing IPS Natural Die Material simulates the shade of the preparation. Fabricate a control die of the selected shade. This control die supports the optimum shade adaptation of the restoration to reproduce the given oral situation.

- 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 corresponding shade to the inner aspects of the restoration using the IPS Condenser and adapt so that the entire inner aspect is coated and filled.
- Completely fill the restoration cavity and insert an IPS Die Holder into the material and adapt excess material around the holder. Make sure that the die material is well adapted along the restoration margins and that there is no gap.
- Cure the IPS Natural Die Material die with a commercial curing light for 60 seconds.
- After polymerization, the die can be finished and or smoothed, if required.



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

Variant A:

Stain/Glaze firing with IPS e.max CAD Crystall./ Shades, Stains and Glaze Spray

Required materials:

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



Preparing for Stain and Glaze firing

Before the Stain and Characterization firing, the restoration must be free of dirt and grease. Any contamination after cleaning must be prevented.

- 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 on the 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.



Intensify the "dentin body" with IPS e.max CAD Crystall./Shade.



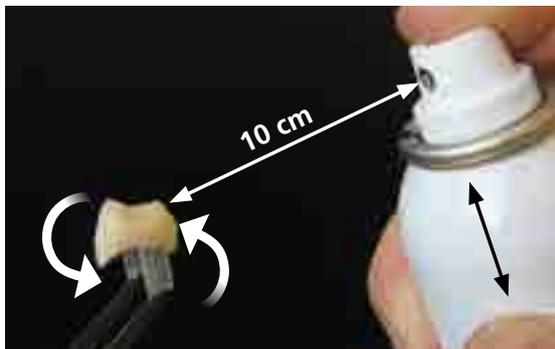
Imitate the incisal area with IPS e.max CAD Crystall./Shades Incisal.



For individual effects and characterizations use IPS e.max CAD Crystall./Stains.

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

- Shake the spray can well immediately before use until the mixing ball in the container is moving freely (approximately 20 s).
- Hold the IPS Empress CAD restoration by its inner aspect using tweezers.
- Hold the spray can as upright as possible during spraying.
- Spray the restoration from all sides to coat the characterized restoration with an even layer. Shake the spray can well between individual bursts.
- Wait briefly until the glaze layer is dry and has assumed a whitish colour. Subsequently, apply a second layer of Glaze Spray.
- If Glaze Spray accidentally reaches the inner aspects of the restoration, remove it with a dry brush.
- Place the IPS Empress CAD restoration on the IPS e.max CAD Crystallization Tray/Pin for firing. Use either IPS Object Fix Putty or Flow to secure the restoration on the pin.
- Place the loaded IPS e.max CAD Crystallization Tray in the centre of the pre-heated ceramic furnace and conduct the Stain/Glaze firing.
- Should renewed application of the spray be necessary after firing, spray and fire the restoration in the same manner again.



Spray an even layer of IPS e.max CAD Crystall./Glaze Spray directly on the unfired Shades/Stains.



For firing, use the IPS e.max CAD Crystallization Tray and the corresponding pins.



Conduct the **Stain/Glaze firing** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 30.**

- Remove the 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.
- Thoroughly clean the restoration.



If additional adjustments are required, e.g. contact points, IPS Empress Add-on 770°C must be used for this purpose. Further information can be found on page 22.



For intraoral cementation, please observe the notes on page 27.

Variant B:

Stain/Glaze firing with IPS e.max CAD Crystall./ Shades, Stains and Glaze Paste

Required materials:

- **IPS e.max CAD Crystall./Shades** are ready-to-use "Dentin" shades 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 paste.
- **IPS e.max CAD Crystallization Tray and Pins**



After having cleaned the restoration, please observe the following procedure:

- Extrude the ready-to-use IPS e.max CAD Crystall./Glaze Paste from the syringe and mix.
- If a slight thinning is desired, the ready-to-use glaze 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. Avoid applying too thick a glaze layer. 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.
- Place the IPS Empress CAD restoration on the IPS e.max CAD Crystallization Tray/Pin for firing. Use either IPS Object Fix Putty or Flow to secure the restoration on the pin.
- Place the loaded IPS e.max CAD Crystallization Tray in the centre of the pre-heated ceramic furnace and conduct the Stain/Glaze firing.



Apply the glazing material on the entire outer surfaces of the restoration.



Characterization using IPS e.max CAD Crystall./Shades...



...and/or IPS e.max CAD Crystall./Stains



For firing, use the IPS e.max CAD Crystallization Tray and the corresponding pins.



Conduct the **Stain/Glaze firing** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 30.**

- Remove the 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.
- Thoroughly clean the restoration.



For intraoral cementation, please observe the notes on page 27.

Optional:

Subsequent adjustments

Further adjustments (of e.g. the contact points) may be necessary after the restoration has been completed. For that purpose, IPS Empress Add-On 770 °C/1418 °F is available.



IPS e.max CAD Crystall./Add-On must not be used in combination with IPS Empress CAD, as this can cause a failure of the restoration.

Procedure:

- Before the adjustment, the restoration must be free from dirt and grease. For that purpose, clean the restoration thoroughly with a steam jet.
- Mix IPS Empress Add-On 770 °C / 1418 °F with IPS Empress Esthetic Veneer Modelling Liquid to a workable consistency. Make sure that the add-on material and liquid are evenly mixed so that an optimum firing result can be achieved.
- Apply the mixed add-on material on the cleaned, desired areas using a brush and slightly blot them with an absorbent cloth.
- Place the restoration in the centre of the IPS e.max CAD Crystallization Tray and fire using the stipulated parameters.
- After firing, manually polish the supplemented areas to a high gloss.



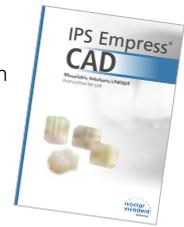
Conduct the IPS Empress Add-On firing on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. Firing parameters see page 30.



Practical Procedure

Cut-back technique

In order to individualize restorations in the incisal area so that they correspond with their natural model, the IPS Empress CAD restoration is additionally veneered using opalescent IPS Empress Esthetic Veneer ceramic materials. The cut-back technique is very efficient if the full-contour anterior crown or the veneer are first designed according to the definite final shape. After that, the incisal third is reduced and subsequently provided with an individualized esthetic veneer. For a detailed description of the materials used and the individual working steps, please refer to the Instructions for Use of IPS Empress CAD labside.



After the CAM process, the fitted IPS Empress CAD restoration is partially reduced using suitable grinding instruments. Excess pressure and overheating must be prevented. Do not grind in any extreme mamelon structures.



Conduct the Wash firing using the IPS Empress Esthetic Veneer Wash Pastes.



Completion of the anatomical shape of the reduced areas using IPS Empress Esthetic Veneer materials.

Complete the tooth shape with the 2nd firing and fire using the firing parameters below.



Finish the restoration with diamonds and give it a true-to-nature shape and surface structure. Finally, conduct the Glaze firing using IPS Ivocolor.



IPS Empress CAD cut-back and layered – the ideal combination for highly esthetic CAD/CAM-fabricated restorations.



Frequently Asked Questions

What CAD/CAM systems are suitable for processing IPS Empress CAD?

IPS Empress CAD has to be processed with an authorized CAD/CAM system. Information on cooperation partners can be found at www.ivoclarvivadent.com.

Which materials can be used to characterize IPS Empress CAD restorations, if necessary?

Either IPS e.max CAD Crystall./ materials or IPS Empress Universal can be used for characterization. Please note: the materials must not be mixed with each other.

Which possibility are there to condition IPS Empress CAD restorations prior to adhesive cementation?

To prepare the IPS Empress CAD restoration for adhesive cementation, it must be conditioned. You can either use the single-component ceramic primer Monobond Etch & Prime or the combination of IPS Ceramic Etching Gel/Monobond Plus.

Where can I find detailed information on the procedure for adhesive cementation?

Detailed information on how to adhesively cement restorations can be found in the Instructions for Use of the conditioning and luting materials in use.

Which firing tray must be used for the Characterization/Glaze firing of IPS e.max CAD Crystall./ materials?

For firing IPS e.max CAD Crystall./ Shades, Stains, Glaze materials, the IPS e.max CAD Crystallization Tray must be used. The firing parameters are coordinated with this firing tray. A honey-comb tray must not be used.

Do IPS Empress CAD restorations require occlusal adjustment after the CAD/CAM process?

Use fine diamonds to smooth out possible surface structures created by the CAD/CAM process, particularly taking into account the functional occlusal areas with antagonist contact.

How can the accuracy of fit of IPS Empress 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.

What must be considered after the firing of IPS Empress 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.

Can IPS Empress CAD restorations also be conventionally cemented?

No. *IPS Empress CAD restorations must be inserted using the adhesive cementation technique.*

Cementation

Possibilities for esthetic cementation are decisive for the harmonious shade effect of an all-ceramic restoration. IPS Empress CAD restorations must be inserted using the adhesive cementation technique.

For the adhesive cementation of IPS Empress CAD restorations, Variolink® Esthetic or Multilink® Automix are the ideal cementation composites depending on the indication.

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. Depending on the cementation material, special adhesive systems are used on the preparation to establish the micromechanical bond to 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 does not result 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 does not result in enhanced “overall strength” of the seated all-ceramic restoration.

Cementation recommendation depending on the indication for IPS Empress® CAD with Variolink® Esthetic or Multilink® Automix

Adhesive cementation			
Cementation material	Variolink® Esthetic LC	Variolink® Esthetic DC	Multilink® Automix
Curing method	LC – light-cure	DC – dual-cure	Self-cure with light option
IPS Empress® CAD			
Veneer	✓	–	–
Inlay, Onlay	✓	–	–
Partial crown	✓	–	–
Crown	✓	✓	✓

✓ Recommended product combination
– Not recommended



Further information on how to find the suitable cementation materials and their use can be found in the multimedia application CNS (Cementation Navigation System, Ivoclar Vivadent).



www.cementation-navigation.com

Aftercare

Same as natural teeth, high-quality IPS Empress CAD restorations require regular professional care. This is beneficial for both the health of the gingiva and teeth, as well as the overall appearance. The pumice-free Proxyl® 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.



Shade Combination Tables

The data contained in the table are approximate values. For shades which are not available as blocks, please observe the following procedure:

- Choose the next (lighter) block shade
- Use IPS e.max CAD Crystall./Shades and Stains for staining and to intensify the dentin shade.

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		 0					 1					 2				 3				 4
IPS e.max CAD Crystall./ Shade Incisal									 I1		 I2									
IPS e.max CAD Crystall./ Stains			 white			 cream		 sunset		 copper		 olive		 khaki		 mahogany				
Chromascop	110	120	130	140	210	220	230	240	310	320	330	340	410	420	430	440	510	520	530	540
IPS e.max CAD Crystall./ Shade				 1						 2		 4			 3				 4	
IPS e.max CAD Crystall./ Shade Incisal					 I1						 I2									
IPS e.max CAD Crystall./ Stains			 white			 cream		 sunset		 copper		 olive		 khaki		 mahogany				

Firing Parameters

Firing leucite-reinforced glass-ceramic restorations:

- Always use the IPS e.max CAD Crystallization Tray and the corresponding pins to fire restorations with IPS e.max CAD Crystall./ materials.
- Apply some IPS Object Fix Putty or Flow material to the cavity of the restoration to place the restoration on the IPS e.max CAD Crystallization Pins. Inner surfaces must not be entirely filled.
- The firing temperatures must be observed at all times. An increase in the firing temperature results in severe vitrification between the framework and the veneering ceramic, which may lead to delayed cracks.
- A decrease in the firing temperature causes the ceramic to be underfired and very brittle, which may lead to delamination.
- When using IPS Empress Add-On 770°C, a ceramic furnace with vacuum function must be used.
- Remove IPS Empress 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 CAD Crystallization Tray, the firing temperatures vary depending on the furnace used.





Stain/Glaze firing with IPS e.max CAD Crystall./Shades, Stains, Glaze

Furnaces Programat	Stand-by temperature B [°C]	Closing time S [min]	Heating rate t ₁ [°C/min]	Firing temperature T ₁ [°C]	Holding time H ₁ [min]	Heating rate t ₂ [°C/min]	Firing temperature T ₂ [°C]	Holding time H ₂ [min]	Vacuum 1 1 ₁ [°C] 2 ₁ [°C]	Vacuum 2 1 ₂ [°C] 2 ₂ [°C]	Long-term cooling L [°C]	Cooling rate t _f [°C/min]
CS	403	06:00	90	820	00:10	30	840	03:00	550/820	820/840	700	0
CS2/CS3	403	06:00	90	830	00:10	30	850	03:00	550/830	830/850	710	0
P300 P500 P700	403	06:00	90	820	00:10	30	840	03:00	550/820	820/840	700	0
P310 P510 P710	403	06:00/IRT	90	830	00:10	30	850	03:00	550/830	830/850	710	0



Corrective firing with IPS Empress Add-On 770°C/1418°F

Furnaces Programat	Stand-by temperature B [°C]	Closing time S [min]	Heating rate t ₁ [°C/min]	Firing temperature T ₁ [°C]	Holding time H ₁ [min]	Heating rate t ₂ [°C/min]	Firing temperature T ₂ [°C]	Holding time H ₂ [min]	Vacuum 1 1 ₁ [°C] 2 ₁ [°C]	Vacuum 2 1 ₂ [°C] 2 ₂ [°C]	Long-term cooling L [°C]	Cooling rate t _f [°C/min]
CS	403	04:00	60	770	02:00	–	–	–	450/769	–	0	0
CS2/CS3	403	04:00	60	770	02:00	–	–	–	450/769	–	0	0
P300 P500 P700	403	04:00	60	770	02:00	–	–	–	450/769	–	0	0
P310 P510 P710	403	04:00/IRT	60	770	02:00	–	–	–	450/769	–	0	0

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