IPS Empress® System

IPS Empress® CAD

Instructions for Use

CHAIRSIDE

CE 0123

ivoclar vivadent®

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IPS Empress® – the Original

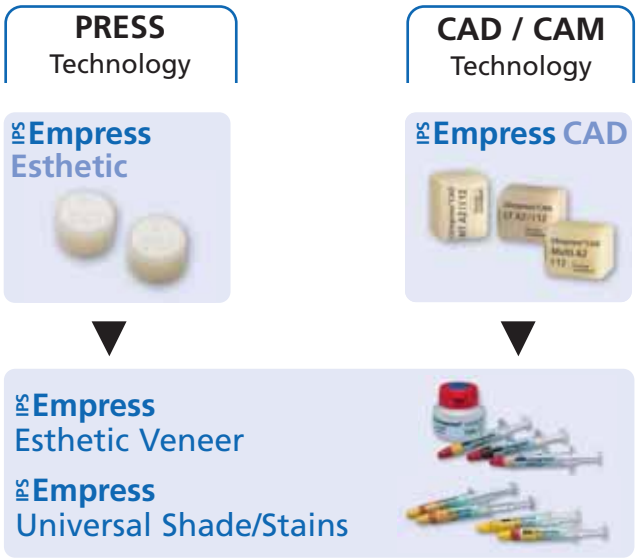
Nearly 20 years ago, IPS Empress revolutionized the processing of ceramic and thanks to its many advantages, such as aesthetics, IPS Empress has been established as the "benchmark". More than 33 million restorations fabricated of IPS Empress throughout the world and the use of "IPS Empress" as a synonym for all-ceramics speak for the durable life-like appearance, the ongoing success, and the high quality standard of the material.

In addition to the tried-and-tested PRESS technology, the CAD/CAM technology has also developed in the area of all-ceramics. In order to supply the "benchmark" for this technology as well, the future IPS Empress System will comprise products for both processing technologies. You will be able to benefit from roughly 20 years of clinical experience and convincing aesthetics, irrespective of whether the restorations were fabricated with the PRESS or CAD/CAM technique.

IPS Empress Esthetic is available for the **PRESS technology**, while **IPS Empress CAD** is used in the **CAD/CAM technology**. Both products consist of the highly aesthetic, leucite-reinforced glass-ceramic that has been clinically tried-and-tested for many years. The two ceramics are characterized by excellent strength values and outstanding aesthetic appearance. They may thus be used for the fabrication of fully anatomic single-unit restorations, such as inlays, onlays, veneers, and crowns.

Both products may subsequently be stained and/or glazed using **IPS Empress Universal Shades/Stains**, or individually veneered using the **IPS Empress Esthetic Veneer** layering ceramic.

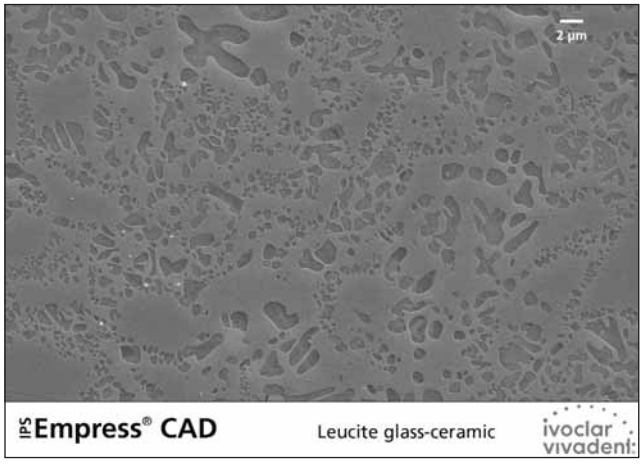
In this way, the IPS Empress System will remain synonymous for highly aesthetic, fully anatomical all-ceramic restorations, irrespective of the processing technology.



IPS Empress CAD – Product Information

Material

IPS Empress CAD is used for the fabrication of highly aesthetic, fully anatomical single-unit restorations by means of 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 a flexural strength of 160 MPa. This type of material has been successful, as well as proven for almost 20 years. The milled restorations feature excellent accuracy of fit and a homogeneous surface. Subsequently, the restorations may be stained using IPS Empress Universal Stains and/or veneered using IPS Empress Esthetic Veneer.



CTE (100–400°C) [10^{-6} /K]	16.6
CTE (100–500°C) [10^{-6} /K]	17.5
Flexural strength (biaxial) [MPa]*	160
Fracture toughness [MPa $m^{0.5}$]	1.3
Vickers hardness [MPa]	6200
Chemical resistance [µg/cm^2]*	25

*according to ISO 6872

Uses

Indications

IPS Empress CAD blocks can be used for the following adhesively cemented restorations. Depending on the type and size of the restoration, the respective HT (High Translucency), LT (Low Translucency), or Multi Block is recommended. IPS Empress CAD restorations may be cemented and either polished, stained/glazed, or veneered.

HT Blocks (High Translucency)	LT Blocks (Low Translucency)	Multi Blocks
Higher translucency and chameleon effect Lower brightness value	**Lower translucency and chameleon effect Higher brightness value**	**True-to-nature transition of shade, translucency, and fluorescence**
– Inlays – Onlays – Veneers	– Anterior and posterior crowns – Partial crowns – Veneers	– Anterior and posterior crowns – Partial crowns – Veneers

For further processing of IPS Empress CAD restorations, users have the following options:
– Aesthetic characterization and glazing of fully anatomical restorations using IPS Empress Universal Shades, Stains, and Glaze pastes.
– Aesthetic veneering in the incisal third of reduced restorations (veneers and anterior crowns) using IPS Empress Esthetic Veneer materials

Contraindications

– Bridge reconstructions
– Conventional and self-adhesive cementation
– Very deep, subgingival preparations
– Patients with severely reduced residual dentition
– Bruxism
– Fully (circularly) veneered anterior and posterior crowns using IPS Empress Esthetic Veneer

Important processing restrictions

Failure to observe the following restrictions may compromise the success achieved with IPS Empress CAD:
– The fully anatomical IPS Empress CAD restorations must not fall below the required minimum thickness
– The reduced (cut-back) IPS Empress CAD restorations must not fall below the required minimum thickness
– The maximum layer thickness of IPS Empress Esthetic Veneers layering materials must not be exceeded
– IPS Empress CAD restorations must not be stained using materials other than IPS Empress Universal Shades, Stains, and Glaze
– 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 ingredients of IPS Empress CAD, the material should not be used.

Composition

– **IPS Empress CAD Blocks**
  Components: SiO_2
  Additional contents: Al_2O_3, K_2O, Na_2O, CaO, and other oxides, pigments

– **IPS Empress Esthetic Veneer**
  Components: SiO_2
  Additional contents: Al_2O_3, K_2O, Na_2O, CaO, oxides and pigments

– **IPS Empress Universal Shades, Stains, and Glaze Paste**
  Components: Oxides, glycerine, butandiol

– **IPS Empress Esthetic Veneer Build-Up Liquid**
  Components: water, butandiol, chloride

– **IPS Empress Universal Glaze and Stain Liquid**
  Components: Butandiol

– **IPS Contrast Spray Chairside**
  Components: Pigment suspension in ethanol; the propellant is a fluoridated hydrocarbon

– **IPS Natural Die Material**
  Components: Polyester urethane dimethacrylate, paraffin oil, SiO_2 and copolymers

– **IPS Natural Die Material Separator**
  Components: Wax dissolved in hexane

– **IPS Ceramic Etching Gel**
  Components: Hydrofluoric acid

Warnings

– Hexane is highly flammable and detrimental to health. Avoid contact with skin and eyes. Do not inhale the vapours and keep away from sources of ignition.
– Do not inhale ceramic grinding dust during processing - use suction equipment and a face mask.
– Etching gel contains hydrofluoric acid. Avoid contact with skin, eyes, and clothing at any time, since the material is highly toxic and corrosive. The etching gel is intended for professional use only and must not be applied intra-orally (in the oral cavity).

Block concept

IPS Empress CAD Blocks

The shading and translucency control of the IPS Empress CAD Blocks is based on a newly developed translucency concept built on the A-D, Chromascop, and Bleach BL shade guides.
The IPS Empress CAD Blocks are available in two degrees of translucency and as a polychromatic block. The blocks are precisely coordinated with the respective indications and thus enable excellent shade match with the corresponding shade guide. Depending on the indication, the blocks provide a true-to-nature chameleon effect, life-like brightness value, or a natural shade transition.

IPS Empress CAD HT (High Translucency)

These blocks are available in the 9 most popular A–D shades, 3 Chromascop shades, and 4 sizes. Given their high translucency, HT blocks are ideally suitable for the fabrication of smaller restorations (e.g. inlays and onlays). Restorations made of HT blocks convince users with their true-to-nature chameleon effect and outstanding adaptation to the residual tooth structure. The blocks demonstrate life-like fluorescence in order to permit optimum integration into the natural residual tooth structure under different light conditions.

A–D

Chromascop

IPS Empress CAD LT (Low Translucency)

These blocks are available in the 9 most popular A–D shades, 3 Chromascop shades, 4 Bleach BL shades, and 4 sizes. Given their high brightness value compared to the HT blocks, the LT blocks are ideal for the fabrication of larger restorations (e.g. anterior and posterior crowns). Restorations made of LT blocks convince users with their true-to-nature brightness value and chroma, which prevents a greying of the incorporated restorations. The blocks demonstrate a life-like fluorescence in order to enable optimum integration into the natural environment, even under varying light conditions. Restorations made of LT blocks are also ideally suitable for the cut-back technique.

A–D

Chromascop

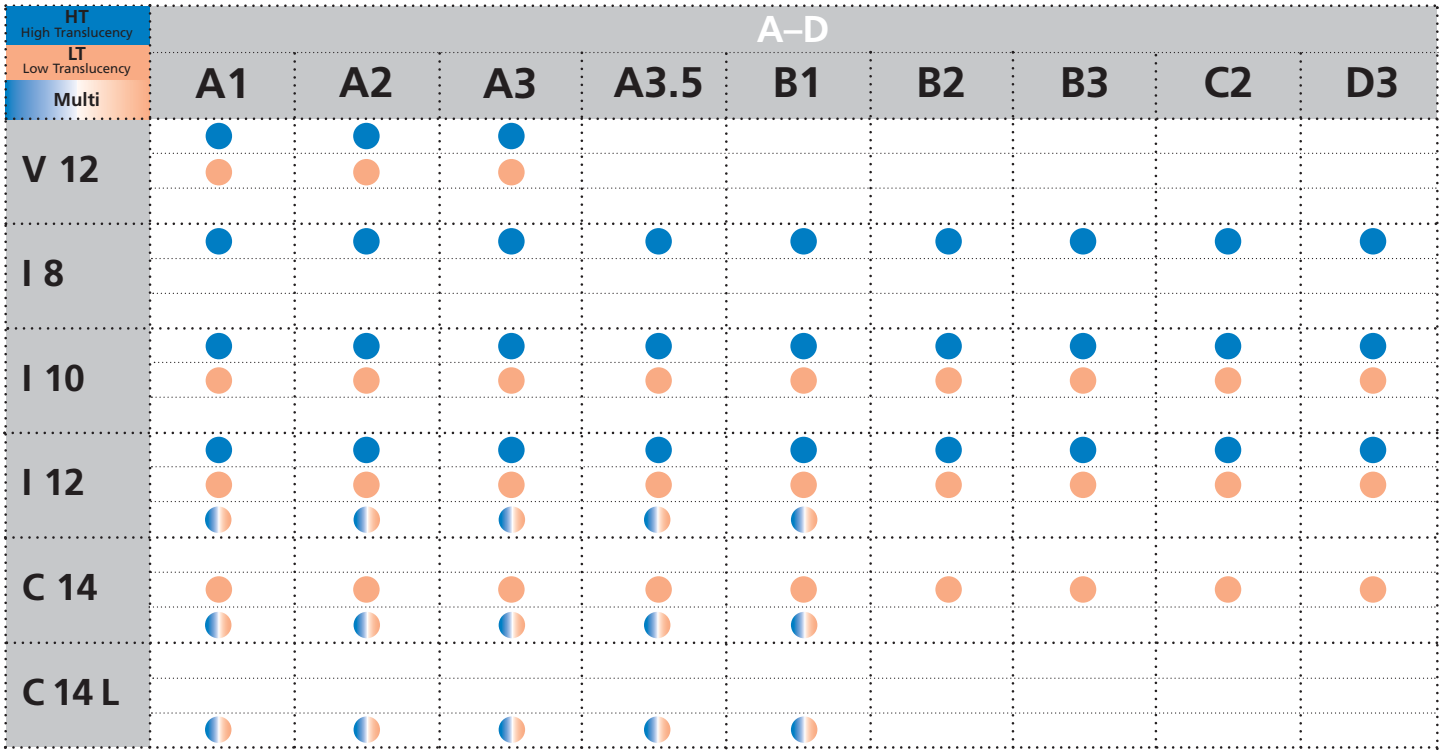
Bleach BL

IPS Empress CAD Multi

These blocks are available in the 5 most popular A–D shades, 2 Bleach BL shades and 3 sizes. Given the natural shade gradient from the dentin to the incisal areas, restorations made of IPS Empress CAD Multi Blocks demonstrate a maximum of aesthetics and naturalness. In conjunction with the flexible positioning of the restoration within the block, the true-to-nature opacity and translucency gradient enables a multitude of aesthetic possibilities. The IPS Empress CAD Multi Block features a transition of fluorescence very similar to that of natural teeth, which results in excellent integration into the residual dentition. Given the innovative combination of true-to-nature transition of shade, translucency, and fluorescence, highly aesthetic restorations are fabricated in an easy way.

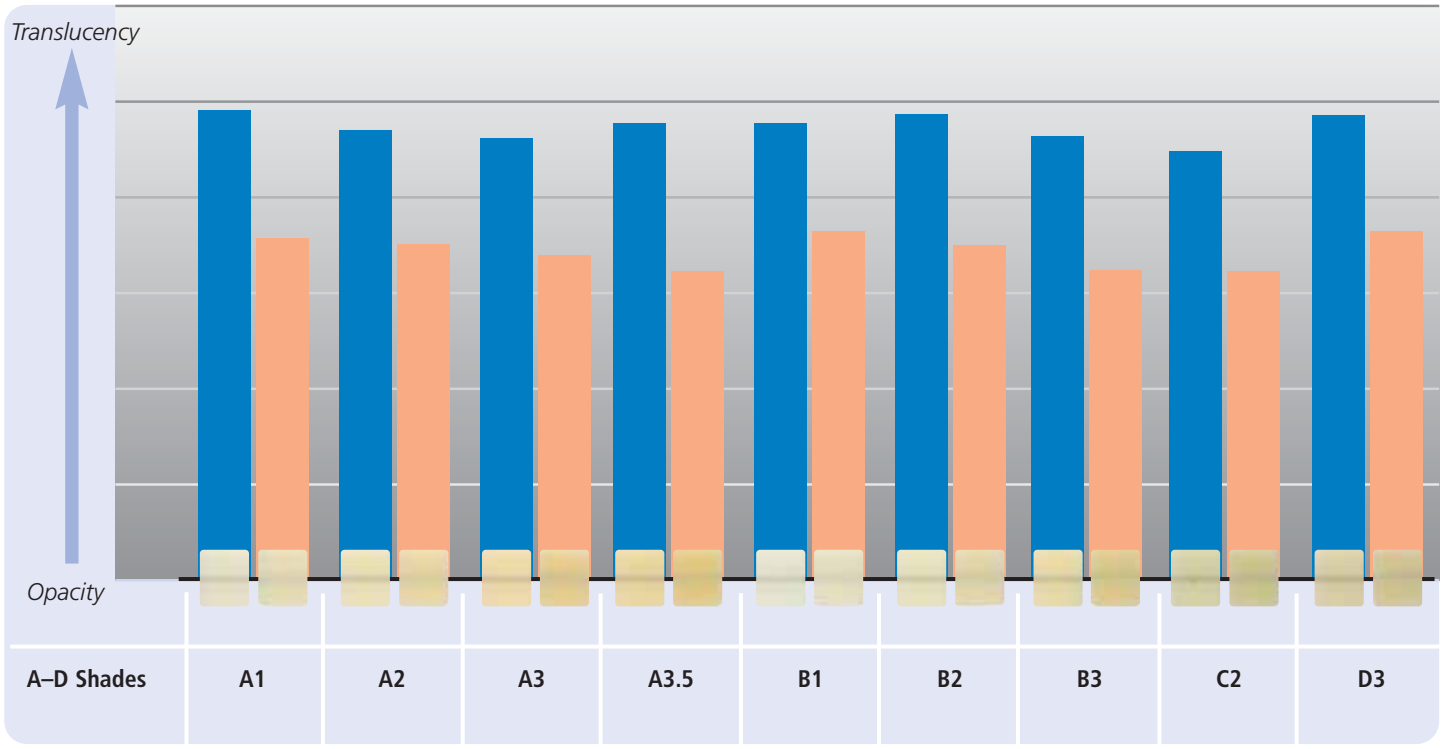
Overview of blocks - shades and sizes*

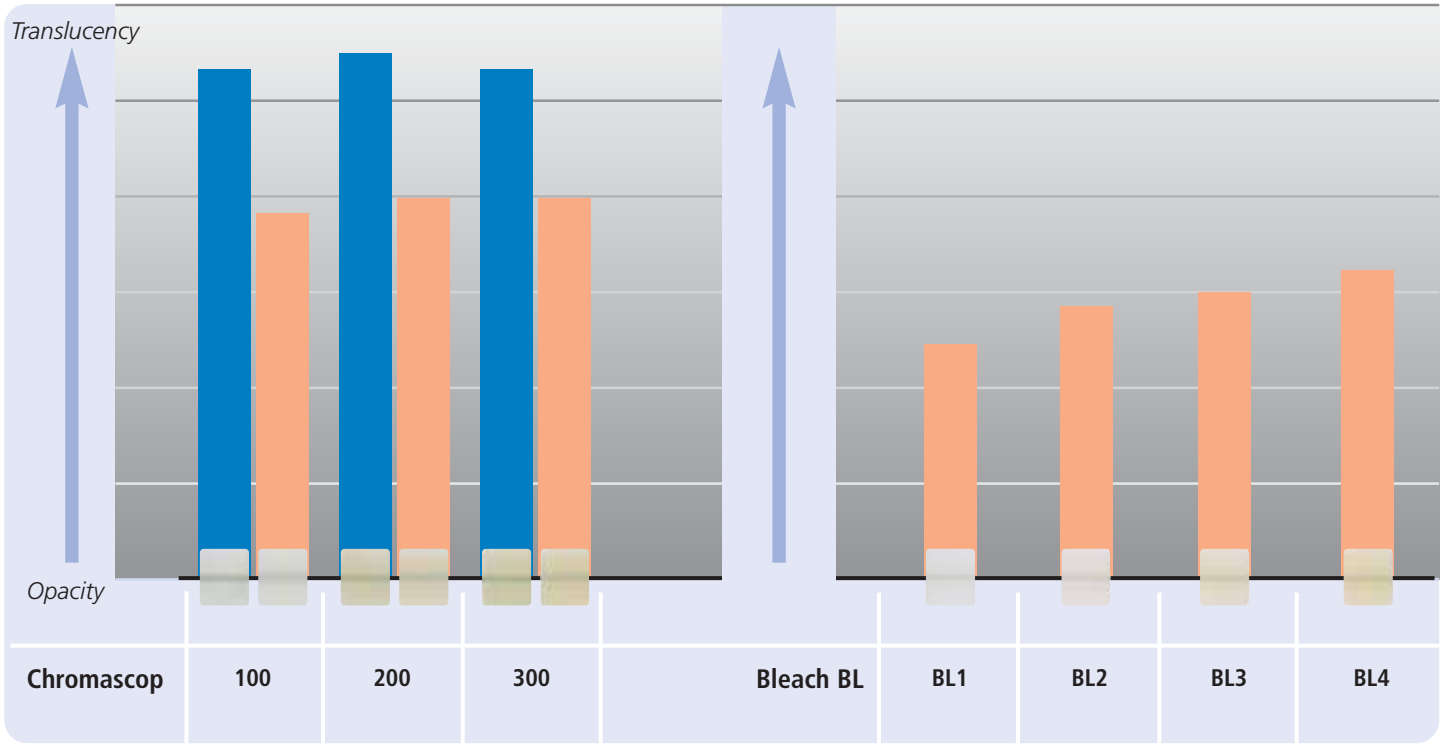
IPS Empress CAD Blocks are available in the following shades and sizes as Refill vials containing 5 blocks each.



*The available product range may vary from country to country, and also from CAD/CAM system to CAD/CAM system.

Overview of blocks – translucency





HT Block LT Block

Product overview for CEREC®

IPS Empress® CAD for CEREC® Basic Kit A–D

The Basic Kit contains a selection of block shapes in the most popular A–D shades, as well as the necessary accessories, e.g. scanning spray, polishing assortment. Therefore, the Basic Kit provides all the necessary products for the complete chairside treatment procedure. The Basic Kit is supplied in the new material cabinet and can be supplemented with any other Ivoclar Vivadent all-ceramic assortment, e.g. IPS e.max.

Delivery form:

IPS Empress CAD for CEREC Basic Kit A–D

- 4x 5 IPS Empress CAD for CEREC and inLab HT Blocks; Shades/sizes: A1/I 12, A2/I 12, A3/I 12, B1/I 12
- 5x 5 IPS Empress CAD for CEREC and inLab LT Blocks; Shades/sizes: A1/C 14, A2/C 14, A3/C 14, B1/C 14, BL2/C 14
- 3x IPS Empress CAD for CEREC and inLab Multi Blocks; Shades/sizes: A1/C 14 L, A2/C 14 L, A3/C 14 L
- 1x 50 ml IPS Contrast Spray Chairside
- 1x 50 ml Virtual CADbite
- 1 OptraFine Assortment
- 8x OptraGate; Sizes S, R
- 8x OptraDam; Sizes S, R
- 1x Bleach BL shade guide
- 1x IPS Empress CAD shade guide

IPS Empress® CAD for CEREC® Trial Kit A–D

The Trial Kit contains a small selection of block shapes in A–D shades, as well as the necessary accessories, e.g. scanning spray, cementation materials, polishing assortment. The Trial Kit thus provides all the necessary products for the first IPS Empress CAD restorations.

Delivery form:

IPS Empress CAD for CEREC Trial Kit A–D

- 5x 1 IPS Empress CAD for CEREC and inLab HT Block; Shades/sizes: A1/I 10, A2/I 10, A1/I 12, A2/I 12, A3/I 12
- 5x 1 IPS Empress CAD for CEREC and inLab LT Block; Shades/sizes: A1/I 12, A2/I 12, A1/C 14, A2/C 14, A3/C 14
- 4x IPS Empress CAD for CEREC and inLab Multi Blocks; Shades/sizes: A1/C 14, A2/C 14, A1/C 14 L, A2/C 14 L
- 1x 50 ml IPS Contrast Spray Chairside
- 1x 50 ml Virtual CADbite
- 1x 9 g Multilink Automix
- 1x 5 g Monobond-S
- 1x 3 g Multilink Primer A+B
- 1 OptraFine PromoPack
- 4x OptraGate; Sizes S, R
- 4x OptraDam; Sizes S, R
- Various accessories

sirona
The Dental Company

Information on the CEREC® System can be obtained from:

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

Product overview for E4D®

IPS Empress® CAD for E4D® Dentist Basic Kit A–D

The Basic Kit contains a selection of block shapes in the most popular A–D shades, as well as the necessary accessories, e.g. scanning spray, polishing assortment. Therefore, the Basic Kit provides all the necessary products for the complete chairside treatment procedure. The Basic Kit is supplied in the new material cabinet and can be supplemented with any other Ivoclar Vivadent all-ceramic assortment, e.g. IPS e.max.

Delivery form:

IPS Empress CAD for E4D Dentist Basic Kit A–D

- 4x 5 IPS Empress CAD for E4D HT Blocks;
  Shades/sizes: A1/I 12, A2/I 12, A3/I 12, B1/I 12
- 5x 5 IPS Empress CAD for E4D LT Blocks;
  Shades/sizes: A1/C 14, A2/C 14, A3/C 14, B1/C 14, BL2/C 14
- 3x IPS Empress CAD for E4D Multi Blocks;
  Shades/sizes: A1/C 14 L, A2/C 14 L, A3/C 14 L
- 1x 50 ml Virtual CADbite
- 1x 9 g Multilink Automix
- 1x 5 g Monobond-S
- 1x 3 g Multilink Primer A+B
- 1 OptraFine Assortment
- 8x OptraGate; Sizes S, R
- 8x OptraDam; Sizes S, R
- 1x Bleach BL shade guide
- 1x IPS Empress CAD shade guide

Information on the E4D® System ca be obtained from:

D4D Technologies
630 International Parkway # 150
Richardson, TX 75081
USA
E-mail:business@d4dtech.com
www.d4dtech.com

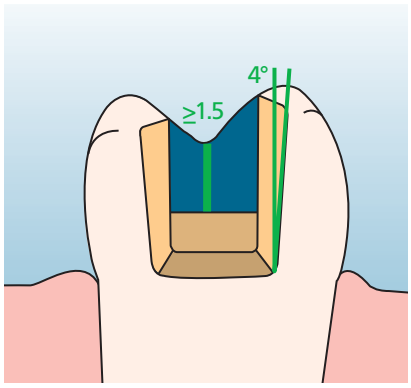
Preparation guidelines and minimum thicknesses

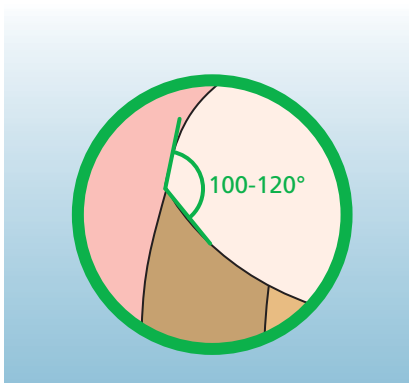
Successful results with IPS Empress CAD can only be achieved if the guidelines below and minimum layering thicknesses are strictly observed. The following minimum thicknesses are required for IPS Empress CAD restorations.

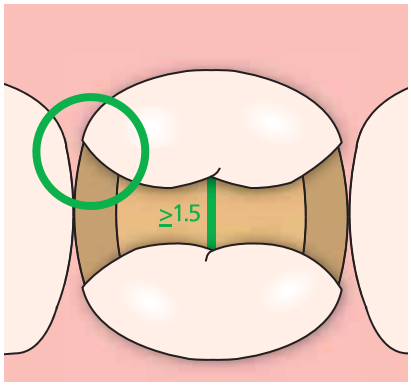
Inlays and Onlays

Static and dynamic antagonist contacts must be taken into consideration. The preparation margins must not be located on centric antagonist contacts.

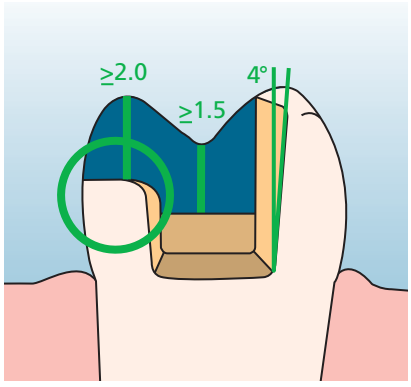
A preparation depth of at least 1.5 mm and an isthmus width of at least 1.5 mm must be observed in the fissure area. Prepare the proximal box with slightly diverging walls and observe an angle of 100–120° between the proximal cavity walls and the prospective proximal inlay surfaces. For inlays with pronounced convex cavity walls without adequate support by the proximal shoulder, marginal ridge contacts should be avoided. Round out internal edges in order to prevent stress concentration within the ceramic material. Eliminate the proximal contacts on all sides. Do not prepare slice-cuts or feather edges.

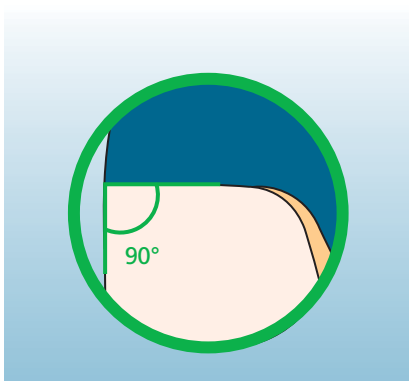


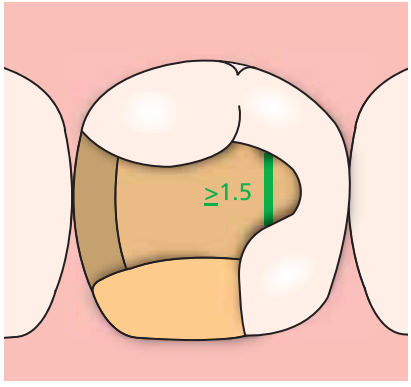




Provide at least 2 mm of space in the cusp areas. The shoulder must not show any inclinations, i.e. it must show a 90° angle to the residual tooth structure. Onlays are indicated if the preparation margin is less than approximately 0.5 mm away from the cusp tip, or if the enamel is severely undermined.



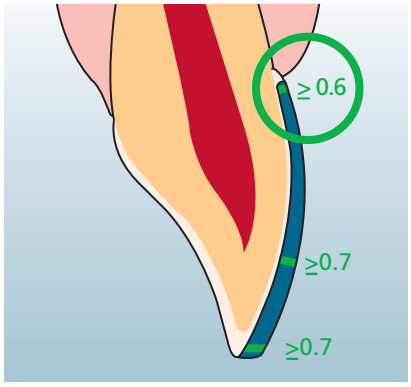


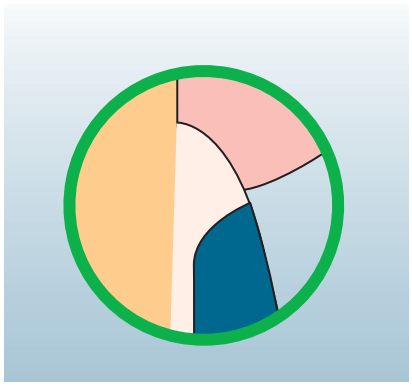


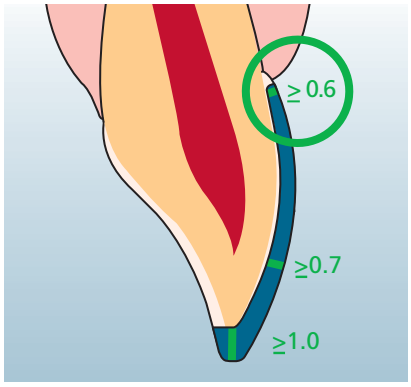
Veneers

If possible, the preparation should be entirely located in the enamel. The incisal preparation margins should not be located in the area of the abrasion surfaces or dynamic occlusal surfaces. By preparing orientation grooves using a depth marker, controlled enamel reduction can be achieved. Opening of the proximal contacts is not required.

For **preparations without involving of the incisal edge** (only labial reduction), the preparation depth in the cervical area should be at least 0.6 mm and at least 0.7 mm in the labial area.
For **preparation reduction of the incisal edge** (labial/incisal reduction), the preparation depth in the cervical area should be at least 0.6 mm, and at least 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 pronounced the reduction should be. Discoloured teeth may require more preparation.

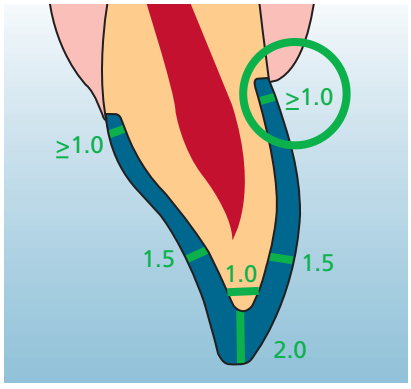


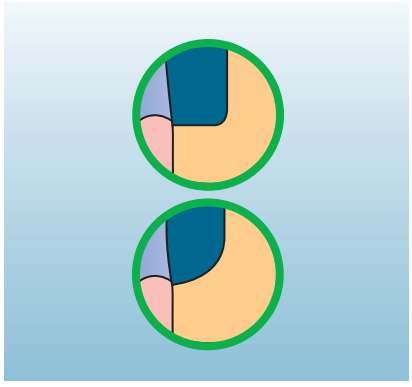


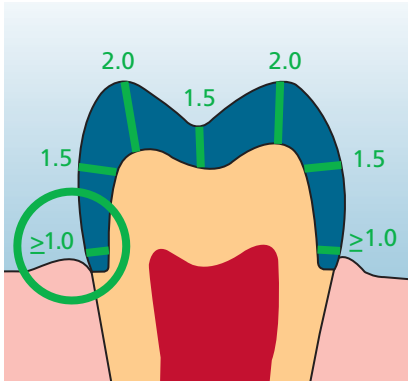


Anterior and posterior crowns

The anatomical shape is evenly reduced while observing the given minimum thicknesses. A circumferential shoulder is prepared with rounded inner edges or a chamfer. The width of the circular shoulder should be at least 1 mm. The incisal/occlusal third is reduced by 2 mm. For anterior crowns, the labial and/or palatal/lingual part of the tooth should be reduced by at least 1.5 mm. The incisal width of the preparation should measure at least 1 mm (milling tool geometry) in order to permit optimum milling of the incisal edge during CAD/CAM processing.







IPS Empress CAD –
Overview of the treatment procedure

In addition to IPS Empress CAD, coordinated products for the entire chairside treatment procedure are available. Products coordinated with each other and the individual working steps increase the processing comfort and the overall quality of the restoration. This enables the fabrication of highly aesthetic and durable IPS Empress CAD restorations with a maximum of efficiency and cost effectiveness.

Treatment procedure

Working Steps		Ivoclar Vivadent Products
Shade Determination		*Tooth Shade Determination* **Chromascop, Bleach BL and IPS Empress CAD Shade Guide** To determine the tooth shade of the non-prepared tooth *Die Shade Determination* **IPS® Natural Die Material** To determine the die shade of the prepared tooth
Intra-Oral Imaging		**OptraGate®** Provides easy access to the extended treatment area by circular retraction of lips and cheeks. **OptraDam®** Anatomically shaped, 3-dimensional rubber dam. **IPS® Contrast Spray Chairside** Enables optimum imaging through detailed definition of the edges. **Virtual® CADbite** Scanable bite registration for intra-oral imaging.
Milling		**IPS Empress® CAD Blocks** Leucite-reinforced ceramic blocks for the CAD/CAM technology
Staining and Veneering		**Tetric® Color** Light-curing composite stains for internal characterization. **IPS Empress Esthetic Veneer** Opalescent ceramic materials for individual, aesthetic supplements. **IPS Empress Universal Shade / Stains** Stains in paste form for individual surface characterization.
Ceramic Firing		**IPS® Object Fix Flow** Auxiliary firing paste to support all-ceramic restorations. **Programat® CS** Compact easy-to-operate ceramic furnace with vaccum function for the dental office.
Etching / Silanating		**IPS® Ceramic Etching Gel** For the fabrication of retentive bonding surfaces on ceramic restorations. **Monobond-S®** Produces silanated bonding surfaces on etched all-ceramic restorations.
Cementation		**OptraDam®** Anatomically shaped, 3-dimensional rubber dam. **Variolink® II, Variolink Veneer, Multilink® Automix** Tried-and-tested adhesive cementation systems. **bluephase®** The cordless high-performance LED for all indications.
Polishing		**OptraFine** High-performance chairside diamond polishing system for ceramic materials.

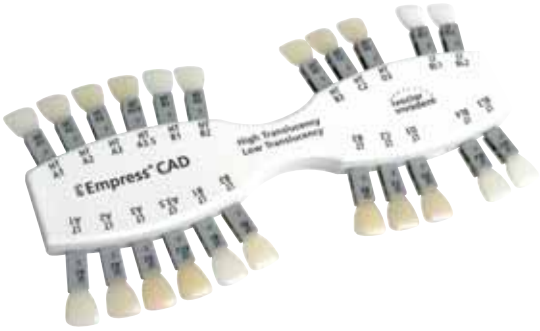
Shade determination

The correct tooth shade is the basis for a restoration with a life-like appearance. After tooth cleaning, the tooth shade of the non-prepared tooth and/or the adjacent teeth is determined. Individual characteristics have to be taken into consideration when determining the tooth shade. If a crown preparation is planned, for example, the cervical shade should also be determined. In order to achieve true-to-nature results, shade determination should be carried out at daylight. Furthermore, the patient should not wear clothes of intensive colours and/or lipstick. Basically, it has to be kept in mind that the final shade of the restoration is the result of the following individual shades:

– Die shade
– Shade of the ceramic block
– Shade of the layering ceramic
– Shade of the cementation material

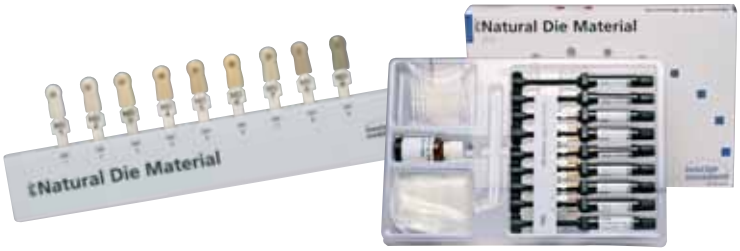
IPS Empress CAD Shade Guide

The IPS Empress CAD shade guide, which shows the shade of of the available IPS Empress CAD HT and LT blocks after milling. The shade tabs have been fired and pressed from original materials and therefore, correspond with the final result.



IPS Natural Die Material

In order to facilitate the reproduction of the tooth shade, the shade of the prepared tooth can be determined with the help of the IPS Natural Die Material shade guide. This facilitates the fabrication of the all-ceramic restoration and the individual characteristics of the preparation may also be taken into consideration. By fabricating a working die made of IPS Natural Die Materials in the respective shade of the preparation, the shade and brightness value of the IPS Empress CAD restorations may be checked during the individual fabrication steps.



Intra-oral imaging

To prepare the optical imaging, **OptraGate®** is placed to facilitate access to the treatment field. OptraGate is a clinical auxiliary device that retracts lips and cheeks during dental treatment. It enables a full view of the treatment field, facilitates the accessibility, and improves the moisture control in the oral cavity.

IPS® Contrast Spray Chairside is used to achieve optimum recordings for CAD/CAM restorations. The IPS Contrast Spray Chairside balances out the different optical properties of the natural tooth (dentin and enamel) and thus permits optimum impressions using a camera. With the atomizing nozzle, an optimum covering layer with a detailed representation of the preparation surfaces and margins is achieved easily and efficiently with only a short spray discharge. Angled atomizing heads are available for the spray. Please observe the corresponding Instructions for Use.
The IPS Contrast Spray ist not necessary for every CAD/CAM (Imaging) system.

Virtual® CADbite registration material is scannable and can be used for the intra-oral imaging when fabricating restorations with CAD/CAM systems such as CEREC or E4D. Virtual CADbite is an addition silicone, which may also be used for "conventional" bite registration techniques in conjunction with indirect restorative procedures.
The material demonstrates a non-slump consistency, short setting time and good dimensional stability. Moreover, it provides excellent reproduction of detail and achieves a final hardness of 32 Shore D.

Milling

To mill the restoration, the **IPS Empress CAD Block** is selected in accordance with the corresponding clinical situation. The clinical situation not only determines the selection of the block in the required shade and translucency, but also the size of the block used. Once the desired block has been selected, it is mounted in the CAM unit and the restoration is milled.
Several options are available to finish and complete the restorations. Please refer to the Chapter "Practical Procedure - Fabrication of IPS Empress CAD Restorations" for detailed descriptions of the individual working steps of the various processing methods.

Staining and veneering

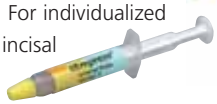
There are three different techniques for staining, characterizing, and veneering IPS Empress CAD:

1. Internal characterization

Tetric® Color are light-curing composite stains for individualized characterizations. They are ideally suitable for internal characterizations (cementation side) of IPS Empress CAD restorations (e.g. veneers). After etching (60 seconds with IPS Ceramic Etching Gel) and silanating (Monobond-S), the stains are applied. After that, the stains are polymerized with a curing light of the bluephase family. No further ceramic firing cycles should be conducted after the "internal characterization" with Tetric Color.

2. External characterization*

IPS Empress® Universal Shade / Stains are ceramic stains for individualized characterizations. Among other things, they are ideal for external staining and characterization of IPS Empress CAD restorations.



The dentin stains are available in 9 A-D and 15 Chromascop shades. For individualized characterizations, 14 intensive stains are available. To reproduce the incisal area, there are 2 Incisal Shades, which provide the incisal third with optical translucency and an in-depth effect. For the final glaze firing of the IPS Empress restorations, a smooth and fine-grained glazing paste is available.

3. Cut-back technique*

IPS Empress® Esthetic Veneer ceramic material are leucite-reinforced layering materials for the cut-back technique. In this technique, fully anatomical IPS Empress CAD restorations (veneers and anterior crowns) are reduced in the incisal third to a dentin-mamelon structure and subsequently completed using materials in paste and powder form in order to design a true-to-nature and aesthetic incisal third.

The IPS Empress Veneer Kit comprises a selection of the most popular wash pastes and layering materials required for the cut-back technique of IPS Empress restorations (Esthetic and CAD). With the wash pastes, an excellent and homogeneous bond with the reduced restoration is achieved. The layering materials feature incisal-like fluorescence and true-to-nature opalescence. Additional wash pastes and layering materials available as Refills are indicated on the material shade guide supplied with the Kit.

* please refer to the Combination Tables for the available shades and materials.

Ceramic firing

IPS Empress CAD restorations are generally fired on a honey-comb firing tray. For that purpose, the restorations are placed either on a firing pillow or metal pins. As an alternative and to better secure the restorations on the metal pins, **IPS® Object Fix Flow** auxiliary firing paste can be used.

The firing cycles are conducted in the **Programat® CS** or any other Ivoclar Vivadent ceramic furnace. The Programat CS is easy to operate and is especially suitable for glaze and crystallization firings. Including its integrated vacuum function, the furnace has been ideally coordinated with the IPS Empress CAD and IPS e.max CAD blocks.

Etching and silanating

Conditioning of the ceramic furnace to prepare for adhesive cementation is required for a sound bond between the cementation material and the all-ceramic restoration. Generally, glass-ceramics are etched using **IPS® Ceramic Etching Gel**. Etching produces retentive bonding surfaces, which increases the bond between the luting composite and the all-ceramic restoration. IPS Ceramic Etching gel is exclusively intended for extra-oral use and must not be applied in the oral cavity.

Subsequent silanating of the bonding surface using **Monobond-S** results in a sound bond between the etched all-ceramic material and the luting composite. The bonding silane is thus an important contributor to the bonding strength between the IPS Empress CAD restorations and the tooth structure.

Cementation

In preparation for adhesive cementation, reliable isolation of the treatment field must be achieved, preferably with a rubber dam.

OptraDam® is a convenient, 3-dimensional rubber dam, which can be quickly and easily inserted thanks to its anatomical shape and the integrated frame. Given its high flexibility and new functional concept, the OptraDam is very comfortable for patients even for longer treatments. The gentle, circular retraction of lips and cheeks enables substantially facilitated access to an enlarged treatment field with simultaneous isolation.

Total Etch

For the preparation of adhesive cementation with Variolink, Total Etch is used. It is an enamel etching and dentin conditioning gel used during the adhesive cementation of all-ceramic restorations.

For the adhesive cementation of IPS Empress CAD restorations, you may choose between tried-and-tested luting composites from Ivoclar Vivadent. Adhesive cementation achieves an excellent bond between the preparation and the restoration.

	Variolink® (Variolink II, Variolink Veneer)	Multilink® (Multilink, Multilink Automix)
Veneers	✓	—
Inlays	✓	✓
Onlays	✓	✓
Partial crowns	✓	✓
Anterior and posterior crowns	✓	✓

✓ indicated

— contraindicated

Variolink® II

The dual-curing luting composite Variolink II has been used for more than ten years and in over 20 million restorations. It is the world's leading highly aesthetic material concept.

Numerous awards as the best product in the category of adhesive luting composites and excellent results from clinical long-term studies are testimony to this success.

Variolink® Veneer
Purely light-curing luting composite in 7 "Value" shades for the adhesive cementation of translucent all-ceramic restorations with a layer thickness of < 2.0 mm (veneers, inlays, onlays).

Multilink® Automix
The universal, self-curing (with light-curing option) resin based luting cement Multilink offers a broad range of indications and produces very high adhesive strength on all material surfaces. Together with the self-etching Primer, which is applied as a simple preliminary layer on enamel and dentin, Multilink is processed quickly and efficiently.

LED lights of the **bluephase®** family are used for the polymerization of light-curing and dual-curing adhesive composites. The high light intensity achieved with bluephase permits comparatively short polymerization times with simultaneous good polymerization depth.

Especially for the demanding polymerization of adhesively cemented all-ceramic restorations, **bluephase 16i** is used. In the process, the entire strength of the high performance LED is utilized. All-ceramic restorations are incorporated as quickly as possible.

REALITY 2005
2005 REALITY Five Star Award
reddot design award winner 2004

Polishing

OptraFine, the specially developed, high performance chairside diamond polishing system for ceramic materials combines the highest efficiency with outstanding polishing results. With regard to both low surface roughness and outstanding aesthetic gloss, OptraFine leaves nothing left to be desired. In contrast to other ceramic polishers, OptraFine is autoclavable and therefore reusable. OptraFine is available in the shapes "flame", "cup", and "disc".

Polishing is carried out in three steps:
– Finishing/smoothing out of the surfaces using the Finisher F
– Polishing using the Polisher P
– Polishing to a high gloss using the high-gloss brush and diamond polishing paste HP

Fabrication of an IPS Empress CAD Restoration

IPS Empress CAD Inlays / Onlays – polished

IPS Empress CAD restorations are ideally suitable to restore small defects with an all-ceramic material, as well as to replace less aesthetic restorations. Given the true-to-nature chameleon effect, IPS Empress CAD restorations beautifully blend in with the residual tooth structure. In this processing technique, the restoration is polished and incorporated after milling in the CAD/CAM system. The surface lustre is achieved by manual polishing. Therefore, this processing method is very efficient and leads to aesthetic results in a quick and easy fashion.

Preparation

After the determination of the tooth shade, preparation is carried out according to the preparation guidelines. As a preparation for intra-oral imaging, the cleaned and dried preparation is covered with IPS Contrast Spray Chairside with one short spray discharge.

Starting situation. the amalgam restoration in the second molar is to be replaced

After preparation

Please refer to the corresponding Operating Instructions and/or Manuals of the respective CAD/CAM system for further information on the CAD/CAM processing procedure. The instructions by the manufacturer must be observed.

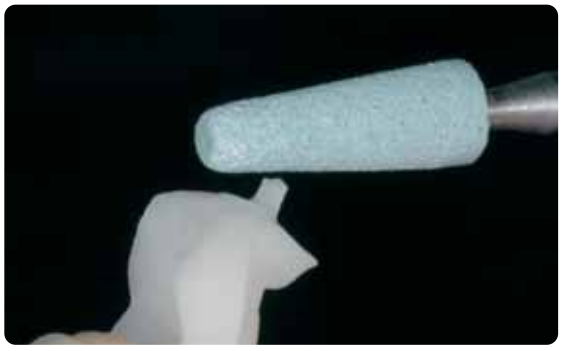
CEREC system from Sirona Dental Systems GmbH

E4D Dentist system from D4D Technologies

Finishing

For finishing glass-ceramics, appropriate grinding instruments are indispensable. If the wrong grinding instruments are used, marginal chipping and local overheating my occur.

The following procedure is recommended for finishing IPS Empress CAD restorations:
– Use only 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 attachment point of the holder and take the proximal contact points into account.
– Carry out individual shape adjustments, if required.
– Try in and adjust occlusion/articulation, if necessary.
– Extra-oral polishing of proximal areas and large surfaces prior to cementation.

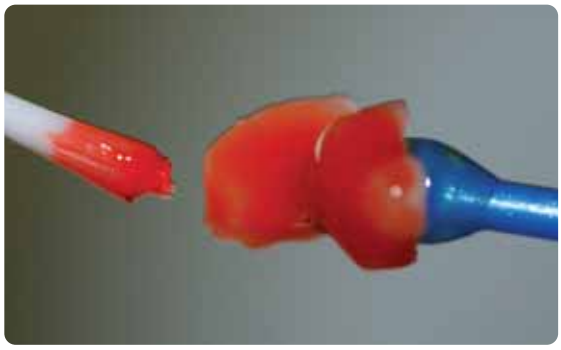

Smooth out attachment point and take proximal contacts into account


Extra-oral polishing of proximal areas and larger surfaces

Adhesive cementation

Conditioning the IPS Empress CAD restoration

To condition it for placement, etch the IPS Empress CAD restoration for 60 seconds using IPS Ceramic Etching Gel and subsequently clean it under running water. Then, silanate the restoration using Monobond-S. Observe the corresponding safety instructions.

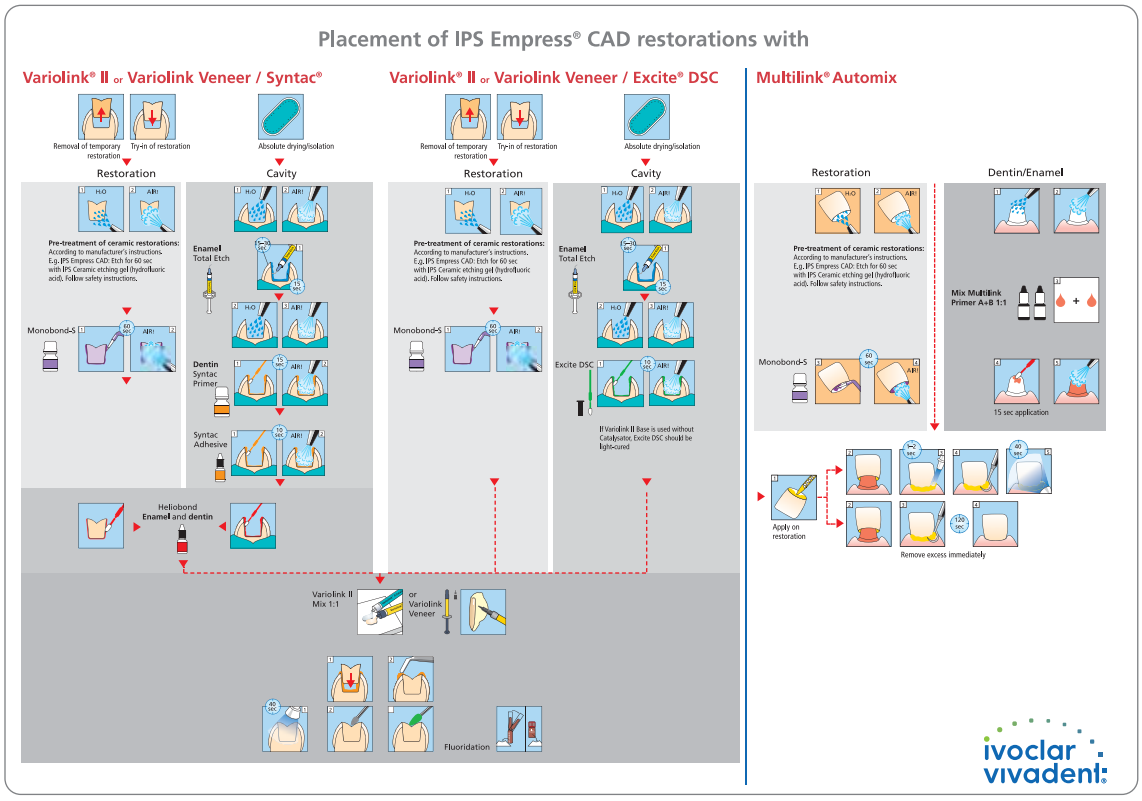

Etching of the IPS Empress CAD restoration using IPS Ceramic Etching Gel


Silanating the IPS Empress CAD restoration using Monobond-S

Conditioning the preparation

You may choose between tried-and-tested luting composites from Ivoclar Vivadent for the adhesive cementation. In the documented case, Variolink II / Syntac were used.

– To condition the preparation for adhesive cementation with Variolink II/Variolink Veneer, Total Etch is used. Total Etch is an enamel etching (30 seconds of etching) and dentin conditioning material (10–15 seconds of etching).
– To condition the preparation for adhesive cementation with Multilink Automix, Multilink Primer A/B is used.



Position the restoration and remove excess.

For polymerization, cover the restoration margin with glycerine gel and polymerize the restoration from all sides.

Polishing

After adhesive cementation, the occlusion/articulation of the restoration is adjusted using diamonds. Subsequently, the restoration is manually polished in 3 easy steps. In order to achieve a life-like surface gloss, follow the instructions below:

– For polishing, we recommend OptraFine, the high-performance, chairside diamond polishing system.
– Observe contact points and margins during the entire polishing procedure!
– Use the corresponding speed and little pressure to avoid heat development.
– Polish proximal areas and large surfaces extra-orally prior to cementation.

Step 1:
Finish/smooth out the surfaces (e.g. proximal areas) using the Finisher F (speed: max. 15,000 rpm, water cooling). This polisher smoothes out the milling grooves of the approx. 60 µm diamond of the CAD/CAM milling unit.
Step 2:
Polish 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).


Adjusting the occlusion/articulation using a fine diamond


Finishing/smoothing out the surfaces using Finisher F (light-blue)


Polishing using Polisher P (dark-blue)


High-gloss polishing using the high-gloss brush and diamond paste HP


Completed, polished IPS Empress CAD restoration

IPS Empress CAD Inlays / Onlays – stained / glazed

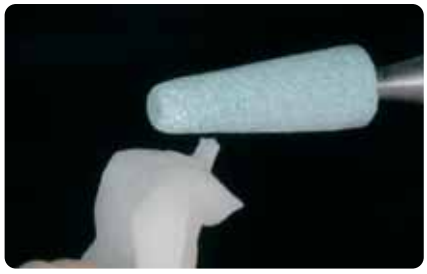
The 2-in-1 technique is suitable for efficient glazing and staining of inlays, onlays, and partial crowns. In this technique, the glaze and stain firing is conducted in one single step. Even though this technique does not permit as many shade adjustments as a separate stain firing, the possible adjustments are entirely sufficient for the size of the restoration. If more intensive and extensive shade adjustments are desired, we recommend conducting a separate stain and characterization firing (as described in the following chapter).

Please refer to the corresponding Operating Instructions and/or Manuals of the respective CAD/CAM system for further information on the CAD/CAM processing procedure. The instructions by the manufacturer must be observed.

Finishing and preparing for stain and glaze firing

For finishing glass-ceramics, appropriate grinding instruments are indispensable. If the wrong grinding instruments are used, marginal chipping and local overheating my occur. The following procedure is recommended for finishing IPS Empress CAD restorations:

– Use only 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 attachment point of the holder and take the proximal contact points into account.
– Carry out individual shape adjustments, if required.



Smooth out attachment point and take proximal contacts into account

Before the stain and glaze firing, the restorations must be free of dirt and grease. Avoid any contamination after cleaning. Observe the following procedure.

– Clean the restoration with ultrasound in a water bath or blast with Al_2O_3 at 0.5 bar pressure (Caution: abrasive) and clean under running water or using the steam jet.
– Certain blasting devices require different settings for the intended blasting procedure.

Clean the restoration before staining

2-in-1 Technique – Stain and glaze firing using IPS Empress Universal

Once the restoration has been cleaned, apply the stains and glazing material in 2 steps. First, the glazing paste is applied, followed by the stains, which are applied on the unfired glaze layer. The following working procedure should be observed.

Step 1 – Application of the glazing material

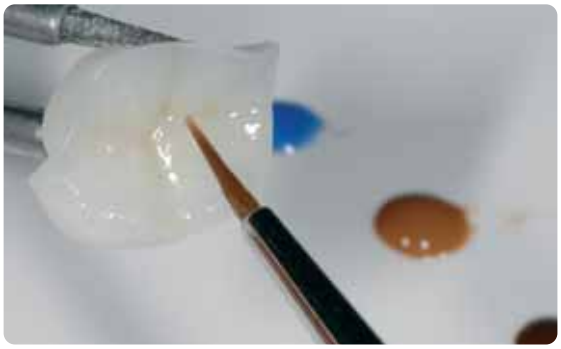
– Extrude IPS Empress Universal Glazing Paste from the syringe and mix thoroughly.
– Thin the material to the desired consistency using IPS Empress Universal Glaze and Stain Liquid. Do not excessively dilute the material, since this may render the glazing procedure difficult to control.
– Apply the glazing material on the entire outer surfaces of the restoration.
– The glazing material must not come into contact with the inner aspects of the restoration.
– Avoid pooling and excessively thick glazing material layers.
– Too thin glazing material layers result in an unsatisfactory gloss.


Evenly apply the glazing material on the entire outer surfaces of the restoration.

Step 2 – Application of Shades / Stains

– Extrude IPS Empress Universal Shade or Stains from the syringe and mix thoroughly.
– Thin the material to the desired consistency using IPS Empress Universal Glaze and Stain Liquid.
– Apply the mixed Shade material directly into the unfired glazing material layer.
– Intensify the corresponding dentin shade in the cervical and occlusal areas using IPS Empress Universal Shades.
– To imitate the incisal area and translucency in the incisal third, use IPS Empress Universal Shade Incisal.
– Apply individualized effects and characterizations on cusps and in fissures using the Stains materials. Only apply the Stains once staining with the Shade materials has been completed.
– Apply the Stains thinly and in a controlled manner on the unfired glazing material layer using a brush.

Apply the mixed Shade material directly into the unfired glazing material layer. Intensify the corresponding dentin shade in the cervical and occlusal areas and use IPS Empress Universal Shade Incisal to imitate the incisal areas.



Apply individualized effects and characterizations on cusps and in fissures using the Stains materials.

After glazing and staining, the glaze and stain firing is conducted in a compatible ceramic furnace (e.g. P300).
The following points should be observed when placing the restoration in the furnace and setting the firing parameters:

– Support inlays, onlays, and partial crowns with a firing pillow and place them on a honey-comb firing tray.
– Place veneers as well as anterior and posterior crowns on metal pins and position them on the honey-comb firing tray.
– As an alternative to the firing pillow and to better secure the restoration on the metal pins (particularly with veneers), a small amount of IPS Object Fix may also be used.
– Restorations supported with a firing pillow on the honey-comb tray are exposed to less heat due to their lower position in the firing chamber. Therefore, in order to achieve a true-to-nature gloss, it is recommended to extend the holding time from 1 minute to 2 minutes.
– Make sure that the firing pillow is regularly replaced in order to prevent contamination. Keep firing pillows used for all-ceramic materials separated from those used for metal-ceramics to avoid cross-contamination.

Place the objects on the honey-comb firing tray and start the firing program

Firing parameters for the Stain and Glaze firing (note the temperature control)

IPS Empress CAD with IPS Empress Universal	B	S	t↗	T	H	V_1	V_2
Stain and Glaze firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1–2' 1–2'	– –	– –

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

Completed IPS Empress CAD restoration, stained and glazed in one step.

Optional

Subsequent adjustment

After completion, additional adjustment (e.g. contact points) may become necessary. For that purpose, IPS Empress Add-On 770 °C/1418 °F is available.

Processing:

- Before the adjustment, the restoration must be free from dirt and grease. For that purpose, thoroughly clean the restoration using the steam jet.
- Mix IPS Empress Add-On 770 °C / 1418 °F 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.
- Position the adjusted restoration on the firing tray and fire in the ceramic furnace.
- After firing, manually polish the supplemented areas to a high gloss.

Firing parameters for the corrective firing

IPS Empress CAD with IPS Empress Add-On 770°C/1418°F	B	S	t↗	T	H	V_1	V_2
Corrective firing	403°C 757°F	4' 4'	60°C 108°F	770°C 1418°F	2' 2'	450°C 842°F	769°C 1417°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

IPS Empress CAD Veneers / Crowns – stained / glazed

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. The IPS Empress Universal Shades and Stains are then applied in a first step and separately fired. The shade result can be checked after firing. If required, the shade of the restoration may be intensified and adjusted to the individual patient case by repeated application of the materials. Once the desired shade has been achieved and the individualized characterizations completed, the glaze firing is conducted.

Please refer to the corresponding Operating Instructions and/or Manuals of the respective CAD/CAM system for further information on the CAD/CAM processing procedure. The instructions by the manufacturer must be observed.

Finishing

For finishing glass-ceramics, appropriate grinding instruments are indispensable. If the wrong grinding instruments are used, marginal chipping and local overheating may occur.

The following procedure is recommended for finishing IPS Empress CAD restorations:

- Use only 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.
- Carefully finish the restoration margins using rubber and silicone polishers (Speed: <10,000 rpm)
- Overheating the glass-ceramic must be prevented.
- Smooth out attachment point of the holder and take the proximal contact points into account.
- Carry out individual shape adjustments, if required.
- Design the surface structure somewhat more pronounced, if necessary, since it will be toned down by the glazing procedure.

Design individual shape adjustments and a true-to-nature surface structure

Optional

Die fabrication using IPS Natural Die Material

The light-curing IPS Natural Die Material simulates the shade of the prepared tooth. 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 restorations with IPS Natural Die Material Separator and allow it to react for a short time.
- Apply die 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 to the restoration margins and that no gaps are present.
- Polymerize the IPS Natural Die Material die with a commercial polymerization light for 60 seconds.
- After polymerization, the die can be finished and or smoothed, if required.

The control die made of IPS Natural Die Material is the optimum basis for a true-to-nature all-ceramic restoration.

Preparing for staining

Before the stain and characterization firing, the restorations must be free of dirt and grease. Avoid any contamination after cleaning.

Observe the following procedure.
– Clean the restoration with ultrasound in a water bath or blast with Al_2O_3 at 0.5 bar pressure (Caution: abrasive) and clean under running water or using the steam jet.
– Certain blasting devices require different settings for the intended blasting procedure.

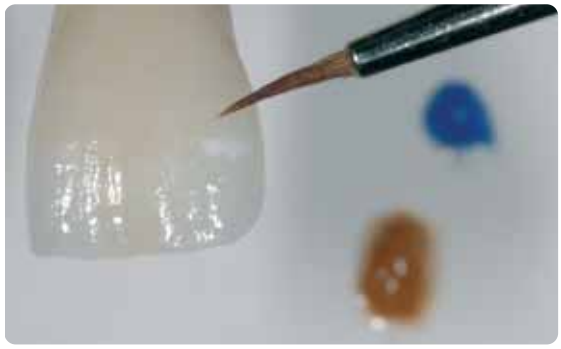
Before staining, clean the restoration using the steam jet

Stain and glaze firing using IPS Empress Universal Shade and Stains

Once the restoration has been cleaned, the stain and characterization firing is conducted. Observe the following working procedure:
– Extrude IPS Empress Universal Shade or Stains from the syringe and mix thoroughly.
– Thin the material to the desired consistency using IPS Empress Universal Glaze and Stain Liquid.
– For better wetting of the stains, a small quantity of IPS Empress Universal Glaze and Stain Liquid may be slightly rubbed into the surface.
– Apply the mixed Shade material directly unto the surface.
– Intensify the corresponding dentin shade in the cervical and central crown thirds using IPS Empress Universal Shades.
– Excessively thick or thin material layers should be prevented.
– More intensive shades are achieved by repeated staining, rather than by applying thicker layers.
– To imitate the incisal area and translucency in the incisal third, use IPS Empress Universal Shade Incisal.
– Design individualized affects and characterizations using the Stains material.
– Apply the Stains thinly and in a controlled manner using a brush.

The dentin body is intensified using IPS Empress Universal Shade

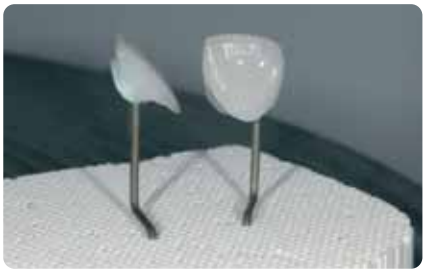
The incisal area is imitated using IPS Empress Universal Shade Incisal



Individualized effects and characterizations are designed using IPS Empress Universal Stains

After staining, the stain and characterization firing is conducted in a compatible ceramic furnace (e.g. P300). The following points should be observed when placing the restoration in the furnace and setting the firing parameters:

– Support inlays, onlays, and partial crowns with a firing pillow and place them on a honey-comb firing tray.
– Place veneers as well as anterior and posterior crowns on metal pins and position them on the honey-comb firing tray.
– As an alternative to the firing pillow and to better secure the restoration on the metal pins (particularly with veneers), a small amount IPS Object Fix may also be used.



Place the objects on the honey-comb firing tray and start the firing program

Firing parameters for the Stain and Characterization firing (note the temperature control)

IPS Empress CAD with IPS Empress Universal	B	S	t↗	T	H	V_1	V_2
Stain and Characterization firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1' 1'	– –	– –

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

Optional

Shade check

To check the tooth shade after the first stain and characterization firing, proceed as follows:

– Wet inner aspects of the restoration with IPS Contour Glaze and Stain Liquid using a brush.
– Place the restoration on the individual control die and check the tooth shade, as well as the individualized effects.
– If adjustments are required, apply the corresponding stains and fire them using the above firing program.

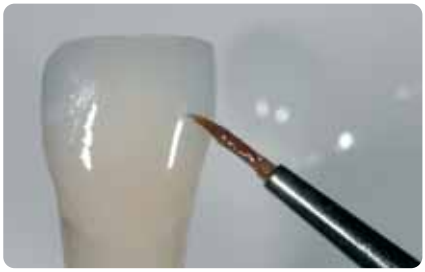
Shade check. If necessary, the shade intensity can be increased by additional staining.

Glaze firing with IPS Empress Universal Glaze

Once the desired shade has been achieved and the individualized characterizations completed, the glaze firing is conducted.

Observe the following working procedure:

- Extrude IPS Universal Glazing Paste from the syringe and mix thoroughly.
- Thin the material to the desired consistency using IPS Empress Universal Glaze and Stain Liquid. Do not excessively dilute the material, since this may render the glazing procedure difficult to control.
- Apply the glazing material on the entire outer surfaces of the restoration.
- The glazing material must not come into contact with the inner aspects of the restoration.
- Avoid pooling and excessively thick glazing material layers.
- Excessively thin glazing material layers result in an unsatisfactory gloss.
- The objects are positioned on the honey-comb firing tray same as for the previous firing procedure.



Evenly apply the glazing material on the entire outer surfaces of the restoration.

- Then, the glaze firing is conducted in a compatible ceramic furnace (e.g. Programat P300).
- If the gloss is unsatisfactory after the first glaze firing, further glaze firing procedures may be conducted using the same firing parameters.

Place the objects on the honey-comb firing tray and start the firing program.

Firing parameters for the glaze firing (note the temperature control)

IPS Empress CAD with IPS Empress Universal	B	S	t↗	T	H	V_1	V_2
Glaze firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1–2' 1–2'	– –	– –

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

Completed, stained, and glazed IPS Empress CAD crown and veneer.

Optional

Subsequent adjustment

After completion, additional adjustment (e.g. contact points) may become necessary. For that purpose, IPS Empress Add-On 770 °C/1418 °F is available.

Procedure:

– Before the adjustment, the restoration must be free from dirt and grease. For that purpose, thoroughly clean the restoration using the steam jet.
– Mix IPS Empress Add-On 770 °C / 1418 °F 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.
– Position the adjusted restoration on the firing tray and fire in the ceramic furnace.
– After firing, manually polish the supplemented areas to a high gloss.

Firing parameters for the corrective firing

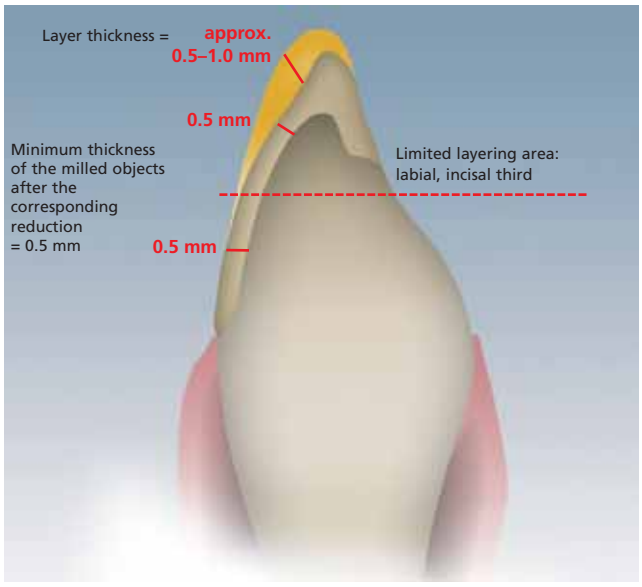
IPS Empress CAD with IPS Empress Add-On 770°C/1418°F	B	S	t↗	T	H	V_1	V_2
Corrective firing	403°C 757°F	4' 4'	60°C 108°F	770°C 1418°F	2' 2'	450°C 842°F	769°C 1417°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

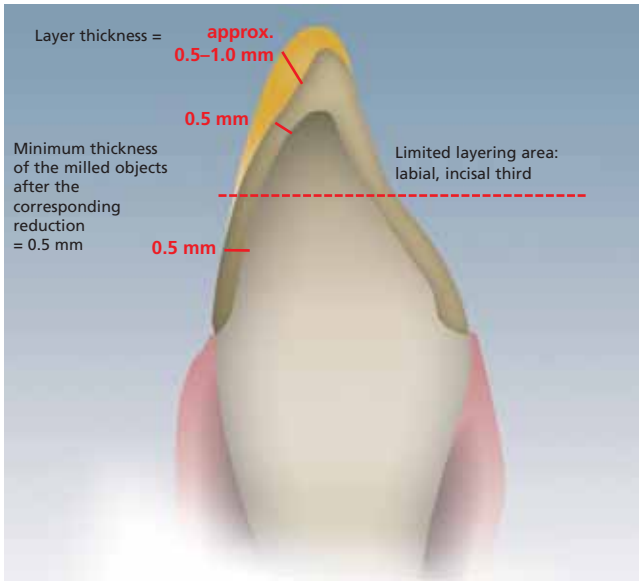
IPS Empress CAD Veneers / Anterior Crowns – Cut-back and layered

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 fully anatomical 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 aesthetic veneer.

Veneer



Anterior crown



Fully anatomical, milled veneer and anterior crown, which are reduced in the incisal area.

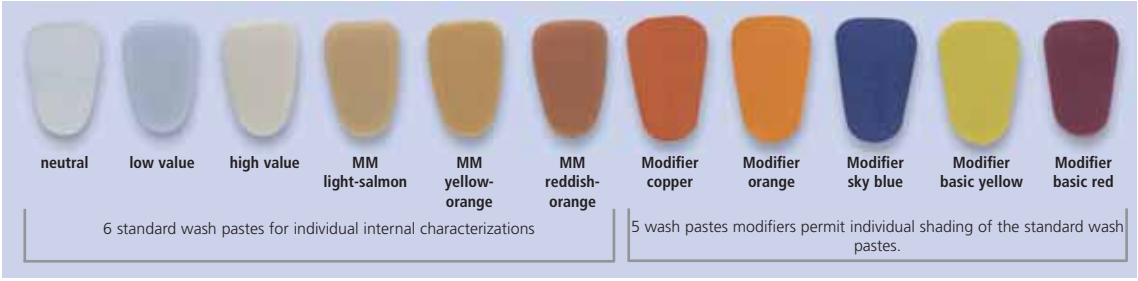
Please refer to the corresponding Operating Instructions and/or Manuals of the respective CAD/CAM system for further information on the CAD/CAM processing procedure. The instructions by the manufacturer must be observed.

Applying the IPS Empress Esthetic Veneer materials

IPS Empress Esthetic Veneer Wash Pastes

Given the 2 : 1 effect of the wash pastes, i.e. bonding and characterization in one step, highly aesthetic restorations can be fabricated very efficiently.

The neutral wash paste produces the direct bond to the reduced restorations and is always applied first on the restoration; it enables a homogeneous bond. Subsequently, the reduced restorations are individually characterized using the 5 standard wash pastes. Ideal shade gradations permit individualized characterizations of the highest order. The 5 standard wash pastes may be individually shaded using the 5 wash paste modifiers or the neutral paste.



IPS Empress Esthetic Veneer Incisal Opal

The opalescent materials are available in three different gradations (low, medium, and high translucency). They feature an incisal-like fluorescence and true-to-nature opalescence. The high stability and excellent modelling properties permit detailed layering of life-like incisal edges. The opalescent effect demonstrates high firing stability.

IPS Empress Esthetic Veneer Transpa

The Transparent materials in 2 shade nuances are used for the true-to-nature reproduction of transparent areas, particularly in the incisal third.

IPS Empress Esthetic Veneer Incisal

The Incisal materials are available in 6 shade nuances and are used for additional characterizations in the incisal area.

IPS Empress Esthetic Veneer Chroma Modifier

These materials support the shade intensity of the reduced restoration and are available in shades 110/A1 and 210/A3.

IPS Empress Esthetic Veneer Brightener

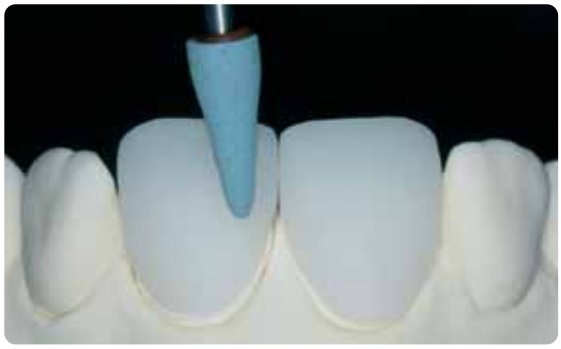
Used to increase the brightness value.

IPS Empress Esthetic Veneer Build-Up Liquid

The Build-Up Liquid is used to mix the IPS Empress Esthetic Veneer materials and the IPS Empress Add-On corrective material. IPS Empress Esthetic Veneer Build-Up Liquid must be used since other build-up liquids may contain organic additives that could leave a residue.

Cut-back technique

Before the cut-back is carried out, the following points must be observed:
- Use only 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.
- Carefully finish the restoration margins using rubber and silicone polishers (Speed: <10,000 rpm)
- Overheating the glass-ceramic must be prevented.
- If the wrong grinding instruments are used, marginal chipping and local overheating may occur.
- Smooth out attachment point of the holder and take the proximal contact points into account.
- Before the cut-back the veneer or anterior crown should correspond with the final tooth shape.
- The incisal length must be exactly defined and the occluding surfaces taken into account.
- A palatal silicone key is used as a reference for the cut-back.
- The silicone key should slightly embrace the incisal edge.



Before the cut-back the veneer or anterior crown should correspond with the final tooth shape.

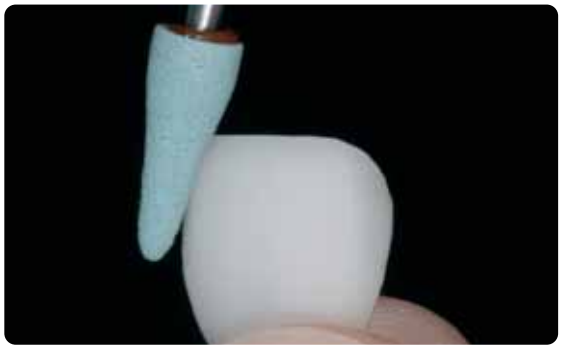
Fabricate a palatal silicone key.

Please see page 28 for information about the fabrication of a control die using IPS Natural Die Material.

The control die made of IPS Natural Die Material is the optimum basis for sound shade reproduction.

The cut-back is conducted in 3 steps. Only in this way is a targeted and controlled reduction possible. The following working procedure should be observed:

– Use only suitable grinding instruments for the cut-back (e.g. ceramic-bonded grinding instruments and diamonds) at low speed.
– Too much pressure and excess heat development during grinding must be prevented.
– The thickness of the reduced IPS Empress CAD restoration must not fall below the required minimum of 0.5 mm.
– Step 1: Proximal cut-back - the mesial and distal ridges are reduced.
– Step 2: Labial/incisal cut-back - volume and length are tapered and reduced
– Step 3: Mamelon cut-back - design life-like mamelons using abrasive silicone disks at low pressure.
– Refrain from designing too extreme mamelons with undercuts.



Too much pressure and excess heat development during cut-back must be prevented.

Step 1: Proximal cut-back – the mesial and distal ridges are reduced.

Step 2: Labial/incisal cut-back – volume and length are tapered and reduced.

Step 3: Mamelon cut-back – design life-like mamelons using abrasive silicone disks. Refrain from designing too extreme mamelons with undercuts.

Completed cut-back of the incisal third.

Preparing for veneering

Before veneering, the restorations must be free of dirt and grease. Avoid any contamination after cleaning.
Observe the following procedure:

– Clean the restoration carefully by blasting with Al_2O_3 at 0.5 bar pressure (Caution: abrasive) and clean with ultrasound in a water bath or using the steam jet.
- Certain blasting devices require different settings for the intended blasting procedure.

Carefully blast the restoration with Al_2O_3 at 0.5 bar pressure (Caution: abrasive)

Clean the restoration with ultrasound in a water bath or using the steam jet

Veneering of IPS Empress CAD with IPS Empress Esthetic Veneer

The IPS Empress CAD restoration is veneered and finished in 3 steps:

Step 1: *IPS Empress Esthetic Veneer Wash Paste for an excellent bond and in-depth shading*
Step 2: *IPS Empress Esthetic Veneer for individualized aesthetics in the incisal third*
Step 3: *IPS Empress Universal Shade/Stains and Glaze for final staining and glazing*

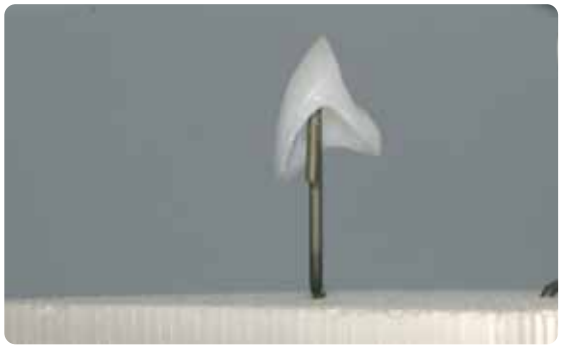
Wash firing with IPS Empress Esthetic Veneer Wash Pastes

The wash firing enables an optimum bond to the reduced IPS Empress CAD restorations.
The following working procedure should be observed:

– Extrude IPS Empress Esthetic Veneer Wash Paste neutral from the syringe and thin it with a small amount of IPS Empress Universal Glaze and Stain Liquid, if required.
– Apply IPS Empress Esthetic Veneer Wash Paste neutral thinly on the entire surface to be veneered, in order to enable an optimum bond.
– Depending on the individual patient situation, design mamelons.
– Apply internal effects using Modifier (pure or diluted).
– The mamelons and internal effects are applied on the unfired Wash Paste neutral layer.
– Note: The shade intensity will not be noticeably changed during firing.
– Place veneers and anterior crowns on the honey-comb firing tray with the help of metal pins. Additionally support the veneers with a small amount IPS Object Fix.

Apply IPS Empress Esthetic Veneer Wash Paste neutral thinly on the entire surface to be veneered, in order to enable an optimum bond.

Apply mamelons and internal effects.



Place restorations on the honey-comb firing tray and fire.

Firing parameters for the Wash firing (note the temperature control)

IPS Empress CAD with IPS Empress Esthetic Veneer	B	S	t↗	T	H	V_1	V_2
Wash firing	403°C 757°F	4' 4'	60°C 108°F	840°C 1544°F	2' 2'	450°C 842°F	839°C 1543°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

1st Incisal/Transpa firing with IPS Empress Esthetic Veneer

The incisal third is built-up according to the silicone key. The matching layering materials are listed in the Combination Table on Page 45. The following working procedure should be observed:

– Mix IPS Empress Esthetic Veneer ceramic materials with the IPS Empress Esthetic Veneer Build-Up Liquid.
– The mixed material should demonstrate good stability. If this is not the case, either too much or too little Build-Up Liquid was added.
– Build up the materials in accordance with the reduction using a ceramic brush.
– If a life-like incisal third is desired, various materials maybe combined and layered.
– Once the tooth shape has been completed, allow the ceramic material to dry for a short period of time.
– Place veneers and anterior crowns on the honey-comb firing tray with the help of metal pins. Additionally support the veneers with a small amount of IPS Object Fix.

Build up the materials in accordance with the reduction.

For a life-like incisal third, combine various materials and layer.

Firing parameters for the 1st Incisal/Transpa firing (note the temperature control)

IPS Empress CAD with IPS Empress Esthetic Veneer	B	S	t↗	T	H	V_1	V_2
1st Incisal/Transpa firing	403°C 757°F	4' 4'	60°C 108°F	830°C 1526°F	2' 2'	450°C 842°F	829°C 1525°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

2nd Incisal/Transpa firing (corrective firing) with IPS Empress Esthetic Veneer

After firing, carefully place the restoration on the model and rework. Proceed as follows for the 2nd firing:

– Clean the restoration with ultrasound in a water bath or with the steam jet and completely dry it.
– Already mixed ceramic material may be rewetted with distilled water, or mix fresh IPS Empress Esthetic Veneer materials with the Build-Up Liquid.
– Complete the missing areas taking the final tooth shape into account.
– Once the tooth shape has been completed, allow the ceramic material to dry for a short period of time.
– Place veneers and anterior crowns on the honey-comb firing tray with the help of metal pins. Additionally support the veneers with a small amount IPS Object Fix.

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

Firing parameters for the 2nd Incisal/Transpa firing (note the temperature control)

IPS Empress CAD with IPS Empress Esthetic Veneer	B	S	t↗	T	H	V_1	V_2
2nd Incisal/Transpa firing	403°C 757°F	4' 4'	60°C 108°F	830°C 1526°F	2' 2'	450°C 842°F	829°C 1525°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2= Vacuum-off temperature °C / °F

Finishing and preparing for stain and glaze firing

Before the stain and glaze firing, the restoration has to be finished as follows:

– Finish the restoration using diamonds and give it a true-to-nature shape and surface structure, such as growth lines and convex/concave areas.
– The areas that are not covered with layering ceramic have to be smoothed out and prepolished using silicone disks in order to obtain an even gloss on the surface after glaze firing.

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

Stain and glaze firing with IPS Empress Universal

The stain and glaze firing is carried out using IPS Empress Universal Shade, Stains, and Glaze material. Depending on the situation, they can be conducted together or one after the other (see pages 27–29 for further details). Before the stain and glaze firing, the restoration must be free of dirt and grease. Any contamination after cleaning must be prevented.
The following working procedure should be observed:

- Before staining and glazing, clean the restoration with ultrasound in a water bath or using the steam jet.
- To check the shade, wet the inner aspects of the restoration with IPS Empress Universal Glaze and Stain Liquid, position the restoration on the control die, and check shade and effects.
- Extrude IPS Empress Universal Glazing Paste from the syringe and mix thoroughly.
- Thin the material to the desired consistency using IPS Empress Universal Glaze and Stain Liquid. Do not excessively dilute the material, since this may render the glazing procedure difficult to control.
- Apply the glazing material a little thicker on areas that are not covered with layering ceramic. In this way, an even gloss can be achieved.
- The glazing material must not come into contact with the inner aspects of the restoration.
- Avoid pooling and excessively thick glazing material layers.
- Excessively thin glazing material layers result in an unsatisfactory gloss.
- To intensify the dentin shade in the cervical and central crown third, mix the corresponding Shade material and apply it directly into the unfired glazing material layer.
- Place veneers and anterior crowns on the honey-comb firing tray with the help of metal pins. Additionally support the veneers with a small amount IPS Object Fix.

Optional

- If the restoration has been optimally prepolished (silky-mat gloss) in the cervical area (not covered with layering ceramic), the glazing material can be applied in these areas only. The layering ceramic features a true-to-nature gloss without the glazing materials.
- If a more intensive shade is required in the cervical area, we recommend conducting a separate stain firing.

Clean restoration with ultrasound in a water bath or using the steam jet.

Evenly apply the glazing material to the entire outer surfaces of the restoration.

Apply the mixed Shades directly into the unfired glazing material layer.

Completely layered IPS Empress CAD crown and veneer fabricated in the cut-back technique.

Firing parameters for the Stain and Glaze firing (note the temperature control)

IPS Empress CAD with IPS Empress Universal	B	S	t↗	T	H	V_1	V_2
Stain and Glaze firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1–2' 1–2'	450°C 842°F	789°C 1453°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

Optional

Subsequent adjustment

After completion, additional adjustment (e.g. contact points) may become necessary. For that purpose, IPS Empress Add-On 770 °C/1418 °F is available.

Procedure:

– Before the adjustment, the restoration must be free from dirt and grease. For that purpose, thoroughly clean the restoration using the steam jet.
– Mix IPS Empress Add-On 770 °C / 1418 °F 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.
– Position the adjusted restoration on the firing tray and fire in the ceramic furnace.
– After firing, manually polish the supplemented areas to a high gloss.

Firing parameters for the corrective firing

IPS Empress CAD with IPS Empress Add-On 770°C/1418°F	B	S	t↗	T	H	V_1	V_2
Corrective firing	403°C 757°F	4' 4'	60°C 108°F	770°C 1418°F	2' 2'	450°C 842°F	769°C 1417°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.
T = Firing temperature °C / °F
H = Holding time / min.
V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

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

IPS Empress CAD – General Information

Preparing for cementation

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

– Leucite-reinforced glass-ceramic materials are generally etched with IPS Ceramic Etching Gel and subsequently silanated using Monobond-S.

	IPS Empress CAD
Indication	**Veneers, inlays, onlays, partial crowns, anterior and posterior crowns**
Cementation method	Adhesive cementation
Etching of the restoration	60 seconds, using IPS Ceramic Etching Gel
Conditioning / Silanating of the restoration	Monobond-S
Cementation system	Variolink II or Variolink Veneer Multilink Automix

Conventional cementation and blasting of finished IPS Empress CAD restoration is contraindicated!

Firing parameters

Firing of leucite-reinforced glass-ceramic restorations

– Always use the honey-comb firing tray to fire the restorations.
- Support inlays, onlays, and partial crowns with a firing pillow and place them on the honey-comb firing tray.
- Place veneers as well as anterior and posterior crowns on metal pins and position them on the honey-comb firing tray.
- As an alternative to the firing pillow and to better secure the restoration on the metal pins (particularly with veneers), a small amount of IPS Object Fix may also be used.
- The firing temperatures must be observed at all times. Increasing the firing temperature will result in severe vitrification between the framework and the veneering ceramic, which may lead to crack formation later on.
- Depending on the working habits, the glaze and stain firing procedures may also be conducted with a temperature increase rate of 60 °C/108 °F per minute.
- If a vacuum pump is available, the stain and glaze firing procedures may also be carried out with a vacuum in place.
- Restorations supported with a firing pillow on the honey-comb tray are exposed to less heat due to their lower position in the firing chamber. In order to achieve a true-to-nature gloss nonetheless, it is recommended to extend the holding time from 1 minute to 2 minutes.
- The firing parameters specified in this Instructions for Use are coordinated with the Ivoclar Vivadent ceramic furnaces (tolerance range ±10 °C/18°F).
– If furnaces other than those from Ivoclar Vivadent are used, temperature adjustments may be necessary.

– These firing parameters represent standard values applicable to the ceramic furnaces from Ivoclar Vivadent. The temperatures indicated also apply to furnaces of older generations, e.g. P20, P90, P95, P80, P100, P200. If one of these furnaces is used, however, the temperatures may deviate by ± 10°C/18°F, depending on the age and type of the heating muffle..
– If a non-Ivoclar Vivadent furnace is used, temperature corrections may be necessary.
– Regional differences in the power supply or the operation of several electronic devices by means of the same circuit may render adjustments of the firing and press temperatures necessary.

IPS Empress CAD with IPS Empress Universal – stained

IPS Empress CAD with IPS Empress Universal ***2-in-1 Technique***	**B**	**S**	**t↗**	**T**	**H**	**V_1**	**V_2**
Stain and Glaze firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1–2' 1–2'	– –	– –
Corrective firing IPS Empress Add-On 770°C/1418°F	403°C 757°F	4' 4'	60°C 108°F	770°C 1418°F	2' 2'	450°C 842°F	769°C 1417°F

IPS Empress CAD with IPS Empress Universal	**B**	**S**	**t↗**	**T**	**H**	**V_1**	**V_2**
Stain and Characterization firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1' 1'	– –	– –
Glaze firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1–2' 1–2'	– –	– –
Corrective firing IPS Empress Add-On 770°C/1418°F	403°C 757°F	4' 4'	60°C 108°F	770°C 1418°F	2' 2'	450°C 842°F	769°C 1417°F

IPS Empress CAD with IPS Empress Esthetic Veneer – veneered

IPS Empress CAD with IPS Empress Esthetic Veneer ***Cut-back and veneered***	**B**	**S**	**t↗**	**T**	**H**	**V_1**	**V_2**
Wash firing	403°C 757°F	4' 4'	60°C 108°F	840°C 1544°F	2' 2'	450°C 842°F	839°C 1543°F
1st Incisal/Transpa firing	403°C 757°F	4' 4'	60°C 108°F	830°C 1526°F	2' 2'	450°C 842°F	829°C 1525°F
2nd Incisal/Transpa firing	403°C 757°F	4' 4'	60°C 108°F	830°C 1526°F	2' 2'	450°C 842°F	829°C 1525°F
Stain and Characterization firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1' 1'	450°C 842°F	789°C 1453°F
Glaze firing	403°C 757°F	6' 6'	100°C 180°F	790°C 1454°F	1–2' 1–2'	450°C 842°F	789°C 1453°F
Corrective firing IPS Empress Add-On 770°C/1418°F	403°C 757°F	4' 4'	60°C 108°F	770°C 1418°F	2' 2'	450°C 842°F	769°C 1417°F

B = Stand-by temperature °C / °F
S = Closing time/minutes
t↗ = Temperature increase rate °C/min. / °F/min.

T = Firing temperature °C / °F
H = Holding time / min.

V_1 = Vacuum-on temperature °C / °F
V_2 = Vacuum-off temperature °C / °F

Combination Tables

The listed combinations are standard combinations. The A–D and Chromascop shades that are not available as IPS Empress CAD Blocks may be achieved using the following procedure:

– Selection of the closest block shade

– Staining and intensifying of the dentin shade using IPS Empress Universal Shade and Shade Incisal.

A–D	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
IPS Empress CAD Blocks	A1	A2	A3	A3.5	A3.5	B1	B2	B3	B3	B1	C2	C2	C2	C2	D3	D3
IPS Natural Die Material	ND 2	ND 2	ND 3	ND 4	ND 8	ND 2	ND 2	ND 5	ND 5	ND 2	ND 7	ND 7	ND 7	ND 7	ND 2	ND 3
IPS Empress Esthetic Veneer *Wash Paste*	neutral															
IPS Empress Esthetic Veneer *Wash Paste Value*	low value, high value															
IPS Empress Esthetic Veneer *Wash Paste Mamelon*	MM l-s, MM y-o, MM r-o															
IPS Empress Esthetic Veneer *Wash Paste Modifier*	copper, orange, sky blue, basic yellow, basic red															
IPS Empress Esthetic Veneer *Incisal Opal*	HT	LT	MT	MT	MT	HT	LT	LT	LT	MT	MT	MT	MT	MT	MT	MT
IPS Empress Esthetic Veneer *Transpa*	T neutral, T blue															
IPS Empress Esthetic Veneer *Incisal*	I white, I grey, I orange, I edge, I yellow, I orange-pink															
IPS Empress Esthetic Veneer *Incisal Chroma Modifier*	110/A1, 210/A3															
IPS Empress Esthetic Veneer *Brightener*	Brightener															
IPS Empress Universal *Shade*	A1	A2/A3/A3.5			A4	B1	B2/B3/B4			C1/C2		C3/C4		D2/D3		D4
IPS Empress Universal *Shade Incisal*	I1	I1	I1	I2	I2	I1	I1	I1	I1	I2	I2	I2	I2	I2	I2	I2
IPS Empress Universal *Stains*	white, mahogany, khaki, orange, grey, vanilla, crackliner, olive, yellow, black, maroon, basic red, basic blue, basic yellow															
IPS Empress Add-On 770°C/1418°F	A-O															

Chromascop	110	120	130	140	210	220	230	240	310	320	330	340	410	420	430	440	510	520	530	540
IPS Empress CAD Blocks	100				200				300				200				300			
IPS Natural Die Material	ND 2	ND 2	ND 2	ND 2	ND 3	ND 3	ND 4	ND 4	ND 5	ND 5	ND 5	ND 5	ND 7	ND 7	ND 7	ND 7	ND 8	ND 8	ND 8	ND 8
IPS Empress Esthetic Veneer *Wash Paste*	neutral																			
IPS Empress Esthetic Veneer *Wash Paste Value*	low value, high value																			
IPS Empress Esthetic Veneer *Wash Paste Mamelon*	MM l-s, MM y-o, MM r-o																			
IPS Empress Esthetic Veneer *Wash Paste Modifier*	copper, orange, sky blue, basic yellow, basic red																			
IPS Empress Esthetic Veneer *Incisal Opal*	HT	LT	LT	LT	MT	MT	MT	MT	LT	MT	MT	MT	MT	MT	MT	MT	MT	MT	MT	MT
IPS Empress Esthetic Veneer *Transpa*	T neutral, T blue																			
IPS Empress Esthetic Veneer *Incisal*	I white, I grey, I orange, I edge, I yellow, I orange-pink																			
IPS Empress Esthetic Veneer *Incisal Chroma Modifier*	110/A1, 210/A3																			
IPS Empress Esthetic Veneer *Brightener*	Brightener																			
IPS Empress Universal *Shade*	110/120		130	140/210		220/230		240	310	320	330	340	410/420		430/440		510	520	530	540
IPS Empress Universal *Shade Incisal*	I1	I1	I1	I1	I1	I1	I1	I2	I1	I1	I2	I2	I2	I2	I2	I2	I2	I2	I2	I2
IPS Empress Universal *Stains*	white, mahogany, khaki, orange, grey, vanilla, crackliner, olive, yellow, black, maroon, basic red, basic blue, basic yellow																			
IPS Empress Add-On 770°C/1418°F	A-O																			

Bleach BL	BL1	BL2	BL3	BL4
IPS Empress CAD Blocks	**BL1**	**BL2**	**BL3**	**BL4**
IPS Natural Die Material	**ND 1**	**ND 1**	**ND 1**	**ND 1**
IPS Empress Esthetic Veneer *Wash Paste*	**neutral**			
IPS Empress Esthetic Veneer *Wash Paste Value*	**low value, high value**			
IPS Empress Esthetic Veneer *Wash Paste Mamelon*	**MM l-s, MM y-o, MM r-o**			
IPS Empress Esthetic Veneer *Wash Paste Modifier*	**copper, orange, sky blue, basic yellow, basic red**			
IPS Empress Esthetic Veneer *Incisal Opal*	**LT**	**LT**	**LT**	**LT**
IPS Empress Esthetic Veneer *Transpa*	**T neutral, T blue**			
IPS Empress Esthetic Veneer *Incisal*	**I white, I grey, I orange, I edge, I yellow, I orange-pink**			
IPS Empress Esthetic Veneer *Incisal Chroma Modifier*	**110/A1, 210/A3**			
IPS Empress Esthetic Veneer *Brightener*	**Brightener**			
IPS Empress Universal *Shade*				
IPS Empress Universal *Shade Incisal*	**I1**	**I1**	**I1**	**I1**
IPS Empress Universal *Stains*	**white, mahogany, khaki, orange, grey, vanilla, crackliner, olive, yellow, black, maroon, basic red, basic blue, basic yellow**			
IPS Empress Add-On 770°C/1418°F	**A-O**			

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