

IPS[®]
e-max[®]

Ceram

Instructions for Use



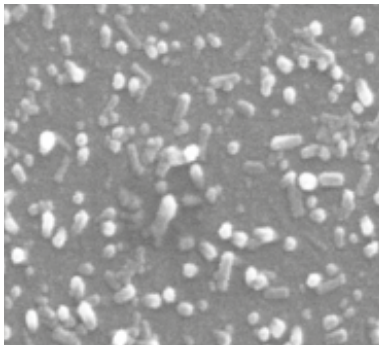
all ceramic
all you need

ivoclar[®]
vivadent[®]
technical

Table of Contents

Product Information

ALL ABOUT IPS e.max® Ceram



- 4 **IPS e.max® System**
- 6 **IPS e.max® Ceram**
 - Material
 - Indications
 - Contraindications
 - Important processing restrictions
 - Warnings
- 8 **Tips and Tricks**
 - IPS e.max Ceram Dentin and Incisal materials
 - IPS emax® Ceram Selection
 - IPS e.max® Ceram Impulse materials
 - IPS Ivocolor Essence powder
 - IPS Ivocolor Glaze Powder/FLUO and Paste/FLUO

Practical Procedure

THE CORNERSTONE OF NATURALNESS



- 18 **Block/ingot/disc selection using the IPS e.max® Shade Navigation App**
 - Gingiva shade determination

PROCESSING ON ZrO₂ FRAMEWORKS



- 22 **IPS e.max® Ceram on ZrO₂**
 - Framework design
 - Layering Diagram
 - Framework preparation
 - ZirLiner firing for unshaded ZrO₂ frameworks
 - 1st Margin firing (optional)
 - 2nd Margin firing (optional)
 - Wash firing (foundation) for pre-shaded and unshaded ZrO₂ frameworks
 - 1st Dentin/Incisal firing
 - 2nd Dentin/Incisal firing
 - Finishing and preparing for the Stain and Glaze firing
 - Stain and Glaze firing

Symbols in the Instructions for Use



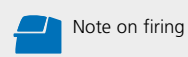
Important



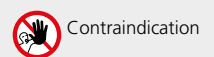
Information



Tips & Tricks



Note on firing



Contraindication

PROCESSING ON LS₂ FRAMEWORKS



- 37 IPS e.max® Ceram on LS₂
 - Framework design
 - Layering Diagram
 - Framework preparation
 - Wash firing (foundation)
 - 1st Dentin/Incisal firing
 - 2nd Dentin/Incisal firing
 - Finishing and preparing for the
 - Stain and Glaze firing
 - Stain and Glaze firing

FURTHER PROCESSING TECHNIQUES



- 47 Gingiva
- 50 Veneers
- 52 Add-On firing

IMPORTANT AND INTERESTING



- 54 Scientific data
- 55 Frequently Asked Questions
- 57 Cementation and Aftercare
- 58 Combination Tables
- 64 Firing Parameters

IPS e.max® System

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

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

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

The coordinated shade concept within the system and the individual products enable flexible working procedures from the shade determination up to the material selection.

The ideal restoration shade is optimally reproduced by means of the IPS e.max Shade Navigation App. It facilitates the material selection, leads to results that feature optimum shade match and thus provides efficiency and reliability.

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



IPS e.max® Ceram

The versatile layering ceramic is optimally coordinated with the materials of the IPS e.max System. Matching the shade when using different framework materials is clearly facilitated by the universal layering diagram and the precise shade coordination. After all, the veneering ceramic is the key to highly esthetic results within the IPS e.max System – both on lithium disilicate (LS₂) and zirconium oxide (ZrO₂) – particularly for the adaptation to the natural model.

The unique combination of translucency, brightness, and opalescence leads to natural light scattering and a balanced relationship between brightness and chroma.

The conventional Dentin and Incisal materials are available in A–D, Chromascop and Bleach shades. If enhanced brightness is desired, IPS e.max Ceram Power Dentin and Power Incisal materials are available in A–D and Bleach shades. With the Gingiva ceramic materials, true-to-nature gingival areas are designed, which are particularly important for implant-retained restorations.



With its universal stains and glaze assortment for the individualized staining and characterization of ceramic materials, **IPS Ivocolor** completes the system. The range of products has been coordinated with the layering, press and CAD ceramics from Ivoclar Vivadent* and offers versatile processing options, irrespective of their CTE value.



* with the exception of uncrystallized IPS e.max CAD and CAD-on restorations.

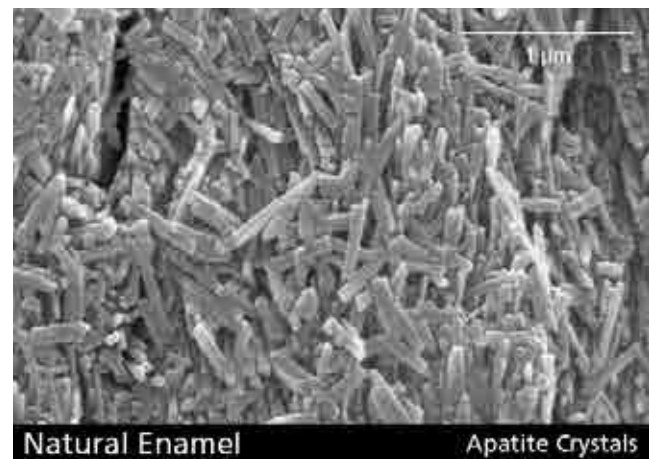
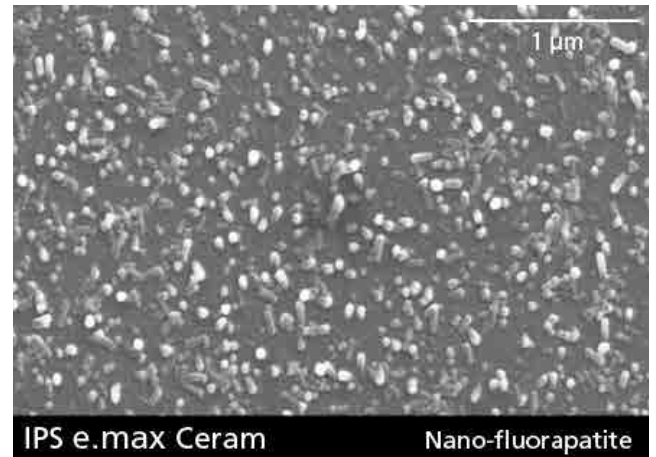
All about IPS e.max® Ceram

IPS e.max® Ceram

Material

IPS e.max® Ceram is a low-fusing nano-fluorapatite glass-ceramic that has been clinically proven for more than 10 years. It is used for the characterization and veneering of lithium disilicate glass-ceramic and zirconium oxide. The material is characterized by good modelling properties, high stability and excellent firing behaviour. The consistent layering concept, uniform processing and matching esthetics on different framework materials permit a harmonious shade match and increase the productivity.

This ceramic, which contains nano-fluorapatite crystals, demonstrates a crystal structure modelled after that of vital teeth. The optical properties are controlled by the nano-fluorapatite crystals in the size range of 100–300 nm and micro-fluorapatite crystals with a length of 1–2 µm. The individual IPS e.max Ceram materials contain different concentrations of the apatite crystals, which then enable a unique and adjustable combination of translucency, brightness and opalescence depending on the type of layering material. The uniform material composition and, consequently, homogeneous clinical properties, irrespective of the framework material used, underlines the comprehensive IPS e.max material concept.



Properties	Specification	Typical average value
CTE (25–400°C) [10 ⁻⁶ /K]	9.4 ± 0.5	–
Flexural strength (biaxial) [MPa]	≥ 50	90
Chem. solubility [µg/cm ²]	< 100	–
Type/Class	Type I / Class 1	–

according to ISO 6872:2015

Indications

- Characterization and veneering of:
 - IPS e.max Press
 - IPS e.max CAD (crystallized)
 - IPS e.max ZirCAD (sintered), except IPS e.max ZirCAD MT Multi
 - IPS e.max ZirPress
- Veneers on refractory dies
- Characterization and veneering of competitor ZrO₂ frameworks with a CTE range of 10.5–11.0 x 10⁻⁶/K (25–500 °C)
- Characterization with IPS Ivocolor Shade and Essence stains
- Glazing with IPS Ivocolor Glaze

Contraindications

- Bruxism
- Patients with severely reduced residual dentition
- Veneering of metal frameworks
- Any other use not listed in the indications

Important processing restrictions

If the following notes are not observed, successful work with IPS e.max Ceram cannot be ensured:

- Exceeding or falling short of the stipulated veneering layer thicknesses
- Failure to observe the layer thickness ratio between the framework and layering ceramics
- Mixing with and processing in conjunction with other dental ceramics
- Zirconium oxide frameworks with a CTE different from the one stipulated must not be veneered.
- Veneering of zirconium oxide frameworks which were not conditioned according to the stipulations for IPS e.max ZirCAD, e.g. blasted with Al₂O₃
- Veneering of IPS e.max ZirCAD MT Multi
- IPS e.max Ceram ZirLiner and Margin materials should not be used on IPS e.max Press and IPS e.max CAD.

Warnings

- If a patient is known to be allergic to any of the ingredients, IPS e.max Ceram must not be used.
- Do not inhale ceramic dust during finishing – use extraction equipment and wear a face mask.
- IPS Margin Sealer 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.
- Observe the Safety Data Sheet (SDS).

Tips and Tricks

IPS e.max Ceram Dentin and Incisal materials

Dentin/(Transpa) Incisal materials

At the beginning of the all-ceramic era, both lithium disilicate and zirconium oxide were only available with medium or high opacity. These opaquer framework structures reflect a lot of light, which increases the brightness of the fabricated restoration. The conventional IPS e.max Ceram Dentin and Incisal materials are exactly adjusted to this effect and are thus optimally suitable for use on opaque substructures. The balanced relation between brightness and chroma results in the exact match with the respective shade guide.

IPS e.max Ceram Dentin materials are available in all A–D, Chromascop and 4 Bleach BL shades. The (Transpa) Incisal materials are offered in 4 or 3 shades, depending on the shade system.



Power Dentin/Power Incisal materials

The development of more translucent all-ceramic framework materials over the past few years, greatly affects veneered restorations. Also, the general trend towards restorations with increased brightness value plays an important role.

The modern translucent substructures reflect less light, which reduces the brightness of the fabricated restoration. To counteract this effect, IPS e.max Ceram “Power Dentin” and “Power Incisal” materials were developed. Without changing the familiar layering diagram, this materials are used to achieve a lifelike brightness on translucent frameworks.

Additionally, restorations which clearly exhibit greater brightness can be achieved on more opaque frameworks with these specially shaded materials – for patient cases where this is required. IPS e.max Ceram Power Dentin (PD) materials are available in all A–D shades and 4 Bleach BL shades. The IPS e.max Ceram Power Incisal materials are available in 4 shades.



IPS e.max® Ceram Selection

IPS e.max® Ceram Selection offers Enamel and Effect materials that will inspire professionals with their brilliant shades and impressive light optical properties.

IPS e.max Ceram Selection comprises twelve materials that are especially designed to give professionals more room for creativity and individuality in the layering technique. The materials are used in combination with the existing IPS e.max Ceram materials and facilitate the creation of individualized characteristics - with the aim to achieve highly esthetic, natural-looking restorations.

The renowned dental technicians Oliver Brix (Germany), August Bruguera (Spain) and Gérald Ubassy (France) have substantially shaped the concept on which IPS e.max Ceram Selection is based. The specially shaded materials and their application are the result of many years of successful work with IPS e.max Ceram.



The twelve shades are divided into three groups:

Special Enamel
shaded Enamel materials



Light Reflector
light-reflecting Effect materials



Light Absorber
light-absorbing Effect materials



More detailed information can be found in the IPS e.max Ceram Selection brochure.



IPS e.max® Ceram Impulse materials

Increasing the brightness value:



By applying **Opal Effect 4** or **Deep Dentin** directly on the wash layer or ZirLiner, the in-depth brightness value in the dentin area can be enhanced. The corresponding areas are subsequently covered with Dentin materials.

IPS e.max Ceram Opal Effect



To increase the brightness value in the incisal third, e.g. if space is limited, **Inter Incisal white-blue** can be used.

IPS e.max Ceram Inter Incisal material:



Increasing the incisal in-depth effect:



To increase the in-depth effect in the incisal third – e.g. if space is limited – **Special Incisal**, e.g. **SI grey**, can be used.

IPS e.max Ceram Special Incisal materials:



Designing a true-to-nature incisal third:



Use Mamelon materials to create a lifelike shade effect in the incisal third. They are applied on the completed incisal area, e.g. **MM light**, **MM salmon**.

IPS e.max Ceram Mamelon materials:



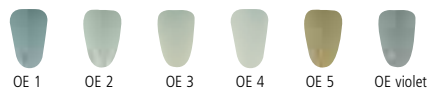
To complete and enhance the vitality in the incisal area, the shaded Transpa materials can be used, e.g. **T brown-grey**.

IPS e.max Ceram Transpa materials:



With the Opal Effect materials, a lifelike opalescent effect in the incisal third can be achieved. **OE 2** can be applied on the individualized cut-back.

IPS e.max Ceram Opal Effect materials:





Opal Effect 1 is layered in the mesial and distal areas.
Opal Effect 5 is excellently suitable to imitate secondary dentin.

IPS e.max Ceram Opal Effect materials:



Increasing the cervical in-depth effect:



The Cervical Transpa materials with their slightly higher fluorescence are used to complete the layering of the cervical third, e.g. **CT orange-pink**.

IPS e.max Ceram Cervical Transpa materials:



Halo effect

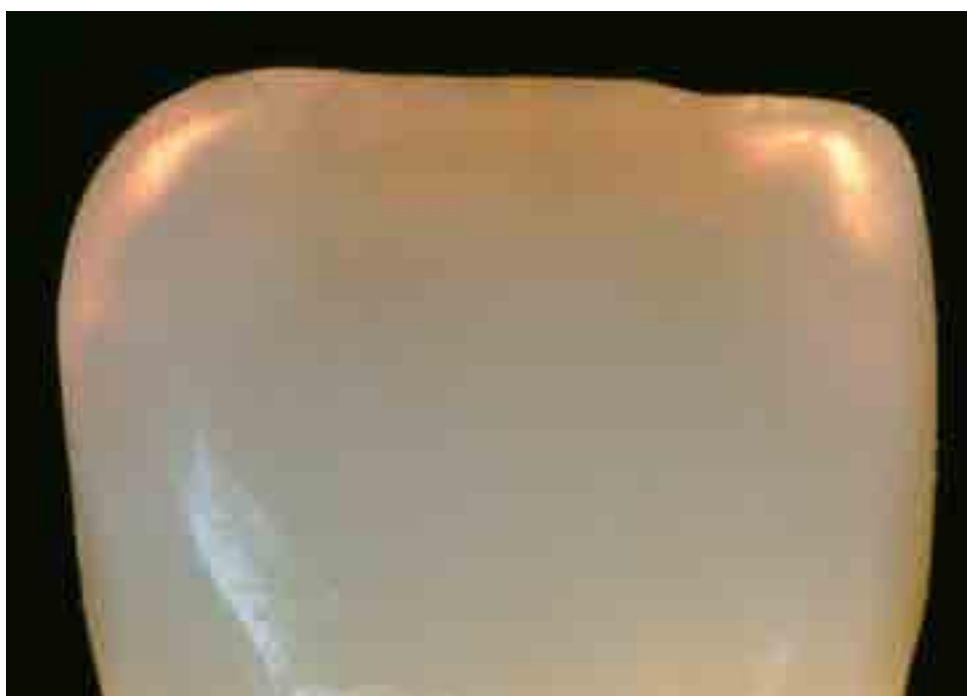


To achieve what is known as the halo effect, **Incisal Edge** is used and applied to prolong the incisal edge.

IPS e.max Ceram Incisal Edge material:



Result of an individual IPS e.max Ceram Impulse layering procedure



IPS Ivocolor Essence powder

IPS Ivocolor Essence stains powders are available in 23 different shades and can be used to mix with or flush in layering materials as well as for surface staining. For more detailed information on the processing of the Essence powders, refer to the IPS Ivocolor Instructions for Use.



IPS Ivocolor Essence – mixing in

For this application, mix only small amounts (max. 5%) with the respective layering materials.

Increasing the chroma or the shade saturation of layering materials, such as Deep Dentin and Dentin



Enhancing the shade effect of Incisal materials, e.g. adjusting of warm and chromatic Incisal materials



Shading of Transpa neutral to create individual Transpa materials



IPS Ivocolor Essence – washing in

To achieve true-to-nature, in-depth shade effects in the restoration, the inclusion of IPS Ivocolor Essence stains is another option.

Internal characterizations should only be flushed in or applied on thoroughly moist areas.

To design **mamelons**, e.g. E 02 cream or E09 terracotta are used.



Flush in E14 profundo to enhance the **in-depth effect**.



To increase the **brightness value** and to **imitate incisal discolouration**, E 01 white and e.g. E 04 sunset can be flushed in.



To design **enamel cracks**, E 02 cream or any mixture can be applied.



IPS Ivocolor Essence – staining

IPS Ivocolor Essence stains are particularly suitable for the individualized characterization of the restoration. Enamel cracks, white spots, discoloured cervical areas and fissures can be recreated in a lifelike fashion.

Superficial deposits, such as those caused by coffee or tea, can be imitated using, e.g. E 11 cappuccino or E 12 espresso.



Staining



Completed crown

Fissures and occlusal surfaces can be reproduced in a lifelike fashion using, e.g. E 05 copper, E 10 mahogany or E 13 terra.



Staining



Completed crown

Enamel stains can be imitated with e.g. E 01 white and/or E 02 cream.



Staining



Completed crown

IPS Ivocolor Glaze Powder/FLUO and Paste/FLUO

IPS Ivocolor Glaze powder and paste are available as a fluorescent and non-fluorescent materials version. For more detailed information, refer to the IPS Ivocolor Instructions for Use.

Mixing of IPS Ivocolor Glaze Powder/FLUO



Mix Glaze Powder mit IPS Ivocolor Mixing Liquid allround or longlife to a homogeneous paste.



Make sure that the consistency of the glazing material is not too liquid.

Mixing of IPS Ivocolor Glaze Paste/FLUO



Mix the Glaze Paste with a suitable instrument before removing it from the jar. Then remove a little Glaze Paste and mix with IPS Ivocolor Mixing Liquid allround or longlife.



Make sure that the consistency of the glazing material is not too liquid.

Application of the glaze



Apply the glazing material in an even layer on the entire restoration. The correctly mixed glazing material remains on the restoration and does not run.



If the glazing material is too thin, it runs uncontrollably and compromises the glazing result.

Result



If the glazing material is applied correctly, the restoration demonstrates an even gloss after firing and features the designed surface texture.



The degree of gloss of the glazed surface is controlled via the consistency of the glazing material and the applied quantity, not by means of the firing temperature. For a higher degree of gloss, use less liquid for mixing the glazing material and/or increase the quantity of glazing material.

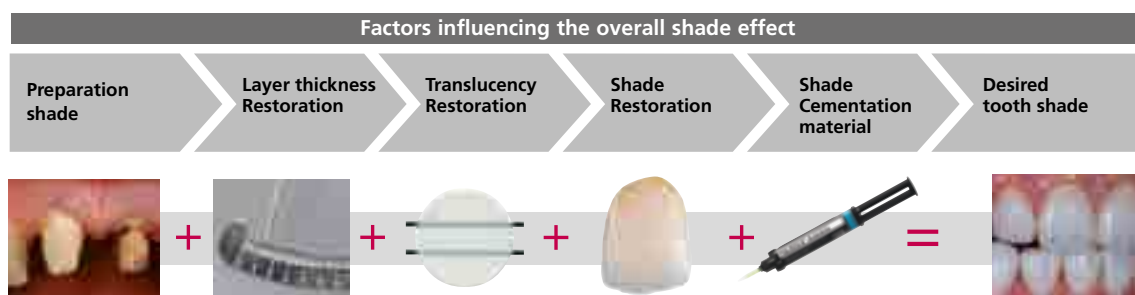
The Cornerstone of Naturalness

Block/ingot/disc selection using the IPS e.max® Shade Navigation App

Optimum shade and shape integration in the oral cavity of the patient is the prerequisite for a true-to-nature all-ceramic restoration. Shade differences between the restoration and the natural residual dentition in particular, disturb the esthetic appearance. To achieve optimum shade integration, the following guidelines and notes must be observed.

The overall esthetic appearance of an all-ceramic restoration is influenced by the following factors:

- **Shade of the prepared tooth** (natural tooth structure, die build-up, abutment, implant)
- **Shade, translucency and layer thickness of the restoration** (A1, A2, A3..., HT, MT, LT..., veneer, characterization)
- **Shade of the cementation material.**



Upon the fabrication of high-quality esthetic restorations, these influencing factors must be taken into consideration. After all, only their interplay results in the overall shade effect. As the shade of the preparation and the layer thickness are usually difficult of control, and the shade of the cementation material only minimally affects the overall shade effect, the selection of the suitable translucency and shade of the IPS e.max block/ingot/disc is of critical important.

The **IPS e.max Shade Navigation App** is used to determine the suitable blocks/ingots/dics.



The IPS e.max Shade Navigation App is the intelligent block/ingot/disc selection app for Android or iOS smartphones and tablets. The app takes all the important influential factors into account and thus enables a very precise translucency and shade recommendation.



5 steps to find the suitable IPS e.max block/ingot/disc:

1

Enter the tooth shade

(Determined/desired tooth shade according to the A-D Shade Guide)



Tips on shade determination:

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. In order to achieve as lifelike results as possible, shade determination should be carried out at daylight. Furthermore, the patient should not wear clothes with intensive colours and/or lipstick. For a flawless reproduction of the determined tooth shade, taking an additional digital photograph of the starting situation is recommended.



Another option for shade determination is provided by the Programat® furnaces equipped with DSA function (Digital Shade Assistant). The integrated image processing software 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 corresponding Programat Operating Instructions.



2

Enter the indication

(Veneer, inlay, etc.)



Tips on selecting the indication:

Not all possible indications are listed in the app. However, the following alternative indications can be used to define a suitable block, ingot or disc:

Non-listed indications	Alternative indications
Bridge	Crown
Partial crown	Onlay
Occlusal veneer (table top)	Onlay

There are no alternative indications available for hybrid abutment and hybrid abutment crown. The material to be selected can be found in the corresponding Instructions for Use.

3

Enter the die shade

(Shade of the preparation defined with the IPS Natural Die Material shade guide)



Tips on determining the die shade:

The die shade is determined with the IPS Natural Die Material shade guide at the largest, most discoloured area of the tooth stump. If you are torn between two shades, always choose the darker one.



The IPS Natural Die Material 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.



Example of the die shade effect



Restoration: Veneer (0.5 mm, IPS e.max® CAD HT B1)
 Cementation material: Variolink® Esthetic neutral
 Preparation shade: IPS® Natural Die Material, ND 1 – ND 9

4

Enter the layer thickness

(Preparation depth and/or wall thickness of the restoration to be fabricated)



Tips on determining the layer thickness:

Determine the layer thickness either manually with calipers or digitally with of the CAD software. Crowns, veneers and copings are measured in the centre of the thinnest vestibular point. Inlays and onlays at the thinnest occlusal point.



Manual determination of the layer thickness, in the centre of the thinnest, vestibular area



Digital determination of the layer thickness, in the centre of the thinnest, vestibular area

Example - Influence of layer thickness and translucency:



Restoration: left: Veneer (0.5 mm, IPS e.max® CAD HT B1);
right: Crown (1.5 mm, IPS e.max® CAD LT B1)
Cementation material: Variolink® Esthetic neutral
Preparation shade: IPS® Natural Die Material, ND 6

5

Enter the material

(IPS e.max CAD, IPS e.max Press, IPS e.max ZirCAD)



Tips on material selection:

If a field is highlighted in grey in the material selection, the material is not suitable for the respective indication or layer thickness.

=

Result for the suitable block



Tips on the result:

The visual presentation of the result, permits the comparison of the restoration shade with the A-D shade guide to recognized any necessary shade adjustments well in advance.



More detailed information on the function and the procedure can be found under www.ipsemax.com/sna or directly in the app.

Gingiva shade determination

For a lifelike reconstruction of the gingiva, the anatomy, surface texture, shade and individual characteristics must be taken into consideration.

The gingiva shade is determined using the Gingiva Solution shade guide prior to the local anaesthesia or the preparation. Given the comprehensive selection of basic and intensive shades, the Gingiva Solution shade concept enables true-to-nature gingiva esthetics.



IPS e.max Ceram material shade guide

The IPS e.max Ceram material shade guide is used for the illustration of the various layering materials and is an important auxiliary for dental technicians. For reasons of light refraction, the dentin shade tabs have been given an anatomical shape and surface structure. The other shade tabs are slightly wedge-shaped to take account of the translucency of the individual materials.

Processing on ZrO₂ Frameworks

IPS e.max® Ceram on ZrO₂

Framework design

The framework design is key to the success of durable all-ceramic restorations. The more attention given to the framework design, the better the final results and the clinical success will turn out to be.

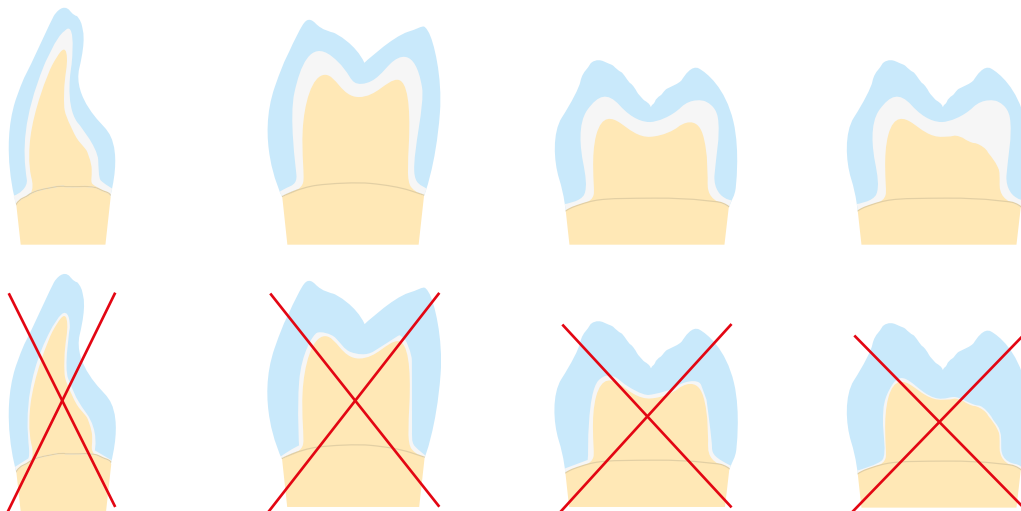


The framework design for the layering technique must always support the shape of the restoration and the cusps in order to obtain an even layer thickness of the veneer with IPS e.max Ceram. Failure to observe the stipulated design criteria and minimum thicknesses for ZrO₂ frameworks may result in clinical failure, such as cracks, delamination and ultimately to fracture of the restoration.

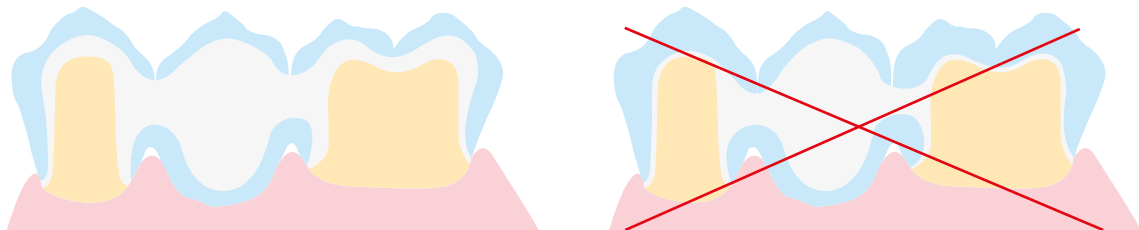


Please refer to the Instructions for Use of the respective framework material for further information regarding the framework design and further processing techniques (e.g. cut-back technique).

Anterior and posterior crowns

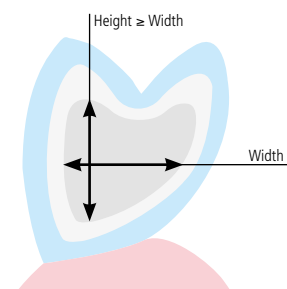


Bridges



Always observe the relation between width and height as well as the suitable dimensions when designing the connectors.

In general, the following applies: Height \geq Width



Layering diagram

The layering diagram of IPS e.max Ceram has been designed in such a way that easy and reliable shade reproduction is possible, irrespective of the framework material or framework shade. A proportional framework design that supports both shape and cusps represents the ideal basis. The allocated layering materials are recommended in accordance with the translucency of the framework. **Important:** When veneering ZrO₂ materials from other manufacturers, the use of ZirLiner is recommended for both preshaded and unshaded frameworks.

Layering diagram for zirconium oxide (ZrO₂)

(e.g. IPS e.max ZirCAD)

	Preshaded framework	Unshaded framework
ZrO ₂ framework		
ZirLiner		Recommendation 
Wash firing		
Dentin	For more brightness 	For more brightness 
Incisal	For more brightness 	For more brightness 

Framework preparation



Fit the sintered zirconium oxide framework (e.g. IPS e.max ZirCAD MO 0) on the model, verify the margins and slightly finish, if required. Make sure that the minimum framework thicknesses are maintained even after minor adjustments.




Further processing to accommodate a ceramic margin (optional)

To place a ceramic margin, the marginal area of the framework (labial or circular) is reduced down to the inner edge of the chamfer or margin preparation.



After finishing, clean the framework with running water or the steam jet, and dry.

 The framework **must not** be blasted with Al_2O_3 , since this would damage the surface.



Avoid any contamination after cleaning, use tweezers and clips. The framework is now free of dirt and grease and ready for the application of ZirLiner.



- The stipulations of the manufacturer of the zirconium oxide regarding framework fabrication and preparation for veneering must be observed.
- Do not 'post-separate' the bridge framework with separating discs after sintering. This may result in undesired predetermined breaking points, which will subsequently compromise the stability of the all-ceramic restoration.

ZirLiner firing for unshaded ZrO₂ frameworks

Mix the IPS e.max Ceram ZirLiner in the desired shade with the respective IPS e.max Ceram ZirLiner Build-Up Liquid (allround) to a creamy consistency.

For unshaded ZrO₂ frameworks, use the IPS e.max Ceram ZirLiners 1–4. If the ZrO₂ frameworks are preshaded, ZirLiner firing is not required.



Apply ZirLiner (e.g. ZL 1) on the entire framework, paying special attention to the margins. If required, the restoration may be vibrated until an even, greenish colour effect is achieved. If the colour appears too pale, the layer is too thin.



Fire the entirely coated ZrO₂ framework with the **ZirLiner firing** on a honey-comb firing tray belong to the furnace (see firing parameters on page 65).



After firing, the IPS e.max Ceram ZirLiner demonstrates a silky-mat surface. The layering thickness is approximately 0.1 mm



For more intensively shaded areas, 4 IPS e.max Ceram Intensive ZirLiners (yellow, orange, brown and incisal) are available.



To achieve a natural shade effect with unshaded zirconium oxide frameworks, the use of IPS e.max Ceram ZirLiner is recommended.

1st Margin firing (optional)



Before the ceramic margin is designed, cover the model die with IPS Margin Sealer and allow it to dry. After that, isolate the margin areas using IPS Ceramic Separating Liquid.



Subsequently, mix IPS e.max Ceram Margin in the desired shade with the corresponding Margin Build-Up Liquid and apply in drop-shaped increments. Then allow to dry.



Then, carefully remove the framework with the dried margin material from the die.



Conduct the **1st Margin firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 65).



For more intensively shaded areas, 4 Intensive Margin materials (yellow, yellow-green, orange, and orange-pink) are available.



IPS e.max Ceram Margin materials are only suitable for the application on IPS e.max ZirCAD and other zirconium oxide frameworks and must not be used in conjunction with glass-ceramic materials.

2nd Margin firing (optional)


After the 1st firing, the margin may require fitting and minor grinding adjustments. Isolate the die again with IPS Ceramic Separating Liquid.

Complete the areas affected by shrinkage and any missing areas using the same Margin material that was used for the 1st firing.



Depending on the size of the gap, the margin material may be carefully applied into the space.



 Carefully remove the framework with the completed and dried margin material from the die, place it on a firing tray, and fire with the **2nd Margin firing** (see firing parameters on page 65).



After the 2nd firing, the margin may have to be slightly adjusted by grinding until good accuracy of fit is achieved.



If the ZirLiner is to be individually characterized after the 2nd Margin firing, this is possible with IPS Ivocolor Essence. Given the lower firing temperature of Essence, characterization prior to the Margin firing is not possible.



If the fit of the margin is to be optimized during the subsequent Dentin and Incisal firing cycles, mix the corresponding Margin material with the Add-On Margin material in a 1:1 ratio and fire using the firing parameters for the 1st Dentin / Incisal firing (Add-On see page 52).

Wash firing (foundation) for preshaded and unshaded ZrO₂ frameworks

The restoration must be free from dirt and grease before the wash firing is done. Prevent any contamination after cleaning. Conduct the Wash firing with IPS e.max Ceram or IPS Ivocolor and IPS e.max Ceram materials.



The low heat conductivity of zirconium oxide always requires a Wash firing, even if a ZirLiner firing was conducted beforehand. The Wash firing ensures controlled sintering of the ceramic onto the framework surface and thus enables a homogeneous bond. Moreover, shade and fluorescence adjustments can be carried out with the Wash firing (e.g. sprinkle technique), for example, by using IPS Ivocolor Shade, Essence or Glaze (FLUO).

Variant A: Wash firing with IPS e.max Ceram



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



Conduct the **Wash firing (foundation)** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 65).

Variant B: Wash firing with IPS Ivocolor and IPS e.max Ceram (sprinkle technique)



If space is limited or to enhance the in-depth shade and fluorescent effect, the sprinkle technique can be applied. For that purpose, IPS Ivocolor Shade, Essence and Glaze (FLUO) are mixed with the respective IPS Ivocolor Liquids to the desired consistency and applied in a covering layer on the entire framework. As an option, only IPS Ivocolor Mixing Liquid can be used. After that, sprinkle the corresponding IPS e.max Ceram material (e.g. Dentin) is on the restoration using a dry brush. Carefully remove excess with blown air or tap it off.



Conduct the **Wash firing (foundation)** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 65).



Make sure that no ceramic powder reaches the inner aspects of the crown, as this may lead to inaccuracies of fit.



The Wash firing may also be conducted without subsequent sprinkling with IPS e.max Ceram ceramic powder, e.g. in the cut-back technique. For that purpose, simply mix IPS Ivocolor Shade, Essence and Glaze with the respective IPS Ivocolor Liquids to the desired consistency and apply the material on the entire framework in a thin, covering layer.

1st Dentin/Incisal firing

Isolate the model before layering the Dentin/Incisal materials. This prevents the ceramic materials from drying out or sticking to the model respectively. The stone die and the adjacent model areas are sealed with IPS Model Sealer. Additionally, isolate the model in the area of the pontics with IPS Ceramic Separating Liquid.



Mix the required IPS e.max Ceram layering materials with the IPS Build-Up Liquids allround or soft.

Underlay the pontic area with Power Dentin and make sure that a good rest is reached.



After that, layer the materials according to the layering diagram using the respective IPS e.max layering materials.

For individual characterization, use e.g. Occlusal Dentin in the palatal area.



Layer the dentin core with Dentin layering material either directly with an indicated mamelon shape or build-up the material to full contour and subsequently reduce it (cut-back technique). For better verification of the size and position of the tooth, the cut-back technique is recommended.



If a different consistency of the ceramic is desired, the liquids may also be mixed with each other at any mixing ratio.



Use distilled water to rewet the layering materials on the mixing pad to avoid accumulation of organic components.



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



... and completely cover them with Incisal materials.



Remove the completely layered restoration from the model, supplement the contact points and separate all interdental areas down to the framework.



Also, it is recommended to compact and smooth the ceramic surface in the direction of the cervical margin with a large, dry brush before firing.



- Use distilled water to rewet the layering materials on the mixing pad to avoid accumulation of organic components.
- Do not absorb too much moisture and prevent the restoration from drying out.

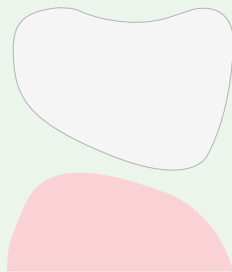


Conduct the **1st Dentin/Incisal firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 65).

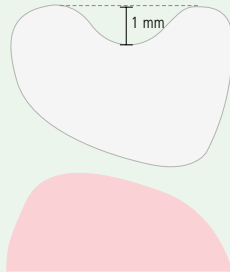


The low heat conductivity of zirconium oxide may jeopardize an optimum firing result for the veneering ceramic, particularly in deep occlusal surfaces or bulky posterior bridge pontics. There are two procedures to achieve the desired firing result, nonetheless:

- Conduct an intermediate or support firing with Deep Dentin or Dentin over the entire surface, to distribute the shrinkage on several firing cycles. What is more, this facilitates the positioning of the Impulse materials during the second firing.
- Occlusal separation of the central fissure with a scalpel beyond the marginal ridge before the first firing. In this way, the ceramic may be sintered to the framework surface in a controlled fashion. For the subsequent 2nd Dentin/Incisal firing, additive compensation of the central fissure and the occlusal surface takes place.



Standard occlusal surface



Deep occlusal surface



Massive bridge pontic

2nd Dentin/Incisal firing



Finish and thoroughly clean the restoration. Cleaning is carried out with ultrasound in a water bath or the steam jet. Blasting the surface with Al₂O₃ Type 100 at 1 bar (15 psi) pressure is only necessary if superficial contamination is evident after cleaning.



Separate adjacent model components (e.g. adjacent teeth, pontic rests) once again with IPS Ceramic Separating Liquid. Thoroughly dry the restoration and complete the missing areas using Dentin and Incisal materials.



Interdental areas and contact points should be given special attention. If necessary, slightly separate the interdental spaces.



Conduct the **2st Dentin/Incisal firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 65).

If additional Dentin/Incisal firings cycles are necessary, use the firing parameters for the **2nd Dentin/Incisal firing**.



Use distilled water to rewet the layering materials on the mixing pad to avoid accumulation of organic components.

Finishing and preparing for the Stain and Glaze firing

Subsequently, finish the restoration.
Use suitable grinding instruments to give the restoration a true-to-nature shape and surface texture, such as growth lines and convex/concave areas.



Areas which should exhibit a higher gloss after Glaze firing (e.g. pontic rests) can be smoothed out and prepolished using silicone polishers.



Finished restorations ...



... ready for the Stain and Glaze firing



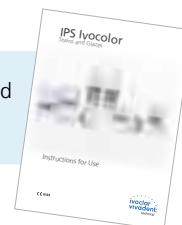
If gold and/or silver dust was used to visualize the surface texture, the restoration has to be thoroughly cleaned with steam. Make sure to remove all gold or silver dust in order to avoid any discolouration after firing.

Stain and Glaze firing

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



Detailed information on the processing of IPS Ivocolor Shade, Essence and Glaze can be found in the IPS Ivocolor Instructions for Use, pages 13–17.



Thoroughly clean the restoration with the steam jet and dry with oil-free air.

Mix IPS Ivocolor Shades and Essences with the corresponding IPS Ivocolor Liquids to the desired consistency.



For better wettability of the stains and glazing materials, the surface can be wetted with a little IPS Ivocolor Mixing Liquid.

Apply Glaze material in an even layer on the entire restoration. The basal area near the pontic should be given particular attention.



Individualize the marginal ridges and the palatal fossa using IPS Ivocolor Essence.

If minor shade modifications are necessary, they can be applied with IPS Ivocolor Shades on the glazing material already in place.



Conduct the **Stain and Glaze firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 65).



IPS e.max Ceram Add-On materials can be used for further adjustments (see page 52).



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

Completed IPS e.max Ceram restoration...



... with a homogeneous, lifelike surface ...



...the basal surface with a high gloss for optimum cleaning.



Processing on LS₂ Frameworks

IPS e.max® Ceram on LS₂

Framework design

The framework design is key to the success of durable all-ceramic restorations. The more attention given to the framework design, the better the final results and the clinical success will turn out to be.

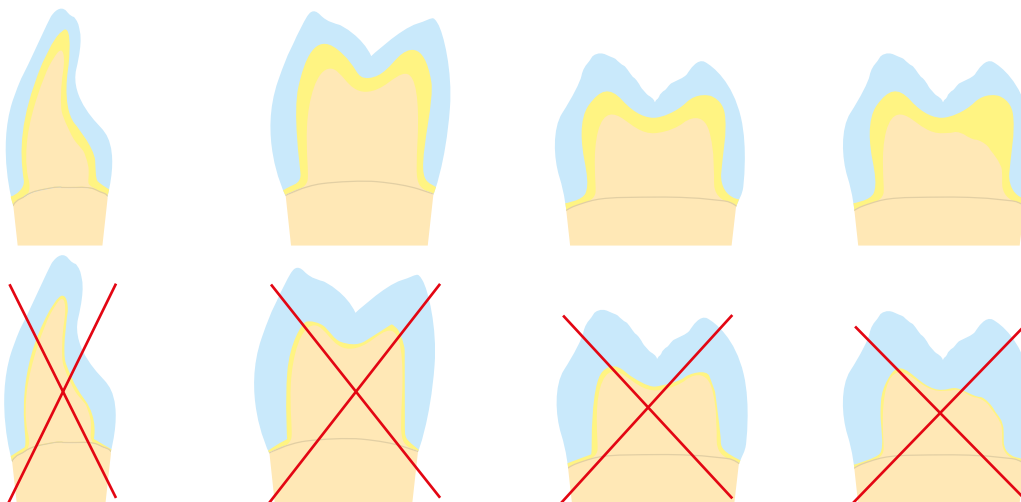


The framework design for the layering technique must always support the shape of the restoration and the cusps in order to obtain an even layer thickness of the veneer with IPS e.max Ceram. Failure to observe the stipulated design criteria and minimum thicknesses for LS₂ frameworks may result in clinical failure, such as cracks, delamination, and ultimately to fracture of the restoration.

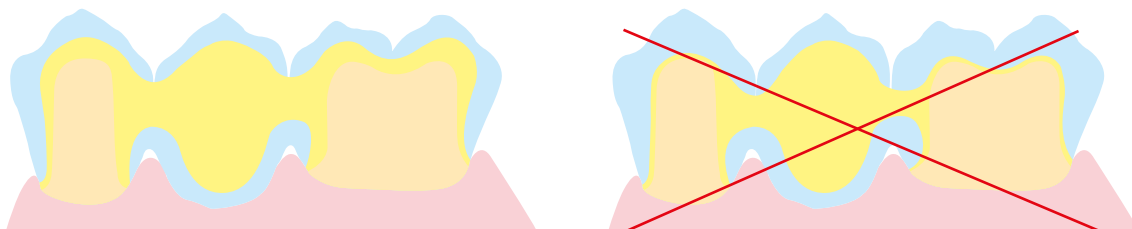


Please refer to the Instructions for Use of the respective framework material for further information regarding the framework design and further processing techniques (e.g. cut-back technique).

Anterior and posterior crowns (IPS e.max CAD, IPS e.max Press)

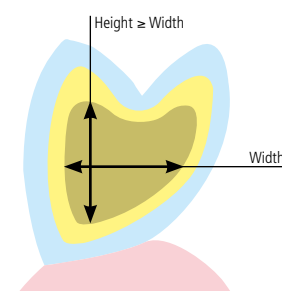


Bridges (IPS e.max Press)



Always observe the relation between width and height as well as the suitable dimensions when designing the connectors.

In general, the following applies: Height \geq Width



Layering diagram

The layering diagram of IPS e.max Ceram has been designed in such a way that easy and reliable shade reproduction is possible, irrespective of the framework material or framework shade. A proportional framework design that supports both shape and cusps represents the ideal basis.

Layering diagram for lithium disilicate (LS₂)

(e.g. IPS e.max Press, IPS e.max CAD)



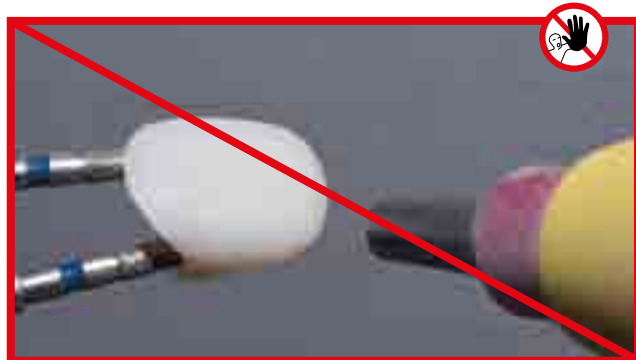
Framework preparation

Suitable grinding instruments are imperative to prepare for high-strength glass-ceramics (e.g. IPS e.max Press/CAD). Please observe the Ivoclar Vivadent Flow Chart "Recommended grinding instruments for IPS e.max glass-ceramics". If unsuitable grinding instruments are used, chipping of the edges and local overheating may occur.



In general, grinding adjustments should be kept to a minimum. Overheating of the ceramic must be avoided. Low speed and light pressure must be observed.

Fit the restoration on the dies and carefully finish the marginal areas. Make sure that the minimum thicknesses are maintained even after the minor adjustments.



Surface preparation of IPS e.max CAD



The **IPS e.max CAD restoration** must **not** be blasted with Al₂O₃ or glass polishing beads.



Surface preparation of IPS e.max Press



Before veneering, clean the **IPS e.max Press restoration** with Al₂O₃ (Type 100) at 1–2 bar pressure (15–30 psi). Some blasting devices may require different pressure settings to accomplish this procedure.



Thoroughly clean the surface with a steam jet prior to the Wash firing and subsequently dry with oil-free air.



Do not 'post-separate' the bridge connectors with separating discs. This may result in undesired pre-determined breaking points, which will subsequently compromise the stability of the all-ceramic restoration.

Wash firing (foundation)

The restoration must be free from dirt and grease before the wash firing is done. Any contamination after cleaning must be prevented. Conduct the Wash firing with IPS e.max Ceram or IPS Ivocolor materials.

Variant A: Wash firing with IPS e.max Ceram

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



Conduct the **Wash firing (foundation)** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64).



Variant B: Wash firing with IPS Ivocolor

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



Conduct the **Wash firing (foundation)** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64).



Variant C: Wash firing with IPS Ivocolor and IPS e.max Ceram (sprinkle technique)



If space is limited or to enhance the in-depth chroma, the sprinkle technique can be applied. Apply IPS Ivocolor Shade, Essence and Glaze as described in Variant B. After that, sprinkle the corresponding IPS e.max Ceram material (e.g. Dentin) is on the restoration using a dry brush. Carefully remove excess with blown air or tap it off.



Conduct the **Wash firing (foundation)** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64).



- Layering materials must not be applied on unfired wash layers (powders and pastes), since this will result in a delamination of the layering ceramic. The wash (foundation) must be fired before the actual layering procedure is started.
- Make sure that no ceramic powder reaches the inner aspects of the crown, as this may lead to inaccuracies of fit.

1st Dentin/Incisal firing



Isolate the model before layering the Dentin/Incisal materials. This prevents the ceramic materials from drying out or sticking to the model respectively. Seal the stone die and the adjacent model areas with IPS Model Sealer and then separate them using the IPS Ceramic Separating Liquid.



Mix the required IPS e.max Ceram layering materials with the IPS Build-Up Liquids allround or soft. Subsequently, conduct the layering procedure according to the layering diagram.

Layer the dentin core with Dentin layering material either directly with an indicated mamelon shape or build-up the material to full contour and subsequently reduce it (cut-back technique). For better verification of the size and position of the tooth, the cut-back technique is recommended.



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



Finally, complete the layering procedure with Incisal and Transpa materials with a labial and incisal overcontour.

To achieve a true-to-nature shade gradation, it is recommended to taper off the Incisal and Transpa material towards the cervical area.



If a different consistency of the ceramic is desired, the liquids may also be mixed with each other at any mixing ratio.



Use distilled water to rewet the layering materials on the mixing pad to avoid accumulation of organic components.



Conduct the **1st Dentin/Incisal firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64).



2nd Dentin/Incisal firing

Finish and thoroughly clean the restoration. Cleaning is carried out with ultrasound in a water bath or the steam jet. Blasting the surface with Al₂O₃ Type 100 at 1 bar (15 psi) pressure is only necessary if superficial contamination is evident after cleaning.



Separate adjacent model components (e.g. adjacent teeth, pontic rests) once again with IPS Ceramic Separating Liquid.

Thoroughly dry the restoration and complete the missing areas using Dentin, Transpa and Incisal materials. Pay particular attention to the proximal and antagonist contact.



Conduct the **2nd Dentin/Incisal firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64).

If additional Dentin/Incisal firings cycles are necessary, use the firing parameters for the 2nd Dentin/Incisal firing.



Use distilled water to rewet the layering materials on the mixing pad to avoid accumulation of organic components.

Finishing and preparing for the Stain and Glaze firing



Subsequently, finish the restoration. Use suitable grinding instruments to give the restoration a true-to-nature shape and surface texture, such as growth lines and convex/concave areas.



Areas which should exhibit a higher gloss after Glaze firing can be smoothed out and prepolished using silicone polishers.



Finished restorations ...



... ready for the Stain and Glaze firing



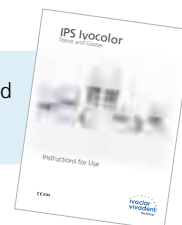
If gold and/or silver dust was used to visualize the surface texture, the restoration has to be thoroughly cleaned with steam. Make sure to remove all gold or silver dust in order to avoid any discolouration after firing.

Stain and Glaze firing

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



Detailed information on the processing of IPS Ivocolor Shade, Essence and Glaze can be found in the IPS Ivocolor Instructions for Use, pages 13–17.



Thoroughly clean the restoration with the steam jet and dry with oil-free air.

Mix IPS Ivocolor Shades and Essences with the corresponding IPS Ivocolor Liquids to the desired consistency.



For better wettability of the stains and glazing materials, the surface can be wetted with a little IPS Ivocolor Mixing Liquid.

Apply Glaze material in an even layer on the entire restoration. The basal area near the pontic should be given particular attention.



Individualize the marginal ridges and the palatal fossa using IPS Ivocolor Essence.

If minor shade modifications are necessary, they can be applied with IPS Ivocolor Shades on the glazing material already in place.



Conduct the **Stain and Glaze firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64).



IPS e.max Ceram Add-On materials can be used for further adjustments (see page 52).





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



Further Processing Techniques

Gingiva

IPS e.max Ceram Gingiva layering materials can be used to create a lifelike gingiva, particularly for implant superstructures. The materials are applied together with the Dentin and Incisal materials and fired.

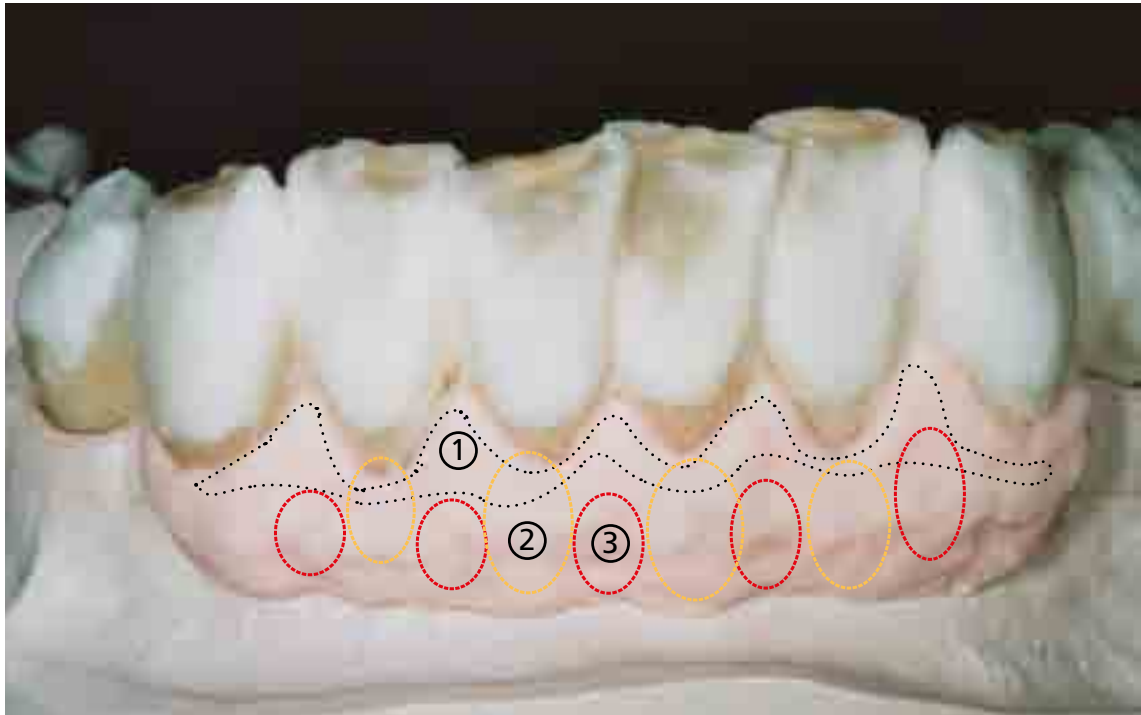
The following 12 ceramic materials are available for designing the gingival portions:



As with the tooth-shaded layering materials, gingival portions made of IPS e.max Ceram have to be adequately supported by a respective zirconium oxide framework.

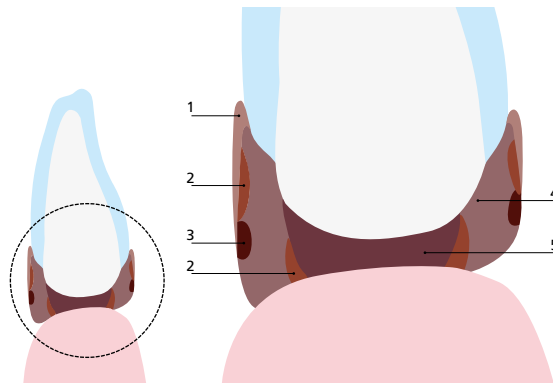
Please observe the following procedure:

- Before layering, apply IPS Model Sealer on the model and allow it to dry. After that, isolate the corresponding areas using IPS Ceramic Separating Liquid.
- For frameworks made of zirconium oxide, the IPS e.max Ceram ZirLiner Gingiva or a tooth-shaded ZirLiner has to be fired on the gingival areas (processing of ZirLiner see page 23; observe the firing parameters).
- The ZirLiner Gingiva is applied together with the tooth-shaded ZirLiner and fired.
- Mix the required IPS e.max Ceram layering materials (e.g. Dentin, Deep Dentin, Incisal, Gingiva) with the Build-Up Liquids allround or soft. If a different consistency of the ceramic is desired, the liquids may also be mixed with each other at any mixing ratio.
- Use distilled water to rewet the layering materials on the mixing pad to avoid accumulation of organic components.
- Underlay the pontic areas of bridges with Deep Dentin in the next lighter shade.
- Place the framework on the model and make sure it is correctly positioned.
- Layer tooth-shaded areas of the restoration according to the layering diagram.
- Depending on the restoration size and extension of the gingival portions, the Gingiva materials can be applied with the first or second Dentin/Incisal firing.
- Use the Gingiva materials to create the basal rest of the restoration on the "natural" gums. In order to ensure proper oral hygiene of the inserted restorations, ensure a homogeneous basal area free of pores and a correct shape.
- Apply the vestibular and oral portions of the gingiva.
- Do not apply excessive suction and prevent the restoration from drying out.
- Before firing, all the interdental areas must be separated down to the framework using a scalpel.
- Position the restoration on the firing tray and fire with the 1st Dentin/Incisal firing (see firing parameters on page 65).
- If additional Dentin/Incisal firing cycles are required, they are conducted using the firing parameters for the 2nd Dentin/Incisal firing. Gingival portions may also be adjusted (see firing parameters on page 65).



Apply the Gingiva materials according to the clinical situation.

- ① Gingiva G1 ② Gingiva G2 ③ Essence E22 ④ Gingiva G3 ⑤ Gingiva G5



Complete the tooth-shaded portions of the restoration using Incisal and Impulse materials for the second Dentin/Incisal firing.

Stain and Glaze firing

The gingival portions are characterized and glazed together with the tooth-shaded areas of the restoration. The Stain firing is conducted with IPS Ivocolor Shade and/or Essences and the Glaze firing with IPS Ivocolor Glaze Powder or IPS Ivocolor Glaze Paste. Depending on the situation, the firing cycles may be conducted together or separately. The firing parameters are identical.

The following procedure must be observed:

- Finish the restoration with suitable grinding instruments and design a true-to-nature shape and surface structure, e.g. texture and stippling.
- Areas which should exhibit a higher gloss after Glaze firing (e.g. pontic rests) can be smoothed out and prepolished using silicone polishers.
- In order to improve the wetting properties of the surface, rub the restoration with moist ceramic or pumice.
- The restoration must be free of dirt and grease. Avoid any contamination after cleaning the restoration with ultrasound in a water bath or with a steam jet.
- Mix the IPS Ivocolor Shade, Essence and Glaze materials with the IPS Ivocolor Mixing Liquid allround or longlife to the desired consistency.
- If shade adjustments on the gingival portions are required, the gingiva-coloured Essence materials can be used.
- Evenly apply the glazing material to the entire surface of the restoration.



Do not use any IPS Ivocolor Glaze FLUO materials on the gingival portions, since natural gingiva does not exhibit any fluorescence.



Conduct the **Stain and Glaze firing** on a honey-comb firing tray belonging to the ceramic furnace.
Firing parameters see page 65.



IPS e.max Ceram Add-On materials can be used for further adjustments (see page 52).



Completed restoration after Glaze firing

The dental lab work was performed by
Thorsten Michel, MDT, Schorndorf, Germany.

Veneers

The following chapter shows the step-by-step layering of veneers on refractory dies.



The refractory die model must be soaked in distilled water for approximately 5–10 minutes before each working step.



For veneer fabrication, smaller working steps and several intermediate firing cycles are recommended.



Model fabrication

The working model and/or the individual dies are duplicated and subsequently cast with a customary refractory die material, e.g. BegoForm® from Bego, Cosmotech VEST from GC (observe the manufacturer's instructions).



- Design the refractory dies as small as possible to minimize their effect on the firing cycles.
- Correct processing and properly conditioned refractory dies are an important prerequisite for accurately fitting veneers.



Wash firing

After degassing, the refractory dies are soaked in water. For the wash firing, IPS e.max Ceram Add-On is preferably applied. However, IPS e.max Ceram Dentin or Transpa clear can also be used. Mix the IPS e.max Ceram ceramic materials with the IPS Build-Up Liquid allround/soft or IPS Ivocolor Mixing Liquid allround/longlife. Then apply very thin, but covering layers on the prepared areas and fire.



Firing parameters **Veneer Wash firing**
see page 66.



Cervical firing

Build-up the cervical areas using IPS e.max Ceram Deep Dentin, mixed with IPS Build-Up Liquid all-round/soft.



Firing parameters **Veneer Cervical firing**
see page 66.

Dentin/Impulse firing

Internal layering is modelled on the natural characteristics and consists of a dentin build-up and various effects. Individual layering with the Impulse materials enables mamelons, opalescence and translucent effects to be achieved.



Firing parameters **Veneer Dentin/ Impulse firing** see page 66.



Incisal firing

Subsequently, build-up the outer enamel layer using Incisal and Transpa materials and fire. If necessary, additional corrective firing cycles may be conducted using the same firing parameters.



Firing parameters **Veneer Incisal firing** see page 66.



Stain and Glaze firing

Finish and thoroughly clean the surface with the steam jet before applying the Glaze. After drying the restoration, cover the ceramic surface with IPS Ivocolor Glaze and fire (see page 16). If desired, additional characterizations may be applied using IPS Ivocolor Essence/Shade (see page 15). You may also conduct a Stain firing before the Glaze firing.



Firing parameters **Veneer Stain and Glaze firing** see page 66.



Divesting the veneers

Remove large amounts of die material using a grinding disc. After that, blast the inner aspect of the veneer with polishing jet medium at max. 1 bar (30 psi) pressure to remove all traces of die material.



Add-On firing

Before or after the completion of a restoration, minor adjustments, such as contact points or margin adjustments, are often required. There are 4 IPS e.max Ceram Add-On materials available for the various requirements, which are processed differently depending on their application.

- IPS e.max Ceram Add-On Margin
- IPS e.max Ceram Add-On Dentin
- IPS e.max Ceram Add-On Incisal
- IPS e.max Ceram Add-On Bleach

Variant 1 – Add-On with Glaze firing

This variant is used if minor adjustments are made with the Glaze firing.




Add-On Margin

Mix IPS e.max Ceram Add-On Margin **pure** with IPS Margin Build-Up Liquid and apply it on the missing margin areas.

Add-On Dentin/Incisal/Bleach

Mix IPS e.max Ceram Add-On Dentin and Incisal in a **1:1 ratio** with Dentin and Transpa Incisal, then mix with the IPS Build-Up Liquids and apply on the respective areas with the Glaze material already in place.



 Then fire the restoration with the **Add-On after Glaze firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64 – 65).



After the corrective firing, polish the supplemented areas to a high gloss using suitable polishing instruments (e.g. rubber polishers).

Variant 2 – Add-On after Glaze firing

After completion and try-in with the patient, further adjustments (e.g. pontic rests, contact points) may be necessary.

Add-On Dentin/Incisal/Bleach

Apply IPS e.max Ceram Add-On Dentin and Incisal **pure** to the corresponding areas.



Then fire the restoration with the **Add-On after Glaze firing** on a honey-comb firing tray belonging to the furnace (see firing parameters on page 64–65).



After the corrective firing, polish the supplemented areas to a high gloss using suitable polishing instruments (e.g. rubber polishers).



If subsequent adjustments of layered veneers are required, they have to be conducted on refractory dies. If the Add-On firing is conducted without the support of a refractory die, there is a risk of deformation of the restoration.

Important and Interesting

Scientific data

Since the beginning of the development, the IPS e.max System has been monitored by the scientific community. Many renowned experts have contributed to an excellent data base with their studies. The worldwide success story, the ever growing demand, as well as over 100 million fabricated restorations are testament to the success and the reliability of the system. More than 20 clinical in-vivo studies to date and even more in-vitro studies, as well as the continuously rising number of clinical studies throughout the world show the impressive long-term success of the IPS e.max System in the oral cavities of the patients. The most important study results are compiled in the "IPS e.max Scientific Report Vol. 2". Further scientific data (i.e. strength, wear, biocompatibility) is contained in the Scientific Documentations about the IPS e.max products. They can be obtained from Ivoclar Vivadent.

For further information about all-ceramics and IPS e.max, please refer to the Ivoclar Vivadent Report No. 16 and 17. Detailed information about the luting composite Variolink® Esthetic can be found in the "Ivoclar Vivadent Report No. 22" and the "Variolink Esthetic Scientific Documentation", while Multilink® Automix is described in details in the "Multilink Automix Scientific Report 2/2016".



Frequently Asked Questions

Is IPS e.max Ceram also suitable to veneer frameworks made of other glass-ceramic materials?

IPS e.max Ceram is not suitable to veneer and characterize glass-ceramic frameworks made of materials other than IPS e.max Press and IPS e.max CAD. On the one hand, the CTE of other glass-ceramic materials is not compatible and, on the other hand, the shade coordination between framework and veneering ceramics is not ensured.

Is IPS e.max Ceram (besides IPS e.max ZirCAD) also suitable to veneer frameworks made of other zirconium oxide materials?

IPS e.max Ceram can be used to veneer frameworks made of sintered zirconium oxide, HIP zirconium oxide as well as pre-sintered zirconium oxide with a CTE range of $10.5\text{--}11.0 \times 10^{-6} \text{ K}^{-1}$ (25–500 °C). The following zirconium oxide materials have been tested:

- KaVo Everest – Bio ZS (coloured and uncoloured) and Bio ZH Blanks
- Nobel Biocare – Procera Zirconia
- DeguDent – Cercon Base
- 3M/Espe – Lava Frame (coloured and uncoloured)
- Vita – In-Ceram 2000 YZ Cubes (coloured and uncoloured)
- Sirona – inCoris
- Amann Girrbach – Ceramill ZI

Is IPS e.max Ceram also suitable for the fabrication of veneers?

IPS e.max Ceram is suitable to fabricate veneers on refractory investment material dies. IPS e.max Ceram meets the required strength values (ISO standard: at least 50 MPa). The physical properties, such as the setting expansion, must be taken into consideration when selecting the corresponding investment material.

What is the purpose of the IPS e.max Ceram ZirLiner?

IPS e.max Ceram ZirLinings are translucent. Their three major purposes are as follows:

1. They enable a strong, homogeneous bond to the zirconium oxide framework.
2. They provide the white, non-coloured zirconium oxide frameworks with chroma, an in-depth effect, and a shaded character without increasing their opacity.
3. They also provide the non-fluorescent zirconium oxide framework with a natural fluorescence, thus enabling the fabrication of lifelike restorations.

Which type of IPS e.max Ceram ZirLiner should be used on shaded zirconium oxide frameworks?

The clear IPS e.max Ceram ZirLiner should be used on shaded zirconium oxide frameworks. The transparent character of the IPS e.max Ceram ZirLiner does not affect the framework shade. A good bond as well as lifelike fluorescence is achieved. If shaded frameworks from other manufacturers are used, the shade compatibility of the IPS e.max Ceram and the framework must be ensured.

Can zirconium oxide frameworks also be veneered without IPS e.max Ceram ZirLiner, or with a wash firing of Dentin material, respectively?

An IPS e.max Ceram ZirLiner in the corresponding shade must always be applied prior to veneering. A Wash firing, e.g. with Dentin material, as it is done for glass-ceramics, is not sufficient.

Why is the IPS e.max Ceram ZirLiner powder green and how should it be applied?

Since zirconium oxide is "white" and, therefore, shows a poor contrast to tooth-coloured and/or white powders, the IPS e.max Ceram ZirLiner was given an identification colour to render its application more simple and efficient. The IPS e.max Ceram ZirLiner consists of a very fine powder and appears somewhat thick due to the dense packing of the grains. Make sure that the material is applied in an even, greenish coat. If the colour appears too pale, the layer is too thin. After firing, however, the ZirLiner demonstrates a layer thickness of approx. 0.1 mm.

How should completely layered IPS e.max Ceram restorations be prepared for firing?

Separate the completely layered IPS e.max Ceram restorations in the interdental area down to the framework and only blot them dry slightly with a cloth. Excessive vibration of the restorations and using suction equipment or excessive drying with blown air should be avoided.

How are the IPS e.max Ceram Add-On materials correctly used?

There are 4 Add-On materials available for final adjustments.

Add-On Margin with a firing temperature of 725 °C (1337 °F) is used for margin adjustments with the Dentin/Incisal/Bleach firings as well as with the final Glaze firing. Depending on the application, the Add-On Margin material is mixed 1:1 with the correspondingly shaded Margin material (adjustment with the Dentin/Incisal/Bleach firing) or used alone (adjustment with the Glaze firing).

Add-On Dentin, Add-On Incisal and Add-On Bleach with a firing temperature of 700 °C (1292 °F) are used to supplement missing areas (e.g. contact points) with the final Glaze firing or a separate Add-On firing after Glaze firing. Depending on the application Add-On Dentin, Incisal and Bleach are mixed 1:1 with the Dentin, Incisal and Bleach material in the corresponding shade (supplement with the Glaze firing) or used alone (supplement after Glaze firing) (see also page 52).

How can the shrinkage be compensated for deep occlusal preparations or very concave areas?

With deep occlusal surfaces and/or steep cusp inclinations and particularly with massive zirconium oxide pontics and abutments, it is favourable to separate the central fissure with a scalpel down to the framework before the first firing (with the ZirLiner layer already fired). In this way, the ceramic may be sintered to the framework surface in a controlled fashion. For the subsequent 2nd Dentin/Incisal firing, the central fissure and occlusal surface are then closed.

What liquid should be used to rewet IPS e.max Ceram layering materials?

If a layering material has to be rewetted on the mixing pad, distilled water has to be used for that purpose. No build-up liquids must be used, since this would result in an accumulation of organic components, which may lead to grey discolouration of the veneer as they fail to fire without leaving residue.

How can the wetting properties of the restoration be improved before the Stain and Glaze firing?

The wetting properties of the surface can either be improved by slight blasting with Al_2O_3 (Type 100 μm / max. 1 bar) or by rubbing with moist ceramic powder or pumice. Good wetting properties are important for a homogeneous application of the Shades, Essence and Glaze materials.

How can the shrinkage of the ceramic be prevented particularly in large bridges and implant superstructures?

If enough space is available, a special Deep Dentin or intermediate Dentin firing is recommended to distribute the overall shrinkage to two firing procedures. Above all else, this secures the position of the Impulse materials after the second firing.

Cementation and Aftercare

Cementation options

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

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

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

Short definition of the different cementation methods:

- Adhesive cementation

With adhesive cementation, the bond is also created by static friction, but primarily by the chemical and/or micro-mechanical bond between the luting material and the restoration, as well as between the luting material and the preparation. Given the chemical and/or micromechanical bond, retentive preparation is not required. Irrespective of the cementation material, special adhesive systems are used on the preparation to generate the micromechanical bond with the dentin and/or enamel. Adhesive cementation results in enhanced "(overall) strength" of the seated all-ceramic restoration.

- Self-adhesive cementation

The cementation material features self-adhesive properties on the tooth, which is why no additional special conditioning of the tooth surface is necessary. Hence, the adhesion of the restoration is partially achieved by a micromechanical and/or chemical bond. In order to achieve sufficient bonding strength, 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 possibilities for the different indications

		Adhesive Cementation	Self-Adhesive Cementation	Conventional Cementation
IPS e.max Ceram	Veneers	✓	—	—
IPS e.max Ceram on ZrO ₂	Anterior and posterior crowns	✓	✓	✓
	Bridge with/without ceramic margin	✓	✓	✓
IPS e.max Ceram on LS ₂	Anterior and posterior crowns	✓	✓	✓
	3-unit bridges up to the 2 nd premolar	✓	✓	✓



Find your way out of the cements maze

Detailed information can be found under www.cementation-navigation.com

Care Notes

As with natural teeth, high-quality IPS e.max restorations require regular professional care. This is beneficial for both the health of the gingiva and teeth, as well as the overall appearance. The pumice-free Proxyt® pink polishing paste is used to care for the surfaces without causing any wear. The low RDA* value = 7 (*Relative Dentin Abrasion) is a reliable confirmation that a low-abrasion cleaning paste is used. Scientific investigations and long-term clinical experience have proved the gentle effect compared to other pastes.



Combination Table A-D – IPS e.max® Ceram



IPS e.max® Ceram									
A-D	BL1	BL2	BL3	BL4	A1	A2	A3	A3.5	A4
IPS e.max Ceram ZirLiner (only ZrO ₂)		ZL clear			ZL 1		ZL 2		ZL 4
IPS e.max Ceram Intensive ZirLiner (only ZrO ₂)						IZL yellow		IZL orange	
IPS e.max Ceram Margin (only ZrO ₂)	M BL1	2/3 M BL1 1/3 M BL4 = M BL2	1/3 M BL1 2/3 M BL4 = M BL3	M BL4	M A1	M A2	M A3	M A3.5	M A4
IPS e.max Ceram Intensive Margin (only ZrO ₂)						IM yellow		IM yellow-green	
IPS e.max Ceram Deep Dentin	DD BL1	2/3 DD BL1 1/3 DD BL4 = DD BL2	1/3 DD BL1 2/3 DD BL4 = DD BL3	DD BL4	DD A1	DD A2	DD A3	DD A3.5	DD A4
IPS e.max Ceram Dentin	D BL1	D BL2	D BL3	D BL4	D A1	D A2	D A3	D A3.5	D A4
IPS e.max Ceram Transpa Incisal		I BL			TI 1		TI 2		TI 3
IPS e.max Ceram Transpa									T neutral
IPS e.max Ceram Add-On		A-O BL			A-O Margin				
IPS e.max Ceram Impulse	Occlusal Dentin	OD orange	OD brown		Mamelon	MM light	MM yellow-orange	MM salmon	
	Transparent		T blue	T brown-grey	T orange-grey		Special Incisal	SI yellow	SI grey
IPS e.max Ceram Selection	Special Enamel	aqua	citrine	honey	apricot	quartz	diamond		
IPS e.max Ceram Gingiva	Gingiva ZirLiner	ZL Gingiva		Basic Gingiva	BG34		Gingiva	G1	G2
IPS Ivocolor Essence	E01 white	E02 cream	E03 lemon	E04 sunset	E05 copper	E06 hazel	E07 olive	E08 khaki	E09 terracotta
								E21 basic red	
IPS Ivocolor Shade		Shade 0			Shade 1	Shade 2			Shade 3
							Shade Incisal 1		

B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
ZL 1		ZL 3		ZL 1		ZL 4				
IZL brown		IZL incisal								
M B1	M B2	M B3	M B4	M C1	M C2	M C3	M C4	M D2	M D3	M D4
IM orange		IM orange-pink								
DD B1	DD B2	DD B3	DD B4	DD C1	DD C2	DD C3	DD C4	DD D2	DD D3	DD D4
D B1	D B2	D B3	D B4	D C1	D C2	D C3	D C4	D D2	D D3	D D4
TI 1		TI 2		TI 1		TI 3				
T clear										
A-O Dentin		A-O Incisal								
Opal Effect		OE 1	OE 2	OE 3	OE 4	OE 5	OE violet	Incisal Edge		Incisal Edge
Inter Incisal		II white-blue		Cervical Transpa		CT yellow	CT orange-pink	CT khaki	CT orange	
Light Reflector		cream	salmon	silk		Light Absorber		fog	lavender	taupe
G3	G4	G5	Intensive Gingiva		IG1	IG2	IG3	IG4	IG5	
E10 mahogany	E11 cappuccino	E12 espresso	E13 terra	E14 profundo	E15 ocean	E16 sapphire	E17 anthracite	E18 black	E19 rose	E20 coral
E22 basic yellow		E23 basic blue								
Shade 4		Shade 5		Shade 6		Shade 7		Shade 6		
Shade Incisal 2		Shade Incisal 3								


Combination Table A-D – IPS e.max® Ceram Power Dentin/Power Incisal



IPS e.max Ceram Power Dentin/Power Incisal									
A-D	BL1	BL2	BL3	BL4	A1	A2	A3	A3.5	A4
IPS e.max Ceram ZirLiner (only ZrO ₂)		ZL clear			ZL 1		ZL 2		ZL 4
IPS e.max Ceram Intensive ZirLiner (only ZrO ₂)						IZL yellow		IZL orange	
IPS e.max Ceram Power Dentin	PD BL1	PD BL2	PD BL3	PD BL4	PD A1	PD A2	PD A3	PD A3.5	PD A4
IPS e.max Ceram Power Incisal		PI BL			PI 1		PI 2		PI 3
IPS e.max Ceram Transpa									T neutral
IPS e.max Ceram Add-On		A-O BL							A-O Dentin
IPS e.max Ceram Impulse	Occlusal Dentin		OD orange	OD brown	Mamelon		MM light	MM yellow-orange	MM salmon
	Transparent		T blue	T brown-grey	T orange-grey	Special Incisal		SI yellow	SI grey
IPS e.max Ceram Selection	Special Enamel	aqua	citrine	honey	apricot	quartz	diamond		
IPS e.max Ceram Gingiva	Gingiva ZirLiner	ZL Gingiva	Basic Gingiva		BG34	Gingiva		G1	G2
IPS Ivocolor Essence	E01 white	E02 cream	E03 lemon	E04 sunset	E05 copper	E06 hazel	E07 olive	E08 khaki	E09 terracotta
								E21 basic red	
IPS Ivocolor Shade	Shade 0				Shade 1	Shade 2			Shade 3
								Shade Incisal 1	

B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4	
ZL 1		ZL 3		ZL 4							
IZL brown		IZL incisal									
PD B1	PD B2	PD B3	PD B4	PD C1	PD C2	PD C3	PD C4	PD D2	PD D3	PD D4	
PI 1		PI 2		PI 1	PI 3		PI 1			PI 2	PI 3
T clear											
A-O Incisal											
Opal Effect	OE 1	OE 2	OE 3	OE 4	OE 5	OE violet	Incisal Edge		Incisal Edge		
Inter Incisal		II white-blue		Cervical Transpa		CT yellow	CT orange-pink	CT khaki	CT orange		
Light Reflector	cream	salmon	silk		Light Absorber		fog	lavender	taupe		
G3	G4	G5	Intensive Gingiva		IG1	IG2	IG3	IG4	IG5		
E10 mahogany	E11 cappuccino	E12 espresso	E13 terra	E14 profundo	E15 ocean	E16 sapphire	E17 anthracite	E18 black	E19 rose	E20 coral	
E22 basic yellow		E23 basic blue									
Shade 4		Shade 5		Shade 6			Shade 7		Shade 6		
Shade Incisal 2		Shade Incisal 3									

Combination Table Chromascop – IPS e.max® Ceram

IPS e.max® Ceram										
Chromascop	110	120	130	140	210	220	230	240	310	
IPS e.max Ceram ZirLiner (only ZrO ₂)		 ZL 1				 ZL 2				
IPS e.max Ceram Intensive ZirLiner (only ZrO ₂)						 IZL yellow		 IZL orange		
IPS e.max Ceram Margin (only ZrO ₂)	 M 110	 M 120	 M 130	 M 140	 M 210	 M 220	 M 230	 M 240	 M 310	
IPS e.max Ceram Intensive Margin (only ZrO ₂)						 IM yellow		 IM yellow-green		
IPS e.max Ceram Deep Dentin	 DD 110	 DD 120	 DD 130	 DD 140	 DD 210	 DD 220	 DD 230	 DD 240	 DD 310	
IPS e.max Ceram Dentin	 D 110	 D 120	 D 130	 D 140	 D 210	 D 220	 D 230	 D 240	 D 310	
IPS e.max Ceram Incisal		 I 1			 I 2			 I 3		
IPS e.max Ceram Transpa								 T neutral		
IPS e.max Ceram Add-On		 A-O BL			 A-O Margin					
IPS e.max Ceram Impulse	Occlusal Dentin		 OD orange	 OD brown	Mamelon			 MM light	 MM yellow-orange	 MM salmon
	Transparent			 T blue	 T brown-grey	 T orange-grey	Special Incisal		 SI yellow	 SI grey
IPS e.max Ceram Selection	Special Enamel	 aqua	 citrine	 honey	 apricot	 quartz	 diamond			
IPS e.max Ceram Gingiva	Gingiva ZirLiner	 ZL Gingiva		Basic Gingiva	 BG34			Gingiva	 G1	 G2
IPS Ivocolor Essence	 E01 white		 E02 cream	 E03 lemon	 E04 sunset	 E05 copper	 E06 hazel	 E07 olive	 E08 khaki	 E09 terracotta
									 E21 basic red	
IPS Ivocolor Shade	 Shade 1							 Shade 2		
	 Shade Incisal 1									

320	330	340	410	420	430	440	510	520	530	540
ZL 3			ZL 4							
IZL brown			IZL incisal							
M 320	M 330	M 340	M 410	M 420	M 430	M 440	M 510	M 520	M 530	M 540
IM orange			IM orange-pink							
DD 320	DD 330	DD 340	DD 410	DD 420	DD 430	DD 440	DD 510	DD 520	DD 530	DD 540
D 320	D 330	D 340	D 410	D 420	D 430	D 440	D 510	D 520	D 530	D 540
I 3										
T clear										
A-O Dentin			A-O Incisal							
Opal Effect	OE 1	OE 2	OE 3	OE 4	OE 5	OE violet	Incisal Edge			Incisal Edge
Inter Incisal	II white-blue		Cervical Transpa			CT yellow	CT orange-pink	CT khaki	CT orange	
Light Reflector	cream	salmon	silk			Light Absorber	fog	lavender	taupe	
G3	G4	G5	Intensive Gingiva			IG1	IG2	IG3	IG4	IG5
E 10 mahogany	E 11 cappuccino	E 12 espresso	E 13 terra	E 14 profundo	E 15 ocean	E 16 sapphire	E 17 anthracite	E 18 black	E 19 rose	E 20 coral
E 22 basic yellow			E 23 basic blue							
Shade 5			Shade 7			Shade 6			Shade 3	
Shade Incisal 2			Shade Incisal 3							

Firing parameters

Firing of lithium disilicate glass-ceramic (LS₂)-supported restorations

- Use the honey-comb firing tray and support pins that belong to the furnace to fire the restorations.
- Ceramic pins must not be used, since they may fuse to the restoration.
- The processing temperatures must be observed. An increase in the firing temperature results in severe vitrification between the framework and the veneering ceramic, which may lead to cracks later. A decrease in the firing temperature causes the ceramic to be underfired and very brittle, which may lead to delamination.
- The parameters stipulated in the Instructions for Use are coordinated with Ivoclar Vivadent furnaces (tolerance range ± 10 °C/18 °F).
- If furnaces other than those from Ivoclar Vivadent are used, temperature adjustments may be necessary.
- At the beginning of the firing procedure, open the furnace and wait for the acoustic signal. Subsequently, place the firing tray with the objects in the centre of the firing table and start the program. If the infrared camera is activated, position the objects in such a way that the infrared camera has a wide view of the objects.
- Remove IPS e.max 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/tweezers.
- Do not blast or quench the objects.

IPS e.max® Ceram on IPS e.max® Press or IPS e.max® CAD (Cut-Back and Layering Technique)

	Stand-by temperature B [°C/°F]	Closing time * S [min]	Heating rate t ↗ [°C/°F/min]	Firing temperature T₁ [°C/°F]	Holding time H₁ [min]	Heating rate t ↗ [°C/°F/min]	Firing temperature T₂ [°C/°F]	Holding time H₂ [min]	Vacuum 1 1₁ 1₂ [°C/°F]	Vacuum 2 2₁ 2₂ [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t₁ [°C/°F/min]
Wash firing (foundation)	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
1 st Dentin/Incisal firing	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
2 nd Dentin/Incisal firing	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
Stain firing with IPS Ivocolor	403/757	IRT/ 06:00	60/108	710/1310	01:00	–	–	–	450/842	709/1308	0	0
Glaze firing with IPS Ivocolor	403/757	IRT/ 06:00	60/108	710/1310	01:00	–	–	–	450/842	709/1308	0	0
Add-On with Glaze firing	403/757	IRT/ 06:00	60/108	710/1310	01:00	–	–	–	450/842	709/1308	0	0
Add-On after Glaze firing	403/757	IRT/ 06:00	50/90	700/1292	01:00	–	–	–	450/842	699/1290	0	0

* IRT standard mode



Depending on the furnace type, the firing temperature can be adjusted by ± 5 °C/9°F, max. by ± 10 °C/18°F.



If the new firing parameters are used, the initial vacuum value must be reduced to 400°C/752°F to ensure sufficient vacuum at the start of the sintering process.



The intelligent infrared technology of the new Programat® furnaces considerably increases process reliability. This leads to high-quality firing results, irrespective of the size and number of restorations in the firing chamber. The infrared camera automatically controls the predrying and closing process. Depending on the type of restoration, the firing time can be reduced by up to 20%.

Firing of zirconium oxide (ZrO₂)-supported restorations

- The heating of the firing chamber depends on the type of furnace, as well as the size of the firing chamber.
- The parameters stipulated in the Instructions for Use are coordinated with Ivoclar Vivadent furnaces (tolerance range ± 10 °C/18 °F).
- If furnaces other than those from Ivoclar Vivadent are used, temperature adjustments may be necessary.
- At the beginning of the firing procedure, open the furnace and wait for the acoustic signal. Subsequently, place the firing tray with the objects in the centre of the firing table and start the program. If the infrared camera is activated, position the objects in such a way that the infrared camera has a wide view of the objects.
- Remove IPS e.max 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/tweezers.
- Do not blast or quench the objects.

IPS e.max® Ceram on IPS e.max® ZirCAD, IPS e.max® ZirPress, Zenostar® (Cut-Back and Layering Technique)

	Stand-by temperature B [°C/°F]	Closing time * S [min]	Heating rate t [°C/°F/min]	Firing temperature T₁ [°C/°F]	Holding time H₁ [min]	Heating rate t [°C/°F/min]	Firing temperature T₂ [°C/°F]	Holding time H₂ [min]	Vacuum 1 1₁ 1₂ [°C/°F]	Vacuum 2 2₁ 2₂ [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t_i [°C/°F/min]
ZirLiner firing ¹⁾	403/757	IRT/ 04:00	40/72	960/1760	01:00	-	-	-	450/842	959/1758	0	0
1 st and 2 nd Margin firing ²⁾	403/757	IRT/ 04:00	40/72	800/1472	01:00	-	-	-	450/842	799/1470	0	0
Wash firing (foundation)	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
1 st Dentin/Incisal firing	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
2 nd Dentin/Incisal firing	403/757	IRT/ 04:00	90/162	650/1202	00:00	20/36	730/1346	02:00	400/752 650/1202	650/1202 729/1344	0	0
Stain firing with IPS Ivocolor	403/757	IRT/ 06:00	60/108	710/1310	01:00	-	-	-	450/842	709/1308	450/842	0
Glaze firing with IPS Ivocolor	403/757	IRT/ 06:00	60/108	710/1310	01:00	-	-	-	450/842	709/1308	450/842	0
Add-On with Glaze firing	403/757	IRT/ 06:00	60/108	710/1310	01:00	-	-	-	450/842	709/1308	450/842	0
Add-On after Glaze firing	403/757	IRT/ 06:00	50/90	700/1292	01:00	-	-	-	450/842	699/1290	450/842	0

* IRT standard mode

** Long-term cooling for the last firing cycle

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

2) not for use with IPS e.max ZirPress



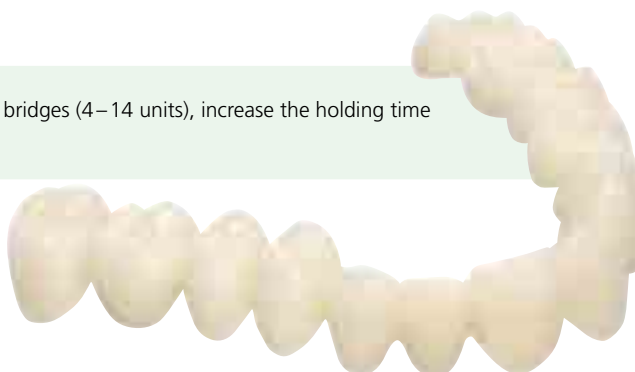
Depending on the furnace type, the firing temperature can be adjusted by ± 5 °C/9°F, max. by ± 10 °C/18°F.



If the new firing parameters are used, the initial vacuum value must be reduced to 400°C/752°F to ensure sufficient vacuum at the start of the sintering process.
When multi-unit ZrO₂ bridges with large pontics are glaze fired with IPS Ivocolor, the heating rate must be reduced to 45°C/81°F/min.



For an optimum result when firing multi-unit bridges (4–14 units), increase the holding time H₂ to 3 minutes.



Firing of IPS e.max Ceram veneers

- The firing parameters for the fabrication of veneers must be observed.
- The prolonged closing time ensures a gentle and complete drying of the refractory die material and thus enables to achieve a homogeneous firing result.
- If furnaces other than those from Ivoclar Vivadent are used, temperature adjustments may be necessary.
- At the beginning of the firing procedure, open the furnace and wait for the acoustic signal. Subsequently, place the firing tray with the objects in the centre of the firing table and start the program. If the infrared camera is activated, position the objects in such a way that the infrared camera has a wide view of the objects.
- Remove IPS e.max 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/tweezers.
- Do not blast or quench the objects.

IPS e.max® Ceram on refractory die material (venereing technique)

	Stand-by temperature B [°C/°F]	Closing time * S [min]	Heating rate t [°C°/F/min]	Firing temperature T [°C/°F]	Holding time H [min]	Vacuum 1 1 [°C/°F]	Vacuum 2 2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t_i [°C°/F/min]
Veneer Wash firing with IPS e.max Ceram Add-On	403/757	IRT/ 08:00	50/90	720/1328	01:00	450/842	719/1326	0	0
Veneer Wash firing with IPS e.max Ceram Dentin/Transpa	403/757	IRT/ 08:00	50/90	780/1436	01:00	450/842	779/1434	0	0
Veneer Cervical firing	403/757	IRT/ 08:00	50/90	770/1418	01:00	450/842	769/1416	0	0
Veneer Dentin/Impulse firing	403/757	IRT/ 08:00	50/90	770/1418	01:00	450/842	769/1416	0	0
Veneer Incisal firing	403/757	IRT/ 08:00	50/90	770/1418	01:00	450/842	769/1416	0	0
Veneer Stains and Glaze firing with IPS Ivocolor	403/757	IRT/ 08:00	50/90	740/1364	01:00	450/842	739/1362	0	0

* IRT standard mode



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.

Ivoclar Vivadent – worldwide

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

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

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

Ivoclar Vivadent Ltda.
Alameda Caiapós, 723
Centro Empresarial Tamboré
CEP 06460-110 Barueri – SP
Brazil
Tel. +55 11 2424 7400
Fax +55 11 3466 0840
www.ivoclarvivadent.com.br

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

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

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

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

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

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

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

Ivoclar Vivadent s.r.l.
Via Isonzo 67/69
40033 Casalecchio di Reno (BO)
Italy
Tel. +39 051 6113555
Fax +39 051 6113565
www.ivoclarvivadent.it

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

Ivoclar Vivadent Ltd.
12F W-Tower
54 Seocho-daero 77-gil, Seocho-gu
Seoul, 06611
Republic of Korea
Tel. +82 2 536 0714
Fax +82 2 596 0155
www.ivoclarvivadent.co.kr

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

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

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

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

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

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

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

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

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

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

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

CE 0123

Rx ONLY
For dental use only!



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

Date information prepared: 2017-04, Rev. 2

These materials have been developed solely for use in dentistry. Processing should be carried out strictly according to the Instructions for Use. Liability cannot be accepted for damages resulting from failure to observe the Instructions or the stipulated area of application. The user is responsible for testing the products for their suitability and use for any purpose not explicitly stated in the Instructions. Descriptions and data constitute no warranty of attributes and are not binding. These regulations also apply if the materials are used in conjunction with products of other manufacturers.

Printed in Germany
© Ivoclar Vivadent AG, Schaan / Liechtenstein
681689/en

ivoclar
vivadent
technical