

IPS
e.max[®]

ZirCAD

CHAIRSIDE
Instructions for Use



all ceramic
all you need

ivoclar
vivadent
passion vision innovation

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.

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® CAD / IPS e.max® ZirCAD

For maximum flexibility



IPS e.max® CAD

Lithium disilicate glass-ceramic (LS₂)

For: Crowns, bridges, inlays, onlays, veneers, partial crowns and implant-supported hybrid restorations

Strength: 530 MPa¹



IPS e.max® ZirCAD

Zirconium oxide ceramic (ZrO₂)

For: Full-contour crowns and bridges

Strength: 1200 MPa²



IPS e.max® CAD Crystall./Shades/Stains and Glaze

Universal Stains and Glazes

For: IPS e.max CAD, IPS e.max ZirCAD and IPS Empress CAD

¹ Average biaxial flexural strength over 10 years

² typical average value for the biaxial strength of IPS e.max ZirCAD LT
Source: R&D Ivoclar Vivadent AG, Schaan, Liechtenstein

IPS e.max CAD is the innovative lithium disilicate glass-ceramic (LS₂) for the CAD/CAM technology. It is unique and combines an outstanding esthetic appearance with high user friendliness. The digitally fabricated restoration is selected from a comprehensive range of indications, which is only offered by IPS e.max CAD. A multitude of translucency levels, shades and block sizes enables flexible working. Proven and coordinated cementation materials ideally supplement the range of products.

IPS e.max ZirCAD permits processing the popular zirconium oxide material easily and quickly by means of the speed sintering procedure to lead to esthetically pleasing results. The IPS e.max ZirCAD LT blocks are pre-shaded and monochromatic and they are indicated for monolithic crowns and 3-unit bridges. The high strength of IPS e.max ZirCAD permits thin wall thicknesses (posterior crowns occlusal and/or central fissure 0.6 mm, anterior crowns 0.4 mm) and tooth structure-preserving preparation. Moreover, the restorations can be seated using conventional and self-adhesive cementation, e.g. with self-adhesive resin cement SpeedCEM® Plus.

IPS e.max CAD Crystall./Shades/Stains and Glaze is the universal system of stains and glazes for IPS e.max CAD, IPS e.max ZirCAD and IPS Empress CAD. The glazing material is available with or without fluorescent effect.

There are separate Instructions for Use for **IPS e.max CAD Monolithic Solutions**, **IPS e.max CAD Veneering Solutions** and **IPS e.max CAD Abutment Solutions**.

Material

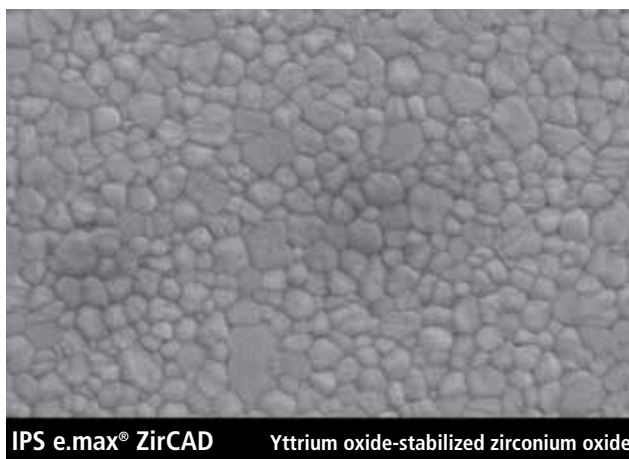
IPS e.max ZirCAD are presintered yttrium oxide-stabilized zirconium oxide blocks for the CAD/CAM technology. The blocks are presintered and monochromatic.

With an average biaxial strength of more than 1200 MPa, the material demonstrates excellent mechanical properties and its fracture toughness is more than twice that of glass-infiltrated ceramic. IPS e.max ZirCAD can be processed very easily in a suitable CAD/CAM unit in its partly sintered, "chalk-like" state.

Milling is carried out with an enlargement of the restoration of approximately 20-25%. Given the controlled manufacturing process of the blocks, the shrinkage of the enlarged, fabricated restoration can be controlled in a targeted fashion during sintering, e.g. in the Programat® CS4. In this way, an excellent accuracy of fit can be achieved. The specific properties of zirconium oxide are achieved after sintering.

The result is a structure with a density of over 99%. The high fracture resistance in combination with the high fracture toughness permits thinner wall thicknesses (posterior crowns occlusal and/or central fissure 0.6 mm, anterior crowns 0.4 mm) as well as conventional cementation.

The restorations are glazed using IPS e.max Crystall./ Glaze, which is available with or without fluorescent effect. For individual characterization, the universal staining system IPS e.max CAD Crystall./ Shade/Stains can be used.



IPS e.max® ZirCAD

Yttrium oxide-stabilized zirconium oxide

IPS e.max® ZirCAD LT

Property	Specification	Typical average value
CTE (25–500°C) [10 ⁻⁶ /K]	10.5 ± 0.5	–
Flexural strength (biaxial) [MPa]	≥ 900	1200
Chemical solubility [µg/cm ²]	< 100	–
Type/Class	Type II / Class 5	–

according to ISO 6872:2015

Uses

Indications

- Full-contour crowns in the anterior and posterior region
- Full-contour 3-unit bridges in the anterior and posterior region

Suitable for wet and dry processing



Contraindications

- Patients with severely reduced residual dentition
- Any other uses not listed in the indications
- Temporary seating

Important processing restrictions



Failure to observe the following restrictions may compromise the results achieved with IPS e.max ZirCAD:

- Falling short of the required minimum connector dimensions
- Milling the blocks in a non-compatible CAD/CAM system
- Sintering in a non-compatible sinter furnace
- Do not mix IPS e.max CAD Crystall./Glaze, Shades and Stains with other dental ceramics (e.g. IPS Ivocolor Glaze, Shades and Essences).

Side effects / warnings



If a patient is known to be allergic to any of the components of the material, IPS e.max ZirCAD must not be used. The processing of IPS e.max ZirCAD produces dust which may irritate the skin and eyes and which may result in lung damage. Make sure that your suction equipment of your CAM machine and at your workplace works flawlessly. Do not inhale grinding dust during finishing and wear a dust mask (particle class FFP2) as well as protective goggles and gloves.

Observe the information in the Safety Data Sheet (SDS).

Composition

IPS e.max ZirCAD LT	
Zirconium oxide (ZrO ₂)	88.0 – 95.5 %
Yttrium oxide (Y ₂ O ₃)	> 4.5 % – ≤ 6.0 %
Hafnium oxide (HfO ₂)	≤ 5.0 %
Aluminium oxide (Al ₂ O ₃)	≤ 1.0 %
Other oxides	≤ 1.0 %

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".

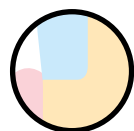


More information is available on the Internet from www.ivoclarvivadent.com.

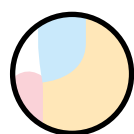
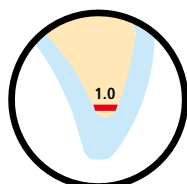
Preparation guidelines

Before you begin with the actual construction, however, please ensure that the preparation is adequate for a ceramic restorations. Successful results can only be achieved with IPS e.max ZirCAD if the guidelines and minimum layer thicknesses are strictly observed.

Basic preparation guidelines for all-ceramic restorations



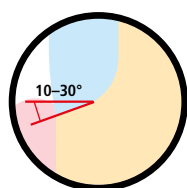
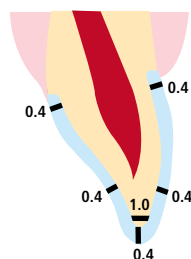
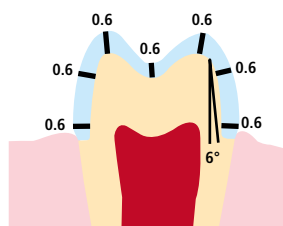
Shoulder preparation



Chamfer preparation

- No angles or edges
- The ideal preparation is a shoulder preparation with rounded inner edges and/or a chamfer preparation
- The indicated dimensions reflect the minimum layer thickness for IPS e.max ZirCAD restorations.
- The incisal edge of the preparation should be at least 1.0 mm (milling tool geometry) in order to permit optimum milling during CAD/CAM processing.

Preparation guidelines for single crowns – 3-unit bridges



- Evenly reduce the anatomical shape and observe the stipulated minimum wall thickness.
- The ideal preparation is a shoulder preparation with rounded inner edges and/or a chamfer preparation with a shoulder /chamfer width of 0.6 mm for posterior crowns and 0.4 mm for anterior crowns.
- For posterior crowns, the reduction in the incisal/occlusal area is at least 0.6 mm for anterior crowns 0.4 mm.
- For anterior crowns, the reduction in the labial/lingual area is at least 0.4 mm and for posterior crowns 0.6 mm.
- For conventional and/or self-adhesive cementation, the preparation must demonstrate retentive surfaces (preparation height at least 4 mm).
- Preparation angle:
4–8° for conventionally and self-adhesive cementation, >6° for adhesive cementation

Design criteria

The restoration design is key to the success of durable all-ceramic restorations.

The more attention given to the design, the better the final results and the clinical success will turn out to be.



The following **minimum layer thicknesses** have to be observed to achieve the tooth shade of the shade guide and to **fulfil the requirements** stipulated in the **preparation guidelines**:
The minimum layer thicknesses thus refer to the layer thickness of IPS e.max ZirCAD.

Connector dimensions



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

- Aim for the largest possible dimensions when designing the connectors.
- The height of the connector is more important for the stability than the width. Doubling the width only results in double the stability, while doubling the height results in up to four times the stability.
- The greater the distance between the abutment teeth, the higher the mechanical stress on the construction and the exerted masticatory forces are going to be.



Wall thickness / connector dimensions of the sintered restoration

Anterior region	IPS e.max ZirCAD LT (sintered)		
	Minimum wall thickness in mm	Connector dimensions mm ²	Design type
Crowns	0.4	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
3-unit bridges	0.6	7	

Posterior region	IPS e.max ZirCAD LT (sintered)		
	Minimum wall thickness in mm	Connector dimensions mm ²	Design type
Crowns	0.6	–	supports the tooth shape and the gingiva shape (incisal, occlusal and/or basal)
3-unit bridges	0.6	9	



Failure to observe the stipulated **minimum wall thicknesses** and **connector dimensions** may result in clinical failures, such as cracks, delamination, and fracture of the restoration.