



# Basic information on Straumann® CARES® tooth prosthetic procedures



# CONTENTS

<b>1. Introduction</b>	<b>2</b>
<b>2. General information</b>	<b>2</b>
2.1 Product description	2
2.2 Intended use	2
2.3 Material features and benefits	3
2.4 Indications	6
2.5 CARES® X-Stream™ one-step prosthetic solution	7
2.6 Material selection	8
2.6.1 Restoration shade/color	8
2.6.2 Processing techniques	9
2.6.3 Processing steps	10
2.7 Warning	11
2.8 Use and handling	11
<b>3. Tooth preparation</b>	<b>11</b>
<b>4. Scanning, restoration design and finishing</b>	<b>12</b>
4.1 Data digitization and restoration design	12
4.2 Finishing and processing	12
4.2.1 Finishing	12
4.2.2 Processing	13
4.2.3 Seating/Bonding	14
4.2.4 Removal of a seated restoration	14
<b>Further information</b>	<b>15</b>
<b>Appendix A</b> – Restoration thickness guidelines	15
<b>Appendix B</b> – Instructions for setting the die parameters (Straumann® CARES® Visual version 7.0 and higher)	19
<b>Appendix C</b> – Chemical composition and physical properties	20
<b>Appendix D</b> – Additional material-specific guidelines	24

## 1. INTRODUCTION

**Straumann® CARES® CAD/CAM** offers you a unique portfolio of materials designed to provide patients and the restorative team with a broad range of treatment options.

Straumann® CARES® CAD/CAM continuously invests in state-of-the-art production centers and in the development of innovative new technologies. Our CAD/CAM solution maintains high-quality standards due to its rigorous and certified quality management system. The excellent properties of all our CAD/CAM element offerings are designed for high reliability and predictability.

With our innovative and constantly evolving solution combined with our extensive service and support program, you have an excellent foundation for successful prosthetic restorations.

## 2. GENERAL INFORMATION

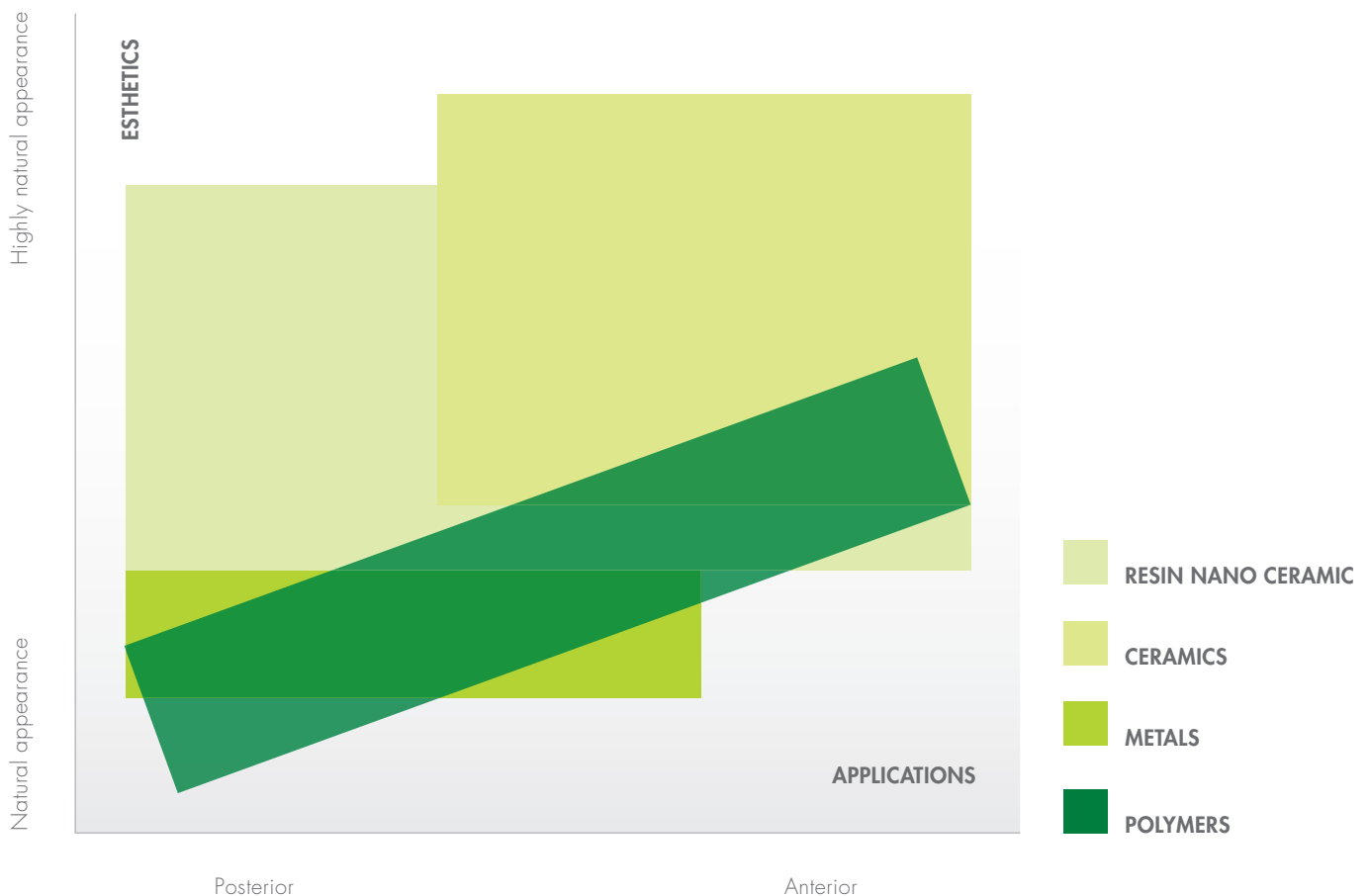
### 2.1 Product Description

Straumann® CARES® Tooth prosthetic restorations are used on natural teeth or for the restoration of Straumann® Implants and prosthetic solutions. Straumann® CARES® Tooth prosthetic restorations allow individual customization regarding function and esthetics for various applications.

Straumann® CARES® Tooth prosthetic restorations are designed by the customer using a Straumann approved software (such as Straumann® CARES® Visual). The design data is then transferred to Straumann where the individualized restorations are fabricated.

### 2.2 Intended use

Straumann® CARES® Tooth prosthetic restorations are intended to restore natural teeth or to be placed on top of abutments.



## 2.3 Material features and benefits

### Resin Nano Ceramic

---



#### **3M™ ESPE™ Lava™ Ultimate Restorative**

(RNC manufactured by 3M)

- Designed to be durable and reliable
- Brilliant esthetics with long-lasting polish
- High efficiency thanks to easy adjustment and polish
- Tooth-preserving wear and shock-absorbent maintaining functional balance

### Ceramics

---



#### **3M™ ESPE™ Lava™ Plus High Translucency Zirconia**

(high translucent zirconium dioxide manufactured by 3M)

- Outstanding esthetics with true colors\* and a plus in translucency
- Beautifully durable
- Incredibly strong and versatile

\* available in 16 high translucency shades with an excellent match to the VITA® Classical Shade Guide and 2 high translucency bleach shades



#### **zerion®**

(low translucent zirconium-dioxide ceramic)

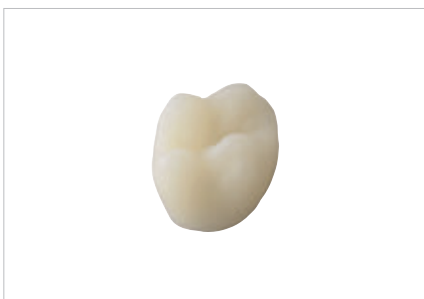
- Broad range of applications for high flexibility
- High-stability frameworks designed for a predictable prosthetic outcome



#### **IPS e.max® CAD**

(lithium-disilicate glass-ceramic manufactured by Ivoclar Vivadent AG)

- All-ceramic restorations for efficient esthetics
- Versatility for easy handling
- High-strength product designed for reliable restorations



#### **IPS Empress® CAD**

(leucite glass-ceramic manufactured by Ivoclar Vivadent AG)

- All-ceramic restorations for natural looking esthetics
- Simplicity for easy handling
- Well-established product designed for predictable restorations



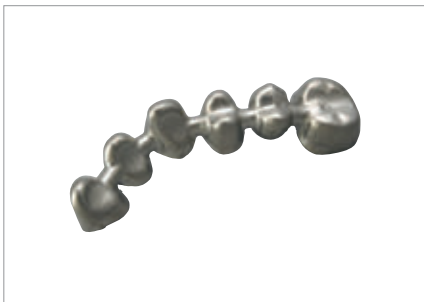
### **VITA® Mark II and TriLux**

(feldspar ceramic manufactured by VITA Zahnfabrik H. Rauter GmbH & Co. KG)

- Wide range of shades for natural looking esthetics
- Versatility for easy handling
- High-quality material designed for predictable results

## **Metals**

---



### **ticon®**

(titanium)

- Milled frameworks designed for high reliability and precision
- Veneering processing comparable to noble casting alloys for easy processing
- Ideal alternative to noble casting alloys



### **coron®**

(cobalt-chromium alloy)

- Milled frameworks for consistent and high quality
- Broad range of applications for high flexibility
- Veneering processing comparable to noble casting alloys for easy processing

## Polymers

---



### **polycon® ae**

(PMMA-based acrylate resin)

- Specially suited for full-contoured temporary restorations for high efficiency
- Excellent compound stability for easy handling



### **polycon® cast**

(filler-free acrylate burn-out resin)\*

- Specifically for conventional crown and bridge wax-up (can be burned out without residue)

\*polycon® cast is not to be inserted into the patient's mouth to check the fit. polycon® cast is not a medical device!

## 2.4 Indications

Straumann® CARES® CAD/CAM offers you a broad array of materials with an extensive range of applications.

		APPLICATIONS <sup>1</sup>											
		Single-tooth restorations					Bridges			Specials			
		Coping	Partial crown	Crown	Veneer	Inlay/Onlay <sup>2</sup>	Inlay/Maryland bridge	Bridge maximum unit <sup>3</sup>	Maximum pontics in the anterior/posterior region	Telescopic crown	Bar and retaining attachment		
MATERIALS <sup>1</sup>	<b>RESIN NANO CERAMIC</b>												
	3M™ ESPE™ Lava™ Ultimate Restorative – LT & HT				●	●							
	<b>CERAMICS</b>												
	3M™ ESPE™ Lava™ Plus Zirconia – HT	●		●		●	●	16	4/2	●	●		
	zerion® LT	●				●	●	16	4/2	●	●		
	IPS e.max® CAD – MO	●											
	IPS e.max® CAD – LT		●	●	●								
	IPS e.max® CAD – HT		●	●	●	●							
	IPS Empress® CAD – Multi & LT		●	●	●								
	IPS Empress® CAD – HT				●	●							
	VITA® Mark II		●	●	●	●							
	VITA® Triluxe		●	●	●								
	<b>METALS</b>												
	ticon®	●		●		●	●	16	4/3	●	●		
	coron®	●		●		●	●	16	4/3	●	●		
	<b>POLYMERS</b>												
	polycon® ae	●		●		●	●	16	1/1				
	polycon® cast	◆		◆		●	◆	16	4/4	◆	◆		

● strongly recommended application    ● possible application    ◆ acrylic burn-out

<sup>1</sup> Application and material availability might differ from country to country.

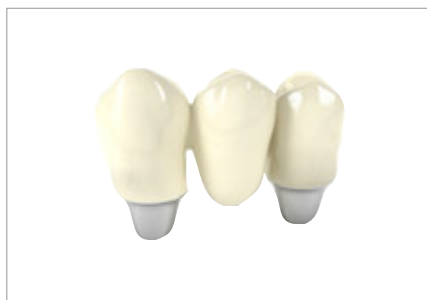
<sup>2</sup> Veneerable inlay/onlay for 3M™ ESPE™ Lava™ Plus Zirconia, zerion®, ticon®, coron®, polycon® ae and polycon® cast materials.

<sup>3</sup> Availability of maximum bridge unit might differ from country to country.



## 2.5 CARES® X-Stream™ one-step prosthetic solution

### CARES® X-Stream™



#### The one-step prosthetic solution: 1 scan, 1 design, 1 delivery

CARES® X-Stream™ is an innovative example of an efficient digital workflow, streamlining clinical steps and simplifying lengthy processes, while ensuring high quality prosthetics.

CARES® X-Stream™ provides a full prosthetic solution, flexible in use, to restore Straumann implants. With only one scan procedure and one simultaneous and adaptive prosthetic element design, all required prosthetic components (e.g. abutments and their relevant bridge) are manufactured in the Straumann validated environment and arrive together in one delivery with an excellent fit of the components. This optimization of the necessary processing steps significantly reduces turnaround time and related costs considerably.

#### CARES® X-Stream™ restorative options<sup>1</sup>

	SINGLE TOOTH						PARTIAL					EDENTULOUS				
	Coping or full-contour crown						Full-contour bridge, bridge framework or bar <sup>7</sup>					Full-contour bridge, bridge framework or bar <sup>8</sup>				
	3M™ ESPET™ Lava™ Plus Zirconia	zerion® LT <sup>5</sup>	IPS e.max® CAD	coron®	ticon®	polycon® ae	3M™ ESPET™ Lava™ Plus Zirconia	zerion® LT <sup>5</sup>	coron®	Titanium for CARES® SRBB <sup>5</sup>	polycon® ae <sup>6</sup>	3M™ ESPET™ Lava™ Plus Zirconia	zerion® LT <sup>5</sup>	coron®	Titanium for CARES® SRBB <sup>5</sup>	polycon® ae <sup>6</sup>
CARES® Abutment, ZrO <sub>2</sub> <sup>2</sup>	●	●	●			●	●	●			●	●	●			●
CARES® Abutment, Ti <sup>3</sup>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Variobase® for Crown <sup>4</sup>	●	●	●	●		●										
Variobase® for Bridge/Bar <sup>4</sup>							●	●	●	●	●	●	●	●	●	●
Variobase® Coping for Bridge/Bar <sup>4</sup>							●	●	●	●	●	●	●	●	●	●

● possible restorative option    ● restoration option available in second half of 2015

<sup>1</sup> Application and material availability might differ from country to country

<sup>2</sup> Not available for the Soft Tissue Level NNC and WN Platforms; all full-contour restorations or frameworks available without screw channel holes

<sup>3</sup> Not available for the Soft Tissue Level NNC Platform; all full-contour restorations or frameworks available without screw channel holes

<sup>4</sup> All full-contour restorations, frameworks or bars available with screw channel holes

<sup>5</sup> Not available for full-contour restorations

<sup>6</sup> Not available for bars

<sup>7</sup> Up to 7-tooth replacement; up to 4 implant-abutment connections

<sup>8</sup> Up to full arch, up to 10 implant-abutment connections

## 2.6 Material selection

### 2.6.1 Restoration shade/color

The selected Straumann® CARES® Tooth prosthetic materials are available in various shades for maximum flexibility and application variety to meet individual patient needs.

#### 2.6.1.1 Resin Nano Ceramic – 3M™ ESPE™ Lava™ Ultimate Restorative

The 3M™ ESPE™ Lava™ Ultimate Restorative material is available in two levels of translucency:

- **High Translucency (HT)** available in the following shades: A1, A2, A3, B1
- **Low Translucency (LT)** available in the following shades: A1, A2, A3, A3.5, B1, C2, D2, Bleach

#### 2.6.1.2 Ceramics

##### 3M™ ESPE™ Lava™ Plus Zirconia

The 3M™ ESPE™ Lava™ Plus Zirconia material is available in 16 high translucency shades with an excellent match to the VITA® Classical Shade Guide (A1; A2; A3; A3.5; A4; B1; B2; B3; B4; C1; C2; C3; C4; D2; D3 and D4) and 2 high translucency bleach shades (W1 and W3)

##### zerion®

The Straumann® CARES® zerion® Low Translucency (LT) material is available for frameworks in the following shades: Bleach, Light 1, Light 2, Light 3, Light 4, Medium 1, Medium 2, Medium 3, Dark

##### IPS e.max® CAD

The IPS e.max® CAD material is available in three levels of translucency:

- **High Translucency (HT)** available in the following shades: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4, BL1, BL2, BL3, BL4
- **Low Translucency (LT)** available in the following shades: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4, BL1, BL2, BL3, BL4
- **Medium Opacity (MO)** available in the following shades: MO 0, MO 1, MO 2, MO 3, MO 4

##### IPS Empress® CAD

The IPS Empress® CAD material is available in three levels of translucency:

- **High Translucency (HT)** available in the following shades: A1, A2, A3, A3.5, B1, B2, B3, C2, D3
- **Low translucency (LT)** available in the following shades: A1, A2, A3, A3.5, B1, B2, B3, C2, D3, BL1, BL2, BL3, BL4
- **Multi** available in the following A-D and Bleach (BL) shades: A1, A2, A3, A3.5, B1, BL1, BL3

##### VITA® Mark II

The VITA® Mark II material is available in the following monochromatic shades: 0M1C, 1M1C, 1M2C, 2M1C, 2M2C, 2M3C, 3M1C, 3M2C, 3M3C, 4M2C, A1C, A2C, A3C according to the VITA color system.

##### VITA® TriLuxe

The VITA® TriLuxe material is available in the following three multilayer shades: 1M2C, 2M2C, 3M2C according to the VITA color system.

#### 2.6.1.3 Polymer – polycon® ae

The Straumann® CARES® polycon® ae material is available in five shades: A1, A2, A3, B1, B2

### 2.6.2 Processing techniques

Depending on the processing technique and indication, the following recommendation can be made regarding the choice of material:

					PROCESSING TECHNIQUE											
					Full-contour					Cut-back				Layering		
					Inlay/Onlay	Veneer	Partial crown	Crown	Bridge	Veneer	Partial crown	Crown	Bridge	Veneerable inlay	Coping	Bridge
RESIN NANO CERAMIC																
3M™ ESPE™ Lava™ Ultimate Restorative – HT/LT					●	●										
CERAMICS																
3M™ ESPE™ Lava™ Plus Zirconia – HT								●	●			●	●	●	●	●
zerion® LT														●	●	●
IPS e.max® CAD – HT					●	●	●	●		●	●	●				
IPS e.max® CAD – LT						●	●	●		●	●	●				
IPS e.max® CAD – MO														●**		
IPS Empress® CAD – HT					●	●				●						
IPS Empress® CAD – LT						●	●	●		●		●*				
IPS Empress® CAD – Multi						●	●	●		●						
VITA® Mark II					●	●	●	●		●		●*				
VITA® Triluxe						●	●	●		●		●*				
METALS																
ticon®								●	●			●	●	●	●	●
coron®								●	●			●	●	●	●	●
POLYMERS																
polycon® ae								●	●			●	●	●	●	●
polycon® cast								●	●			●	●	●	●	●

- possible

\* only for anterior crowns

\*\* only for anterior crowns and premolars

### 2.6.3 Processing steps

Depending on the indication, material and chosen technique, different processing steps can be followed to achieve the final restoration.

		PROCESSING STEPS						
		None	Crystallization	Polishing	Glazing	Staining/Characterization	Layering	Build-up/Adding-on
<b>RESIN NANO CERAMIC</b>								
	3M™ ESPET™ Lava™ Ultimate Restorative – LT & HT	●		●		●		●
<b>CERAMICS</b>								
	3M™ ESPET™ Lava™ Plus Zirconia* – HT			●	●	●	●	
	zerion® LT						●	
	IPS e.max® CAD – MO		●				●	
	IPS e.max® CAD – LT & HT		●		●	●	●	
	IPS Empress® CAD – Multi, LT & HT	●		●	●	●	●	
	VITA® Mark II & TriLuxe	●		●	●	●	●	
<b>METALS</b>								
	ticon®			●			●	
	coron®			●			●	
<b>POLYMERS</b>								
	polycon® ae	●		●			●	
	polycon® cast	n.a.						

● mandatory processing step and/or technique

● possible processing step and/or technique

(Note: depending on the material selected, some steps can be combined)

\* Full-contour restorations made of 3M™ ESPET™ Lava™ Plus Zirconia shall be either polished or glazed

## 3. TOOTH PREPARATION

### 2.7 Warning

The instructions provided are insufficient to serve as the only means for processing and placing Straumann® CARES® Tooth prosthetic restorations and related components. Only those dental professionals thoroughly trained in dental restorations should be processing and placing these restorations. Processing and placing Straumann® CARES® Tooth prosthetic restorations and related components without proper training may lead to failure of the restoration and other complications. Restoration failure may lead to restoration removal or other complications.

Failure to follow the procedures outlined in these instructions may harm the patient and/or lead to any or all of the following complications:

- Aspiration or ingestion of components
- Damage to the components or teeth
- Loosening of the restoration or other components
- Improper final restoration or malfunction of the restoration application
- Impairment of the patient's chewing function

### Warning

Apply appropriate precautions in order to prevent aspiration and/or ingestion when placing Straumann® CARES® Tooth prosthetic restorations and related components.

For restorations used in combination with Straumann abutments, the final restoration shall only be placed in occlusion when the implant is completely osseointegrated.

### 2.8 Use and handling

If the Straumann® CARES® Tooth prosthetic restorations are not processed and placed by the same dental professional, these instructions for use shall be transmitted to the person placing the restoration.

For restorations used in combination with Straumann abutments, the instructions for use of the Straumann abutment shall be transmitted to the dentists as including the use and handling of the complete final restoration (including compatibility, cleaning, disinfection and sterilization information).

Straumann® CARES® Tooth prosthetic restorations are not sterile when delivered. The restoration needs to go through a standard disinfection or comparable cleaning process before being placed.

For successful results with Straumann® CARES® Tooth prosthetic restorations, the following tooth preparation guidelines shall be observed:

- The preparation shall not have angles or sharp edges.
- The shoulder preparation shall be with rounded inner edges and/or chamfer.
- The preparation shall have retentive surfaces for conventional cementation and/or self-adhesive cementation.

*Additional preparation guidelines specific to 3M™ ESPE™ Lava™ Ultimate Restorative 3M™ ESPE™ Lava™ Plus Zirconia, IPS e.max® CAD, IPS Empress® CAD, VITA® Mark II and TriLuxe shall also be observed – see Appendix D.*

## 4. SCANNING, RESTORATION DESIGN AND FINISHING

### 4.1 Data digitization and restoration design

The patient situation can be scanned with a Straumann-approved intra-oral scanner and the data is then imported in a Straumann-approved software.

The patient situation can be taken with a conventional impression tray. The dental laboratory will scan the fabricated master model (preferably with removable segments) with a Straumann-approved desktop scanner.

Once the patient situation is digitized, the individualized restoration is designed with Straumann® CARES® Visual or a Straumann-approved software.

- For Straumann® CARES® Tooth restorations, please ensure that the designed prosthetic components meet the restoration thickness guidelines (see Appendix A). Only the Straumann® CARES® Visual software is engineered to ensure that the restoration thickness guidelines are met.
- For bridge constructions, the cross-sections shall be adjusted in relation to the total size of the bridge work and the transition from a connector to a crown or coping shall be rounded.
- For specific preparations (e.g. sharp incisal edge, flat preparation), the Straumann® CARES® Visual software die parameters can be adapted (see Appendix B).

Our customers not yet having the requisite scanning and/or software can also take advantage of our CARES® Scan & Shape Service<sup>1</sup>, a simple way to our complete digital offering with an on-demand design service based on the specifications from wax-ups or models provided.

For further information, please refer to the instructions for use of the respective scanner and software.

<sup>1</sup> The CARES® Scan & Shape service is not available in all countries; please check with your local sales representative for further information.

### 4.2 Restoration finishing and processing

#### 4.2.1 Finishing

Straumann® CARES® Tooth prosthetic restorations may need to be ground for finishing and adjusting. For successful results the following rules shall be observed:

- The restoration thickness guidelines shall be followed (see Appendix A).
- Only suitable grinding instruments (see Appendix E) for the selected material shall be used for finishing and adjusting the Straumann® CARES® Tooth prosthetic restorations.

**Warning:** Take appropriate precautions in order to prevent inhalation of grinding/polishing dust.

*Additional finishing guidelines specific to each of our Straumann® CARES® Tooth prosthetic material shall also be observed – see Appendix D.*

#### 4.2.2 Processing

Depending on the material, processing technique and indication selected, the Straumann® CARES® Tooth prosthetic restorations can be directly seated or finalized through different processing steps (see chapter 2.6.3 Processing steps).

The processing steps can be overall described as follows:

##### a) Crystallization

This processing step is exclusive and mandatory for IPS e.max® CAD restorations by Straumann® CARES®. The flexural strength of the delivered IPS e.max® CAD restoration by Straumann® CARES® is  $\geq 130$  MPa. To reach its final flexural strength of  $\geq 360$  MPa and its final optical characteristics (shade, translucency and brightness), the IPS e.max® CAD restoration by Straumann® CARES® need to go through a crystallization firing in a furnace at 840°C – 850°C (1544°F – 1562°F). Further information on the crystallization, compatible furnaces, firing programs, etc. is available in the instructions for use.

##### b) Polishing

In this processing technique, the delivered full-contour restoration is only polished.

##### c) Glazing

In this processing technique, glazing is applied on the delivered full-contour restoration followed by a glaze firing. For IPS e.max® CAD restorations by Straumann® CARES®, the crystallization and glaze firing can be performed in one step.

##### d) Staining

In this processing technique, staining is applied on the delivered full-contour restoration. Depending on the material, the restoration is then either polished or glazed and followed by a stain and glaze firing.

For IPS e.max® CAD restorations by Straumann® CARES®, the crystallization, stain and glaze firing can be performed in one step.

##### e) Layering

In this processing technique, various layering materials are fired on the delivered framework.

All commercially available veneering materials intended for layering the selected material and suitable for the CTE value

of the selected material (see Appendix C) can be used. The processing instructions of the veneering material manufacturers shall be followed.

Before layering, the restoration shall be cleaned with a steam jet.

##### f) Build-up or adding-on

This processing step is exclusive for Straumann® CARES® Restorations made of 3M™ ESPE™ Lava™ Ultimate Restorative. It allows to adjust the restoration with additive technique. In this processing technique, methacrylate based lightcured restorative is applied on the delivered full-contour restoration, followed by light curing and polishing.

For restorations used in combination with Straumann abutments, always finalize the restoration prior to bonding to the Straumann abutment.

*Additional processing guidelines specific to each of our Straumann® CARES® Tooth prosthetic material shall also be observed – see Appendix D.*

### 4.2.3 Seating/Bonding

Depending on the indication and material selected, the restoration can be seated using adhesive, self-adhesive or conventional cementation (see table below).

CEMENTATION	
	Adhesive Self-adhesive Conventional Temporary
<b>RESIN NANO CERAMIC</b>	
3M™ ESPE™ Lava™ Ultimate Restorative	● ●
<b>CERAMICS</b>	
3M™ ESPE™ Lava™ Plus Zirconia	● ● ● ●
zerion®	● ● ●
IPS e.max® CAD*	● ●* ●*
IPS Empress® CAD	● ●
VITA® Mark II & Triluxe*	● ●*
<b>METALS</b>	
ticon®	●
coron®	●
<b>POLYMERS</b>	
polycon® ae	●
polycon® cast	n.a.

\* for crowns only

Only suitable cementation systems for the selected material shall be used. The instructions for use of the cement manufacturer shall be followed.

#### a) Seating on natural teeth

Before being seated, the restoration shall be prepared (the conditioning of the ceramic or metal surface is decisive for generating a sound bond between the cementation material and the restoration) and the preparation shall be conditioned.

- Thoroughly clean the restoration.
- Remove the temporary restoration (when relevant) and clean the preparation thoroughly.
- Conduct the clinical try-in and check the occlusion and articulation before conditioning.
- If adjustments are required, polish the restoration extraorally.
- Condition the restoration and preparation in accordance with the processing instructions of the selected cementation material before cementation.

#### b) Bonding on Straumann Abutments

To bond the restorations on Straumann Abutments, the following steps shall be observed:

- Fix the Straumann Abutment to the implant analog with a screw (hand-tight).
- Seal the screw channel with wax.
- Apply dental cement on the Straumann Abutment. Only suitable cementation systems for the selected material shall be used. The instructions for use of the cement material manufacturer shall be followed.
- Bond the restoration to the Straumann Abutment.
 

**Note:** It is not necessary to sandblast Straumann® Variobase® prior to bonding.
- Immediately remove cement excess from the Straumann Abutment and polish the lower margin of the restoration after the cement has set. Clean the final restoration with a steam jet prior to sending it to the dentist.
 

**Note:** Before placing the restoration in the patient's mouth, the product must be cleaned, disinfected and sterilized (Autoclave (moist heat) at 134 °C (273 °F) for 5 minutes). The instructions for use of the Straumann Abutment shall be followed.

*Additional seating guidelines for 3M™ ESPE™ Lava™ Ultimate Restorative, 3M™ ESPE™ Lava™ Plus Zirconia, IPS e.max® CAD, IPS Empress® CAD, VITA® Mark II and Triluxe shall also be observed – see Appendix D.*

### 4.2.4 Removal of a seated restoration

To remove a seated restoration, the following steps shall be observed:

- Grind down the approximal contact at the restoration in order to release and protect the adjacent teeth.
- Use conventional dental tools and adequate water cooling to slit the restoration.
- Lift and pull off the restoration with common dental tools.

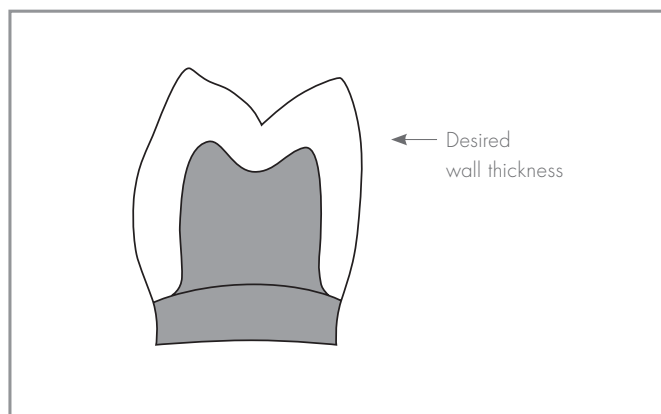


## Appendix A – Restoration thickness guidelines

### Appendix A1 – Guiding principle

Different minimum wall thickness guidelines apply depending on the wished material, indication and tooth position. The validated workflow of our CARES® Visual software simply incorporates all these settings to ensure that the designed restoration meets the various requirements.

To keep this safe and guided environment, while granting more flexibility to meet specific individual patient situations, a flexible



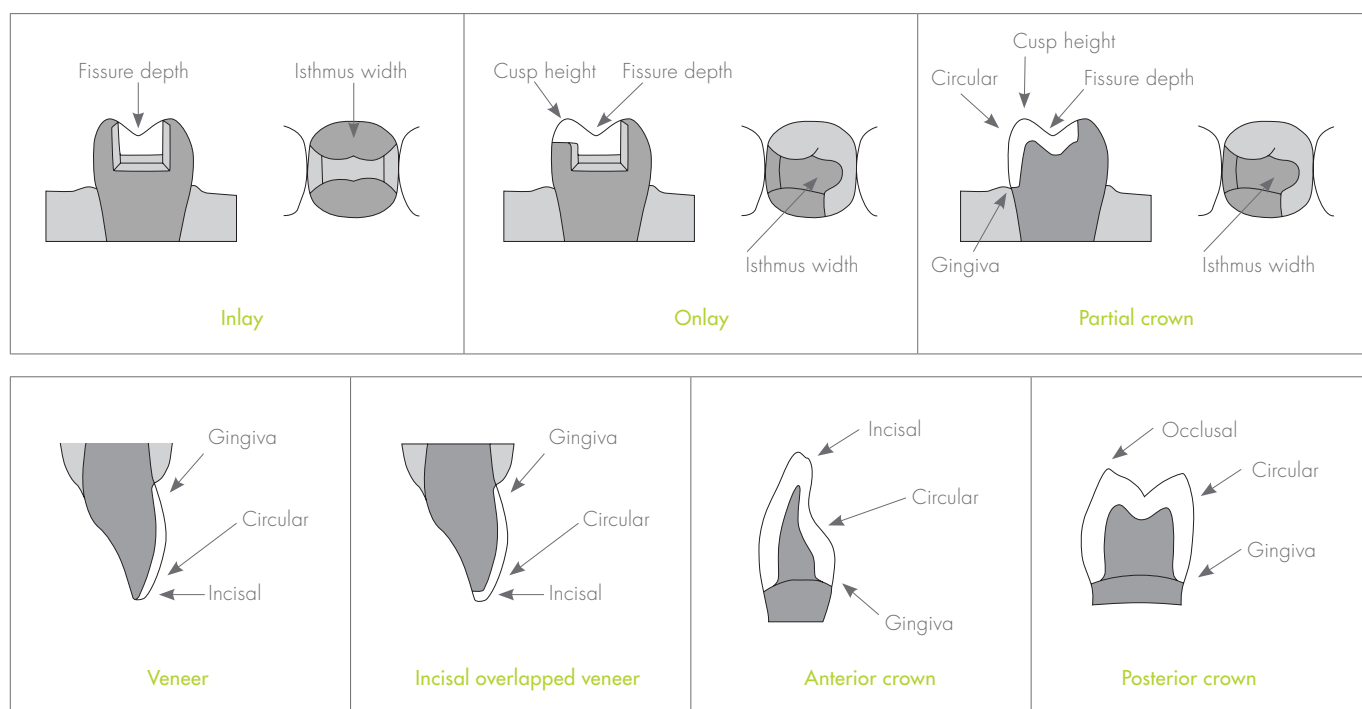
validated workflow is also available with following restoration wall thickness options:

- If the desired wall thickness is above the one specified in the relevant instructions for use, the restoration is delivered as to-day **with our Straumann Guarantee**<sup>1</sup>.
  - If the desired wall thickness is below the one specified in the relevant instructions for use, the restoration is delivered **without Straumann Guarantee**<sup>1</sup>.
- Note:** Within the validated workflow, our CARES® Visual software (version 8.8 or higher) will inform pro-actively our CARES® customers and ask them to confirm their desire to receive the restoration without the Straumann Guarantee<sup>1</sup>.
- If the desired wall thickness is below the defined Straumann value, the restoration cannot be ordered as its quality and stability beyond this wall thickness is questionable.

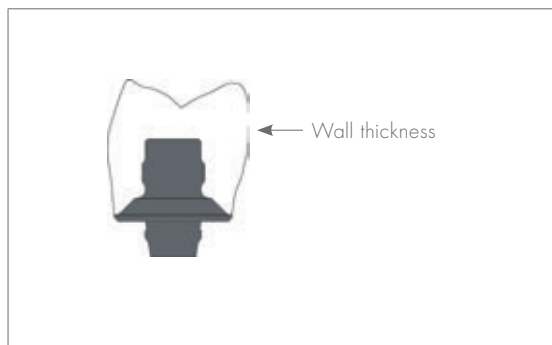
<sup>1</sup> 5 or 10 years guarantee depends on the material. See Straumann® Guarantee (152.360) for details.

### Appendix A2 – Definitions

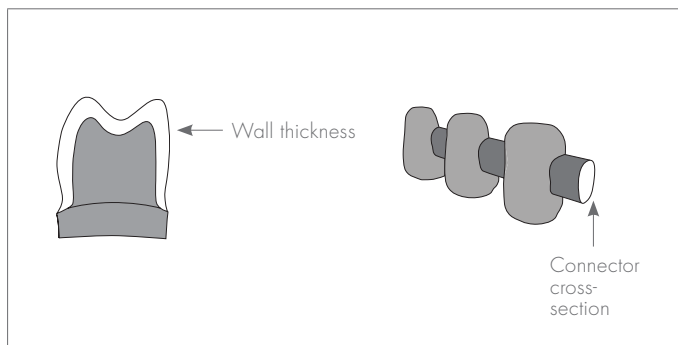
Single-unit restoration



## Restoration on Variobase®



## Bridge construction



## Appendix A3 – Full-contour

### FULL-CONTOUR MINIMUM THICKNESS GUIDELINES

Inlay/Onlay	Veneer	Partial crown	Anterior crown	Posterior crown	Anterior Bridge	Posterior Bridge
Cusp height (mm)						
Fissure depth (mm)						
Isthmus width (mm)						
Gingiva (mm)						
Circular (mm)						
Incisal (mm)						
Gingiva (mm)						
Circular (mm)						
Cusp height (mm)						
Fissure depth (mm)						
Isthmus width (mm)						
Incisal (mm)						
Circular (mm)						
Gingiva (mm)						
Occlusal (mm)						
Circular (mm)						
Gingiva (mm)						
Wall thickness (mm)						
Connector cross-section (mm <sup>2</sup> )						
Maximum pontics						
Wall thickness (mm)						
Connector cross-section (mm <sup>2</sup> )						
Maximum pontics						

### RESIN NANO CERAMIC

3M™ ESPE™ Lava™ Ultimate – HT & LT

1.5

0.4

0.6

0.5\*

### CERAMICS

3M™ ESPE™ Lava™ Plus Zirconia – HT

1.0

0.6

0.7

1.0

1.5

0.3

0.5

0.3

7

4

0.5

9

2

IPS e.max® CAD – HT

1.0

0.6

0.7

1.0

1.5

1.5

1.2

1.0

1.5

1.0

IPS e.max® CAD – LT

2.0

1.5

0.6

0.7\*\*

1.0

1.5

2.0

1.5

2.0

1.5

1.0

2.0

1.5

1.0

IPS Empress® CAD – HT

2.0

1.5

0.6

0.7\*\*

1.0

1.5

2.0

1.5

2.0

1.5

1.0

2.0

1.5

1.0

IPS Empress® CAD – LT & Multi

2.0

1.5

0.5

1.0

2.0

1.5

1.5

1.0

2.0

1.0

VITA® Mark II

2.0

1.5

0.5

1.0

2.0

1.5

1.5

1.0

2.0

1.0

VITA® TriLuxe

### METALS

ticon®

0.4

0.4

0.4

5

4

0.4

5

3

coron®

0.3

0.3

0.3

5

4

0.3

5

3

### POLYMERS

polycon® ae

0.6

0.6

0.6

9

1

0.6

9

1

polycon® cast

0.25

0.25

0.25

5

4

0.25

5

4

## Appendix A4 – Cut-back

CUT-BACK MINIMUM THICKNESS GUIDELINES						
Veneer*	Partial crown	Anterior crown	Posterior crown	Anterior Bridge	Posterior Bridge	
Gingiva (mm)						
Circular (mm)						
Incisal (mm)						
Gingiva (mm)						
Circular (mm)						
Cusp height (mm)						
Gingiva (mm)						
Circular (mm)						
Incisal (mm)						
Gingiva (mm)						
Circular (mm)						
Occlusal (mm)						
Wall thickness (mm)						
Connector cross-section (mm <sup>2</sup> )						
Maximum pontics						
Wall thickness (mm)						
Connector cross-section (mm <sup>2</sup> )						
Maximum pontics						

## CERAMICS

3M™ ESPE™ Lava™ Plus Zirconia – HT						0.3			0.5		0.3	7	4	0.5	9	2
IPS e.max® CAD – HT & LT	0.6	0.4	1.0	1.5	1.3	1.0	1.2	0.4	1.5	1.0						
IPS Empress® CAD – Multi & HT	0.6	0.5														
IPS Empress® CAD – LT						0.5	1.5	1.0								
VITA® Mark II & TriLux	0.5					1.0										

## METALS

ticon®			0.4	0.4	0.4	5	4	0.4	5	3
coron®			0.3	0.3	0.3	5	4	0.3	5	3

## POLYMERS

polycon® ae			0.6	0.6	0.6	9	1	0.6	9	1
polycon® cast			0.25	0.25	0.25	5	4	0.25	5	4

\* includes incisal overlapped veneer

\*\* 1.3 for molars.

## Appendix A5 – Veneerable frameworks

FRAMEWORK MINIMUM THICKNESS GUIDELINES							
Anterior coping	Posterior coping	Anterior bridge			Posterior bridge		
Wall thickness (mm)	Wall thickness (mm)	Wall thickness (mm)	Connector cross-section (mm <sup>2</sup> )	Maximum pontics	Wall thickness (mm)	Connector cross-section (mm <sup>2</sup> )	Maximum pontics

CERAMICS
3M™ ESPET™ Lava™ Plus Zirconia – HT
zerion® – LT
IPS e.max® CAD – MO (up to premolar)

0.3	0.3	7	4	0.5	9	2
0.5	0.5	9	4	0.5	9	2
0.8*						

METALS
ticon®
coron®

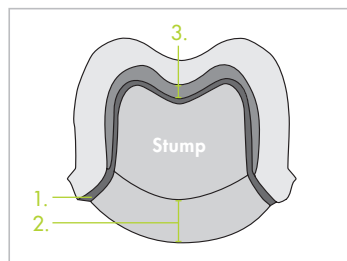
0.4	0.4	5	4	0.4	5	3
0.3	0.3	5	4	0.3	5	3

POLYMERS
polycon® ae
polycon® cast

0.6	0.6	9		0.6	9	1
0.25	0.25	5		0.25	5	4

\* 1.0 mm occlusal for premolars

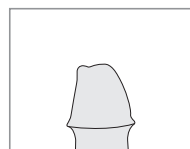
## Appendix B – Instructions for setting the die parameters (Straumann® CARES® Visual – Version 7.0 and higher)



### PARAMETERS

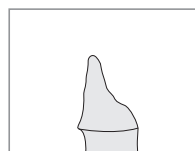
- Settable parameters

1. Cement gap
2. Collar position
3. Extra vertical gap



### NORMAL PREPARATION

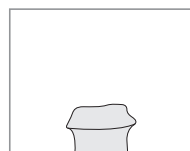
- No parameter adjustments necessary



### SHARP INCISAL EDGE

- Increase *Extra vertical gap*  
Note: increase *Collar position* additionally by extreme shoulder

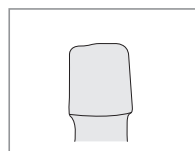
by approx.  
0.01–0.02 mm



### FLAT PREPARATION, VERY CONICAL PREPARATION

- Increase *Collar position* (up to max. 2/3 of die height) to achieve friction
- Reduce *Cement gap* for a tighter fit

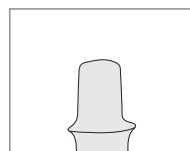
by approx.  
0.01–0.02 mm



### PREPARATION WITH PARALLEL WALLS WITHOUT SHOULDER

- Increase *Cement gap* to achieve a looser fit
- Reduce *Cement gap* if a tighter fit should be achieved

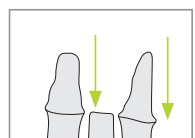
by approx.  
0.01–0.02 mm



### PREPARATION WITH PARALLEL WALLS AND SHOULDER

- Reduce *Extra vertical gap*
- Increase *Cement gap* to achieve a looser fit
- Reduce *Cement gap* if a tighter fit should be achieved

by approx.  
0.01–0.02 mm



### PARALLEL WALLS ON BRIDGES

- Reduce *Collar position*
- Increase *Cement gap* to achieve a looser fit

by approx.  
0.01–0.02 mm

The information above applies to all materials and is provided to optimize the individual fit. We generally advise you to use default settings or to make only minor adjustments.

## Appendix C – Chemical composition and physical properties

### Appendix C1 – 3M™ ESPE™ Lava™ Ultimate Restorative

#### Chemical composition

3M™ ESPE™ Lava™ Ultimate Restorative is a Resin Nano Ceramic containing approximately 80% (by weight) nanoceramic particles bound in the resin matrix. The ceramic particles are made up of three different ceramic fillers that reinforce a highly cross-linked polymeric matrix. The fillers are a combination of non-agglomerated/non-aggregated 20 nm (nanometer) silica filler, non-agglomerated/non-aggregated 4 to 11 nm zirconia filler, and aggregated zirconia/silica cluster filler (comprised of 20 nm silica and 4 to 11 nm zirconia particles).

#### Physical properties

Material	Resin Nano Ceramic
Density [g/cm <sup>3</sup> ]	2.1
Flexural strength [MPa]	204 ± 19

### Appendix C2 – 3M™ ESPE™ Lava™ Plus Zirconia

#### Chemical composition

ELEMENTS	WEIGHT
ZrO <sub>2</sub> + HfO <sub>2</sub> + Y <sub>2</sub> O <sub>3</sub>	≥ 99.0%
Y <sub>2</sub> O <sub>3</sub>	> 4.5 to ≤ 6.0%
HfO <sub>2</sub>	≤ 5%
Al <sub>2</sub> O <sub>3</sub>	≤ 0.5%
Other oxides	≤ 0.95%

#### Physical properties

Material	3Y-TZP
Density [g/cm <sup>3</sup> ]	≥ 6.05
Biaxial flexural strength according to ISO 5872 [MPa]	> 1000
CTE (20 – 500 °C) [10 <sup>-6</sup> K <sup>-1</sup> ]	10.5

### Appendix C3 – zerion®

#### Chemical composition

ELEMENTS	WEIGHT
ZrO <sub>2</sub> + HfO <sub>2</sub> + Y <sub>2</sub> O <sub>3</sub>	≥ 99.0%
Y <sub>2</sub> O <sub>3</sub>	> 4.5 to ≤ 6.0%
HfO <sub>2</sub>	≤ 5%
Al <sub>2</sub> O <sub>3</sub>	≤ 0.5%
Other oxides	≤ 0.5%

#### Physical properties

Material	Y-TZP-A
Density [g/cm <sup>3</sup> ]	≥ 6.05
Flexural strength [MPa]	≥ 800
CTE (20 – 500 °C) [10 <sup>-6</sup> K <sup>-1</sup> ]	10.5

## Appendix C4 – IPS e.max® CAD

### Chemical composition

ELEMENTS	WEIGHT
SiO <sub>2</sub>	57 – 80 %
Li <sub>2</sub> O	11 – 19 %
K <sub>2</sub> O	0 – 13 %
P <sub>2</sub> O <sub>5</sub>	0 – 11 %
ZrO <sub>2</sub>	0 – 8 %
ZnO	0 – 8 %
Others + coloring oxides	0 – 12 %

### Physical properties

AFTER CRYSTALLIZATION	
Material	Lithium-disilicate glass-ceramic
Flexural strength [MPa]	≥ 360
Fracture toughness [MPa m <sup>0.5</sup> ]	≥ 2
Chemical solubility [µg/cm <sup>2</sup> ]	≤ 50
CTE (100 – 500 °C) [K <sup>-1</sup> ]	10.45 ± 0.5

## Appendix C5 – IPS Empress® CAD

### Chemical composition

ELEMENTS	WEIGHT
SiO <sub>2</sub>	60 – 65 %
Al <sub>2</sub> O <sub>3</sub>	16 – 20 %
K <sub>2</sub> O	10 – 14 %
Na <sub>2</sub> O	3.5 – 6.5 %
Other oxides	0.5 – 7 %
Pigments	0.2 – 1 %

### Physical properties

Material	Leucite glass-ceramic
Density [g/cm <sup>3</sup> ]	2.5 ± 0.1
Vickers hardness HV	6200 ± 250
Flexural strength [MPa]	160 ± 20
Fracture toughness [MPa m <sup>0.5</sup> ]	1.3 ± 0.1
Chemical solubility [µg/cm <sup>2</sup> ]	25
Modulus of elasticity [GPa]	62 ± 8
CTE (100 – 500 °C) [10 <sup>-6</sup> K <sup>-1</sup> ]	17.5 ± 0.25

## Appendix C6 – VITA® Mark II and TriLux

### Chemical composition

ELEMENTS	WEIGHT
SiO <sub>2</sub>	56 – 64 %
Al <sub>2</sub> O <sub>3</sub>	20 – 23 %
K <sub>2</sub> O	6 – 8 %
Na <sub>2</sub> O	6 – 9 %
CaO	0.3 – 0.6 %
TiO <sub>2</sub>	0.0 – 0.1 %

### Physical properties

Material	fine-structure feldspar ceramic
Density [g/cm <sup>3</sup> ]	2.44 ± 0.01
Flexural strength [MPa]	154 ± 15
CTE (25 – 500 °C) [10 <sup>-6</sup> K <sup>-1</sup> ]	9.4 ± 0.1
Transformation range [°C]	780 – 790
Chemical solubility (ISO 6872) with Akzent finishing [µg/cm <sup>2</sup> ]	≈ 30

## Appendix C7 – ticon®

### Chemical composition

ELEMENTS	WEIGHT
Ti	Balance
O	≤ 0.25 %
Fe	≤ 0.30 %
N	≤ 0.03 %
C	≤ 0.08 %
H	≤ 0.015 %

### Physical properties

Color	Silver
Material	Titanium Grade 2
Yield strength $R_{p0.2}$ [MPa]	≥ 275
Tensile strength $R_m$ [MPa]	≥ 345
Elongation, A [%]	≥ 20
CTE (25 – 500 °C) [ $10^{-6}$ K <sup>-1</sup> ]	9.6

## Appendix C8 – coron®

### Chemical composition

ELEMENTS	WEIGHT
Co	Balance
Cr	28.0 %
W	8.50 %
Si	1.65 %
Additional elements below 1 %	Mn, N, Nb, Fe

### Physical properties

WITH THERMAL TREATMENT	
Color	Silver grey
Material	NPM alloy
Yield strength $R_{p0.2}$ [MPa]	≥ 360
Elongation at break $A_5$ [%]	≥ 2
CTE (25 – 500 °C) [ $10^{-6}$ K <sup>-1</sup> ]	14.3



## Appendix C9 – polycon® ae

### Chemical composition

ELEMENTS	WEIGHT
Polymethyl methacrylate (PMMA)	> 98 %
Methylmethacrylate	< 1 %
Dibenzoylperoxide	< 1 %
Pigments	< 0.5 %

### Physical properties

Material	PMMA
Biaxial flexural strength [MPa]	≥ 50
Water absorption [µg/mm³]	≤ 40
Water solubility [µg/mm³]	≤ 7.5

## Appendix C10 – polycon® cast

### Chemical composition

ELEMENTS	WEIGHT
Polymethyl methacrylate (PMMA)	> 98 %
Methylmethacrylate	< 1 %
Dibenzoylperoxide	< 1 %
Pigments	< 0.5 %

### Physical properties

Color	colorless
Material	PMMA

## Appendix D – Additional guidelines which are material specific

### Appendix D1 – Additional guidelines specific to 3M™ ESPE™ Lava™ Ultimate Restorative

#### Contraindications and side effects

Allergies or hypersensitivity to chemical ingredients of 3M™ ESPE™ Lava™ Ultimate Restorative – see “Chemical composition”.

#### Tooth preparation guideline

- For inlays and onlays, traditional design is recommended. Do not undercut. Taper the cavity walls 5–6 degrees to the long axis of the preparation. All internal edges and angles should be rounded. Incisal/occlusal reduction is 1.5 to 2 mm clearance in centric occlusion and all excursions.
- For veneers, standard reduction of the labial surface is 0.6 mm and 0.4 mm at the gingival portion because the enamel is thinner in this area. The reduction of the incisal, labial-lingual angle is 0.5 to 1.5 mm. Keep preparation margins in the enamel. Margins for the veneers should be above the gingival tissues. Proximal extensions should be far enough into the proximal region so margins do not show and have no proximal-gingival undercuts.

#### Finishing and polishing

The Straumann® CARES® Restorations made of 3M™ ESPE™ Lava™ Ultimate Restorative is supplied in a highly cured state. This material **should not be fired** under any circumstances during finishing.

- Clean the restoration in an ultrasonic cleaner or steam cleaner; gently blow dry with an air syringe.
- Check the fit of the final restoration to the preparation. If necessary, gently adjust contacts, occlusion and accentuate grooves using a fine needle diamond.
- To remove the bulk of the sprue, use either a sanding wheel or a coarse rubber wheel.
- For final finishing, use a diamond impregnated rubber wheel or a medium wheel to smooth.
- When polishing extraorally: use a bristle brush, spin brush in polishing agent to incorporate paste into brush. Apply to the surface of the restoration with low speed hand piece working slowly into surface.
- Buff with muslin rag wheel.
- When polishing intraorally, apply intraoral paste directly to unpolished restoration using a soft black, latch angle, intraoral prophyl brush. Paste must be worked slowly into surface. This will take about 1 minute. Use water or isopropanol alcohol while brush is rotating to disperse paste.
- Buff with diamond impregnated points/cups.

#### Processing

Before being processed, the restoration shall always be cleaned in an ultrasonic cleaner or steam cleaner, gently blow dry with an air syringe.

#### Recommended material for the characterization

3M™ Filtek™ Supreme Ultra/XTE/Z350 Universal Restorative.

Please refer to the material availability and instructions for use of 3M™ ESPE™.

#### Seating

For successful results with Straumann® CARES® Restorations made of 3M™ ESPE™ Lava™ Ultimate Restorative, do not use hydrofluoric acid etching and do not use phosphoric acid to clean the restoration.

- Ensure a tight fit with minimal cement gap.
- Clean the restoration in an ultrasonic cleaner or steam cleaner, gently blow dry with an air syringe.
- Check the fit of the final restoration. Adjust, finish and polish if necessary.
- Sandblast (air abrade) the bonding surface with aluminium oxide ( $Al_2O_3$ ) with a grain size < 50 µm at a pressure of 2 bars (30 psi).
- Clean the restoration with alcohol and dry the restoration. Ensure that the surface is free of contamination (e.g. saliva, acetone).
- Depending on the cement, apply appropriate primer/bonding agents. If no primer is recommended, apply silane to the bonding surface of the restoration. The instructions for use of the cement, primer/bonding manufacturer shall be followed.
- Follow the instructions for resin based materials provided with the cement selected.

#### Recommended cement

3M™ ESPE™ RelyX™ Ultimate Adhesive Resin Cement with 3M™ ESPE™ Scotchbond™ Universal Adhesive (Primer and Adhesive in one bottle).

Please refer to the material availability and instructions for use of 3M™ ESPE™.

#### Build-up or adding-on to the restorations

The Straumann® CARES® Restorations made of 3M™ ESPE™ Lava™ Ultimate Restorative is supplied in a highly cured state. This material **should not be fired** under any circumstances during build-up or adding-on.

- Extraorally roughen the site to be added to with a coarse diamond or stone, or air abrade (sandblast with 50 µm aluminum oxide). Clean the restoration in an ultrasonic cleaner with normal detergent.
- Intraorally roughen the site to be added to with a coarse diamond, stone or intraoral air abrasion unit. Rinse and clean the prepped site, then dry.
- Brush on 3M™ ESPE™ Scotchbond™ Universal Adhesive to the roughened area for 20 seconds and gently blow dry for 5 seconds.
- Light-cure adhesive for 10 seconds.
- Apply 3M™ Filtek™ Supreme Ultra/XTE/Z350 Universal Restorative (or other methacrylate based light-cured restorative) and light cure according to the instructions for use of the methacrylate based light-cured restorative manufacturer.
- Shape and smooth the addition using a medium wheel or diamond impregnated rubber wheel.
- Polish using the appropriate steps – see “Finishing and polishing”.

#### Recommended Build-up or Adding-on material

3M™ Filtek™ Supreme Ultra/XTE/Z350 Universal Restorative.

Please refer to the material availability and instructions for use of 3M™ ESPE™.

#### Further information

Straumann® CARES® Restorations made of 3M™ ESPE™ Lava™ Ultimate Restorative are manufactured with 3M™ ESPE™ Lava™ Ultimate Restorative from 3M company. Additional information on the 3M™ ESPE™ Lava™ Ultimate Restorative and 3M™ ESPE™ Lava™ solution is available on the 3M webpage ([www.3MESPE.com](http://www.3MESPE.com)).

### Appendix D2 – Additional guidelines specific to 3M™ ESPE™ Lava™ Plus Zirconia

#### Contraindications and side effects

- Allergies or hypersensitivity to chemical ingredients of the zirconium dioxide material ( $ZrO_2$ ,  $Y_2O_3$ ,  $HfO_2$ ,  $Al_2O_3$ ).
- Long span bridge and inlay/onlay/Maryland/cantilever bridges are contraindicated to patients with parafunctions (e.g. bruxist patients).

#### Use and handling

Occlusion check for full contour restorations: zirconia surfaces are not subject to any noteworthy abrasive wear. This must be considered when planning the therapy. Special attention must be paid to the design of the occlusal surface so that dynamic and static occlusion is correct. This should be checked regularly by a dentist, e.g. during preventive check-ups.

#### Tooth preparation

Further information is available in the 3M™ ESPE™ Clinical Handling Guidelines for Dentists and Labs available on the 3M website ([www.3MESPE.com](http://www.3MESPE.com)).

#### Finishing

Only suitable grinding instruments shall be used for finishing and adjusting the 3M™ ESPE™ Lava™ Plus Zirconia restoration:

- Turbine at 30'000rpm to 120'000rpm or fast running-handpiece at up to 30'000rpm; use of water cooling can always be recommended
- To avoid overheating the framework or restoration, apply only light pressure and smooth a particular area for only a short time.
- When a diamond grinder is used, use only fine-grain diamonds with grain sizes between fine 30 µ and extra-fine 15 µ. Whether the diamonds are bonded galvanically or ceramically is of importance only for the endurance of the diamond tool.
- If a diamond grinder is used for finishing work, rubber polishers must be used subsequently to smooth and polish the grinding marks to a high gloss so ensure the stability of the restoration. Disc- or cone-shaped rubber polishers can be used for the cervical areas of connectors.

## Processing

- Frameworks:
  - Never remove layers with hydrofluoric acid since this substance damages the 3M™ ESPE™ Lava™ Plus Zirconia restoration.
- Full contour restorations:
  - Full contour restorations made of 3M™ ESPE™ Lava™ Plus Zirconia shall be either glazed or polished to achieve a smooth surface, which is antagonist wear friendly. When polished, crown margins, fissures and cusps can be processed using the rubber polishers normally used for ceramics. Use diamonds polishing paste and a suitable polishing brush for the final polishing. Before polishing or glazing, the restoration shall be cleaned with a steam jet.

## Seating/Bonding

### Recommended cement

- RelyX Temp NE or RelyX™ Temp E for temporary cementation
- RelyX™ Luting Plus Automix for permanent conventional cementation
- RelyX™ Unicem 2 Automix or RelyX™ U200 for permanent self-adhesive cementation

## Further information

Straumann® CARES® Restorations made of 3M™ ESPE™ Lava™ Plus Zirconia are manufactured with 3M™ ESPE™ Lava™ Plus High Translucency Zirconia from 3M company. Additional information on the 3M™ ESPE™ Lava™ Plus Zirconia restorations and 3M™ ESPE™ Lava™ solution is available on the 3M website ([www.3MESPE.com](http://www.3MESPE.com)).

## Appendix D3 – Additional guidelines specific to zircon®

### Contraindications and side effects

- Allergies or hypersensitivity to chemical ingredients of the zirconium dioxide material ( $ZrO_2$ ,  $Y_2O_3$ ,  $HfO_2$ ,  $Al_2O_3$ ).

### Finishing

zircon® Frameworks delivered by Straumann should only be processed mechanically if absolutely necessary.

- Use only water-cooled, fine diamond tools, preferably  $\leq 100\mu m$ .
- Localized overheating may occur during grinding, which will result in fissures in the material.
- Use modern fine-grain diamonds for the careful reduction of edges and fine processing of surfaces.
- Use only diamond tools in excellent condition. A reduced cutting performance of the tool generates heat.
- Do not use dry polishing tools.
- The removal can be done with high rotational speed but with a low grinding pressure.
- Grinding of the interdental connections shall be avoided.
- The subsequent separation with cutting discs shall not be performed, as this would initiate breaking points.
- Grinding indents into the framework or sharp edges shall be avoided.
- Sandblasting of the veneering surfaces shall be avoided.

### Note

Through the mechanical surface processing such as polishing and sandblasting (with  $Al_2O_3$  or high luster sandblasting beads), critical amounts of energy may be added to the framework, which will damage the surface structure. The deformation of the crystal lattice structure might cause a phase change of the zirconium dioxide ceramic (from tetragonal to monoclinic). A monoclinic structure has a lower CTE (app.  $7 \times 10^{-6}/K$ ) than a tetragonal one.

If mechanical processing of the framework is required, a final thermal treatment is recommended for the regeneration of the structure (see table below).

Start temperature °C	→ min.	↗ min.	↗ (°C/min)	Temp. app. °C	→ min.	Vac
500	–	5.00	100	1000	15.0	–

### Note: Slow cooling recommended

Clean the zircon® Framework in an ultrasonic cleaner or with short steaming after processing.

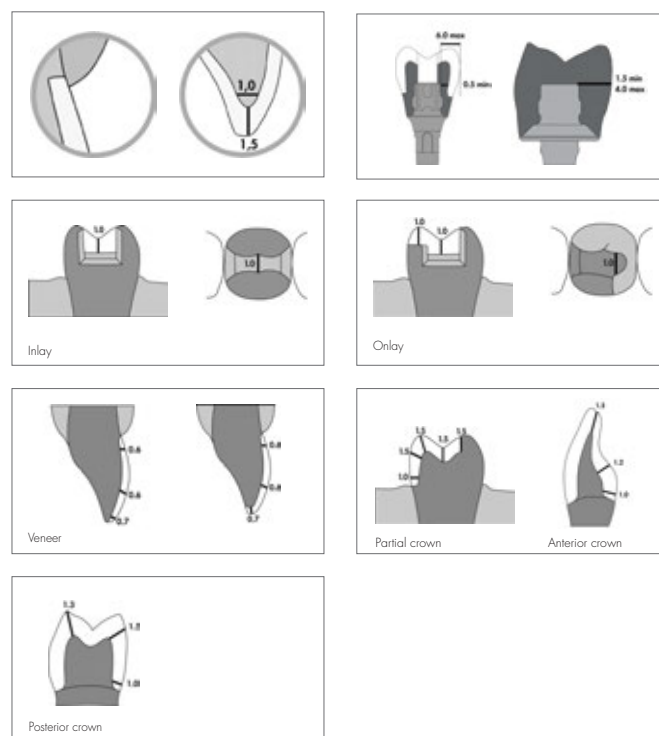
## Appendix D4 – Additional guidelines specific to IPS e.max® CAD

### Contraindications and side effects

- Allergies or hypersensitivity to chemical ingredients of the lithium-disilicate glass-ceramic material ( $SiO_2$ ,  $Li_2O$ ,  $K_2O$ ,  $P_2O_5$ ,  $ZrO_2$ ,  $ZnO$ , coloring oxides)
- Layering technique for molar crowns
- Very deep subgingival preparations
- Patients with severely reduced residual dentitions
- Bruxism
- Use of a luting composite other than Multilink® Hybrid Abutment to lute IPS e.max® CAD restorations by Straumann® CARES® on Straumann® Variobase® Abutments
- Intraoral adhesion of IPS e.max® CAD restorations by Straumann® CARES® on Straumann® Variobase® Abutments

### Preparation guideline

- The tooth preparation guidelines (see figure below) shall be followed.
- The preparation must demonstrate retentive surfaces for conventional and/or self-adhesive cementation.
- For inlays, onlays and partial crowns, the static and dynamic antagonist contacts must be taken into consideration and the preparation margin must not be located on the centric antagonist contacts.
- For veneers, if possible, the preparation should be located in the enamel and the incisal preparation margins should not be located in the area of static or dynamic enamel contact.
- For copings used in combination with Straumann® Variobase® Abutments, create an emergence profile with a right angle at the transition to the crown.
- For crowns used in combination with Straumann® Variobase® Abutments, the opening of the screw channel shall not be located in the area of contact points.



### Restoration design

For the cut-back and layering techniques, the following relationship of the layer thickness between IPS e.max® CAD (restoration) and IPS e.max® Ceram (veneer) must be observed:

For a total layer thickness of the restoration of respectively 0.8 mm, 1.0 mm, 1.2 mm, 1.5 mm, 1.8 mm, 2.0 mm, 2.5 mm and 3.0 mm, the minimum layer thickness of the delivered restorations (IPS e.max® CAD) must respectively be 0.4 mm, 0.5 mm, 0.6 mm, 0.8 mm, 1.0 mm, 1.1 mm, 1.3 mm, 1.6 mm and the maximum layer thickness of the veneer (IPS e.max® Ceram) must respectively be 0.4 mm, 0.5 mm, 0.6 mm, 0.7 mm, 0.8 mm, 0.9 mm, 1.2 mm, 1.4 mm.

## Finishing

- The IPS e.max® CAD restorations by Straumann® CARES® shall have enough support from the tooth shape (when relevant) and shall always make up at least 50% of the total layer thickness of the restoration.
- For restorations used in combination with Straumann® Variobase® Abutments, do not finish the shoulder and take into account the fit to the gingiva if the emergence profile has to be adjusted.
- For full-contour restorations, check the proximal and occlusal contacts.
- To prevent delamination and, in particular, chipping at the edges, the restorations shall be ground only with low rpms and light pressure.
- Overheating of the glass-ceramic shall be avoided.
- Do not blast the restoration with Al<sub>2</sub>O<sub>3</sub> or glass polishing beads.
- Recommended grinding instruments
  - For smoothing out of attachment points: DCB Grinder Disk (1), Diadur DD-8 Disk (2), Super Max (3), Diamond Stone Disk (4), Diagen Turbo Grinder Disk (5)
  - For finishing of surface: DCB Grinder Cone (1), Diadur DD-13 Cone (2), CeraPro (3), Diamond Stone Cone (4), Diagen Turbo Grinder Cone (5)
  - For finishing of margins: Ceramic Polisher 9690/9691 (1), Diapol L26DG/L26 Dmf (2), CeraGloss blue/yellow (3) Diamond Polisher (4), High End Power Disk 626-C/626-M (5)

**Manufacturers:** Komet Brasseler (1), EVE (2), edenta (3), Jota (4), Bredent (5)

## Processing

The flexural strength of the IPS e.max® CAD restorations by Straumann® CARES® is  $\geq 130$  MPa. To reach its final flexural strength of  $\geq 360$  MPa and its final optical characteristics (shade, translucency and brightness), the IPS e.max® CAD restorations by Straumann® CARES® need to go through a crystallization firing in a furnace at 840 °C – 850 °C (1544 °F – 1562 °F).

### Important processing restrictions for the crystallization procedure

Failure to observe the following restrictions may compromise the results achieved with IPS e.max® CAD restorations by Straumann® CARES®:

- Crystallization shall be conducted in a ceramic furnace that has been calibrated and approved or recommended by Ivoclar Vivadent AG.
- Crystallization parameters defined by Ivoclar Vivadent AG shall be followed.
- Use a IPS Object Fix Putty or Flow firing paste for the crystallization. After the crystallization, do not remove firing paste residue with Al<sub>2</sub>O<sub>3</sub> or polishing beads (use steam blaster and ultrasonic water quench).

The following processing techniques are possible to characterize the final restoration:

- Staining technique: the delivered full-contour restoration is completed by applying stain and glaze materials.
- Layering technique: various IPS e.max® Ceram layering materials are fired onto the delivered coping.
- Cut-Back technique: various IPS e.max® Ceram layering materials are applied in the incisal and/or occlusal area of the delivered restorations, followed by the application of stain and glaze materials.

## Note

Clinical try-in may be performed either before or after crystallization of the restoration. For clinical try-in with the Straumann® Variobase® Abutment, please follow the Ivoclar Vivadent "IPS e.max® CAD Abutment Solutions Instructions for Use."

Depending on the restoration and the chosen technique, different procedures can be followed to achieve the final restoration result.

### a) Crystallization and glazing (in one step) – Staining technique

In this processing technique, staining and glazing are applied on the delivered restoration. The crystallization and glaze firing is performed in one step.

The delivered IPS e.max® CAD restorations by Straumann® CARES® have to be placed on a Crystallization Pin (smaller restorations as inlays, onlays and veneers do not need to be entirely supported if Glaze Paste is applied). Characterizations are applied using IPS e.max® CAD Crystall./Shades and Stains with the Glaze Paste or Glaze Spray by Ivoclar Vivadent AG.

## Note

The IPS e.max® CAD Crystall./Glaze Spray is not recommended for glazing copings and crowns used in combination with Straumann® Variobase® Abutments, as the glazing material shall neither reach the bonding surface nor the screw channel.

The following procedure shall be observed for partial crowns and crowns:

- Select the largest possible Crystallization Pin, which does not come into contact with the circular crown.
- Fill the inside of the restoration with IPS Object Fix Putty or Flow up to the margin.
- Press the selected Crystallization Pin deeply into the restoration margin so that it is adequately fixed.
- Avoid contamination of the outer restoration surface.

The following procedure shall be observed for copings and crowns used in combination with Straumann® Variobase® Abutments:

- Use the IPS e.max® CAD Crystallization Pin XS
- Fill the interface of the restoration with either IPS Object Fix Putty or Flow auxiliary firing paste. Immediately reseal the IPS Object Fix Putty/Flow syringe after extruding the material.
- Press the IPS e.max® CAD Crystallization Pin XS only slightly into the IPS Object Fix Putty/Flow. Important: Do not press the pin in too deep to make sure that it does not touch the walls. This may lead to cracks in the restoration.
- Smooth out displaced auxiliary firing paste using a plastic spatula so that the pin is securely in place.
- Prevent contamination of the outer surface / occlusal surface of the restoration.
- Clean off any possible contamination with a brush dampened with water and dry.

Then apply Crystall./Glaze Paste by holding the restoration by the firing pin and glazing evenly the entire restoration. Apply mixed Shades and Stains directly into the unfired glaze layer using a fine brush.

For copings and crowns used in combination with Straumann® Variobase® Abutments, the glazing material shall neither reach the bonding surface nor the screw channel, as this may compromise the accuracy of fit. Check the interface before firing and carefully remove any contamination.

The crystallization and stain/glaze firing (combination firing) is conducted in a compatible ceramic furnace. When placing the objects and setting the firing parameters, observe the following procedure:

- Place the restoration with the Crystallization Pin into the center of the Crystallization Tray.
- If the Glaze Paste was selected, place inlays, onlays, veneers directly on a Crystallization Pin, using a small amount of IPS Object Fix Putty or Flow if applied.
- Do not place more than six restorations at once on the firing tray for the combination firing.
- Conduct the combination firing using the parameters specified by Ivoclar Vivadent AG.

## Note

If a restoration made of IPS e.max® CAD MO and one made of IPS e.max® CAD LT are to be crystallized in the same firing, the firing parameters for IPS e.max® CAD MO shall be used.

When the combination firing is completed, the restorations have to cool down to room temperature in a place protected from draft. Then, the restorations can be removed from the hardened firing paste and the residue shall be removed with ultrasound in a water bath or with steam.

**Note:** Do not blast or quench objects.

### b) Crystallization followed by staining & glazing – Staining technique

In this processing technique the restoration is crystallized in a first step. Staining and glazing are applied in a second step, followed by the stain and glaze firing of the tooth-colored restoration.

The following procedure shall be observed for copings and crowns used in combination with Straumann® Variobase® Abutments:

- Use the IPS e.max® CAD Crystallization Pin XS
- Fill the interface of the restoration with either IPS Object Fix Putty or Flow auxiliary firing paste. Immediately reseal the IPS Object Fix Putty/Flow syringe after extruding the material.
- Press the IPS e.max® CAD Crystallization Pin XS only slightly into the IPS Object Fix Putty/Flow. Important: Do not press the pin in too deep to make sure that it does not touch the walls. This may lead to cracks in the restoration.
- Smooth out displaced auxiliary firing paste using a plastic spatula so that the pin is securely in place.
- Prevent contamination of the outer surface/occlusal surface of the restoration.
- Clean off any possible contamination with a brush dampened with water and dry.

The IPS e.max® CAD restorations by Straumann® CARES® shall be placed on the firing tray by using only IPS Object Fix Putty or Flow as an auxiliary firing paste. Slightly overfill the restoration with the auxiliary firing paste. The restoration shall be placed in the centre of the IPS e.max® CAD Crystallization Tray. The crystallization firing shall be conducted in a compatible ceramic furnace and follow the parameters specified by Ivoclar Vivadent AG.

#### Note

If a restoration made of IPS e.max® CAD MO and one made of IPS e.max® CAD LT are to be crystallized in the same firing, the firing parameters for IPS e.max® CAD MO shall be used.

When the crystallization is completed, the restorations have to cool down to room temperature. Then, the restorations can be removed from the hardened firing paste, and the residue must be removed with ultrasound in a water bath or with steam.

**Note:** Do not blast or quench objects.

The stain and glaze firing is only conducted once the IPS e.max® CAD restorations by Straumann® CARES® were cleaned. Depending on the situation, the stain and glaze firing may be conducted together or separately. If more pronounced characterizations are required, a separate stain and characterization firing is recommended.

#### Note

For copings and crowns used in combination with Straumann® Variobase® Abutments:

- The IPS e.max® CAD Crystall./Glaze Spray is not recommended, as the glazing material shall neither reach the bonding surface nor the screw channel.
- The glazing material shall neither reach the bonding surface nor the screw channel, as this may compromise the accuracy of fit. Check the interface before firing and carefully remove any contamination.

#### c) Crystallization followed by layering & glazing – Layering and cut-back techniques

In this processing technique the restoration is crystallized in a first step. Various layering materials are then fired on the delivered restorations followed by a final glaze firing.

The following procedure shall be observed for copings and crowns used in combination with Straumann® Variobase® Abutments:

- Use the IPS e.max® CAD Crystallization Pin XS
- Fill the interface of the restoration with either IPS Object Fix Putty or Flow auxiliary firing paste. Immediately reseal the IPS Object Fix Putty/Flow syringe after extruding the material.
- Press the IPS e.max® CAD Crystallization Pin XS only slightly into the IPS Object Fix Putty/Flow. Important: Do not press the pin in too deep to make sure that it does not touch the walls. This may lead to cracks in the restoration.
- Smooth out displaced auxiliary firing paste using a plastic spatula so that the pin is securely in place.
- Prevent contamination of the outer surface/occlusal surface of the restoration.
- Clean off any possible contamination with a brush dampened with water and dry.
- Place the restoration in the centre of the IPS e.max® CAD Crystallization Tray.

The IPS e.max® CAD restorations by Straumann® CARES® shall be placed on the firing tray by using only IPS Object Fix Putty or Flow as an auxiliary firing paste. Slightly overfill the restoration with the auxiliary firing paste. The restoration shall be placed in the centre of the IPS e.max® CAD Crystallization Tray. The crystallization firing shall be conducted in a compatible ceramic furnace and follow the parameters specified by Ivoclar Vivadent AG.

When the crystallization is completed, the restorations have to cool down to room temperature. After, the restorations can be removed from the hardened firing paste, and the residue shall be removed with ultrasound in a water bath or with steam.

**Note:** Do not blast or quench objects.

The restoration can be placed on the model to check the fit, and slight adjustments can be done if necessary, observing the minimum thicknesses guidelines (see Appendix A). Before layering, the restoration shall be cleaned with a steam jet. Place the restorations on a honey-combed firing tray and the corresponding support pins (do not use the IPS e.max® CAD Crystallization Tray or Pin) and prevent the restoration from sticking to the pin by rounding the top edges of the support pin, covering the pin with platinum foil or covering the pin with small amount of IPS Object Fix Putty or Flow. Do not use contaminated pins.

Conduct the wash firing with Deep Dentin or Dentin materials on clean restorations (free of dirt and grease). Apply the wash in a thin coat on the entire restoration.

#### Note

The wash firing shall be conducted with the parameters specified by Ivoclar Vivadent AG.

The IPS e.max® Ceram layering material can be applied on the restoration. Perform the layering in accordance with the layering diagram. Conduct the 1<sup>st</sup> dentin and incisal firing with the corresponding parameters specified by Ivoclar Vivadent AG (for the cut-back technique only one incisal firing is requested).

Compensate for the shrinkage and complete the missing areas in the next layering process. Then conduct the 2<sup>nd</sup> dentin and incisal firing with the corresponding parameters specified by Ivoclar Vivadent AG.

#### Note

For the cut-back technique finish the restoration using diamonds and give it a true-to-nature shape and surface structure such as growth lines and convex/concave areas. If gold or silver dust was used to visualize the surface texture, the restoration has to be thoroughly cleaned with steam.

#### Note

For copings and crowns used in combination with Straumann® Variobase® Abutments, the characterization shall neither reach the bonding surface nor the screw channel, as this may compromise the accuracy of fit.

#### Important processing restrictions for the layering procedure

Strictly follow the guidelines and framework thicknesses (see Appendix A) to achieve successful results with IPS e.max® CAD restorations by Straumann® CARES®. For layering the IPS e.max® CAD restorations by Straumann® CARES® use the Ivoclar Vivadent IPS e.max® Ceram veneering material. The instruction for use by Ivoclar Vivadent AG shall be followed.

Depending on the situation, the stain and glaze firings may be conducted together or separately one after the other. Conduct the stain and glaze firings with the corresponding parameters specified by Ivoclar Vivadent AG.

#### Seating

Before being seated, the restoration shall be prepared. The conditioning of the ceramic surface is decisive for generating a sound bond between the cementation material and the restoration. The following steps shall be observed:

- Conduct the clinical try-in before etching in order not to contaminate the etched surface.
- Thoroughly clean the restoration with water and blow dry.
- Condition the restoration (generally etch bond the bonding surface with 5% hydrofluoric acid gel for 20 seconds; for adhesive or self-adhesive cementation, silanize the bonding surface of the restoration).

Before seating the restoration, the preparation shall be conditioned. The following steps shall be observed:

- Remove the temporary and thoroughly clean the preparation.
- Try in and check the occlusion and articulation before conditioning.
- Polish the restoration extraorally if adjustments are required.
- Condition the preparation in accordance with the selected cementation material.

For restorations used in combination with Straumann® Variobase® Abutments, the instructions for use of the Straumann® Variobase® Abutments shall be followed for the bonding and the restoration shall be luted extraorally to the Straumann® Variobase® Abutment with the self-curing luting composite Multilink® Hybrid Abutment, ideally in conjunction with Monobond® Plus, for the permanent cementation of ceramic structures made of lithium-disilicate glass-ceramic. The instruction for use by Ivoclar Vivadent AG shall be followed.

#### a) Prepare the Straumann® Variobase® Abutment

#### Note

It is not necessary to sandblast the Straumann® Variobase® Abutment.

- Fix the cleaned (or sterilized) abutment to the implant analog with a screw (hand-tight).
- Seal the screw channel with wax.
- Apply self-adhesive dental cement on the abutment. Apply Monobond® Plus on the clean bonding surface and allow it to react for 60 seconds. After the reaction time, disperse any residue with air that is free of water and oil and polish the lower margin of the coping after the cement has set.

- Seal the screw channel with a foam pellet or wax. The bonding surface must not be contaminated in the process.

#### b) Prepare the restoration ceramic structure

- Do not blast the ceramic structure.
- Clean the coping structure in an ultrasonic bath or with a steam cleaner (clean the crown structure with water) and subsequently blow dry.
- After cleaning, the bonding surface must not be contaminated under any circumstances, as this would impair the bond.
- Wax can be applied to protect the outer surfaces or the glazed areas.
- Etch the bonding surface with 5% hydrofluoric acid gel (IPS Ceramic Etching Gel) for 20 seconds. Make sure that no etching gel comes into contact with the occlusal surface.
- Thoroughly rinse off the etching gel with water and dry with oil- and water-free air.
- Apply Monobond Plus to the etched and cleaned surface and allow it to react for 60 seconds. After the reaction time, dry any remaining residue with oil- and water-free air.

#### c) Cement the restoration to the abutment with Multilink® Hybrid Abutment

The instruction for use by Ivoclar Vivadent AG shall be followed.

#### Note

Immediately remove excess cement from the abutment and polish the lower margin of the restoration after the cement has set. The restoration shall be cleaned prior to sending it to the dentist.

#### d) Placing the Straumann® Variobase® Abutments with the luted restoration

This instruction for use of the Straumann® Variobase® Abutments shall be followed.

#### Further information

- Additional information on Straumann Products (including Straumann® Variobase® Abutments) and Straumann® CARES® Digital Solutions are available on the Straumann website ([www.straumann.com](http://www.straumann.com)) and respective instructions for use which can be downloaded from Straumann web site ([www.ifu.straumann.com](http://www.ifu.straumann.com)).
- IPS e.max® CAD restorations by Straumann® CARES® are manufactured with IPS e.max® CAD material from Ivoclar Vivadent AG, Liechtenstein.
  - Additional information on the IPS e.max® system is available on the Ivoclar Vivadent AG website ([www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)).
  - Additional information on the IPS e.max® CAD material (e.g. its detailed processing, crystallization and firing parameters) is available in the Ivoclar Vivadent AG brochures IPS e.max® CAD Instructions for Use and IPS e.max® CAD Abutment Solutions Instructions for Use, which can be downloaded from the Ivoclar Vivadent AG website.

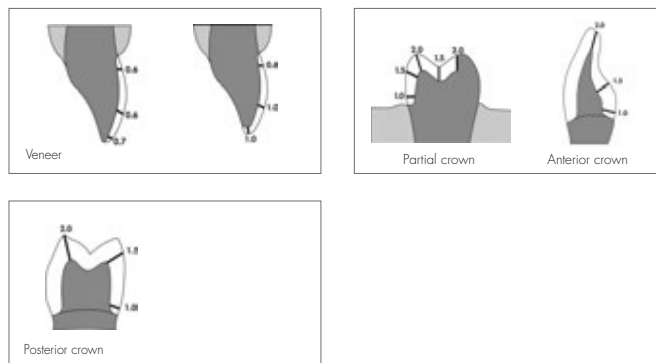
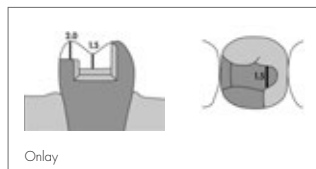
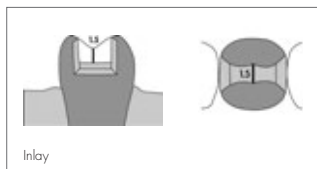
### Appendix D5 – Additional guidelines which are specific to IPS Empress® CAD

#### Contraindications and side effects

- Allergies or hypersensitivity to chemical ingredients of the leucite glass-ceramic material ( $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{K}_2\text{O}$ ,  $\text{Na}_2\text{O}$ , other oxides, pigments)
- Very deep subgingival preparations
- Patients with severely reduced residual dentition
- Bruxism

#### Tooth preparation guideline

- The tooth preparation guidelines (see figure below) shall be followed.
- The preparation must not have angles or sharp edges and the shoulder preparation must be with rounded inner edges and/or chamfer.
- For inlays, onlays and partial crowns, the static and dynamic antagonist contacts must be taken into consideration and the preparation margin must not be located on the centric antagonist contacts.
- For veneers, if possible, the preparation should be located in the enamel and the incisal preparation margins should not be located in the area of static or dynamic enamel contact.



#### Finishing

- Only suitable grinding instruments must be used for finishing and adjusting the IPS Empress® CAD restorations by Straumann® CARES®:
  - Use only fine-grained (grain size < 60µm), ceramic-bonded grinding instruments or diamonds at a speed of up to 20,000 rpm and little pressure.
  - If necessary, finish carefully the restoration margins using rubber and sili-cone polishers (speed: < 10000 rpm).
  - Overheating of the ceramic must be avoided.
- Extraoral polishing of proximal areas and large surfaces is required prior to cementation.
- Always clean the restoration with ultrasound in a water bath or blast with  $\text{Al}_2\text{O}_3$  at 0.5 bar pressure and clean under running water or using the steam jet before further processing.

#### Recommended grinding instruments:

- For smoothing out of attachment points: DCB Grinder Disk (1), Diadur DD-8 Disk (2), Super Max (3), Diamond Stone Disk (4), Diagen Turbo Grinder Disk (5)
- For finishing of surface: DCB Grinder Cone (1), Diadur DD-13 Cone (2), CeraPro (3), Diamond Stone Cone (4), Diagen Turbo Grinder Cone (5)
- For finishing of margins: Ceramic Polisher 9690/9691 (1), Diapol L26DG/L26 Dmf (2), CeraGloss blue/yellow (3) Diamond Polisher (4), High End Power Disk 626-C/626.M (5)

**Manufacturers:** Komet Brasseler (1), EVE (2), edenta (3), Jota (4), Bredent (5)

#### Processing

##### Important processing restrictions:

Failure to observe the following restrictions may compromise the results achieved with IPS Empress® CAD restorations by Straumann® CARES®:

- The various required firings (staining, glazing, layering) must be conducted in a ceramic furnace that has been calibrated and approved or recommended by Ivoclar Vivadent AG.
- Firing parameters defined by Ivoclar Vivadent AG must be followed.
- Before being processed, the restoration must always be cleaned with ultrasound in a water bath or blast with  $\text{Al}_2\text{O}_3$  at 0.5 bar pressure and clean under running water or using the steam jet before further processing.

The following processing techniques are possible to characterize the final restoration:

- Polishing of the delivered full-contour restoration without staining and glazing.
- Staining technique: the delivered full-contour restoration is completed by applying stain and glaze materials.
- Cut-back technique: various layering materials are applied in the incisal area of the delivered restorations, followed by the application of stain and glaze materials.

Depending on the restoration and the chosen technique, different procedures can be followed to achieve the final restoration result.

#### a) Polishing

In this processing technique, the delivered full-contour restoration is only polished.

The occlusion/articulation of the restoration can be adjusted using diamonds, before polishing the restoration manually. The following procedure must be observed:

- Observe contact points and margins during the entire polishing procedure.
- Use the corresponding speed and little pressure to avoid heat development.
- Polish proximal areas and large surfaces extraorally prior to cementation.



- Finish/smooth out the surfaces (speed: max. 15000rpm, water cooling).
- Polish the restoration (speed: max 15000rpm, water cooling) to a high gloss using the high-gloss brush and diamond polishing paste (speed: max. 15'000rpm).

#### b) Staining & glazing (in one step) – Staining technique

In this processing technique, staining and glazing are applied on the delivered restoration. The stain & glaze firing is performed in one step.

First, the glazing material is applied, followed by the Stains material, which is applied on the unfired glaze layer. The following procedure must be observed:

- Apply the glazing material on the entire outer surfaces of the restoration (the glazing material must not come into contact with the inner aspects of the restoration).
- Then, apply the mixed Shades material directly into the unfired glazing material layer.
- When completed, apply individualized effects and characterizations on cusps and in fissures with the Stains materials using a brush.
- Conduct the glaze and stain firing in a compatible ceramic furnace.

When placing the objects and setting the firing parameters, observe the following procedure:

- Support inlays, onlays, and partial crowns with a firing pillow and place them on a honey-comb firing tray.
- Place veneers as well as crowns on metal pins and position them on the honey-comb firing tray.
- As an alternative to the firing pillow and to better secure the restoration on the metal pins (particularly with veneers), a small amount of IPS Object Fix may also be used.
- Make sure that the firing pillow is regularly replaced in order to prevent contamination. Keep firing pillows used for all-ceramic materials separated from those for metal-ceramics to avoid cross-contamination.

#### c) Staining followed by glazing – Staining technique

In this processing technique, first staining is applied on the delivered restoration and the staining firing is conducted. Glazing is applied in a second step and the glazing firing can be conducted.

First, the staining material is applied. The following procedure must be observed:

- Apply the mixed Shades material directly onto the surface.
- Apply individualized effects and characterizations with the Stains materials using a brush.
- Conduct the stain firing in a compatible ceramic furnace.

When placing the objects and setting the firing parameters, observe the following procedure:

- Support inlays, onlays, and partial crowns with a firing pillow and place them on a honey-comb firing tray.
- Place veneers as well as crowns on metal pins and position them on the honey-comb firing tray.
- As an alternative to the firing pillow and to better secure the restoration on the metal pins (particularly with veneers), a small amount of IPS Object Fix may also be used.
- Make sure that the firing pillow is regularly replaced in order to prevent contamination. Keep firing pillows used for all-ceramic materials separated from those for metal-ceramics to avoid cross-contamination.

Then, the glazing material is applied. The following procedure must be observed:

- Apply the glazing material on the entire outer surfaces of the restoration (the glazing material must not come into contact with the inner aspects of the restoration).
- Once the glaze application is completed, conduct the glaze firing in a compatible ceramic furnace. (If the gloss is unsatisfactory after the first glaze firing, further glaze firing procedures may be conducted using the same firing parameters.)

#### d) Layering followed by glazing – Cut-back technique

In this processing technique, various layering materials are fired on the delivered restoration followed by a glazing firing.

IPS Empress® Esthetic Veneer Wash Paste must be applied neutrally and thinly on the entire restoration surface to be layered, in order to enable an optimum bond. If required, mamelons should be designed and internal effects applied on the un-

fired Wash Paste neutral layer. Then the restorations must be placed on the honey-comb firing tray with the help of metal pins (the veneers can be additionally supported with a small amount IPS Object Fix). Conduct the wash firing with the parameters specified by Ivoclar Vivadent AG.

The IPS Empress® Esthetic Veneer layering material can be applied on the restoration using a ceramic brush. Once the tooth shape has been completed, the layering material must dry for a short period of time. Then the restorations can be placed on the honey-comb firing tray with the help of metal pins (the veneers can be additionally supported with a small amount of IPS Object Fix). Conduct the first Incisal/Transpa firing with the parameters specified by Ivoclar Vivadent AG.

Once the first Incisal/Transpa firing is completed, clean the restoration with ultrasound in a water bath or with the steam jet and completely dry it. Carefully place the restoration on the model and complete the missing areas of the final tooth shape. Once the tooth shape has been completed, the layering material must dry for a short period of time. Then the restorations can be placed on the honey-comb firing tray with the help of metal pins (the veneers can be additionally supported with a small amount of IPS Object Fix). Conduct the second Incisal/Transpa firing with the parameters specified by Ivoclar Vivadent AG.

If necessary, finish the restorations using diamonds. The areas that are not covered with layering ceramic must be smoothed out and pre-polished using silicone disks in order to obtain an even gloss on the surface after glaze firing. The restoration must be cleaned with ultrasound in a water bath or using the steam jet. Then the glazing material can be applied, even a little thicker on areas that are not covered with layering ceramic to achieve an even gloss. The glazing material must not come into contact with the inner aspects of the restoration. The restorations can be placed on the honey-comb firing tray with the help of metal pins (the veneers can be additionally supported with a small amount of IPS Object Fix). Conduct the stain & glaze firing with the parameters specified by Ivoclar Vivadent AG.

#### Important processing restrictions for the layering procedure

Strictly follow the guidelines and framework thicknesses (see Appendix A) to achieve successful results with IPS Empress® CAD restorations by Straumann® CARES®. For layering the IPS Empress® CAD restorations by Straumann® CARES® use the Ivoclar Vivadent IPS Empress® Esthetic Veneer ceramic materials. The instructions for use by Ivoclar Vivadent AG must be followed.

#### Seating

The conditioning of the ceramic surface in preparation for cementation is decisive for generating a sound bond between the luting material and the restoration. The following steps must be observed:

- Conduct the clinical try-in before etching in order not to contaminate the etched surface.
- Thoroughly clean the restoration with water and blow dry.
- Etch the inner surface for 60 seconds using 5 % hydrofluoric acid gel and then condition/silanate the restoration in accordance with the selected cementation material.

After the seating, adjust the occlusion/articulation of the restoration using diamonds if required. Polish the restoration manually. Procedure as described in section "a) Polishing" in "Processing" must be observed.

#### Further information

IPS Empress® CAD restorations by Straumann® CARES® are manufactured with IPS Empress® CAD material from Ivoclar Vivadent AG, Liechtenstein.

- Additional information on the IPS Empress® system is available on the Ivoclar Vivadent AG website ([www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)).
- Additional information on the IPS Empress® CAD material (e.g. its detailed processing, firing parameters) is available in the Ivoclar Vivadent AG brochure "IPS Empress® CAD Instructions for use – Labside", which can be downloaded from the Ivoclar Vivadent AG website.

#### Appendix D6 – Additional guidelines specific to VITA® Mark II and TriLux®

##### Contraindications and side effects

- Insufficient oral hygiene
- Insufficient preparation results
- Insufficient tooth structure substance
- Insufficient space
- Significant tetracycline discoloration
- Highly interlaced teeth
- Extreme dystopias of the teeth

- Bruxism
- Allergies or hypersensitivity to chemical ingredients of the fine-structure feldspar ceramic material ( $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Na}_2\text{O}$ ,  $\text{CaO}$ ,  $\text{K}_2\text{O}$ ,  $\text{TiO}_2$ )
- Very deep subgingival preparations

#### Tooth preparation guideline

- The tooth shall be sufficiently cooled during the preparation and shall not be exposed to heat caused by high pressure.
- Instruments with good cutting performance shall be used.
- The coarse preparation shall be carried out before the fine preparation.
- The pulp shall be protected against damage caused by milling/grinding.
- Subgingival preparation margins shall be avoided.

#### The preparation shall comply with the following requirements:

- Tooth-specific preparation
  - The upper and lower tooth axes shall be aligned.
  - The required residual dentine thickness of 0.7–1.0 mm shall be ensured in all areas.
- Defect-oriented preparation
  - Minimally invasive preparation resulting in extremely thin restorations is not compatible with ceramics.
  - The preparation shall provide a stable basis for the restoration.
  - The preparation shall ensure freedom of rotation and accurate positioning.

#### Preparation information for posterior crown and anterior crown:

- A chamfer or shoulder with rounded inner angle shall be prepared. The aim shall be a circumferential cutting depth of 1 mm.
- The vertical preparation angle shall be at least 3°.
- All transitions from the axial to the occlusal or incisal surfaces shall be rounded.
- A subgingival preparation border shall generally be avoided.

#### Preparation information for inlays and onlays:

- Box preparations are not required to achieve mechanical retention thanks to the use of the adhesive technique and will also lead to unfavorable ceramic designs.
- To ensure increased resistance of the material, shaping of deep fissures can be omitted.

#### Preparation information for veneers:

- Avoid proximal "gutter-shaped" preparation.

#### Finishing and polishing

A careful polishing is crucial for esthetics and the functionality of the restorations

- The occlusion shall be designed in order to avoid interferences (no early contact in static and dynamic occlusion).
- For very thin restorations, the fine correction of the occlusion shall be carried out after seating in order to avoid fractures of the ceramic.
- Interference contact points can be revealed by means of Shimstock film.

#### Warning

The following guidelines shall also be observed:

- The removal of occlusal contact points shall be carried out by spindle-shape diamond abrasive instruments with ample water cooling. Too sharp diamond instruments shall not be used.
- Pre-polishing of the fissures with fine-grained diamond abrasives (8 µm) and ample water cooling is recommended.
- The correction of the ceramic restorations shall be carried out by means of rounded fine-grained diamond instruments.
- Extraoral polishing of proximal areas and large surfaces is required prior to cementation.

#### Warning

The following guidelines shall also be observed:

- Do not use hard metal instruments.
- Use only fine-grained diamond abrasives (grain size 40 µm) for contouring and finish diamonds (grain size 8 µm) for pre-polishing.
- The margins and contact points shall be carefully polished.
- Recommended speed shall be used and heat development shall be avoided.
- The restoration shall be finished/smoothed out with  $\text{Al}_2\text{O}_3$  coated flexible discs and diamond polishing pastes with decreasing particle sizes and fine-grained finishing diamond paste with low rotation speed and ample water cooling.
- Adequate brushes and diamond polish pastes shall be used for mirror finishing of the ceramic surface. Low rotation speed and low pressure (< 15000 rpm) shall be applied without water cooling.

- The polishing paste shall be removed with a water spray.
- The restoration shall be fluoridated.
- The restoration shall be always cleaned with water in an ultrasound bath, under running water or using the steam jet before further processing.

#### Processing

- For optimal results, recommendations of the manufacturers of staining, glazing and layering materials shall be followed.
- In the case of restorations with large surfaces and for surface individualization, staining or glazing materials shall be applied.
- The various firing required (staining, glazing, layering) shall be conducted in an adequate furnace recommended by the manufacturer of the materials.
- Firing parameters defined by the manufacturer of the materials shall be followed.
- Before being processed, the restoration shall always be cleaned with ultrasound in a water bath and clean under running water or using the steam jet.

#### Recommended material:

VITA® Mark II and VITA® Triluxe restorations by Straumann can be characterized or individualized, respectively, by means of the following:

- Shading pastes such as VITA Shading Paste or staining such as VITA Akzent
- Layering materials such as VITA VM 9, or
- Glazing materials such as VITA Akzent glaze

#### Seating

For the adhesive cementation of VITA® Mark II and VITA® Triluxe restorations by Straumann, light or dual hardening composites shall be used according to a correct and established functional enamel-dentin-adhesive system (total bonding) procedure. Conditioning of the ceramic internal surfaces in preparation for cementation is decisive for generating a sound bond between the adhesive materials and the restoration. Adhesive seating protocols for inlays, onlays, crowns, partial crowns and veneers are similar. However, a few specific recommendations for veneers and crowns shall be observed:

- For thin veneers, the use of dual-curing composites shall be avoided for esthetical reasons. Instead, light curing composites shall be used.
- The fixation of the veneers with a finger allows for a homogeneous pressure distribution during placement.
- The adhesive seating of crowns are with free-flowing dualcuring composites is advantageous.

To condition the tooth structure, the following steps shall be observed:

- The clinical try-in shall be conducted before etching in order to not contaminate the etched surface.
- Any contamination of the surfaces shall be avoided. For this, a rubber dam might be placed.
- The enamel, if available, shall be etched with a phosphoric acid gel, 35% (e.g. VITA ETCHANT GEL) during 30 s. rinsing 30 s, drying 20 s.
- The dentin primer (e.g. VITA A.R.T. Bond Primer A+B) shall be rubbed in with a single-use micro brush for 30 s and dried by blowing out for 15 s.
- The dentin adhesive (e.g. Syntac Adhesive) shall be rubbed in for 30 s and dried by blowing out for 15 s.
- The adhesive layer (e.g. VITA A.R.T. Bond) shall be rubbed in for 20 s and dried by carefully blowing out for 5 s.
- Curing with light shall be carried out for 60 s.

To condition the restoration, the following steps shall be observed:

- The restoration shall be thoroughly cleaned with alcohol.
- The internal surfaces of the restoration shall be etched with hydrofluoric acid gel, 5% (e.g. VITA CERAMICS ETCH) during 60 s.
- The acidic residues shall be completely removed with a steam jet during 60 s. Alternatively, clean the restoration with water in an ultrasonic bath. Dry the restoration for 20 s. Do not brush the restoration in order to avoid any contamination.
- Coat the etched surfaces with a silan layer (e.g. VITASIL) and let evaporate completely.
- A layer of bonder (e.g. VITA A.R.T. Bond) shall be applied and blown out. Do not light cure. Do not expose the restoration to light.

To place the restoration, the following steps shall be observed:

- A thin layer of composite shall be applied in the cavity and carefully place the restoration in situ.
- The exceeding materials shall be removed with a probe.
- $\text{A}_3\text{O}_2$ -protective gel (e.g. VITA OXY-PREVENT) shall be applied on the cervical margins.
- Curing with light shall be carried as follows. 40 s. buccal, 40 s. oral, 40 s. occlusal per proximal cavity with a LED polymerization lamp of the 2<sup>nd</sup> generation with 5W LED chips and a light power higher than 1000 mW/cm<sup>2</sup>.



- The material excess shall be removed using a scaler, respectively with fine-grained diamond abrasives (grain size < 40 µm).
- The proximal part of the restoration shall be polished with flexible abrasive discs. See procedures described in in section "Finishing and polishing".
- The restoration shall not be cleaned before being placed.

#### Further information

VITA® Mark II and VITA® Triluxe restorations by Straumann are manufactured with VITABLOCS® Mark II and VITABLOCS® Triluxe materials respectively. Additional information on the VITABLOCS® materials and system is available on the VITA Zahnfabrik H. Rauter GmbH & Co. KG homepage ([www.vita-zahnfabrik.com](http://www.vita-zahnfabrik.com)).

### Appendix D7 – Additional guidelines specific to ticon®

#### Contraindications and side effects

Allergies or hypersensitivity to titanium (Ti).

#### Finishing

- Special titanium carbide cutters shall be used.
- The surface should always be processed in the same direction to avoid overlaps of the material.
- Moderate rotational speed (max. 15000rpm), as well as low grinding pressure are required. If necessary, reduce the grinding pressure and/or rotational speed.
- The finished framework surface shall be sandblasted with pure Al<sub>2</sub>O<sub>3</sub> with a medium grain size of 110 to 150 µm at a maximum pressure of 2 bar.
- Subsequently allow the framework to rest for 5 minutes (for passivation of the surface) and then the framework shall be cleaned with a hot steam. Do not perform any ultrasound or acid bath treatment.
- After this final step, the ticon® Framework should no longer be touched with fingers.

#### Note

Titanium dust and particles are highly flammable. Sufficient safety measures must therefore be taken (e.g. no smoking during grinding, no open flames, etc.). If titanium dust or vapors are generated, safety panes, goggles, respirator and exhaust must be used.

ticon® Frameworks delivered by Straumann® may be welded.

For successful results, it is important to observe the geometry, surface structures, welding sequence, and welding parameters recommended for each individual device during laser welding. Suitable additional material may be required. The processing instructions of the welding device manufacturers shall be followed.

#### Note

We do not recommend titanium/precious metal or titanium/non precious metal combination weld seams.

#### Processing – Polishing

The finished ticon® Framework surfaces can be brightly polished with commercially available polishing compounds or with diamond polishing paste. The polish improves the condition of the finished surface. To prevent smudging, use a moderate rotational speed and low pressure during polishing. Polishing residue shall be removed with an ultrasound cleaner or steam jet.

### Appendix D8 – Additional guidelines specific to coron®

#### Contraindications and side effects

Allergies or hypersensitivity to chemical ingredients of the cobalt-chromium material (Co, Cr, W, Si, Mn, N, Nb, Fe).

#### Note

- Isolated patient cases have shown local irritation caused by electrochemical reactions.
- Galvanic effects may occur if different alloy groups are used.

#### Finishing

- Coarse and fine, sharp, tungsten carbide cutters shall be used for surfaces to be layered.
- The surface should always be processed in the same direction to avoid overlaps of the material.
- The finished framework surface shall be sandblasted with a one-way sandblast abrasive Al<sub>2</sub>O<sub>3</sub> with a medium grain size of 125 µm at a maximum pressure of 2 to 3 bar.
- The framework shall be cleaned with a hot steam or with distilled water in an ultrasound bath. Do not immerse coron® Frameworks into a pickling bath.

#### Note

Material overlaps as well as the use of silicon carbide abrasive tools may lead to the formation of blowholes during the ceramic firing.

coron® Frameworks delivered by Straumann may be soldered and welded. For successful results use solders and welding flux with suitable composition and melting temperature for the alloy to be soldered.

#### Note

Soldering after the ceramic firing is not recommended due to the reduced corrosion resistance and lower diffusion of the precious metal solder with the NPM (Non-Precious Metals) alloys. Other joining techniques such as laser or TIG welding are advisable. Laser welding will be done with the according grade of laser welding wire. Soldered frameworks shall be cooled slowly after the ceramic has been fired.

#### Processing

##### a) Polishing

The coron® Frameworks and occlusal surfaces may be covered with fine aluminium abrasive bodies prior to buffing and high gloss polishing to attain smooth and even transitions.

##### b) Layering

An oxide firing or control firing is not required for veneering ceramic due to the exclusion of casting faults, inclusions and blowholes. If an oxide firing is carried out however, then select 10 minutes at 980°C in air (no vacuum).

For successful results with coron® Frameworks, the following guidelines shall be observed:

- The thickness of the veneering ceramic shall be even and not exceed 2 mm.
- The surface shall be cleaned thoroughly by brushing it with distilled water after each ceramic firing to remove soluble oxides.
- When using opaquer containing titanium dioxide, it should be noted that the titanium dioxide and chromium from the alloy may form a yellowish green pigment and thus result in discolorations at the margin.
- The higher modulus of elasticity of the coron® Frameworks, in comparison to NPM alloys results in greater tensions in the NPM alloy-ceramic compound. This special circumstance shall be taken into account for large-span units, with delayed cooling off in the sense of slow cooling, or rather expansion cooling, after the firing according to the instructions of the veneering ceramics manufacturer.

#### Note

Repeated firings and longer resting time in ceramics ovens may possibly increase the CTE value of the ceramic. The result is tensile stresses in the ceramic, which can lead to fissures. All firings – except opaquer firings – should be exposed to slow cooling.

### Appendix D9 – Additional guidelines specific to polycon® ae

#### Contraindications and side effects

Allergies or hypersensitivity to chemical ingredients of polycon® ae (polymethyl methacrylate, methylmethacrylate, dibenzoylperoxide, pigments)

#### Finishing

- Tungsten carbide cutters for plastics with a maximum rotational speed of 20'000rpm shall be used in order to prevent smearing.
- Overheating of the framework shall be avoided in order not to affect the fit of the framework.

#### Note

If polymer dust develops, ensure not to exceed the general dust limit and wear a fine particle mask with a particle filter FFP.

#### Processing

Before layering, roughen the surface to be layered with small coarse grinding stones or diamonds.

#### Further information

- For additional information about the use of Straumann® Products, call Straumann's customer service department.
- Additional information on Straumann® Products and Straumann® CARES® Digital Solutions are available on the Straumann website ([www.straumann.com](http://www.straumann.com)).
- Additional information on the different Straumann® CARES® Tooth prosthetic restorations are available in the instructions for use (IFU) listed below:

IFU REFERENCE	IFU DESCRIPTION
701225	Straumann® CARES® Restorations made of 3M™ ESPE™ Lava™ Ultimate Restorative
701654	Straumann® CARES® restorations made of 3M™ ESPE™ Lava™ Plus Zirconia
701049	zerion® LT
150.772	IPS e.max® CAD Restorations by Straumann® CARES®
701045	IPS Empress® CAD Restorations by Straumann® CARES®
701043	VITA® Mark II and TriLux® Restorations by Straumann®
701051	ticon®
701050	coron®
701053	polycon® ae

All instructions for use are available on the Straumann® website ([www.ifu.straumann.com](http://www.ifu.straumann.com)).

#### Please note

Practitioners must have appropriate knowledge and instruction in the handling of the Straumann product described herein ("Straumann Product") for using the Straumann Product safely and properly in accordance with these instructions for use.

The Straumann Product must be used in accordance with the instructions for use provided by the manufacturer. It is the practitioner's responsibility to use the device in accordance with these instructions for use and to determine if the device fits to the individual patient situation.

The Straumann Product is part of an overall concept and must be used only in conjunction with the corresponding original components and instruments distributed by Institut Straumann AG, its ultimate parent company and all affiliates or subsidiaries of such parent company ("Straumann"), except if stated otherwise in the instructions for use. If use of products made by third parties is not recommended by Straumann in the instructions for use, any such use will void any warranty or other obligation, express or implied, of Straumann.

#### Validity

Upon publication of these instructions for use, all previous versions are superseded.

#### Availability

Application and material availability might differ from country to country. Some items of the Straumann® Dental Implant System are not available in all countries.



Caution, consult accompanying documents



Consult instructions for use. Please follow the link to the e-IFU [www.ifu.straumann.com](http://www.ifu.straumann.com)



Manufacturer



Do not re-use



Catalogue number



Serial number



Non-sterile

**Rx only**

Caution: U.S. Federal law restricts this device to sale by or on the order of a dental professional.



## **International Headquarters**

Institut Straumann AG

Peter Merian-Weg 12

CH-4002 Basel, Switzerland

Phone +41 (0)61 965 11 11

Fax +41 (0)61 965 11 01

[www.straumann.com](http://www.straumann.com)

3M™, ESPE™, Lava™, RelyX™, Filtek™ and Scotchbond™ are trademarks of 3M or 3M Deutschland GmbH. Used under license in Canada.

IPS e.max® and IPS Empress® are registered trademarks of Ivoclar Vivadent AG, Liechtenstein.

VITA® is a registered trademark of VITA Zahnfabrik H. Rauter GmbH & Co. KG, Germany.

iTero™ is a registered trademark of Align Technology, Inc., California.

© Institut Straumann AG, 2015. All rights reserved.

Straumann® and/or other trademarks and logos from Straumann® mentioned herein are the trademarks or registered trademarks of Straumann Holding AG and/or its affiliates.