etkon
CADCAM BY STRAUMANN

Materials overview



SUCCESS INCLUDED

The etkon way
to your digital future

etkon runs Germany's largest and most advanced centres for CADCAM technology. According to our philosophy of "one system for all proven materials," we are able to offer you a unique range of materials. Whether ceramics, metal, or plastics – with our scanning and milling system you can always select the material you want for your crowns and bridges.

Our technological advantage paves the way to your digital future – regardless of the size of your laboratory and your location. Simple handling and maximum precision turns you into a 360-degree provider of CADCAM technology.

DIN EN ISO 13485 certified

etkon – Overview of materials

Ceramics

zerion (zirconium dioxide ceramic)
Aluminium oxide ceramics
VITA In-Ceram® ALUMINA and ZIRCONIA[2]

Metal

ticon (titanium)
coron (CoCr)

Plastics

Fibreglass-reinforced polyamide
polycon ae (tooth-colored PMMA)[3]
polycon cast (castable PMMA)

All material details provided by the manufacturers.

The etkon principle – Access to a large variety of materials

With your scanner and etkon milling centres, frameworks for crowns and bridges up to 16-units are available in ceramic, non-precious metal, together with implant superstructures, primary and tertiary frameworks for telescopic work and provisional replacements made of plastics.

Zirconium Dioxide – high-performance ceramics

- For metal-free dental restorations
- Biocompatible
- Perfect aesthetics
- Milling of multi-unit, large-span bridges

Aluminium Oxide Ceramics

- Ideal aesthetics
- Biocompatible
- For single crowns and smaller bridges

Titanium – the material of the future

- Economical
- Lighter than other materials
- Biocompatible

CoCr Alloy

- An alternative to precious alloys
- Economic
- Minimum oxide formation

Polyamide for temporaries

- Neutral taste
- Extremely stable
- Irritation-free

Tooth-coloured PMMA

- Neutral taste
- Tooth-colored (B1), hence highly aesthetic
- Irritation-free

PMMA for casting

- Fully combustible
- Stable wax-ups

VITA In-Ceram® ALUMINA and ZIRCONIA

Increased strength

VITA In-Ceram® ALUMINA is a porous aluminum oxide ceramic that achieves excellent mechanical properties by glass infiltration. The material is especially suitable for copings in the anterior and posterior as well as for three-unit anterior bridges.

After infiltration of VITA In-Ceram® ZIRCONIA, an aluminum/zirconium oxide mixture, the high fracture toughness of this material combines with the excellent mechanical properties of aluminum oxide to produce a particularly robust ceramic material. Due to its very high resistance, this material is particularly suitable for three-unit bridges and copings in the posterior region.

Zinc phosphate cement, glass ionomer cement or chemically curing composite cements can be used for cementing.

Indications:
VITA In-Ceram® ALUMINA for single crowns and anterior bridges – up to three units

VITA In-Ceram® ZIRCONIA for single crowns, anterior and posterior bridges – up to three units

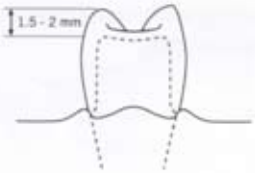
Possible veneering materials:
VITADUR® ALPHA
VITA VM®7
Creation AV by Geller
VINTAGE AL by Shofu

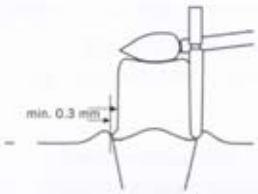
Subject to the specifications of the veneering material manufacturers.

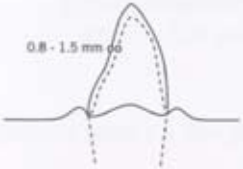
CE 0124

PROPERTIES	UNIT OF MEASUREMENT	VALUE	
		ALUMINIA	ZIRCONIA
Al2O3	%	100	67
ZrO2 (Ce-stabilized)	%		33
Density (infiltrated)	g/cm3	3.84	4.24
Fracture toughness (infiltrated)	MPa√m	3.9	4.4
Flexual strength, 3-Point	MPa	500	600
Elastic modulus	GPa	280	258
CTE (20 – 500° C)	10-6/K	7.4	7.8

Preparation for ceramics







Preparation Technique for CADCAM-milled Crowns and Bridges

Given the extreme hardness of zirconium dioxide and the guidelines for CADCAM processing, the following points should be considered for preparation:

- Circular shoulder and chamfer preparations transmit chewing pressure and ensure the strength of the coping.
- Ceramic copings require shoulder and chamfer preparations with at least 0.3 mm of support to prevent chipping.
- The occlusal or incisal edges should be slightly rounded (avoid sharp edges).
- There should always be an optimum path of insertion between all abutments. Bridges with diverging abutments can be produced by using the 5D Highspeed technology.
- At least 1.5 to 2 mm clearance should be provided between the die and its antagonist.
- Sufficient space for possible connectors should also be available – at least 3 × 3 mm.

Downstream processing of ceramics

The new machine generation: Milling heads with 1.5 x gravitational acceleration – Made in Germany

Processing instructions for zirconium dioxide downstream processing of zirconium dioxide frameworks

etkon controls and delivers the milled zirconium dioxide frameworks. Additional processing takes place in the respective dental labs.

For reasons related to the milling technique and the material, zirconium dioxide frameworks are produced with a thickness of approx. 0.4 – 0.5 mm. etkon does not assume any warranty for frameworks whose thickness was reduced to below 0.4 mm.

- Perform contour adjustments only with water-cooled, fine-grain diamond cutters at medium rotation speeds with low pressure.
- Avoid local overheating of the framework during grinding. Otherwise, fissures may occur in the zirconium dioxide structure.
- Remove bur marks on the coping with a rubber polishing cup or stone.
- Check the thickness of the structure with a caliper during cutting.
- Clean the zirconium dioxide frameworks with a steam jet.
- Depending on the specifications provided by the veneering material manufacturers, it may be necessary to use a liner.
- These instructions are based on our own insights and experience. They cannot be used as a basis for any liability claims.

Important note:
Use only water-cooled, fine-grain diamond cutters for modifying zirconium dioxide frameworks.

When modifying ceramic workpieces, observe the obligatory safety precautions (mouth guard, safety glass shield, suction, protective goggles).

Subject to the specifications of the veneering material manufacturers.

ticon — the dental metal of the future

Multi-functional leader

Pure titanium has been used for many years in medicine as a multi-functional implant material. Thanks to its outstanding properties, proven in the aerospace technology, the material is now revolutionising dental technology. Titanium has proven itself in dentistry in many ways. Hypersensitive patients in particular appreciate pure titanium for crowns, bridges and implants due to its absolute biocompatibility. Titanium has outstanding physical and mechanical properties: with its very high bending resistance, high fracture toughness, and corrosion resistance it ensures a maximum of biocompatibility.

The proven solution for dental restorations:

- Radiopaque.
- Very low heat conductivity.
- High purity.
- Bio-inert against acids and physiological solutions.
- Optimum bond between titanium and veneering ceramic.

Indications:
From single crowns to 16-unit bridges

Implant superstructures

Primary and tertiary frameworks for telescope restorations

Possible Veneering Materials For Combination Restorations:
TiKrom
Triceram® by Dentaurum
VITA Titankeramik
GC Initial Ti

Subject to the specifications of the veneering material manufacturers.

CE 0483

PROPERTIES	UNIT OF MEASUREMENT	VALUE
Grade 2, annealed		
N2	%	0.03
C	%	0.1
H2	%	0.0125
Fe	%	max. 0.30
O2	%	max. 0.25
Ti	%	min. 99.3
CTE (20 – 500° C)	10-6/K	9.6
Melting point	°C	1,670
Proof stress Rp 0,2	MPa	325 – 395
Density	g/cm3	4.5
Tensile strength Rm	MPa	460 – 475
Elongation at failure A5	%	30 – 35

coron – an alternative to precious metals

Low-cost alternative

This CoCr alloy is the economic solution in the field of non-precious metals on a cobalt-chrome basis. Indications range from individual crowns to 16-unit bridges – completely tension-free. The optimised homogenous structure ensures the stable quality of the veneered and finished result.

- Free of potentially toxic elements (nickel, beryllium, iron).
- 100% new metal guaranteed.
- Optimum bond between coron alloy and veneering ceramic.
- Absence of carbon optimises laser welding.
- No degassing cycle necessary.

Indications:
From single crowns to 16-unit bridges

Implant superstructures

Primary and tertiary frameworks for telescope restorations

Possible Veneering Materials:
VM® 13 by VITA
VITA Omega 900
HeraCeram by Hereaus Kulzer
Carmen® by Dentaurum
CCS by Dentaurum

Subject to the specifications of the veneering material manufacturers.

CE 0483

PROPERTIES	UNIT OF MEASUREMENT	VALUE
Co	%	60.5
Cr	%	28
W	%	9
Si	%	1.5
Vickers hardness (HV10)		320
Elastic modulus	GPa	230
CTE (20 – 500° C)	10-6/K	14.1
Melting interval	°C	1,320 – 1,420
Proof stress Rp 0,2	MPa	635
Density	g/cm3	8.6
Elongation at failure A5	%	32

Preparation notes for metal alloys

Subject to the generally valid preparation guidelines for ceramically veneered metal restorations.

Downstream processing of ticon

- Titanium can only be machined with special tools. These tools must not be used for other materials.
- Ensure a uniform grinding direction, average rotation speed (max. 15,000 rpm) and low contact pressure.
- Avoid material overlaps.
- Prior to veneering, slightly sandblast the framework with alumina (110 – 150 µm, pressure ≤ 2 bar) and set aside for 5 minutes for passivation.
- If our recommendations deviate from those of the veneering material manufacturer, the latter take priority over our instructions.

Downstream processing of coron

- Minimum wall thickness (after finishing): for ceramic veneers, 0.3 mm; for resin veneers, 0.3 mm.
- For preparation, use fine-toothed tungsten-carbide cutters and ceramically bound abrasion heads.
- Avoid material overlaps.
- Prior to veneering, slightly sandblast the framework with alumina (125 µm, pressure 2 – 3 bar) and steam-clean. No degassing cycle necessary.

Subject to the specifications of the veneer manufacturers.

Fibreglass-reinforced polyamide
Metal-free restorations

For sophisticated long-term temporaries

Polyamide reinforced with short, parallel-aligned glass fibres has many applications. It comes as an industrially produced solid blank whose properties are not changed by CAM cutting.

It can be attached conventionally or with adhesives

Downstream processing of plastic

- When using tungsten-carbide tools, observe the maximum speed of 20,000 rpm to prevent smearing. The attachment of retentions significantly improves the bond between the polyamide and the veneering material.
- Prior to veneering, sandblast the frameworks with alumina (250 µm, ≤ 3 bar pressure).
- If our recommendations deviate from those of the veneering material manufacturer, the latter take priority over our instructions.

Intraoral Cementing Options:
Provisionals: Temporary cements

Long-term provisionals: Non-bonding glass ionomer cements

Indications:
Temporary crowns and bridges in the anterior and posterior regions.

Note:
Bridges with more than one pontic are contraindicated.

Veneering:
All conventional veneering materials on a PMMA basis.

CE 0124

PROPERTIES	UNIT OF MEASUREMENT	VALUE
Fibreglass-reinforced copolyamide, modifiers (DC-Tell)		
Flexural strength	MPa	380
Elastic modulus	MPa	22,000
Melting point	°C	260
Density	g/cm3	1.69

polycon ae tooth-colored PMMA

polycon|ae

For sturdy long-term temporaries

polycon ae is an acrylic resin based on PMMA showing high strength and greatly improved abrasion resistance, which makes it particularly well-suited for the milled dental restorations such as temporary crowns and bridge restoration in the anterior and posterior regions.
The properties of polycon ae are preserved during CAM processing of the industrially produced resin blanks.

- High biocompatibility.
- High colour stability.
- Excellent bond strength with non-ceramic veneering materials.
- Aesthetic colour design through coloured framework materials.

Indications:
Metal-free restorations for hypersensitive patients

Functional and aesthetically demanding long-term temporaries

Crown and bridge veneering

Possible Veneering Materials For Combination Restorations:
Artglass® by Heraeus Kulzer
VITA ZETA® LC
VITA VM® LC
Solidex by Shofu
CERAMAGE by Shofu
Sinfony™ by 3M ESPE

Subject to the specifications of the veneering material manufacturers.

CE 0124

PROPERTIES	UNIT OF MEASUREMENT	VALUE
Material		PMMA (polymethyl methacrylate)
Colour		tooth-colored (B1)
Density	g/cm3	1.19
Bending strength	MPa	83
Solubility	µg/mm3	0.2
Flash point	°C	> 250

polycon cast castable PMMA

Polycon cast

is a filler-free acrylic resin representing an alternative to the regular crown or bridge modelling technique for cast restorations. The PMMA resin is castable without residue and can be used instead of modelling wax.

Note:Castable resin materials tend to expand slightly during firing. It is therefore recommended to reduce the edges of the crown by about 1 mm and to fill it with cervical wax (or any other commercially available modelling wax). A light all-over wax cover also creates an expansion reservoir in the muffle.

Identical downstream processing of polycon cast and polycon ae

The completed milled units should be reworked with tungsten-carbide cutters suitable for resins at a maximum speed of 20,000 rpm to prevent smearing. Excessive heat must be avoided during finishing to prevent framework fitting problems.

Indication:
For cast restoration (all-metal or veneered), telescope restorations, precision attachments, and oral implantology.

Caution:
polycon cast must not be inserted into the patient's mouth to check the fit, as polycon cast has not been approved as a medical device.

Important Note:
The use of investment compounds for quick-heating (speed investment compounds) is not recommended.

CE 0124

PROPERTIES	UNIT OF MEASUREMENT	VALUE
Material		PMMA
Colour		colorless
Density	g/cm3	1.19
Modulus of elasticity	MPa	3,300
Bending strength	MPa	115
Flash point	°C	450

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