Straumann® PURE Ceramic Implant System®
FAQs

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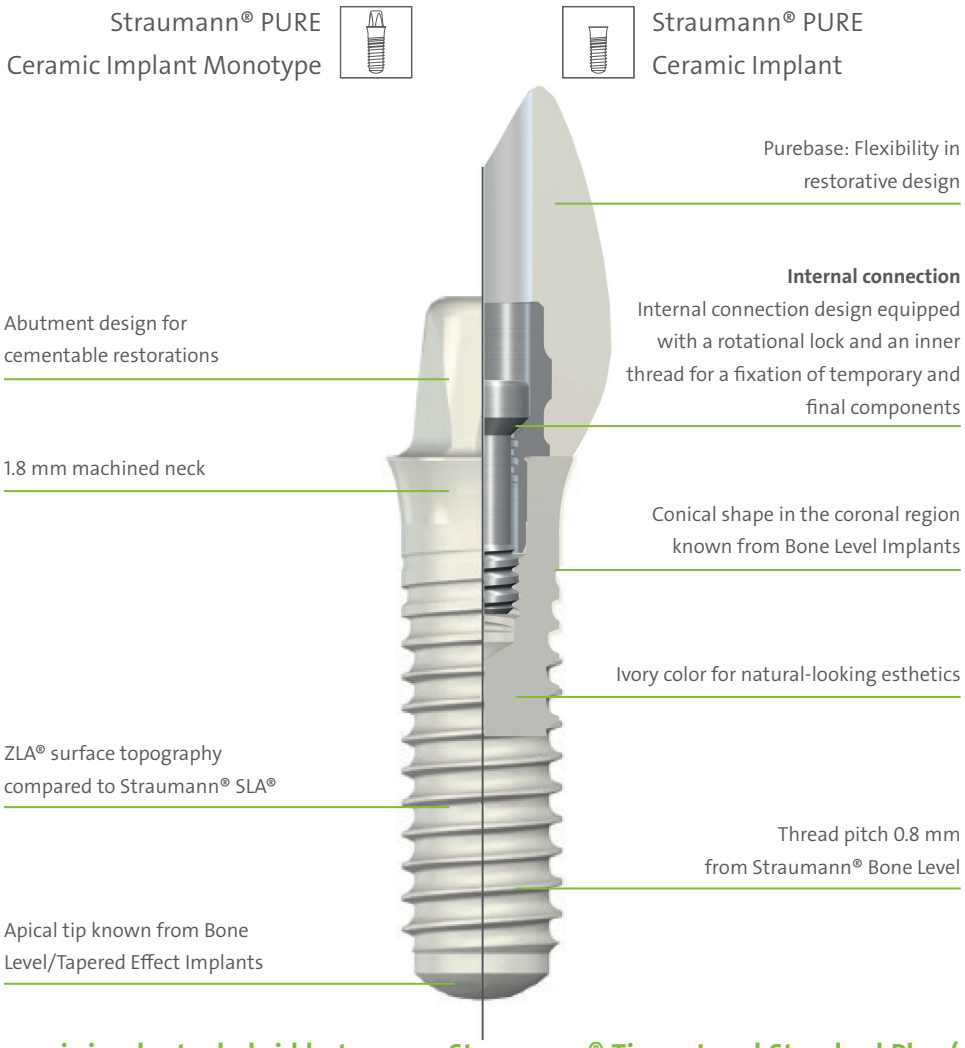
Overview of Straumann® PURE Ceramic Implants: General

Which products are included in the Straumann® PURE Ceramic Implant system?

The Straumann® PURE Ceramic Implant system consists of the Straumann® PURE Ceramic Implant Monotype and the two-piece Straumann® PURE Ceramic Implant with the corresponding prosthetic components. The Straumann® PURE Ceramic Implant Monotype is available in two endosteal diameters ∅ 3.3 mm and ∅ 4.1 mm, each with an abutment height of 4 mm or 5.5 mm. The two-piece Straumann® PURE Ceramic Implant is available in the endosteal height of ∅ 4.1 mm.

All implants in the PURE Ceramic Implant system are Tissue Level implants with a Bone Level thread.



Why is the PURE ceramic implant a hybrid between a Straumann® Tissue Level Standard Plus (smooth collar of 1.8 mm in height) and a Straumann® Bone Level Implant (bone level thread)?

The Bone Level thread allows optimized bone contact. The smooth Tissue Level shoulder promotes optimum and highly esthetic soft tissue grafting.

straumann®

	Straumann® PURE Ceramic Implant Monotype	Straumann® PURE Ceramic Implant
Portfolio		
Length	8 mm, 10 mm, 12 mm, 14 mm	8 mm, 10 mm, 12 mm, 14 mm
Endosteal diameters	∅ 3.3 mm, ∅ 4.1 mm	∅ 4.1 mm
Shoulder diameter	∅ 3.5 mm, ∅ 4.8 mm	∅ 4.8 mm
Abutment height	4 mm, 5.5 mm	PUREbase 3.5 mm, 5.5 mm
Surgery		
Traditional surgery	✓	✓
Traditional implantation	✓	✓
Guided surgery	✓	✓
Guided implantation	-	✓
Covered healing	-	✓
Prosthetic abutment		
Screwed abutment	-	✓
Cemented abutment	✓	✓
Intraoral cementing	✓	✓
Cementing in the laboratory	-	✓
Abutment with angle correction	-	-
Prosthetic abutment		
Single crowns	✓	✓
Bridges	(✓)*	(✓)**
Cantilever bridges	-	-

* Bridge solutions on a Straumann® PURE Ceramic Implant Monotype are an option, but require very accurate planning. The non-engaging temporary copings can be used for temporary bridges to ensure an ideal emergence profile.

** There are no special PUREbase designs for bars and bridges. The current PUREbase is ideal for single tooth restorations, but can also be used for bridge solutions. The attachment is generated in this case and connected to the PUREbase. The next step is to cement the bridge onto this single attachment.

Surgery

Which extra instruments must be purchased for the PURE Ceramic Implant system?

The instruments and the cassette are identical to those used for the Straumann® Bone Level Implant Line (BL). The corresponding PURE position indicators should also be used. Optionally, the Diagnostic T and the Implant Distance Indicator for Tissue Level may be used for planning. For comparison, the Straumann® X-ray Template (150.215) can be used for both the Straumann® PURE Ceramic Implant and the Straumann® PURE Ceramic Implant Monotype. All components are shown in the "Straumann® PURE Ceramic Implant System, Basic information" (USLIT 1193).

Is a new drill protocol required?

No. The Straumann® PURE Ceramic Implant system is inserted with the Bone Level drilling protocol. The same surgical cassette can be used for the PURE Ceramic Implant System.

Is there a new profile drill for the PURE Ceramic Implant?

The Straumann® Bone Level Profile Drill is recommended for PURE. Depending on the bone conditions, the Straumann® Tissue Level RN Standard Plus Profile Drill may also be used after this.

Is there space in the surgical cassette for the position indicators?

Yes, the upper right grommets in the surgical cassette may be used for the position indicators.

Position indicators are very helpful for careful planning. Is there a position indicator with a 2.8 mm diameter for the 4.1 mm PURE Ceramic Implant?

A position indicator with these dimensions is not planned for the 4.1 mm PURE Ceramic Implant. Use the depth gage to check the position.

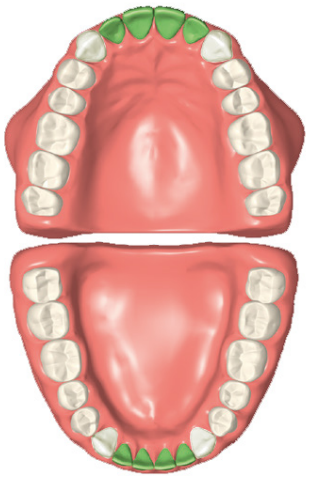
Can the PURE Ceramic Implant system be used to perform a bone augmentation/sinus lift?

Yes, that has already been performed. Please note that as with all implants, especially when performing a sinus lift, there must be sufficient residual bone volume to achieve good primary stability.

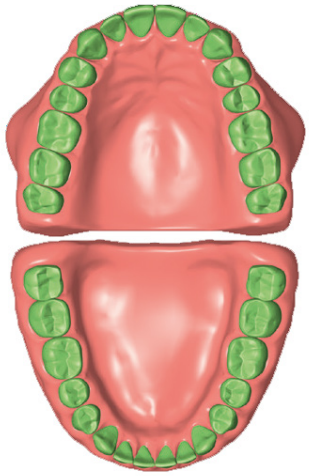
Indications

What are the indications of the PURE Ceramic Implant system?

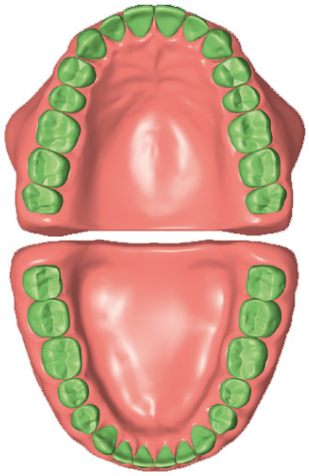
The Straumann® PURE Ceramic Implant system is suitable for oral endosteal implantation in the upper and lower jaw and for the functional and esthetic oral rehabilitation of partially or fully edentulous patients. Individual crowns, bridges and partial or full prostheses and single tooth replacement are among the prosthetic options.



Indications PURE Ceramic Implant Monotype
∅ 3.3 mm



Indications PURE Ceramic Implant Monotype
∅ 4.1 mm



Indications PURE Ceramic Implant
∅ 4.1 mm

Property (unit)	Titanium grade 4	Y-TZP
Density (g/cm³)	4.5	6.05
Hardness (HV)	250	1,100 - 1,500
Strength (MPa)	680 (tensile strength)	≥ 1,200 (4-point bending strength)
Elasticity module (GPa)	110	200 - 220

What is the difference between zircon, zirconium and zirconium dioxide?

Zirconium is a chemical element with the symbol Zr. Zirconium is also the name of the metallic form of the element Zr, which is a shiny, grayish-white transition metal.

Zircon = Zirconium silicate ($ZrSiO_4$) is a naturally occurring mineral and the primary source of the element zirconium.

Cubic zirconia (CZ) is a crystalline form of zirconium dioxide ($ZrO2_2$). The synthetically produced, visually perfect crystal is normally colorless and is described as an artificial diamond.

Zirconium dioxide (ZrO_2) is a white crystalline oxide of zirconium. Zirconium dioxide (also called zirconium dioxide or zirconoxide) is a 100% ceramic material.

Implants in the Straumann® PURE Ceramic Implant system have the following chemical composition:

Elements	% weight
$ZrO_2 + HfO_2 + Y_2O_2$	≥ 99.0
Y_2O_2	> 4.5 to ≤ 6.0
HfO_2	≤ 5
HfO_3	≤ 0.5
Other oxides	≤ 0.5

How can zirconium dioxide be metal-free, if it is called zirconium (i.e. a metal)?

Zirconia is an oxide of Zirconium. Zirconia is a ceramic and does not have any metal properties.

Generally speaking, metals are good conductors of heat and electricity. Ceramics do not have these properties.
Similar to zirconia, there are other compounds around us where a metal reacts with a gas to form a non-metal. As an example, take NaCl:

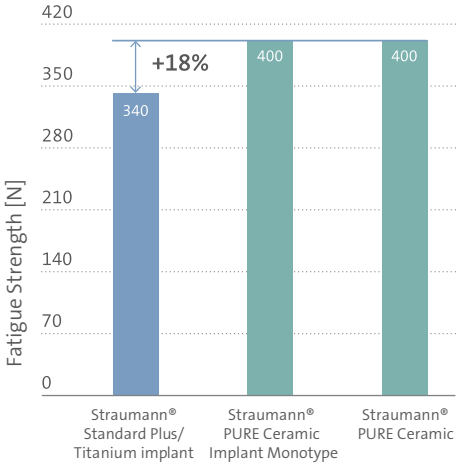
Sodium or Na is a very volatile metal and chlorine or Cl, we know is a gas. The reaction of Na and Cl forms....salt! We know that salt is very different than a metal and we would never call NaCl a metal. Similarly, zirconium dioxide or zirconia is not a metal.

Ceramic materials are subject to an aging process. Does this affect the performance of the implant?

The ceramic material used for the Straumann® PURE Ceramic Implant system has successfully undergone an extensive range of laboratory tests with up to 100 years of simultaneous aging under stress, as well as several animal studies. The long-term is thus ensured (Data on file).

Are the PURE Ceramic Implants only compared with titanium implants or titanium implants plus abutments in the tests?

In line with the ISO standard 14801, tests are always carried out with implants plus abutments. Therefore the strength of the PURE Ceramic Implants is compared with the strength of the titanium implant and its abutment.



How have strength tests been carried out?

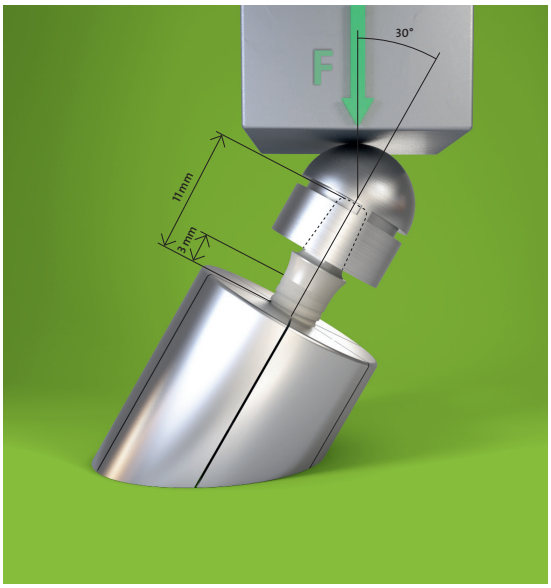
Implants in the Straumann® PURE Ceramic Implant system demonstrate physical properties that are more than the normal requirements in the mouth of the patient. Static (simulation of a single load, comparable with, a patient accidentally biting on a cherry stone) and dynamic tests are carried out (simulation of chewing cycles over a life-time). The implants are restored with ceramic crowns and tested in accordance with ISO standard 14801. The tests show that the PURE Ceramic Implant system is characterized by a significantly higher strength than demanded by the standard. This quality standard is ensured by an additional strength test of each implant that is supplied, by what is called a proof test (loading test).

What is the 100% proof test?

Each individual implant is mechanically tested with a load test especially developed at Straumann (100% proof test). The 100% proof test guarantees the customer that each and every implant is high strength and has the highest quality level.

How many PURE Ceramic implants have been implanted in people?

Since the introduction of the Straumann® PURE Ceramic Implant Monotype in September 2011, globally, over 18,000 implants have been delivered to our customers.



Is Y-TZP radioactive?

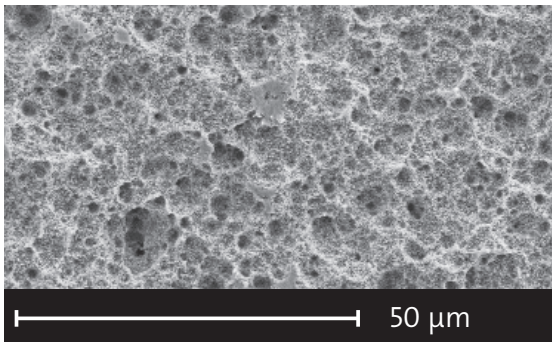
Modern zirconium dioxide material used for implants is no more radioactive than natural bone: Our Straumann® PURE Ceramic Implant system shows a radioactivity of 20-50 Bq/kg, which is less than half the radioactivity of bone and is generally lower than the naturally occurring radioactivity in the environment.[1]

[1]According to ISO 13356 values of ≤ 200 Bq/kg are permissible for use as an implant material.

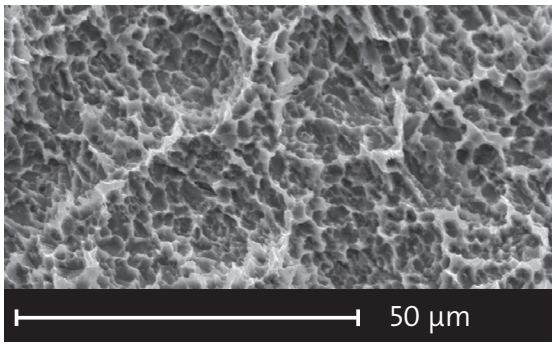
Topography

What type of surface do implants of the Straumann® PURE Ceramic Implant System have?

The Straumann® PURE Ceramic Implant system has a ZLA® surface, based on the SLA surface technology, as used in the Straumann titanium implants. The topography of the Straumann® ZLA® surface is characterized by a macro and micro roughness, which is ideal for cell agglomeration. In preclinical studies, the ZLA® surface exhibited values comparable to the SLA® surface for osseointegration and healing patterns and times in terms of peri-implant bone density and BIC value (bone-to-implant contact).*



ZLA® surface



SLA® surface

What are the recommended healing times?

If there is good bone quality and adequate bone supply, a healing time of at least 6 weeks is recommended. In spongy cancellous bone, a healing time of at least 12 weeks is recommended. In all other situations, such as after bone grafting or incomplete contact between implant surfaces and bones, longer healing times are recommended.

If there is good primary stability, an immediate temporization can be implanted out of occlusion.

Situation	Healing phase
• Good bone quality and adequate bone quantity • Implants with a diameter of 4.1 mm	At least 6 weeks
• Cancellous bone quality	At least 12 weeks
• No complete contact between implant surfaces and bone • Bone grafting required	Healing time depends on the situation

What is the roughness value “Sa” of the PURE Ceramic Implant?

While SLA has an “Sa” value of approximately 1.2µm, the Sa value for the ZLA® surface is 0.6 - 0.8µm (measured with a 30-micrometer filter).

*Gahlert 2012 (v0.1) M, Roehling S, Sprecher CM, Kniha H, Milz S, Bormann K. In vivo performance of zirconia and titanium implants: a histomorphometric study in mini pig maxillae. Clin. Oral Impl. Res. 23, 2012;281–286 doi: 10.1111/j.1600-0501.2011.02157.x Gahlert_ClinImplDentRelRe s_2009_Early (v0.1) M, Roehling S, Sprecher CM, Kniha H, Milz S, Bormann K. In vivo performance of zirconia and titanium implants: a histomorphometric study in mini pig maxillae. Clin. Oral Impl. Res. 23, 2012;281–286 doi: 10.1111/j.1600-0501.2011.02157.x

Does mechanical debridement damage the implant surface?

The use of metal instruments for cleaning the surface of the implant is not recommended, as metal particles from the instrument may remain on the implant surface.

Only hand scalers and curettes based on Teflon are recommended for cleaning the implants.

Does laser treatment damage the surface?

The only laser systems that appear not to damage the surface of the implant are diode lasers (tested wavelength 810 nm).*

Miscellaneous

What is the clinical evidence for the Straumann® PURE Ceramic Implant system?

The product claims are clinically supported. Bormann et al. (2018)** published three-year data with 97.5 % survival and success rates for the Straumann® PURE Ceramic Implant Monotype. The 5-year data is expected to be published. As the new two-piece Straumann® PURE Ceramic Implant is made of the same material, and has the same Tissue Level form, surface and production procedure as the PURE Ceramic Implant Monotype, similar clinical outcomes can be expected.

How is peri-implantitis treated and what do I have to watch out for?

The treatment of an inflammatory process or peri-implantitis depends on the specific patient situation. Some customers have recommended the following general procedures for the PURE Ceramic Implant system:

1. Treat infected neighboring teeth: Carry out root treatment, remove teeth in very poor condition, treat chronic periodontitis, etc.
2. Treatment around the implant: Eliminate the factors that have caused or advanced the inflammatory response. Sometimes it is advisable to remove the crown and set an abutment until the inflammation is under control and improving, as this makes it easier to clean around the implant.
3. Wound cleaning: It is recommended that wounds are cleaned using plastic or Teflon-based scalers and curettes and are treated with ultrasound and airflow, e.g. with Perioflow from EMS (with water!), glycine 25µm, > pressure from the jet from 1.4 to 2.1 bar or airflow from EMS S1 (with water!), sodium bicarbonate 40µm, > pressure from the jet from 3.5 to 4.5 bar.
4. Rinsing: Chlorhexidine 0.12%
5. Care at home: Establish a good oral hygiene routine (show patients cleaning techniques with a toothbrush and interdental brushes), rinse mouth with chlorhexidine mouthwash (0.12%) every 12 hours for 2 weeks.
6. Follow-up visits: 2 weeks and 1 month after treatment

*Stubinger_LaserSurgMed_2008_40_223 (v0.1), Homann, Etter, Miskiewicz, Wieland, Sader; Effect of Er:YAG, CO2 and Diode Laser Irradiation on Surface Properties of Zirconia Endosseous Dental Implants; Lasers in Surgery and Medicine 40: 223-228 (2008)
noda Dental Materials (v0.1), Okuda, Tsuruki, Minesaki, Tenonouchi, Ban; Surface damages of zirconia by Nd:YAG dental laser irradiation; Dental Materials Journal 29(5): 536-541 (2010)

**A prospective clinical study to evaluate the performance of zirconium dioxide dental implants in sin (v0.1) KH, Gellrich NC, Kniha H, Schild S, Weingart D, Gahlert M. A Prospective Clinical Study to Evaluate the Performance of Zirconium Dioxide Dental Implants in Single Tooth Gaps in the Maxilla and Mandible: 3-Year Results. Publication in preparation 2017.

Straumann® PURE Ceramic Implant system

Summary of key points

- The implants in the Straumann® PURE Ceramic Implant system are TL implants with a BL thread
- The Straumann® PURE implants are made of Y-TZP ceramic. Y-TZP stands for yttria stabilized zirconium dioxide
- Zirconium dioxide is a ceramic with high mechanical strength, not to be confused with the metallic material zirconium
- The implants of the Straumann® PURE Ceramic Implant system have a ZLA® surface. This structure combines macro and micro roughness and in preclinical and clinical trials has shown comparable osseointegration to the gold standard SLA.
- Every implant undergoes full safety quality testing (100% proof test) before it leaves the production facility in Villeret (Switzerland).
- Scientifically sound success, with over 30 publications in independent professional journals and 18 ongoing clinical trials

Straumann® PURE Ceramic Implant Monotype

Surgery

- Traditional implantation
- Healing with protective cap (optional)

Prosthetic abutment

- Prosthetic abutment on the implant: The crown can be cemented directly onto the implant

Options for securing the restoration

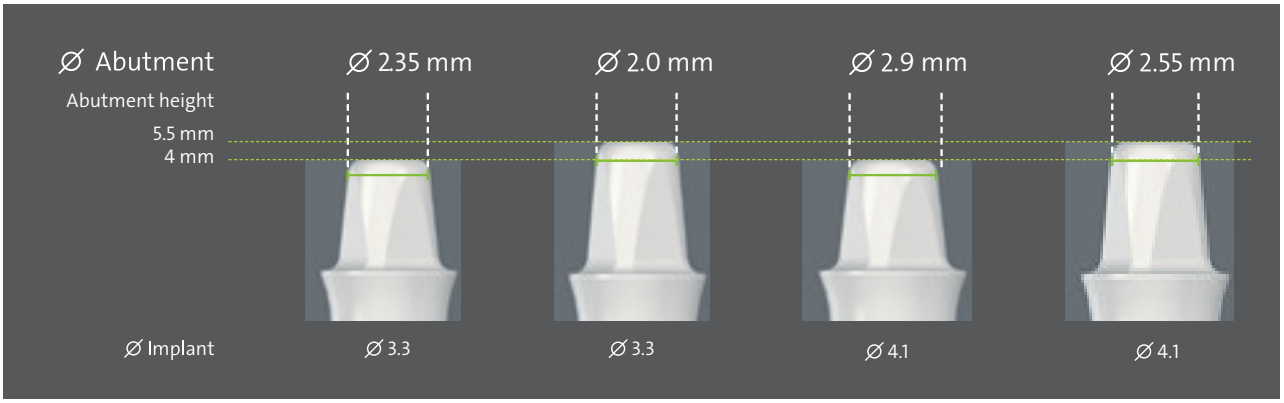
- Intraoral cementing

Alignment

- Abutment design with rotation protection for simple centering

What is the diameter of the top part of the abutment?

The diameters shown are measured before the top end is rounded off.



Why are there no abutment heights of > 5.5 mm?

The existing abutment height is considered sufficient for cementing any restoration and offers sufficient retention.

Healing

What is the wall thickness of the healing caps?

⌀ 4.1 mm: The wall thickness is approximately 0.85 mm. The diameter is 5.5 mm, which means that the implant shoulder overlaps by 0.35 mm.

⌀ 3.3 mm: The wall thickness is between 0.35 mm and 0.4 mm. The largest diameter is 4.3 mm.

What are the upper dimensions of the impression cap?

⌀ 4.1 mm: The retentions of the impression plate are 5 x 7 mm, so the diagonal is 8.6 mm. As the corners are rounded, the value is slightly smaller at approximately 8.5 mm.

⌀ 3.3 mm: The retentions of the impression plate are 4.5 x 7 mm, so the diagonal is 8.1 mm.

What is the retention strength of the protective caps?

The retention strength of the protective caps is 8-12 Newton.

What are some of the ways to ensure that the implant can heal unstressed?

- Thermoplastic partial dentures
- Temporary dentures
- “Eggshell” temporary restoration (with splint)
- Maryland bridge as a protection/interim denture
- Posterior tooth adhered with plastic
- Metal-reinforced long-term temporary restoration
- Provisional restoration

Prosthetics

Which material is available for the restoration?

Any materials suitable for esthetic restoration on metal implants may be used; there are no limits in terms of materials.

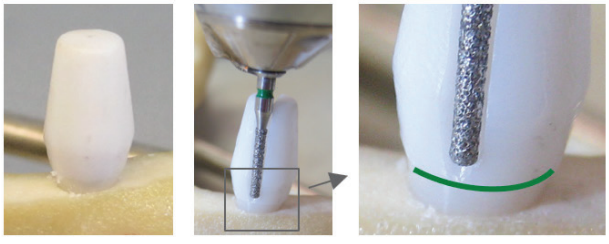
What experience is there with bridges on ceramic implants?

Bridges have been successfully used on the basis of PURE Ceramic Implant Monotype. Very precise planning is a prerequisite.

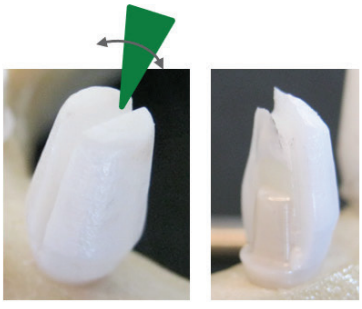
How is a cement-retained crown removed?

A fully ceramic restoration on the PURE Ceramic Monotype Implant can be removed like any other ceramic restoration. It is important to ensure that the implant shoulder is not damaged.

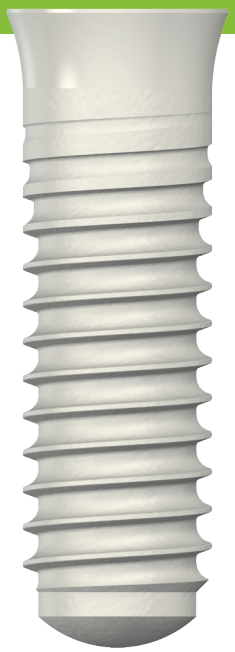
- The crown can be split with a suitable full ceramic diamond bur under continuous water cooling. It is important to ensure that you do not damage the implant. After splitting the crown, the slit can be widened with a wedge effect.
- Ensure here that the patient is not injured by a ceramic particle. If half of the crown remains in place it can be removed with forceps.
- Any cement residues can then be easily removed from the abutment before a new crown is cemented in place.



Keep an adequate distance away from the implant shoulder to avoid damage to the implant.



Straumann® PURE Ceramic Implant Monotype



Surgery
- Traditional or guided implantation
- Healing with healing caps, covered healing with 0 mm locking screw possible

Prosthetic abutment
- Screwed Abutment construction

Options for securing the restoration
- Intraoral cementing
- Cementing in the laboratory
- Screwing in place: The construction can be removed

Alignment
- Internal connection with rotational lock

Why is it again a Tissue Level implant and not a Bone Level implant?
The two-piece PURE Ceramic Implant is a successor of the successful PURE Ceramic Implant Monotype, which is also a TL. Studies have confirmed the excellent success and survival rates, optimum soft tissue grafting, etc. of the PURE Monotype. These advantages are used for the two-piece PURE ceramic implant. By virtue of the tooth-like color, a Tissue Level implant performed in the esthetic zone with ceramic implants demonstrates excellent results, without the dark color showing through the gingiva and crown, as is sometimes seen in metal implants.

Connection

Does the two-piece ceramic implant have a CrossFit® connection?
No, it has a connection that is similar to CrossFit®, and has been specially developed for the PURE Ceramic Implant to ensure that the distribution of forces in the implant are as homogeneous as possible and to prevent load peaks. **Components from the rest of the portfolio do not fit here!**

Which tests have been carried out for durability and possible wear?
Tests have been conducted on breaking strength, fatigue, screw loosening and associated micromovements and other specifications, going beyond the standard scope of the ISO 14801 mechanical tests. These include additional mechanical-dynamic stress tests where we increased the cycle count from 2 million to 10 million, as well as testing at various test frequencies of 2Hz and 15Hz. To see if hydrothermal aging has an impact, implants were tested with and without aging. We also tested implants in saline solution at an increased temperature (85°C) with deeper loads, which would correspond to aging of the implant in the patient's mouth with more routine loads. The tested implants were not only inspected visually for damage, but also under the microscope. Several SEM, Nanofocus, XRD and FIB (Focused Ion Beam) tests were performed to assess if structural changes could be detected. All tests had a positive outcome.

Tests on fretting and tribochemical behavior were also carried out at the Fraunhofer Institute IWM (Institute for Mechanics of Materials), where it was concluded that the micromovements and stress concentration that arise are so minimal that they have a negligible effect under long-term stress conditions.

To what extent has the internal thread of the implant been tested?

The geometry of the internal connection was the focus of the research team for many years. The interface geometry between the implant and TAN PUREbase and screws, for instance, was optimized:

- Internal square geometry in the implant has been deepened
- Edges that penetrate into the implant have been replaced by radial, tangential junctions
- The surface of the internal square was refined (reduced friction coefficient) by employing an enhanced production process
- The external square geometry from PUREbase has been extended and optimized to ensure precision fit in the implant (no tilting, reduced room for rotation)
- The shoulder geometry of the screw has been optimized and the contact surface in the abutment has been raised (increased screw pretension)

As a result, we have been able to show in tests that the new Straumann® PURE Ceramic Implant withstands similar loads to the established Straumann® PURE Ceramic Implant Monotype, i.e. at a dynamic load of over 400 N. The release torque of the screws is very close to the tightening torque of 35Ncm. This means that during loads of 2 million to 10 million cycles (up to 40 years), there is virtually no screw loosening.

Surgery, drill protocol

Are new surgical instruments required to place the two-piece PURE ceramic implant?

No. As with the PURE Implant Monotype, the standard Straumann® Surgical Cassette BL can be used. The PURE two-piece implant has the same drill protocol as the Straumann BL and therefore the same as the PURE Monotype implant.

Can I use a Bone Profiler?

No, there is no Bone Profiler for the PURE Ceramic implants, and the ones that are available are not compatible with PURE implants. If bone material has to be removed from the implant, use a scalpel or surgical scissors to do so. Important: Do not use rotating instruments!

Prosthetics

What is the temporary restoration for a PURE Ceramic Implant?

Information on the production of a temporary restoration for the PURE Ceramic Implant is available in the “Straumann® PURE Ceramic Implant System, Basic information”.

Which abutments are available for the PURE two-piece implant?

Currently, for the final restoration we have: the **Straumann® PUREbase.**
The Straumann® PUREbase is made of titanium alloy. This is designed so that our ceramic implants can withstand high mechanical loads. Mechanical tests confirm that the titanium PUREbase meets our internal standards, which are even higher than the normal standard (standard: 290 N versus over 360 N).

The PUREbase acts as the inner core and is inside the restoration. There is therefore no metal contact with the oral cavity or the gingiva. This also has esthetic advantages and is what distinguishes it from Variobase®.

Straumann® PURE Ceramic Implant RD with CI RD Straumann® PUREbase

VS

Straumann® Standard Plus RN with Straumann® RN Variobase®

Groundbreaking innovation:
PUREbase and crown/cap are seated at the same level on the implant. PUREbase forms the internal core, while the crown/cap forms the outer shell with soft tissue contact.

Should the PUREbase be etched before cementing?

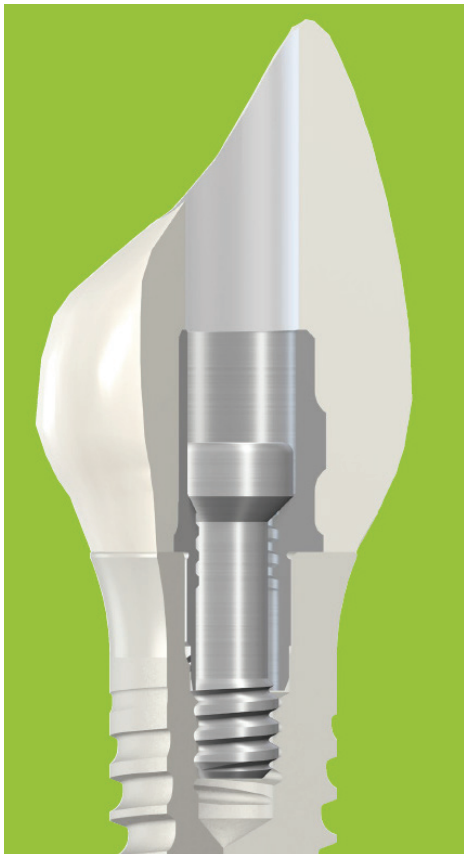
The PUREbase does not need to be modified (no blasting or etching). It is, however, important to following instructions provided by the cement manufacturer on priming the cement.

What material is the PUREbase abutment of the two-piece implant made of?

The PUREbase and the basal screw are made of TAN (titanium-aluminum-niobium). However, the metal parts have no direct contact with the patient, as they are completely enclosed by ceramic; by the implant at the bottom area and the crown in the top area.

The exact composition of the PUREbase abutment is listed in the following table:

Elements	% weight
Nitrogen	≤ 0.05
Carbon	≤ 0.08
Hydrogen	≤ 0.009
Tantalum	≤ 0.5
Iron	≤ 0.25
Niobium	6.5 - 7.5
Oxygen	≤ 0.2
Aluminum	5.5 - 6.5
Titanium	0.01 - 0.1



Is there color bleeding/abrasion from the PUREbase in the interface/thread of the ceramic implant?

There is always minimal abrasion between the implant and the abutment when it is inserted and removed. The same applies to titanium implants and titanium abutments; however, it is not as easy to see the gray abrasion on the metal surface as on a zirconium ceramic (the same principle and argumentation as for full zirconium abutments).

Can I cement the components outside the model?

To ensure a perfect fit and to check the approximal contact points, we recommend cementing within the model. Many users have told us that they prefer to cement outside the model and that they have achieved perfectly seated crowns using this approach. The final inspection on the model to check fit and under the microscope (->gap-free adhesion) are, however, critical.

Is the Cementation Aid for PUREbase optional?

Definitely not! Adhesion of the PUREbase without the Cementation Aid leads to inaccurate adhesion which will manifest as a gap between the implant and the crown. It is also very important to observe the protocol enclosed in the pack. It is particularly important to push down firmly during hardening (please ensure that the crown is not tilted) and to completely remove any excess cement from the underside of the crown/PUREbase at the end. The finished crown on the repositionable analog should undergo a final inspection under the microscope/magnifying glass to ensure there is no gap. The exact steps are set out in the brochure "CI RD Straumann® PUREbase, Basic information (USLIT.1195)".

Will PUREbase abutments without rotation lock for bridging technique be available?

That would be a possible extension of the portfolio. All further developments will not start until later in 2019 at the earliest and will depend on market demand.

Titanium intolerance

What is Straumann's position on immunological reactions to titanium/titanium hypersensitivity?

The Straumann Group has been collecting clinical evidence for its Dental Implant System for over 20 years. This makes the Straumann Dental Implant System one of the most-documented clinically validated and comprehensively tested dental implant systems in the world.

In general, Straumann® implants, abutments, closure screws and healing abutments are made of implant quality grade 4 titanium. Some of the basic and occlusal screws and synOcta® abutments are made of a titanium-aluminum-niobium alloy, which contains 90% titanium. Straumann Roxolid implants are made of a titanium-zirconium alloy with 85% titanium. All these materials are widely used in implants.

No nickel, cobalt or any other metals are added to these materials, and there are only traces of them. In orthopedics implants made of titanium and titanium alloy are the first-line alternative to stainless steel, for example, in patients who are hypersensitive to nickel/cobalt.

Generally speaking, hypersensitivity to titanium, titanium-aluminum-niobium or titanium-zirconium alloys is extremely rare.

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