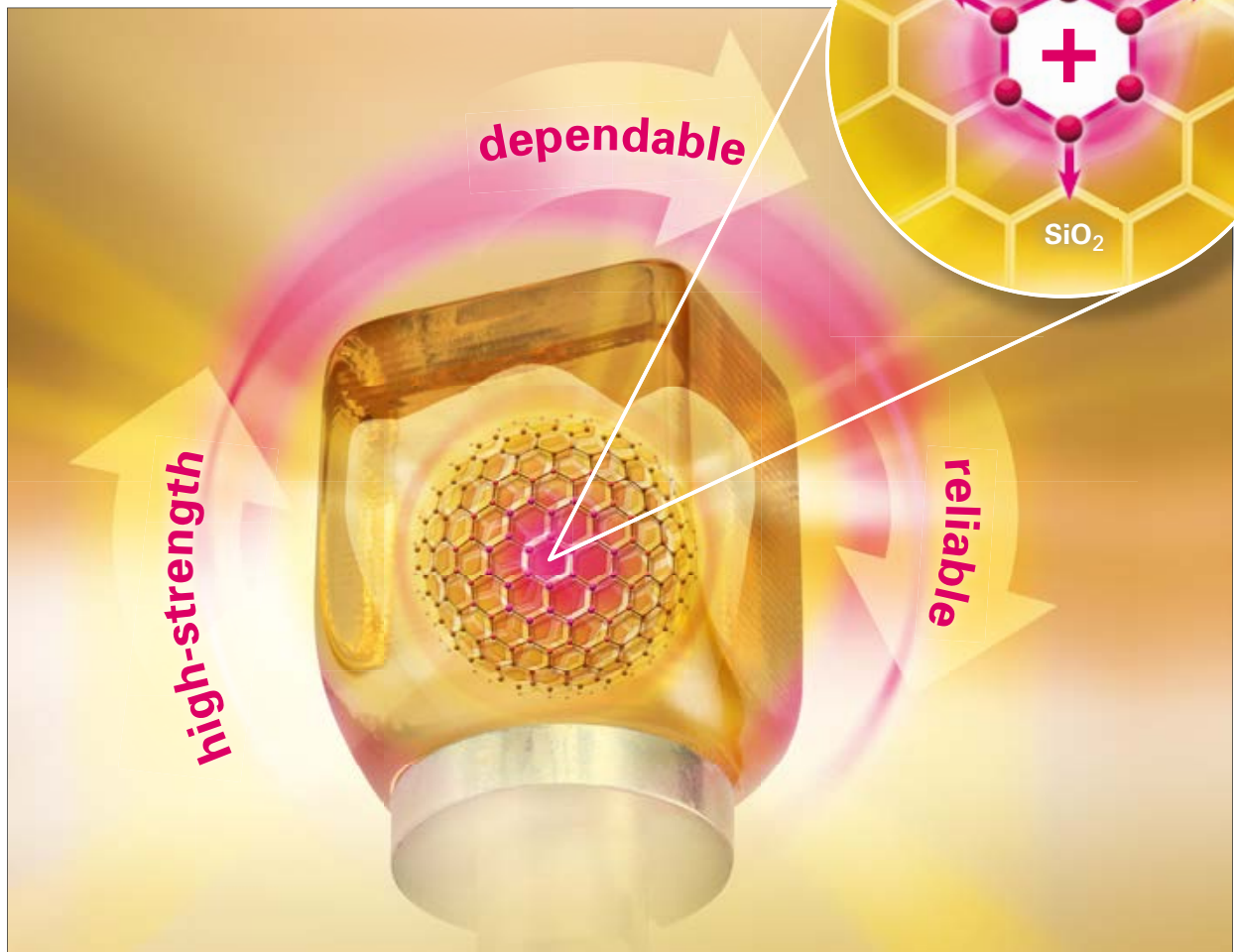


VITA SUPRINITY®

The concept



VITA shade taking

VITA shade communication

VITA shade reproduction

VITA shade control

Date of issue: 01.14

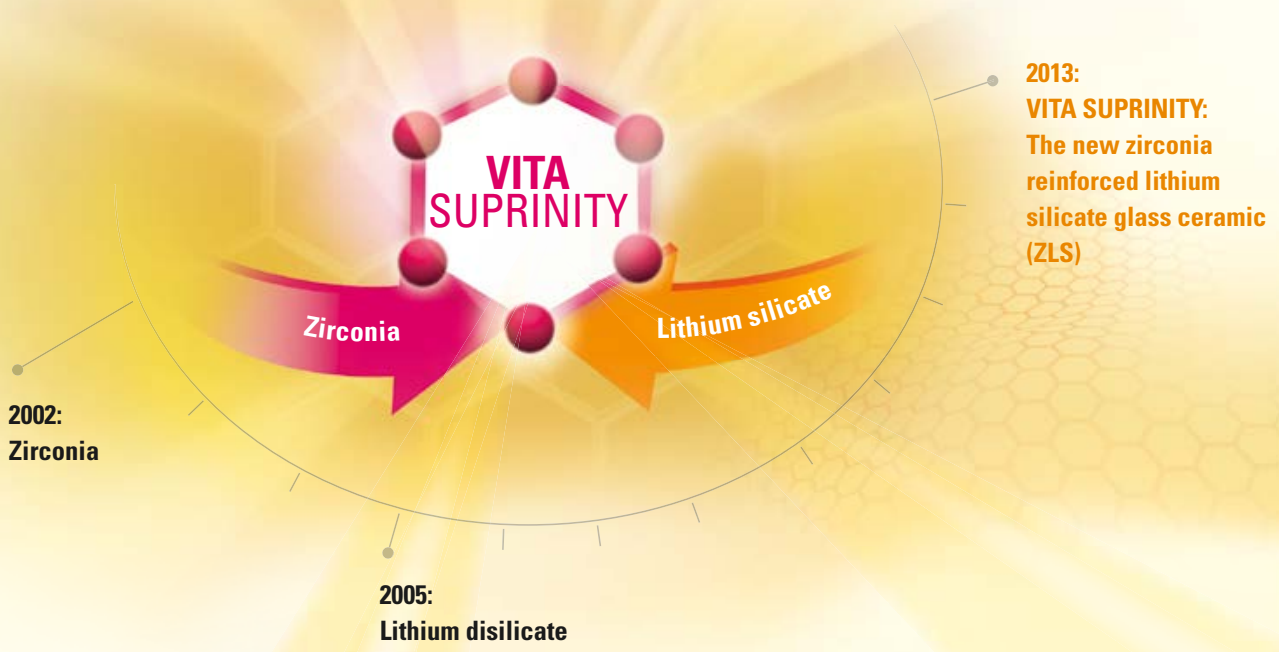


VITA shade, VITA made.

VITA

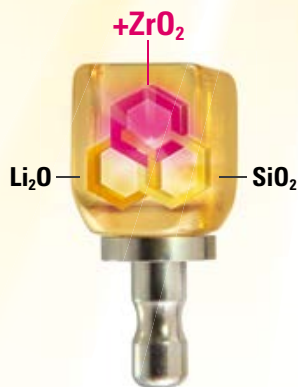
The new zirconia reinforced, high-performance glass ceramic.

DEVELOPMENT STAGES OF CAD/CAM MATERIALS



An element for utmost load capacity:

VITA SUPRINITY has a zirconia content that is approx. 10 times higher than the one of lithium disilicate ceramic.



VITA SUPRINITY components	Wt.-%
ZrO ₂ (zirconia)	8 – 12
SiO ₂ (silicon dioxide)	56 – 64
Li ₂ O (lithium oxide)	15 – 21
Various	> 10

Source: Internal study, VITA R&D, (1)



"Excellent load capacity thanks to a special structure"

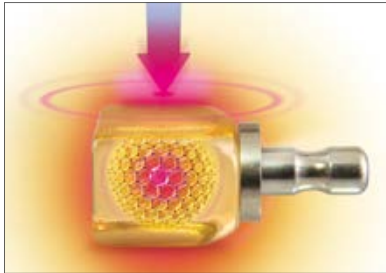
VITA Zahnfabrik offers VITA SUPRINITY, a new generation of glass ceramic material products. With the aid of an innovative manufacturing process, the glass ceramic is enriched with zirconia (approx. 10 % by weight). The results are the world's first zirconia reinforced lithium silicate ceramic (ZLS)*.

This new glass ceramic features a special fine-grained and homogeneous structure which guarantees excellent material quality and consistent high load capacity, as well as long-term reliability. Moreover, the material also offers outstanding processing characteristics such as easy milling and polishing.

Thanks to the excellent translucency, fluorescence and opalescence of this new glass ceramic material, VITA SUPRINITY provides excellent esthetic properties. VITA SUPRINITY covers a wide range of indications that includes anterior and posterior crowns, suprastructures on implants, veneers, inlays and onlays.

* This class of materials is a joint development of VITA Zahnfabrik, DeguDent GmbH and Fraunhofer-Institute for Silicate Research ISC.

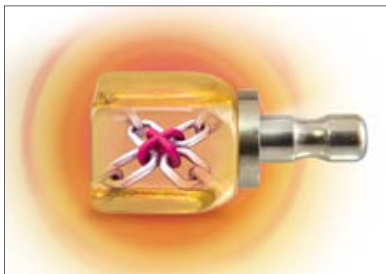
VITA SUPRINITY® Overview of benefits



The new glass ceramic for excellent load capacity.

Excellent load capacity:

Thanks to excellent mechanical load capacity, VITA SUPRINITY ensures high reliability and long-term clinical success.



Added reliability thanks to zirconia reinforcement.

Outstanding reliability:

The result of continuous load tests and the Weibull modulus show that VITA SUPRINITY offers durable restorations and a maximum level of reliability.



Processing made easy.

Simple processing:

This new glass ceramic features high firing stability and can be crystallized without using an auxiliary firing paste. Moreover, the material can be easily reworked manually and polished.

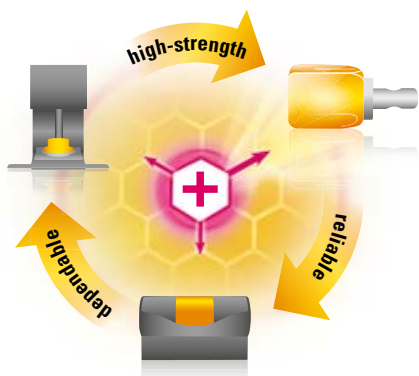
After polishing, VITA SUPRINITY exhibits an excellent surface quality.



Precise restorations with Sirona's MC XL system.

Optimal precision:

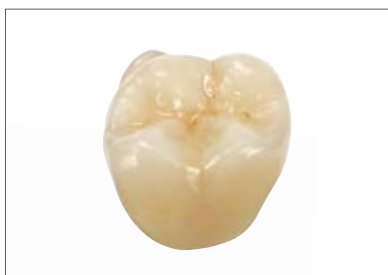
Compared to lithium disilicate ceramics, VITA SUPRINITY reveals improved edge stability after milling with Sirona's MC XL system. As a result, restorations with higher precision are guaranteed.



Reliable and user-friendly: milling, firing and processing.

High process reliability:

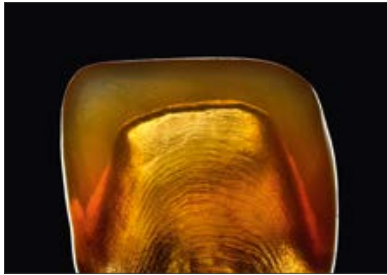
VITA SUPRINITY ensures particularly high processing reliability. As a result, temperatures during the crystallization process that are slightly below or above the standard temperature do not have a significant influence on dimensional stability or mechanical properties.



VITA SUPRINITY restorations impress with a natural play of colors.

Outstanding esthetics:

Thanks to the excellent translucency, fluorescence and opalescence, esthetically pleasing results can be achieved with VITA SUPRINITY. Plus, the natural play of colors can be perfectly reproduced with VITA VM 11 veneering material.



Natural play of colors.

Natural play of colors in all shade nuances:

VITA SUPRINITY glass ceramic demonstrates a variety of shade nuances, which is achieved by a special preparation process of coloring components and the special manufacturing process of VITA SUPRINITY.

Excellent translucency and opalescence:

VITA SUPRINITY features natural translucency with an opalescent play of colors. Since zirconia is finely distributed in the glass phase, crystallization of the zirconia particles is eliminated. As a result, the zirconia does not have an opaque effect.



Natural translucency.

Integrated fluorescence:

Due to the unique material structure and the addition of rare earth elements, the new generation of glass ceramic products reveals increased and natural fluorescence for all tooth shades.



Excellent opalescence.



Integrated fluorescence.



VITA SUPRINITY® Indications, variations, geometries, shades



Ideal for a variety of indications.

VITA SUPRINITY offers great versatility

Range of indications:

VITA SUPRINITY can be used for a wide range of indications including anterior and posterior crowns, suprastructures on implants, veneers, inlays and onlays.

Variations:

VITA SUPRINITY is the zirconia reinforced lithium silicate ceramic in the precrystallized state. A fully crystallized version, VITA SUPRINITY FC, is also available.



The new glass ceramic in the precrystallized state as VITA SUPRINITY (transparent, to the right) and in the fully crystallized state as VITA SUPRINITY FC (tooth-colored, to the left).

Geometries:

VITA SUPRINITY is available in the geometry LS-14 (18 x 14 x 12 mm).

Range of shades:

VITA SUPRINITY is available in the shades 0M1, A1, A2, A3, A3.5, B2, C2 and D2. All block shades are available in two translucency levels (T = Translucent and HT = High Translucent).



VITA SUPRINITY® A system with matched components

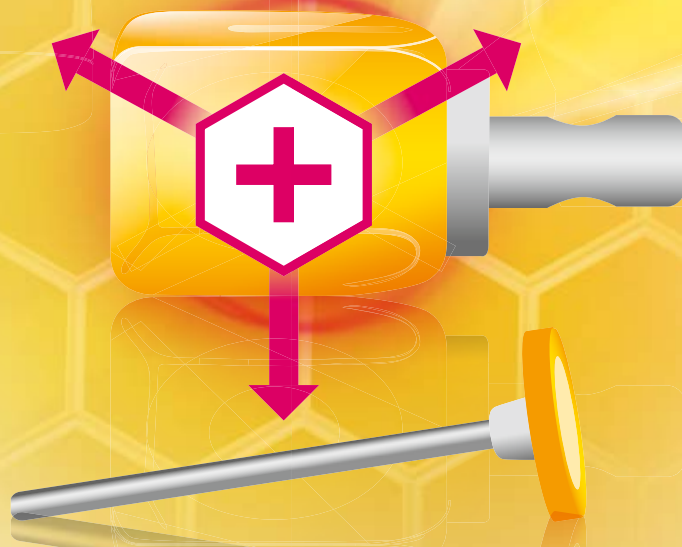
Perfect combination

Complementary products for polishing, characterizing and veneering for VITA SUPRINITY are especially matched with the new generation of glass ceramic products.


VITA AKZENT® Plus



VITAVM® 11



VITA SUPRINITY® Polishing Set

A smiling man with a beard and blue eyes, wearing a blue button-down shirt, is pointing upwards with his right hand and to the side with his left hand. The background is a soft, light yellow gradient. A faint, light blue hexagonal pattern is visible in the lower-left corner of the image.

VITA VM 11 veneering material is available for veneering restorations made of VITA SUPRINITY. The VITA SUPRINITY Polishing Sets are used to achieve top-quality, high-gloss surfaces. VITA AKZENT Plus is suitable for simple and esthetically convincing characterization - as a result, **an all-around solution with excellent results** is available for practices and laboratories.

VITA SUPRINITY® Polishing Set (clinical / technical)



Instruments for pre- and high-gloss polishing

The VITA SUPRINITY Polishing Sets were developed for reliable, efficient and material-specific surface treatment of zirconia reinforced lithium silicate ceramic (ZLS) restorations in dental practices and laboratories. The sets include various polishing instruments for pre- and high-gloss polishing.

These instruments are suitable for careful and gentle polishing of occlusal surfaces, cusps, fissures and restoration contact points. These polishing instruments ensure a brilliant shine on the finished restoration.



The easy and fast way to an excellent shine.

Easy to use and consistently good results

Excellent final results:

Highly esthetic and plaque-resistant surfaces are produced with these instruments. Precise concentricity, matched grit sizes and the individual geometries of the instruments guarantee superior results.

Simple and safe handling:

The instruments provide removal capacity that can be easily controlled and ensure minimal wear. Good handling and the ability to use without polishing paste enables simple and fast processing. Safe use of these clinical instruments is guaranteed through sterilization.

Gentle and careful processing:

These instruments, which were developed especially for VITA SUPRINITY, ensure gentle and careful processing.

As a result, for example, the risk of possible formation of microcracks is reduced.



VITA SUPRINITY® – Characterization with VITA AKZENT® Plus



Impressive options for shade characterization

With the 19 VITA AKZENT Plus stains, practices and laboratories can characterize the shade of any dental ceramic material easily and efficiently, regardless of the restoration's CTE. These new fluorescent stains allow internal staining of restorations during layering as well as staining and glazing of external surfaces.

Depending on the user's preferred method of processing and the relevant area of application, VITA AKZENT Plus stains are available as powders and ready-to-use pastes. The glazing Body Stains and Glaze materials are also available as sprays.

Three different application forms are available:

POWDER:

for unlimited flexibility and cost-effectiveness

PASTE:

ready-to-use pastes with uniform consistency and homogeneous pigmentation

SPRAY:

ready-to-use, easy-to-apply glaze and finishing agent stains



The stains enable outstanding shade characterization.

What practices and laboratories benefit from

Versatile:

With 19 shades and 3 application forms, VITA AKZENT Plus offers dental practices and laboratories a complete range of products for numerous characterization options.

User-friendly:

Whether you're working on internal coloring, surface characterization or fine glazing: with VITA AKZENT Plus fluorescent stains, you can adapt your restoration easily and effortlessly.

Cost-effective:

VITA AKZENT Plus can not only be used for characterizing VITA SUPRINITY restorations, the stains are also suitable for all other dental ceramic materials, regardless of the restoration's CTE.

VITA SUPRINITY® – Individualization with VITAVM® 11



Perfectly matched veneering material

VITA VM 11 is a low-fusing fine-structure feldspar ceramic that has been developed especially for individualizing crown substructures made of zirconia reinforced lithium silicate ceramic (ZLS).

Due to its individual CTE, a separate veneering material is required for this new generation of glass ceramic. The perfectly matched CTE values of substructure and veneering materials help minimize stress to ensure superior bonding and veneering reliability that is free of warping.

The benefits of VITA VM 11 for the user

Highly esthetic restorations:

The high translucency and warm shades of VITA VM 11 in combination with the opalescent effect of VITA SUPRINITY create highly esthetic restorations with a vivid play of colors.

Reliable bonding:

Stress-free and reliable bonding is ensured through a perfect match of both CTE ranges.

Simple processing:

Excellent stability, minimal shrinkage and high edge stability are distinctive features of VITA VM 11. Thanks to the excellent surface wettability of VITA SUPRINITY, multiple layering without liner firing or washbake is possible.

Unsurpassed firing stability:

The outstanding firing properties of VITA VM 11 result in very high dimensional stability even after several firings.

Excellent grinding and polishing properties:

Thanks to the proven fine structure of VITA VM 11, its smooth and densely sealed surface can be easily and quickly polished.



VITA SUPRINITY® Findings of materials science



The new generation of glass ceramics: VITA SUPRINITY.

The new generation of glass ceramics

At the beginning of the new millennium, the use of zirconia in the dental sector was an important milestone since the material enabled the fabrication of multi-unit, all-ceramic bridges for the first time. An additional material has been available to dental users all over the world since the introduction of a lithium disilicate-based glass ceramic in 2005.

VITA SUPRINITY reflects the systematic advancement in this field. This newly developed generation of glass ceramic materials combines the positive material characteristics of zirconia (ZrO_2) and glass ceramic.

The following test results demonstrate the effects of these material properties and how VITA SUPRINITY differs from current CAD/CAM materials.

Short overview - physical/mechanical properties

Test	VITA SUPRINITY
3-point flexural strength	approx. 420 MPa* ¹
3-point flexural strength, precrystallized	approx. 180 MPa
Biaxial strength	approx. 540 MPa* ²
Modulus of elasticity	approx. 70 GPa
Weibull modulus	approx. 8.9
CTE	approx. $12.3 \cdot 10^{-6}/K$

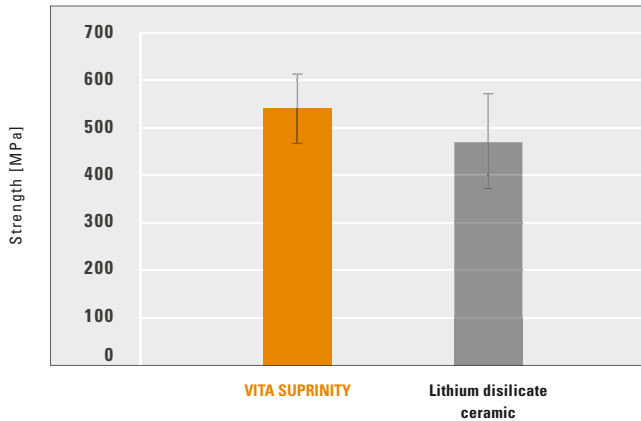
*¹) The 3-point flexural strength value indicated is the average of numerous lot tests performed by VITA's Quality Control with partially automated preparation of specimens, which resulted in lower strength values than those obtained for careful manual preparation of specimens.

*²) Based on ISO 6872 with modified geometry of specimens.

VITA SUPRINITY® Findings of materials science

Excellent load capacity ensures reliability

Biaxial strength



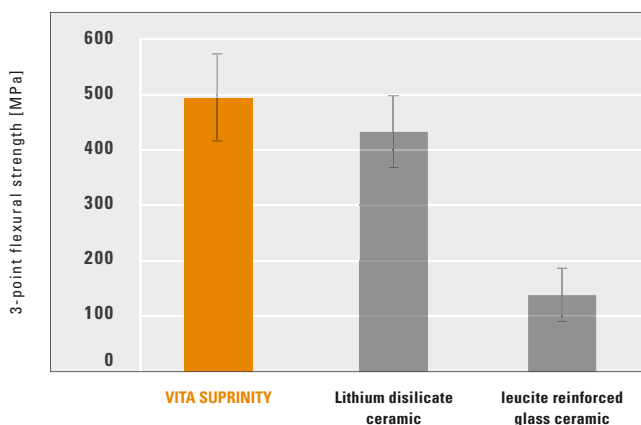
Source: Internal study, VITA R&D, (1)

Test method:

- Test was carried out based on ISO 6872 with a modified geometry of specimens.
- To reduce defects of margins, the blocks were not turned first, but rectangular discs were prepared from the blocks with comparable geometries using a diamond wire saw.
- Then a uniform layer of thickness of approx. 1.2 mm was milled using a lapping machine and final crystallization was carried out according to the manufacturer's instructions.
- 20 specimens of each material were loaded until fracturing occurred (Zwick universal testing machine) and the strength was determined.
- To calculate the stress, the diameter used in the formula was replaced by the length of the shorter side of the rectangle.

Conclusion: With a value of 541 MPa, VITA SUPRINITY features higher average strength and lower standard deviation than lithium disilicate ceramic in this test.

3-point flexural strength after milling



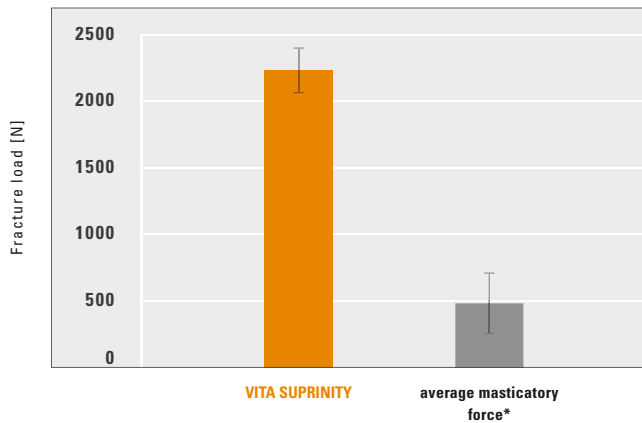
Source: Internal study, VITA R&D, (1)

Test method:

- The test was carried out in accordance with ISO 6872.
- A diamond saw was used to prepare bending rods from the blocks.
- Using a SiC suspension (grain size 1200), the specimens were milled manually to a uniform layer thickness of approx. 1.2 mm, a chamfer was added and crystallization was carried out according to the manufacturer's instructions. No additional tempering process was completed for the leucite reinforced glass ceramic.
- 10 specimens of each material were loaded until fracturing occurred (Zwick universal testing machine) and the 3-point flexural strength was determined.

Conclusion: In this test series, VITA SUPRINITY produced an average flexural strength of 494.5 MPa. This value is more than three times higher than the value determined for traditional leucite reinforced glass ceramic (138.7 MPa). The result for the lithium disilicate ceramic in this test is 435.0 MPa.

Static fracture load



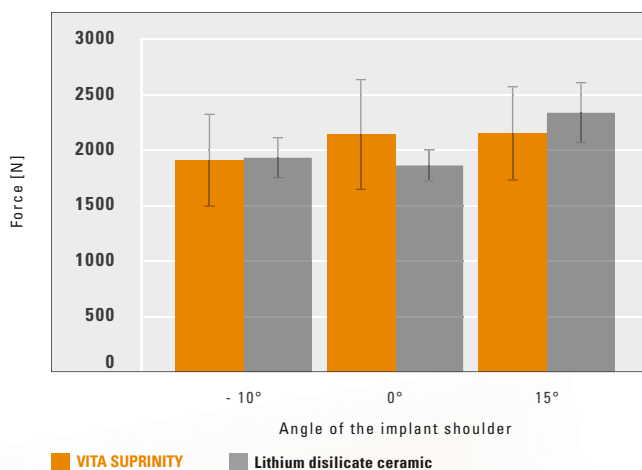
Source: Internal study, VITA R&D, (1)

Test method:

- Molar crowns made of VITA SUPRINITY were milled using the MC XL system and then polished and crystallized.
- The crowns were bonded to hybrid ceramic dies (modulus of elasticity: 23 GPa) using RelyX Unicem (self-adhesive, 3M ESPE) and then immersed for accelerated aging in warm water (37°C) for one week.
- In a testing machine, static load was applied to the crowns until fracturing occurred.
- The bars represent the average value obtained based on 6 crowns.

Conclusion: In this test setup, VITA SUPRINITY withstands a load of approx. 2,262 N. The average maximum masticatory force, however, ranges from approx. 490 N to 725 N(*[2]). Accordingly, the molar crowns that were used withstood significantly higher loads.

Fracture load of implant crowns



Source: Internal study, VITA R&D, (1)

Test method:

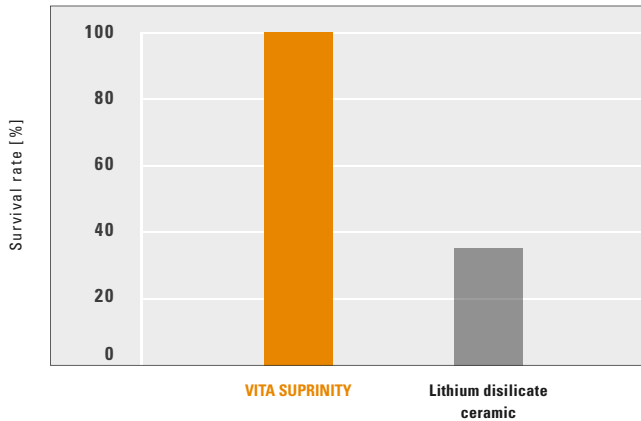
- First implant bodies were fabricated (non-precious metal) which had only different shoulder angles.
- Angles of -10°, 0° and 15° were used for this test setup.
- The implants were embedded in a resin with an modulus of elasticity similar to the one of bone (Ren Cast CW20/Ren HY49, Huntsman). Then the milled crowns were cemented to the implants (Sirona MC XL-System) using Multilink Implant (Ivoclar Vivadent).
- A series of five crowns of each material were tested for each angle.
- In a testing machine, static load was applied to the crowns until fracturing occurred.

Conclusion: With values of approximately 2000 N, the static tests on implants for VITA SUPRINITY produced a result that was similar to the one for dies made of a hybrid material.

VITA SUPRINITY® Findings of materials science

VITA SUPRINITY stands for special reliability

Dynamic load test



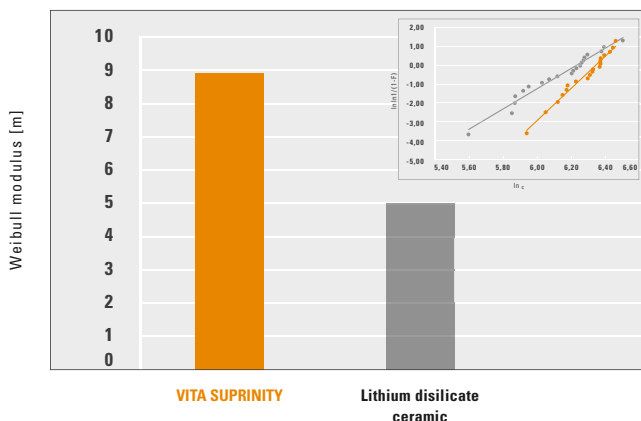
Source: Internal study, VITA R&D, (1)

Test method:

- Six crowns of each material (VITA SUPRINITY, lithium disilicate ceramic) were tested in the Dynames machine.
- Following etching, the crowns were cemented to dies made of a hybrid material (modulus of elasticity approx. 23 GPa) using RelyX Unicem (3M ESPE).
- The specimens were embedded in Technovit 4000 (Heraeus Kulzer) and immersed in warm water (37 °C) for at least one week.
- Following accelerated aging, the crowns were subjected to a cyclic load : 1,200 N for 1.2 million cycles, 2.0 Hz, 5 mm steel beads as the antagonist, temperature: 37 °C.

Conclusion: The survival rate of the VITA SUPRINITY crowns in this test was 100%. The masticatory force used in the test was 1,200 N, far exceeding the maximum force of human jaw muscles.

Weibull modulus



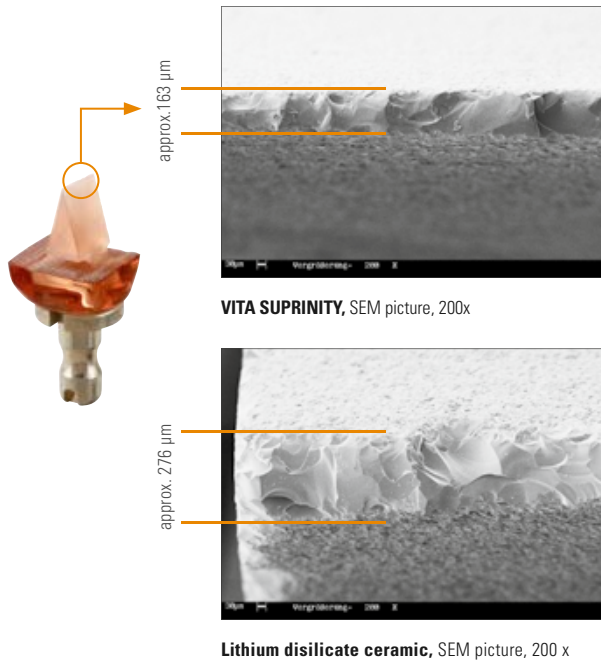
Source: Internal study, VITA R&D, (1)

Test method:

- The Weibull modulus was determined based on the flexural strength of 20 bending bars.
- Using a theory developed by Weibull, based on the concept of failure of the weakest link, the strength distribution of ceramic materials can be described effectively in mathematical terms. (3).
- A high Weibull modulus indicates uniform material quality, which, in addition to the high load capacity values, is an indicator for the reliability of a material.

Conclusion: In this test VITA SUPRINITY exhibits the highest Weibull modulus in this class of materials.

Simple processing and optimized precision

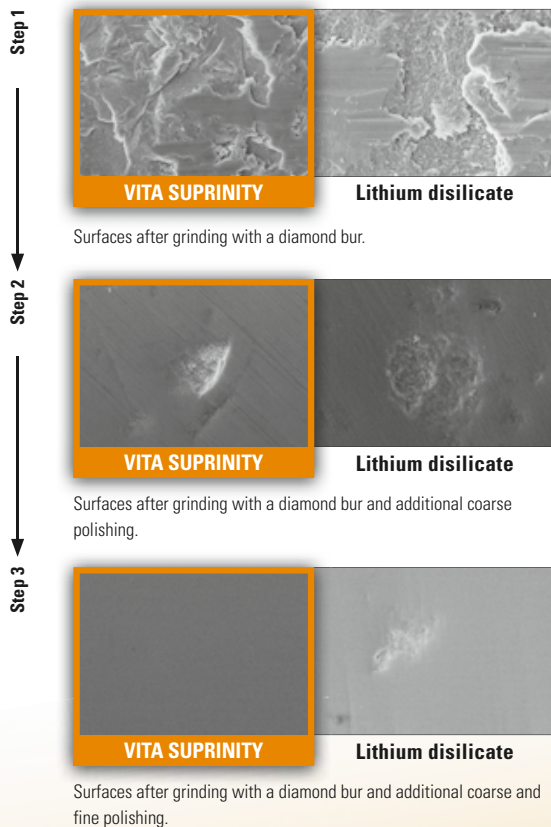


Test method:

- Wedge-shaped 30° test specimens made of two glass ceramic materials (VITA SUPRINITY and lithium disilicate) were milled from the blocks in the normal milling mode.
- To evaluate the edge stability, the width of the wedge tips was measured under the scanning electron microscope.

Conclusion: When using the default milling programs (normal mode), VITA SUPRINITY exhibits higher marginal accuracy than the lithium disilicate ceramic.

Source: Internal study, VITA R&D, (1)



Test method:

- Plates with an area of 20 x 20 mm were prepared; manual polishing was carried out.
- Three tools were used for reworking: fine diamond, prepolymer and fine polisher.
- The processing time for each stage was 30 seconds.

Conclusion: In the case of VITA SUPRINITY, the test geometry can be polished to high gloss within 90 seconds using the instruments recommended.

Source: Internal study, VITA R&D, SEM pictures, 2000 x, (1)

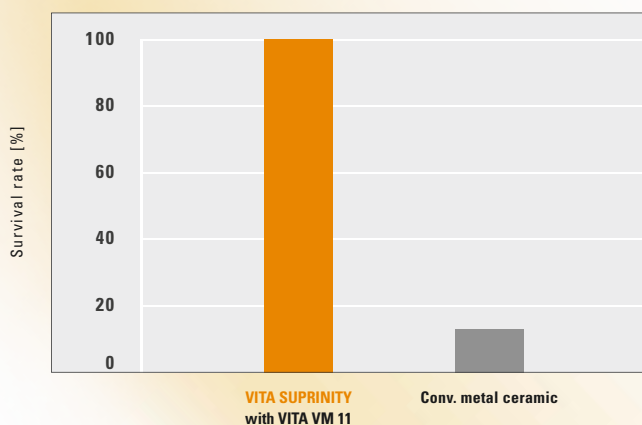
VITA SUPRINITY® Findings of materials science

**VITA SUPRINITY and VITA VM 11 veneering material:
matched perfectly!**

Physical/mechanical properties

VITA VM 11	Unit of measure	Value
CTE (coefficient of thermal expansion)	$10^{-6}/K$	approx. 11,6
Softening temperature	°C	approx. 600
Transformation temperature (TG)	°C	approx. 540
3-point flexural strength	MPa	approx. 100

Thermal shock resistance



Source: Internal study, VITA R&D, (1)

Test method:

- Six crowns were fabricated using VITA SUPRINITY in accordance with the working instructions, then they were veneered with VITA VM 11.
- Afterwards, the crowns were heated to 105 °C in a furnace, left in the furnace for 30 minutes and quenched subsequently in ice water.
- After the crowns had been checked for cracks and flaking, the undamaged specimens were heated up to 120 °C.
- This process was completed using steps of 15 °C until a temperature of 165 °C was reached; the higher the survival rate, the lower the risk of cracks or flaking of the veneering material based on long-term experience in daily use.
- The values were compared with the average values of a series of tests over numerous years of VMK generations in combination with non-precious metal alloys.

Conclusion: In combination with VITA VM 11, VITA SUPRINITY reveals perfect thermal shock resistance. When using conventional metal ceramics, in most cases the first cracks are formed at temperatures starting at 135 °C.

VITA SUPRINITY® Material and accessories



VITA SUPRINITY

The new zirconia reinforced VITA SUPRINITY glass ceramic features a special fine-grained and homogeneous structure which guarantees excellent material quality and consistent high load capacity, as well as long-term reliability.

- Excellent load capacity and high reliability
- Simple processing and optimized precision
- High process reliability
- Outstanding esthetics



VITA SUPRINITY Polishing Set clinical/technical

The VITA SUPRINITY Polishing Sets were developed for reliable, efficient and material-specific surface treatment of zirconia reinforced lithium silicate ceramic (ZLS) restorations in dental practices and laboratories. The sets include various polishing instruments for pre- and high-gloss polishing.

- These instruments are suitable for careful and gentle polishing of occlusal surfaces, cusps, fissures and restoration contact points.
- They ensure a brilliant shine on the finished restoration.



VITA AKZENT Plus

The 19 VITA AKZENT Plus stains are used to characterize the shade of any dental ceramic material easily and efficiently, regardless of the restoration's CTE.

- These new fluorescent stains allow staining and glazing of restorations.
- VITA AKZENT Plus stains are available as powders and ready-to-use pastes.
- The glazing Body Stains and Glaze materials are also available as sprays.



VITA VM 11

VITA VM 11 is a low-fusing fine-structure feldspar ceramic that has been developed especially for individualizing crown substructures made of zirconia reinforced lithium silicate ceramic (ZLS).

- Highly esthetic restorations
- Reliable bonding
- Simple processing
- Unsurpassed firing stability
- Excellent grinding and polishing properties

Bibliography

1. Internal studies, VITA R&D:

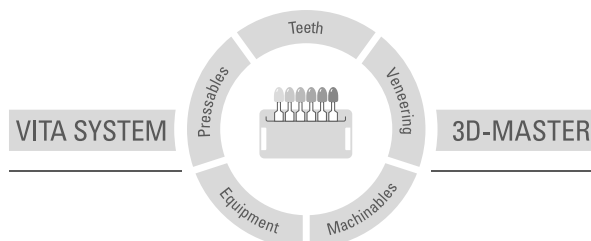
VITA Zahnfabrik H. Rauter GmbH & Co. KG
Research and Development
Inorganic Chemistry
Spitalgasse 3
79713 Bad Säckingen

Dipl.-Ing. Michael Gödiker, Unit Manager R&D Inorganic Chemistry,
Bad Säckingen

Prof. Dr. Dr. Jens Fischer, Head of Department R&D Inorganic Chemistry,
Bad Säckingen
Date of issue: 07.13

2. Körber K, Ludwig K (1983). Maximale Kaukraft als Berechnungsfaktor zahntechnischer Konstruktionen. Dent-Labor XXXI, Heft 1/83: 55 – 60.
3. Breviary Technical Ceramics, Verband der Keramischen Industrie e.V., 2003

More information about VITA SUPRINITY is available at:
www.vita-suprinity.de / www.vita-suprinity.com



Please note: Our products must be used in accordance with the instructions for use. We accept no liability for any damage resulting from incorrect handling or usage. The user is furthermore obliged to check the product before use with regard to its suitability for the intended area of application. We cannot accept any liability if the product is used in conjunction with materials and equipment from other manufacturers that are not compatible or not authorized for use with our product. Furthermore, our liability for the accuracy of this information is independent of the legal basis and, in as far as legally permissible, shall always be limited to the value as invoiced of the goods supplied, excluding value-added tax. In particular, as far as legally permissible, we do not assume any liability for loss of earnings, indirect damages, ensuing damages or for third-party claims against the purchaser. Claims for damages based on fault liability (culpa in contrahendo, breach of contract, unlawful acts, etc.) can only be made in the case of intent or gross negligence. The VITA Modulbox is not necessarily a component of the product.
Date of issue of this information: 01.14

After the publication of these working instructions any previous versions become obsolete. The current version can be found at www.vita-zahnfabrik.com.

VITA Zahnfabrik has been certified in accordance with the Medical Device Directive and the following product bears the CE mark  0124:

VITA SUPRINITY® · VITAVM₁₁ · VITA AKZENT® Plus

CEREC® and inLab® are registered trademarks of Sirona Dental Systems GmbH, Bensheim, Germany. Multilink® Implant is a registered trademark of Ivoclar Vivadent AG, Schaan, Liechtenstein. RelyX Unicem™ is a registered trademark of 3M Company or 3M Deutschland GmbH. Technovit® 4000 is a registered trademark of Heraeus Kulzer GmbH, Wehrheim, Germany. RenCast® CW 20 and Ren® HY 49 are registered trademarks of Huntsman LLC or a company affiliated with Huntsman LLC.

VITA

VITA Zahnfabrik H. Rauter GmbH & Co.KG
Postfach 1338 · D-79704 Bad Säckingen · Germany
Tel. +49(0)7761/562-0 · Fax +49(0)7761/562-299
Hotline: Tel. +49(0)7761/562-222 · Fax +49(0)7761/562-446
www.vita-zahnfabrik.com · info@vita-zahnfabrik.com
 facebook.com/vita.zahnfabrik