

# Straumann® PURE Ceramic Implants

## A 100 % proof test ensures reliable implant strength

Ceramic implants provide a number of interesting benefits. Particularly, patient expectations for a metal-free alternative or an outstanding esthetic appearance can be fulfilled. However, the mechanical stability of ceramic implants has been questioned after mechanical failures of such implants has been documented in a few studies<sup>1,2,3</sup>. Taking this issue into account, Straumann has developed a ceramic implant with the aim to provide clinicians and patients with the peace of mind they deserve: the Straumann® PURE Ceramic Implant, whose production process has been elevated to a new level of quality.

Before market launch, the Straumann® PURE Ceramic Implant had to undergo rigorous mechanical tests (ISO 14 801<sup>4</sup> standard) in order to identify the ultimate fracture resistance and fatigue strength. According to the ISO norm 14 801, the implant-abutment system (1) is fixed in a block with the coronal aspect of the system exposed (2) in order to simulate a bone recession of 3 mm. A second block applies a cyclic load (3) acting with a specific force (F) defined by the test requirements of the implant abutment system. The implant is positioned with an inclination of 30° towards the force axis with a distance of 11 mm to the embedded plane. This strength test is crucial to determining the long term mechanical reliability of the completed implant treatment and restoration.



Fig. 1: Test setup according to ISO 14 801

### THE STRAUMANN® PURE CERAMIC IMPLANT COMPARED TO THE STRAUMANN® STANDARD PLUS IMPLANT (TITANIUM)

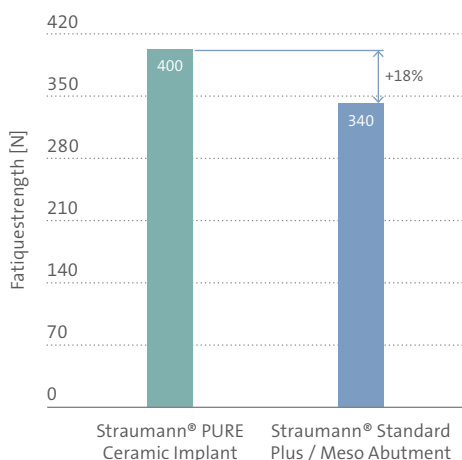


Fig. 2: Fatigue strength comparison of ceramic and titanium implants<sup>5,6</sup>

The Straumann® PURE Ceramic implant was compared with the Straumann® Standard Plus titanium implant, according to the same test setup described above. In materials science, fatigue is by definition the weakening of a material caused by repeatedly applied loads. Accordingly, this test simulates continuous chewing forces on the implant.

When measuring the fatigue strength, a fixed force is acting repeatedly on the implant-abutment system. For this specific test, two soft tissue level implants with an endosteal diameter of  $\varnothing$  4.1 mm were selected.

As shown in Fig. 2, the Straumann® PURE Ceramic Implant shows a higher fatigue strength compared to a titanium implant with abutment<sup>5,6</sup>.

## THE STRAUMANN® PURE CERAMIC IMPLANT COMPARED TO A COMPETITOR PRODUCT

Additionally, the mechanical performance of the Straumann® Pure Ceramic Implant (Ø 4.1mm) was tested in comparison with another commercially available ceramic implant (Z-Look Evo Rapide Implant from Z-System, Ø 4.0 mm), in conformity to ISO 14801<sup>4</sup>. Beyond fatigue strength (Fig. 3), the ultimate fracture resistance (Fig. 4)

was evaluated, by applying a static force on the implant which was constantly increased until a part of the system failed.

The tests have shown a higher mechanical resistance of the Straumann® PURE Ceramic Implant in both ultimate fracture resistance<sup>6</sup> and fatigue strength<sup>6</sup>.

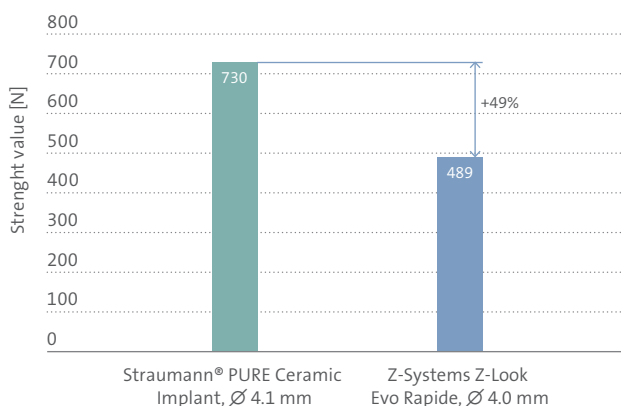


Fig. 4: Ultimate fracture resistance of two different ceramic implants

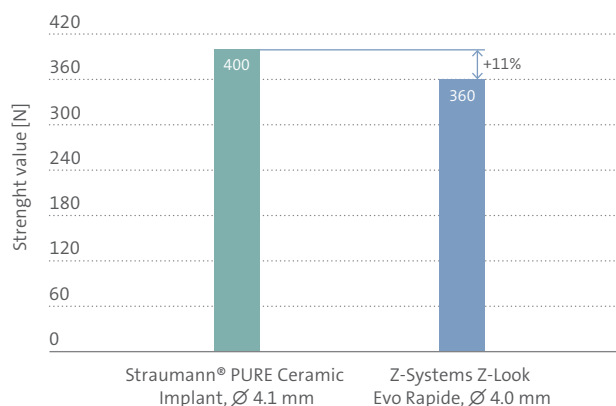


Fig. 3: Fatigue strength of two different ceramic implants

## STRAUMANN® PURE CERAMIC IMPLANT 100% PROOF TESTED

Every single Straumann® PURE Ceramic implant has to undergo a proof test before it leaves the Straumann® production facility. During this mechanical quality test procedure according to ISO 14801 setup, the implant is additionally rotated at least once 360° around its axis to test the implant in all directions. During this rotation a load is applied that assures that surviving implants are qualified for delivery to the customer.

Ceramic implants from Straumann® are designed to support loads above what is expected in actual use, demonstrating safety and exceptional design integrity. The Straumann® PURE Ceramic implant 100% proof test is a unique process in the history of dental implant production and ensures an unprecedented level of quality assurance and ultimate safety.



### References

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- ISO Standard 14 801:2007
- Data on file (internal data)
- Data on file (comparison test)

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