

SCIENTIFIC REPORT

Grandio Seal – Rheology

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Grandio Seal has an extremely high filler content for a fissure sealant at 70%, which makes it unrivalled in its stability and abrasion resistance. Such a high filler content normally entails too high a viscosity for a fissure sealant. Not so in the nano-technological Grandio Seal, as the following study by the University of Odessa shows.

Rheological comparison of Grandio Seal and Delton FS+ (Dentsply DeTrey)

The Ukrainian Academy of Medical Sciences in Odessa compared the flow properties of two highly filled fissure sealants in 2007.^[1] The sealants tested were Delton FS+ (55 % filler) and the nanohybrid Grandio Seal (70 %). Both materials are thixotropic, i.e. they become free-flowing under pressure and movement but are stable without movement or pressure. These two clinically important aspects of thixotropy were evaluated separately.

Flowability under pressure (spreadability) in accordance with ISO 6876

Equal quantities of material (10 mg) were placed between two glass plates under yellow light and the upper glass plate was weighted down with 100 g. After 5 min, the diameter was measured in several places and averaged.

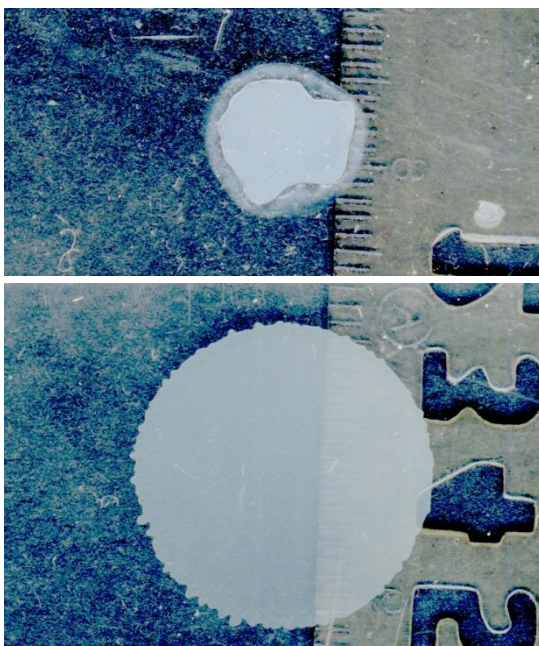


Figure 1 clearly shows that Grandio Seal is distinctly more free-flowing than Delton FS+ under movement and flows a further distance. The average diameter for Grandio Seal was 17.8 mm whilst for Delton FS+ it was 7.9 mm.

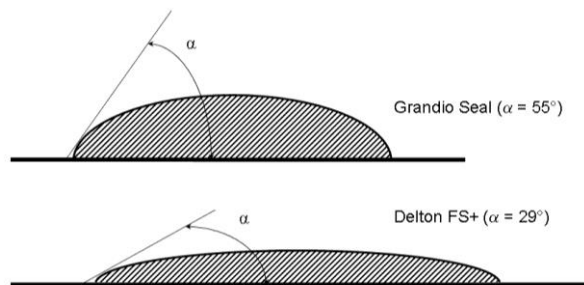
This ability to become free-flowing under pressure or movement is important for the material to flow completely into the fissure.

The distinct thixotropic properties of Grandio Seal enable the sealant to penetrate even into deep or drop-shaped fissures when moved with the application tip or a probe, and not merely rest on the funnel.

Figure 1: Flow test in accordance with ISO 6876

Stability, measurement of the contact angle

A fissure sealant should be “free-flowing on demand”, i.e. as free-flowing as possible during incorporation, whilst still allowing controlled application. This stability prevents unwanted or belated flow out of the fissures - a property which can be visually measured via the contact angle and also subject of the comparison of the two materials carried out in this study. Fig. 2 shows the result.



At 55°, the contact angle for Grandio Seal is significantly higher than for Delton FS+ at 29°. In practice, this means that the material remains in place until it is fixed. The stability also provides good stability in storage. In the study, Delton FS+ separated into resin and filler in a capillary test. Grandio Seal, however, remained homogenous.

Figure 2: Measurement of the contact angle

The study came to the following conclusion: [transl.] “Grandio Seal flows better into the fissures and penetrates better into the micro-spaces than the material Delton FS+ [...]”.

Conclusion: Good flow into fissures is the principal duty of a fissure sealant, and Grandio Seal achieves this better than other materials. When this is combined, as in this case, with extremely high strength and abrasion resistance due to 70 % filler content, then Grandio Seal provides a potent prophylactic instrument.

[1] O. W. Denga, J. M. Denga, Stom. Institute, Nat. Academy Odessa UA, 2007, data on file, VOCO GmbH.