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Flexural Strength and Modulus of Several Splinting Products

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Purpose – To determine the flexural strength and modulus of several splinting materials prepared per manufacturer’s instructions and after being subjected to storage in water at 37°C for 24 hours.

Experimental Design –

Materials: *Quartz Splint UD (RTD)* [Lot # 159211103]; *Ribbond (Ribbond Products)* [Lot# D105]; *everStick C&B (Stick Tech Ltd.)*[Lot# 20130202ES12]; *F-Splint-Aid (Polydentia SA)*[Lot# 134011004]

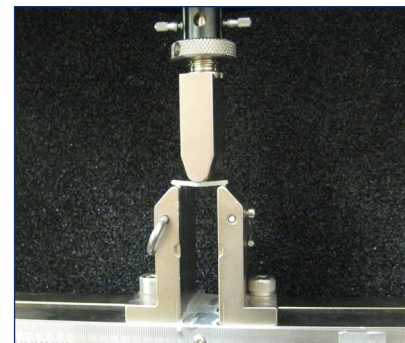
Test: Flexural strength and modulus

Repetitions: 8

Flexural strength and modulus – 2.0 x 2.0 x 25 mm bars composed of two layers were molded in a Teflon mold according to the manufacturer’s instructions and RTD methodology in concurrence with ASTM specification 4049. Light curing was performed with a Demi (Kerr Corp.) LED curing light. The fibers for three of the products came pre-saturated with resin. Ribbond was the only product supplied as resin-free glass fiber and Wetting Resin packaged in a separate delivery bottle. The product was supplied with instructions to the clinician on how to properly saturate the glass fibers. In clinical use of such glass fiber materials, it was recommended that they be covered with, or imbedded in, a dental composite of choice to eliminate the irritation that may be potentially caused by protruding glass fiber ends. For this test procedure (ISO #4049), the composite component was omitted, to eliminate the variability such a coating would create regarding the strength and modulus, and to test the strength of only the reinforcing fiber/resin mix product packaged by each manufacturer. The cured bars were stored in water at 37°C for 24 hours before testing. The bar specimen was wet ground with 600-grit SiC on all four sides to remove flash and to yield the specified cross-sectional dimensions. The bar specimens were then subjected to a three-point bending test (shown in the attached photo) with a test span of 20 mm to determine the flexural strength and modulus. Testing was performed on a universal testing machine (Instron 5866) with a 0.75 mm/min cross-head rate. Means and standard deviations were calculated.

Results –

Product	Flexural Strength, MPa	Flexural Modulus, GPa
<i>Quartz Splint UD (RTD)*</i>	631 (50)	24.0 (1.3)
<i>Ribbond (Ribbond Products)</i>	153 (22)	4.0 (0.5)
<i>everStick C&B (Stick Tech Ltd.)</i>	414 (70)	19 (1.2)
<i>F-Splint-Aid (Polydentia)</i>	187 (57)	9.0 (1.2)



Conclusions – *Quartz Splint UD* was the strongest and stiffest of the four materials.