

## Bond Strength of Scotchbond Universal Plus

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### Purpose:

To test the direct bond strength of **Scotchbond™ Universal Plus** compared to **Scotchbond™ Universal** to tooth structure in self-etch and total-etch modes.

**Materials:** **Scotchbond™ Universal Plus Adhesive** (3M), **Scotchbond™ Universal Adhesive**, **3M™ Filtek™ Universal**, **Scotchbond™ Universal Etchant**

**Substrates:** human superficial dentin, human ground enamel

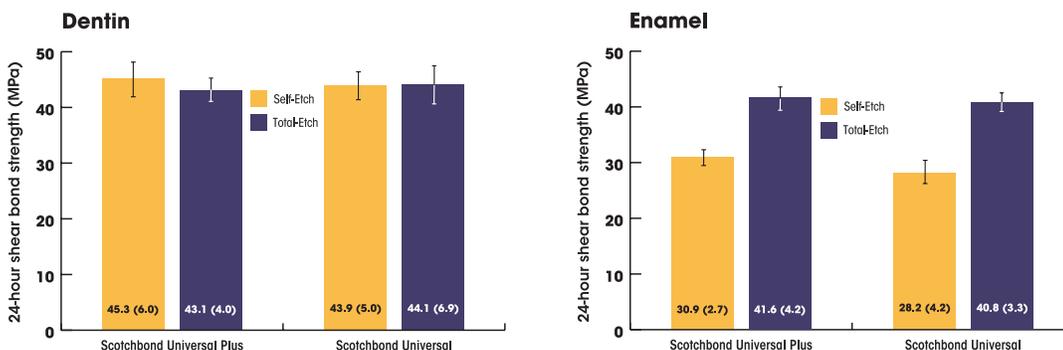
**Etching Mode:** Self-Etch and Total-Etch

### Test Methods:

**ISO 29022 Direct Shear Bond Strength, n=8 per substrate:**

Human adult molars extracted within the previous 3 months, and sterilized in a 0.5% chloramine T solution, were embedded in acrylic resin discs and ground through 320-grit SiC paper to form bonding substrates of superficial dentin and ground enamel. Specimens were then ultrasonically cleaned in deionized water for 5 minutes to remove grinding debris. Etchant was applied in the total-etch groups with **Scotchbond Universal Etchant** (3M) for 15 seconds. Adhesive was scrubbed into the surface for 20 seconds, gently air dried and light cured for 10 seconds with an Elipar Deep Cure-S LED curing light. **3M Filtek Universal** was then placed on top of the bonding agent utilizing the Ultradent Shear Test mold and jig to produce a 2.38 mm diameter shear test cylinder according to ISO 29022:2013 and light cured for 20 seconds. The specimens were then transferred to a 37°C deionized water bath until for 24 hours until testing. Testing was performed using an Instron 5866 at a crosshead speed of 1 mm/min according to ISO 29022:2013 and shear bond strength results are given with means and standard deviations.

### Results:



Failure modes to dentin predominately involved mixed failures involving tooth structure. Likewise, Total-Etch enamel specimens frequently involved enamel fractures indicating a bond strength close to the maximum shear stress of the tooth structure in these cases. Failure mode to self-etch enamel was adhesive at the adhesive-enamel interface in all cases. There were no visible differences in failure mode between the two adhesives.

### Conclusion:

**Scotchbond Universal Plus Adhesive** has equivalent 24-hour bond strength to tooth structure as **Scotchbond Universal Adhesive**.