

THE DENTAL ADVISOR™

"Improved Patient Care through Research"



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Self-etching Bonding Agents

Adhesives for bonding direct and indirect restorative materials to tooth structure continue to evolve. Multiple-bottle bonding agents (4th-generation) provide high bond strengths and are dependable. Single-bottle bonding agents (5th-generation) require fewer steps and provide high bond strengths. The latest bonding agents (6th- and 7th-generation) eliminate the need for etching with phosphoric acid by the use of an acidic primer. The 6th-generation – Type I self-etching primers + adhesives (**Clearfil SE Bond**) have components that are applied separately to the tooth. The 6th-generation – Type II self-etching adhesives (**3M ESPE Adper Prompt L-Pop Self-Etch Adhesive, Xeno III**) are first mixed and then applied. The 7th-generation bonding agents (**iBOND**) are self-etching adhesives that require no mixing. The 6th- and 7th-generation bonding agents dissolve the smear layer when applied and do not require rinsing.

Even with improvements in adhesives, various clinical factors can adversely affect the bond strength (see *Clinical Hints*). Bond strengths to enamel and superficial dentin are typically greater than to deep dentin.

Clinical Hints

- **Teeth can be moist or dry** – Avoid pools of water or over-drying.
- **Hemostatic agents and caries detectors** – If contamination of the etched tooth occurs, rinse profusely with water and reapply the self-etching bonding agent.
- **Drying the primer** – Follow manufacturer's recommendations for evaporating the solvent carefully. Water does not evaporate quickly.
- **Eugenol-based temporary restorations** – Avoid eugenol-based provisional materials. Use a non-eugenol material.
- **Bleaching agents** – Wait 1 week after bleaching before a bonding procedure.
- **LED light-curing unit** – Bonding agents with initiators other than CQ (camphorquinone) may not cure with LED lights.
- **Post-operative sensitivity** – Self-etching bonding agents dissolve the smear layer without exposing dentinal tubules, thereby helping to minimize post-operative sensitivity.

Compatibility of Self-etching Bonding Agents with Self-cured Composites

6th-generation – Type I (self-etching primer and adhesive) bonding agents are generally compatible with self-cured composite cores or resin cements. A compatible dual-cured adhesive is applied to the primed tooth before the composite is applied.

6th-generation – Type II (self-etching adhesive) and **7th-generation** bonding agents are **not** compatible with self-cured composite cores or resin cements. The acidity of the bonding agent can interfere with the setting of the composite.

Rating Self-etching Bonding Agents

Product	Company	Type of Cure	Unit Dose	Filler, Wt. %	Fluoride Release	Refrigeration Required or Recommended	Number of Steps	Total Time, seconds	Bond Strength, Enamel, MPa†	Bond Strength, Dentin, MPa†	Cost, \$/ml*	Rating
6th-generation – Type I (Self-etching Primer and Adhesive):												
ADHESE	IVOCLAR VIVADENT	LC	No	2	No	No	6	51	16	21	21.00	94%
CLEARFIL LINER BOND 2V	KURARAY AMERICA	DC	No	10	No	Yes	6	66	28	35	32.00	87%
CLEARFIL SE BOND	KURARAY AMERICA	LC	No	10	No	Yes	5	46	29	28	21.80	95%
CONTAX	ZENITH/DMG	DC, LC	No	0	Yes	No	3	60	20	20	33.30	ce
FL-BOND	SHOFU	LC	No	17	Yes	No	5	33	21	27	30.00	91%
GC UNIFIL BOND	GC AMERICA	LC	No	0	Yes	Yes	4	38	20	30	19.83	88%
NANO-BOND	PENTRON CLINICAL TECHNOLOGIES	DC, LC	No	—	No	Yes	5	63	14	20	14.99	84%
ONE-STEP PLUS WITH TYRIAN SPE	BISCO	LC	No	8.5	No	No	6	50	na	na	15.83	na
OPTIBOND SOLO PLUS SELF-ETCH ADHESIVE SYSTEM	SDS/KERR	DC, LC	Yes	15	Yes	No	7	76	28	25	41.60	ce
6th-generation – Type II (Self-etching Adhesive):												
3M ESPE ADPER PROMPT L-POP SELF-ETCH ADHESIVE	3M ESPE	LC	Yes	0	No	No	4	38	22#	12#	15.99	89%
BRUSH&BOND	PARKELL	LC	No	0	No	No	3	33	10	15	33.00	89%
ONE-UP BOND F	TOKUYAMA DENTAL CORP./J. MORITA USA	LC	No	10	Yes	Yes	3	35	22	21	10.90	91%
TENURE UNI-BOND WITH GLOSS-N-SEAL	DEN-MAT	LC	No	0	No	No	5	38	na	na	13.25	ce
TOUCH&BOND	PARKELL	LC	No	0	No	Yes	4	38	12	2	18.00	na
XENO III	DENTSPLY/CAULK	LC	No	4.8	Yes	No	4	38	31	29	20.00	96%
7th-generation (No Mix, Self-etching Adhesive):												
iBOND	HERAEUS KULZER	LC	Yes	0	No	Yes	3	50	19	12	25.00	90%

na=not available, ce=current being evaluated

*Costs are listed for comparison only and are not used to calculate the ratings. All costs are listed in U.S. dollars.

†24-hour tensile bond strengths

#Bond strengths are based on a 1-coat technique; instructions for use now indicate a 2-coat technique.

THE DENTAL ADVISOR Recommends:

6th-generation, Type I – **Clearfil SE Bond, AdheSE, FL-BOND**

6th-generation, Type II – **Xeno III, One-Up Bond F**

7th-generation – **iBOND**



Xeno III
(DENTSPLY/Caulk)



Clearfil SE Bond
(Kuraray America)



FL-BOND
(Shofu)



One-Up Bond F
(Tokuyama Dental Corp./
J. Morita USA)