

THE DENTAL ADVISORTM

"Improving Patient Care Through Research & Education"

2007

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July/August

BONDING AGENTS 2

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Ratings

Excellent	+++++
Very Good	++++
Good	+++



Bonding Agents

Bonding agents for enamel and dentin have changed remarkably over the last 10 years. Currently, there are five categories of bonding agents – 4th-generation, 5th-generation, 6th-generation (Type I), 6th-generation (Type II), and 7th-generation. The 4th- and 5th-generation bonding agents rely on the use of phosphoric acid and are called total-etch or etch and rinse systems. The self-etching bonding agents (6th- and 7th-generation) do not require the use of phosphoric acid for etching prepared tooth structure and do not require rinsing. As compared to previous bonding agents, 6th- and 7th-generation bonding agents are less technique sensitive and result in less tooth sensitivity.

This Buyer's Guide of THE DENTAL ADVISOR reports the characteristics and compares 58, 4th-, 5th-, 6th- and 7th-generation bonding agents. Clinical tips are given for a number of clinical techniques for restorative procedures requiring bonding. Effects of contamination on bond strengths to dentin are also discussed.

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Bonding Agents

Modes of Curing

Light-cured bonding agent – use of a light-curing unit is required; bonding agents typically contain camphorquinone (CQ) as the polymerization photoinitiator.

Dual-cured bonding agent – use of a light-curing unit is usually optional.

- The light-cured mode generally results in higher bond strengths than dual- or self-cured modes.
- The addition of a dual-cured catalyst to a bonding agent adds steps and possibly confusion, more chances for error.
- Some light-cured bonding agents have been shown to bond well to dual-cured composites.
- For indirect restorations thicker than 1.0 mm, it is best to use dual-cured bonding agents with dual- or self-cured resin cements.

Bond Strength Measurement

Bond strengths reported in THE DENTAL ADVISOR were measured in tension (inverted cone test) using a 3-mm diameter bonded specimen. Bond strengths ranging between 15 and 30 MPa are clinically desirable. Higher bond strengths might provide better retention under higher occlusal loads.

Ranges of Tensile Bond Strength, MPa		
	Enamel	Dentin
4 th -generation	23-32	21-24
5 th -generation	19-33	18-28
6 th -generation (Type I)	7-28	16-35
6 th -generation (Type II)	12-31	2-29
7 th -generation	18-28	18-28

Clinical Tips

All-ceramic Restorations

- Be sure bonding agent is compatible with the resin cement used.

Fiber-reinforced Posts

- Light-cured bonding agents may be difficult to activate properly in the canal; use dual-cured bonding agents.
- Bonding agents often accelerate the setting times of the cement in the canal.

Ceramic Veneers

- Use a one-step, light-curing technique for veneers less than 1.0-mm thick; apply bonding agent and resin cement, then light cure.

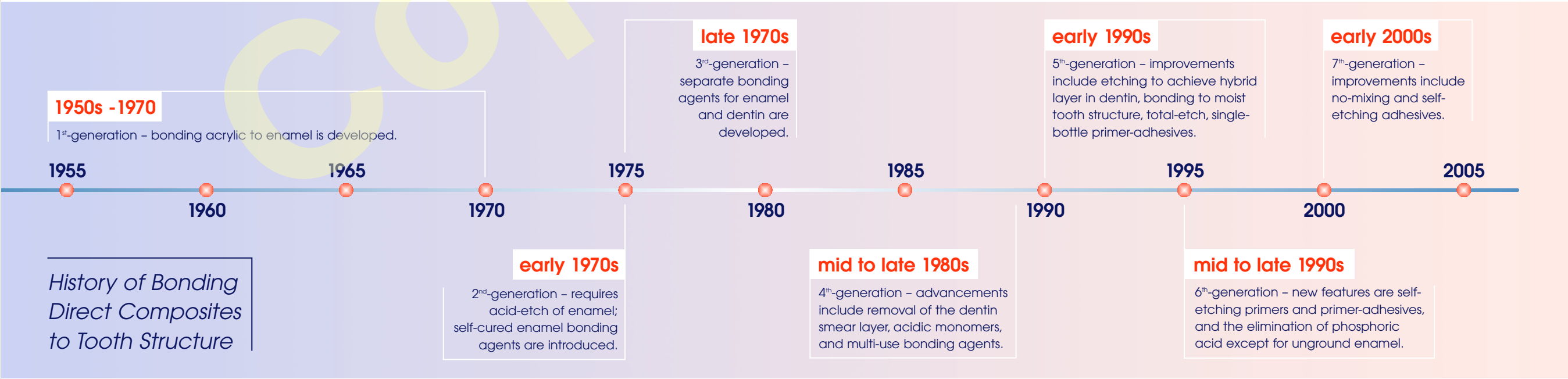
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Clinical Notes

- **Etchant** – typically phosphoric acid used to clean and demineralize the tooth surface, used for 4th- and 5th-generation bonding agents.
- **Primer** – hydrophilic monomer used to wet and penetrate the tooth surface.
- **Self-etching (acidic) primer** – primer with acid groups producing low pH.
- **Adhesive** – monomer used to bond the composite to the primed tooth surface.

Bonding Agents		Characteristics			Uses			
Generation	Components	Phosphoric Acid, Etching & Rinsing	Smear Layer on Dentin	Dual-cured Activator Available	Direct, Light-cured Resins	Indirect, Posterior Resins or Ceramics	Self-cured Core Build-ups	Thin Anterior Ceramic Veneers (<1.0mm)
4 th	Etchant, primer, adhesive (apply components separately)	Yes	Removed	Yes	Yes	Yes, with dual-cured catalyst	Yes, with dual-cured catalyst	Yes
5 th	Etchant, primer/adhesive (apply components separately)	Yes	Removed	Some products	Yes	Yes, with dual-cured catalyst	Yes, with dual-cured catalyst	Yes
6 th (Type I)	Acidic primer, adhesive (apply components separately)	No	Modified	Some products	Yes	No	Yes	Yes (etch or pumice enamel)
6 th (Type II)	Acidic primer/adhesive (mix components and apply)	No	Modified	No	Yes	No	Yes, with dual-cured catalyst	Yes (etch or pumice enamel)
7 th	Acidic primer/adhesive (no mixing, apply)*	No	Modified	Some products	Yes	Yes, with dual-cured catalyst	Yes, with dual-cured catalyst	No

*Dual-cured product requires mixing



- For veneers more than 1.0-mm thick, use a two-step, light-curing technique; apply bonding agent and light cure, then apply resin cement and light cure. Be sure to thin the bonding agent with air before light curing.
- Instructions for some resin cements recommend additional application of the bonding agent to the veneer without separate light curing before cementation (**3M ESPE RelyX Veneer Cement**/3M ESPE, **Variolink Veneer**/Ivoclar Vivadent, **Variolink II**/Ivoclar Vivadent).



Variolink Veneer
(Ivoclar Vivadent)

Posterior Composites

- Bonding agents with acetone should be used immediately after dispensing. Other bonding agents should be used within three minutes of dispensing.
- Carefully follow instructions on application time and use of air to thin the adhesive and evaporate the solvent. With less volatile solvents (water, ethanol), more air is needed for evaporation.
- Some bonding agents (**Clearfil SE BOND**, **Clearfil S³ BOND**) etch the surface of the metal matrix band, making it difficult to remove the band. Scratching the surface of the metal band with a spoon excavator after bonding but before placement of the composite is helpful.

Core Materials

- 4th-generation bonding agents are generally compatible with self-cured composite cores or resin cements. The tooth is primed, the adhesive is applied and light cured, and then the composite core is placed.
- 5th-generation bonding agents are generally not compatible with self-cured composite cores or resin cements. The acidity of the bonding agent can interfere with the setting of the composite. Several bonding agents (**DenTASTIC UNO**, **OptiBond SOLO Plus**, **Prime & Bond NT**) have a catalyst for use with self-cured restorative materials.
- 6th-generation (Type I) bonding agents are generally compatible with self-cured composite cores or resin cements. The tooth is primed, the adhesive is applied and light cured, and then the composite core is placed.
- 6th-generation (Type II) bonding agents are generally not compatible with self-cured composite cores or resin cements. The acidity of the bonding agent can interfere with the setting of the composite.
- 7th-generation bonding agents are generally not compatible with self-cured composite cores or resin cements. The acidity of the bonding agent can interfere with the setting of the composite. Currently, one bonding agent (**Xeno IV Dual Cure**) has a catalyst for use with self-cured restorative materials.

Standard Application Steps

- 4th-generation (*light-cured*) – Place primer on tooth, air dry, place resin on tooth, air dry, light cure.
- 4th-generation (*dual-cured*) – Mix primer base and catalyst, place the mixed primer on tooth, air dry, mix resin base and catalyst, place the mixed resin on tooth, air dry, light cure.
- 5th-generation (*light-cured*) – Place primer on tooth, air dry, place resin on tooth, air dry, light cure.
- 5th-generation (*dual-cured*) – Mix primer and catalyst, place primer on tooth, air dry, place resin on tooth, air dry, light cure.
- 6th-generation (Type I) – Place primer on tooth, air dry, place resin on tooth, air dry, light cure.
- 6th-generation (Type II) – Mix primer and resin, place mixture on tooth, air dry, light cure.
- 7th-generation (*light-cured*) – Place adhesive on tooth, air dry, light cure.
- 7th-generation (*dual-cured*) – Mix adhesive and catalyst, place mixture on tooth, air dry, light cure.

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3M ESPE Adper Scotchbond
Multi-Purpose Plus Adhesive System
(3M ESPE)



ALL-BOND 3
(Bisco Dental Products)

THE DENTAL ADVISOR Recommends:

4th-generation: **3M ESPE Adper Scotchbond Multi-Purpose Plus Adhesive System (97%)**, **OptiBond FL (96%)**

Product	Company	Type of Cure	Bottle	Unit-dose	Filler Weight	Fluoride Release	Refrigeration Required	Bond Strength Enamel, MPa	Bond Strength Dentin, MPa	Multi-use Packaging Refill Cost	Unit-dose Cost	Rating
4 th -generation												
3M ESPE Adper Scotchbond Multi-Purpose Plus Adhesive System	3M ESPE	DC, LC	Yes	No	0%	No	No	32	21	Activator: \$26.25/ml; Catalyst: \$26.25/ml; Adhesive: \$19.00/ml; Primer: \$19.00/ml	na	97%
ALL-BOND 2	Bisco Dental Products	DC, LC	Yes	No	0%	No	No	23	24	Primer A: \$9.33/ml; Primer B: \$9.33/ml; Prebond Resin: \$4.00/ml; D/E Bonding Resin: \$4.33/ml	na	na
ALL-BOND 3	Bisco Dental Products	DC, LC	Yes	No	0%	No	No	nt	nt	Part A & Part B ¹ : \$11.25/ml; Resin: \$20.59/ml	na	na
Bond-It	Pentron Clinical Technologies	DC, LC	Yes	No	na	No	Yes	25	21	Primer A: \$6.24/ml; Primer B: \$4.54/ml; DC Activator: \$5.88/ml; LC Resin: \$4.55/ml	na	91%
DenTASTIC All-Purpose	Pulpdent	DC	Yes	No	0%	No	No	31	21	Part A: \$8.33/ml; Part B: \$6.66/ml; Part C: \$6.66/ml; Part 1: \$5.00/ml; Part 2: \$5.00/ml	na	86%
Gluma Solid Bond	Heraeus	DC, LC	Yes	No	25%	Yes	No	nt	nt	Bond: \$17.00/ml; Primer: \$17.00/ml	na	na
OptiBond FL	Kerr Corporation	LC	Yes	Yes	48%	Yes	No	32	31	Adhesive: \$9.80/ml; Primer: \$9.80/ml	\$14.00/ml	Bottle: 96% UD: na
ProBOND	DENTSPLY Caulk	DC, LC	Yes	No	0%	No	No	26	19	Adhesive: \$27.94/ml; Primer: \$27.94/ml	na	87%

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DC = dual-cured, LC = light-cured
nt = not tested
¹ Only available in a kit, no refills are available.

Contaminants

Eugenol-containing Materials

- Use non-eugenol temporary cements or provisionals; eugenol-based materials can lower bond strength to dentin.
- If a eugenol-based material must be used, the tooth should be pumiced before bonding.

Hemostatic Agents

- Residual chemicals from hemostatic agents containing ferric sulfate, aluminum chloride or other chemicals can lower bond strength to dentin.
- Rinse contaminated areas for at least 10 seconds with water, acid etch or scrub with *Consepsis*/*Ultradent* before bonding.

Saliva, Blood and Plasma

- Contamination with these fluids can lower bond strength.
- Rinse contaminated areas for at least 10 seconds with water before bonding.



3M ESPE Adper Single Bond Plus
(3M ESPE)



Excite
(Ivoclar Vivadent)

Water

- Most bonding agents with water solvent bond well to dry or moist dentin.
- Avoid over-wet (pooled water) or over-dry (desiccated) dentin before application of the bonding agent.

Whitening Agents

- Residual oxygen from take-home or in-office whitening can lower bond strength.
- Wait one week after whitening before a bonding procedure.
- Color of a whitened tooth may rebound during this time as the teeth rehydrate.



XP BOND
(DENTSPLY Caulk)

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THE DENTAL ADVISOR Recommends:

5th-generation: *Bond-1* (96%), *ONE-STEP* (96%)

Product	Company	Type of Cure	Bottle	Unit-dose	Filler Weight	Fluoride Release	Refrigeration Required	Bond Strength Enamel, MPa	Bond Strength Dentin, MPa	Multi-use Packaging Refill Cost	Unit-dose Cost	Rating
5 th -generation												
3M ESPE Adper Single Bond Plus	3M ESPE	LC	Yes	Yes	10%	No	No	22	18	\$27.33/ml	40 Unit-dose: \$16.45/ml; 100 Unit-dose: \$15.50/ml	Bottle: 93% UD: na
Admira Bond	VOCO	LC	Yes	Yes	na	Yes	No	na	na	\$23.75/ml	50 Unit-dose: \$31.67/ml; 200 Unit-dose: \$25.17/ml	Bottle: na UD: 88%
ALPHA-BOND	Dental Technologies	DC, LC	Yes	No	0%	No	No	nt	nt	Adhesive: \$7.00/ml; DC Activator: \$7.00/ml	na	ce
Bond-1	Pentron Clinical Technologies	DC, LC	Yes	No	0%	No	Yes	23	20	Bond: \$11.54/ml; DC Activator: \$8.32/ml	na	96%
DenTASTIC UNO	Pulpdent	LC	Yes	No	0%	No	No	21	26	\$10.17/ml	na	88%
DenTASTIC UNO-DUO	Pulpdent	DC	Yes	No	0%	No	No	nt	nt	UNO: \$10.17/ml; DUO: \$18.67/ml	na	ce
Excite	Ivoclar Vivadent	LC	Yes ¹	Yes	1%	No	No	22	28	\$16.60/ml	\$20.00/ml	Bottle: 91% UD: na
Excite DSC	Ivoclar Vivadent	LC	No	Yes	1%	No	No	nt	nt	na	\$27.80/ml	91%
Gluma Comfort Bond + Desensitizer	Heraeus	LC	Yes	Yes	0%	No	No	21	18	\$27.50/ml	\$25.00/ml	Bottle: 92% UD: na
IntegraBond	Premier Dental Products	DC, LC	Yes	No	0%	No	No	25	9	Bond: \$12.77/ml; SC Activator: \$12.77/ml	na	86%
One Coat Bond	Coltène/Whaledent	LC	No ²	No	5%	No	No	33	20	\$56.85/ml	na	86%
ONE-STEP	Bisco Dental Products	LC	Yes	No	0%	No	No	31	23	\$15.00/ml	na	96%
ONE-STEP PLUS	Bisco Dental Products	LC	Yes	Yes	8.5%	No	No	23	22	\$15.50/ml	\$16.50/ml	Bottle: 88% UD: na
PQ1	Ultradent	LC	No ²	No	40%	No	No	25	22	\$13.96/ml	na	na
Prelude TE	Danville Materials	DC, LC	Yes	No	24%	Yes	No	25	27	Adhesive: \$10.79/ml; MicroPrime: \$5.00/ml	na	91%
Prime & Bond NT	DENTSPLY Caulk	DC, LC	Yes	Yes	3%	No	No	28	22	Bond: \$26.11/ml; SC Activator: \$28.20/ml	80 Unit-dose: \$21.20/ml ³	Bottle: 91% UD: na
stae	SDI North America	LC	Yes	No	0%	Yes	No	28	15	\$14.65/ml	na	86%
Tenure Multi-Purpose Plus	Den-Mat	LC	Yes	No	9%	No	No	nt	nt	Part A: \$17.33/ml; Part B: \$17.33/ml; Part S: \$11.50/ml	na	na
Tenure Quick with Fluoride	Den-Mat	LC	Yes	No	9%	Yes	No	19	18	\$19.17/ml	na	na
XP BOND	DENTSPLY Caulk	LC, DC, SC	Yes	Yes	5.5%	No	No	nt	nt	\$22.34/ml	\$19.33/ml	na

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DC = dual-cured, LC = light-cured
nt = not tested

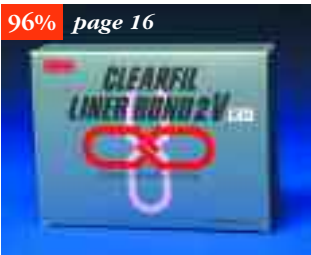
¹ Dispensed in the VivaPen.
² Packaged in a multi-use syringe.
³ Activator (either DC or SC) is not available in unit-dose packaging.



91% *page 12*
3M ESPE Adper Prompt L-Pop Self-Etch Adhesive
(3M ESPE)



ALL-BOND SE
(Bisco Dental Products)



96% *page 16*
Clearfil LINER BOND 2V
(Kuraray America)



98% *page 18*
Clearfil PROTECT BOND
(Kuraray America)



95% *page 20*
Clearfil SE BOND
(Kuraray America)

THE DENTAL ADVISOR Recommends:

6th-generation (Type I): *Clearfil PROTECT BOND (98%), AdbeSE (96%), Clearfil LINER BOND 2V (96%)*

6th-generation (Type II): *Xeno III (96%)*

Product	Company	Type of Cure	Bottle	Unit-dose	Filler Weight	Fluoride Release	Refrigeration Required	Bond Strength Enamel, MPa	Bond Strength Dentin, MPa	Multi-use Packaging Refill Cost	Unit-dose Cost	Rating
6 th -generation (Type I)												
3M ESPE Adper Prompt L-Pop Self-Etch Adhesive	3M ESPE	LC	Yes	Yes	0%	No	No	19 ¹	17 ¹	Liquid A: \$14.50/ml; Liquid B: \$14.50/ml	40 Unit-dose: \$19.58/ml; 500 Unit-dose: \$14.67/ml	Bottle: na UD: 91%
AdheSE	Ivoclar Vivadent	LC	Yes	No	2%	No	No	16	21	Bond: \$10.00/ml; Primer: \$10.00/ml; DC Activator: \$18.00/ml	na	96%
Clearfil LINER BOND 2V	Kuraray America	DC, LC	Yes	No	10%	No	Yes	28	35	Bond A: \$21.20/ml; Bond B: \$19.66/ml; Primer A: \$7.00/ml; Primer B: \$7.00/ml	na	96%
Clearfil PROTECT BOND	Kuraray America	LC	Yes	No	10%	Yes	Yes	25	35	Bond: \$19.80/ml; Primer: \$17.33/ml	na	98%
Clearfil SE BOND	Kuraray America	LC	Yes	No	10%	No	Yes	23	31	Bond: \$19.40/ml; Primer: \$6.83/ml	na	95%
Contax	Zenith Dental/DMG	LC	Yes	No	0%	Yes	No	20	20	Bond: \$15.27/ml; Primer: \$15.27/ml; Activator: \$15.27/ml	na	91%
FL-BOND	Shofu	LC	Yes	No	17%	Yes	No	21	27	Bond: \$11.08/ml; Primer A: \$10.36/ml; Primer B: \$10.36/ml	na	91%
frog	SDI North America	LC	Yes	No	6%	No	Yes	6.7	16.3	Bond: \$9.87/ml; Primer: \$9.87/ml	na	92%
GC UniFil Bond	GC America	LC	Yes	No	4%	No	Yes	20	30	Bond: \$7.70/ml; Primer: \$12.49/ml	na	89%
Nano-Bond	Pentron Clinical Technologies	DC, LC	Yes	No	>5%	No	Yes	14	20	Adhesive: \$10.33/ml; SE Primer: \$4.93/ml; DC Activator: \$8.32/ml	na	86%
One Coat Self-Etching Bond	Coltène/Whaledent	LC	Yes	Yes	2.5%	No	No	22	24	Primer: \$11.58/ml; Bond: \$11.58/ml	50 Unit-dose: \$19.80/ml	Bottle: 93% UD: na
OptiBond SOLO Plus	Kerr Corporation	DC, LC	Yes	Yes	15%	Yes	No	28	25	Bond: \$23.97/ml; DC Activator: \$14.39/ml	100 Unit-dose: \$21.06/ml ²	Bottle: 92% UD: na
Prelude SE	Danville Materials	DC, LC	Yes	No	24%	Yes	No	25	27	Adhesive: \$10.79/ml; Primer: \$10.79/ml; Link: \$10.79/ml	na	91%

Product	Company	Type of Cure	Bottle	Unit-dose	Filler Weight	Fluoride Release	Refrigeration Required	Bond Strength Enamel, MPa	Bond Strength Dentin, MPa	Multi-use Packaging Refill Cost	Unit-dose Cost	Rating
6 th -generation (Type II)												
ALL-BOND SE	Bisco Dental Products	LC	Yes	No	0%	No	Yes	nt	nt	Part I & Part II ³ : \$12.50/ml; Liner: \$23.53/ml	na	na
Brush & Bond	Parkell	LC	Yes	No	0%	No	No	22	18	Liquid: \$21.66/ml; Applicators: \$0.53/each	na	93%
Futurabond NR	VOCO	LC	Yes	Yes	3%	Yes	No	na	na	\$14.12/ml ³	50 Unit-dose: \$21.60/ml; 200 Unit-dose: \$16.15/ml	Bottle: 93% UD: 92%
Max Bond LC ⁴	J. Morita USA	LC	Yes	No	0%	No	No	nt	nt	Agent A: \$11.99/ml; Agent B: \$11.99/ml	na	ce
One-Up Bond F Plus	Tokuyama America	LC	Yes	No	10%	Yes	Yes	31	24	Bond A: \$10.00/ml; Bond B: \$10.00/ml	na	86%
Tenure Uni-Bond with Gloss-N-Seal	Den-Mat	LC	Yes	No	0%	No	No	nt	nt	Part A: \$17.33/ml; Part B: \$17.33/ml	na	92%
Touch & Bond	Parkell	LC	Yes	No	0%	No	Yes	12	2	Liquid: \$18.00/ml; Applicators: \$0.53/each ³	na	na
Xeno III	DENTSPLY Caulk	LC	Yes	No	4.8%	Yes	No	31	29	\$24.41/ml ³	na	96%

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DC = dual-cured, LC = light-cured
nt = not tested

¹ The unit-dose packaging was used for the bond strength testing.
² Activator (either DC or SC) is not available in unit-dose packaging.
³ Only available in a kit, no refills are available.
⁴ Formerly known as Excel Bond LC.

Bonding Agents

Etching with Phosphoric Acid

Most manufacturers of self-etching bonding agents recommend the use of phosphoric acid to etch uncut enamel before application of the self-etching primer or self-etching adhesive. Even so, the improvement in bond strength may not be large.

If the phosphoric acid also etches dentin, the bond strength of the self-etching adhesive to dentin may be reduced. This reduction may occur if the self-etching adhesive fails to completely penetrate the additional demineralized dentin produced by the phosphoric acid etch. Apply extra coat(s) of bonding agent as needed to obtain a shiny surface.

- *Pumice technique* – Pumice can be used on uncut enamel before applying the bonding agent to improve bond strength.
- *Pre-etch technique* – Apply phosphoric acid to enamel before preparing the tooth. This technique eliminates the need to etch uncut enamel while the dentin is exposed, avoiding possible contamination of dentin with phosphoric acid. ■

Survey of Clinical Consultants

Over 100 of our clinical consultants responded to a survey on usage of bonding agents – the results are below. **Editors' Note:** The survey results were not used to rate products.

Use of Bonding Agents					
	4 th	5 th	6 th (Type I)	6 th (Type II)	7 th
Always/Mostly	11%	24%	31%	16%	18%
Summary: A majority (65%) of clinical consultants use 6 th - and 7 th -generation bonding agents.					

Postoperative Sensitivity					
	4 th	5 th	6 th (Type I)	6 th (Type II)	7 th
Often/Sometimes	25%	32%	18%	13%	12%
Summary: Clinical consultants reported postoperative sensitivity more often with 4 th - and 5 th -generation bonding agents.					

Bonding Agents Preferred for Various Techniques					
	4 th	5 th	6 th (Type I)	6 th (Type II)	7 th
Veneers	19%	40%	18%	13%	10%
Anterior composites	11%	29%	32%	13%	15%
Posterior composites	8%	21%	33%	16%	22%
Composite cores and esthetic posts	14%	20%	34%	19%	13%
Resin cements	12%	31%	24%	16%	17%
Summary: Clinical consultants preferred 5 th - and 6 th -generation (Type I) bonding agents for the techniques indicated above.					

Use of Desensitizing Agent					
	4 th	5 th	6 th (Type I)	6 th (Type II)	7 th
Always/Mostly	25%	40%	17%	6%	11%
Summary: Clinical consultants used desensitizing agents infrequently but more often with total-etch 4 th - and 5 th -generation bonding agents.					

Coming soon!

THE DENTAL ADVISOR Online

www.dentaladvisor.com

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AdheSE One
(Ivoclar Vivadent)



Clearfil S³ BOND
(Kuraray America)



G-BOND
(GC America)



go!
(SDI North America)

THE DENTAL ADVISOR Recommends:

7th-generation: Clearfil S³ BOND (98%),
G-BOND (97%), Xeno IV Dual Cure (96%)

Product	Company	Type of Cure	Bottle	Unit-dose	Filler Weight	Fluoride Release	Refrigeration Required	Bond Strength Enamel, MPa	Bond Strength Dentin, MPa	Multi-use Packaging Refill Cost	Unit-dose Cost	Rating
7 th -generation												
AdheSE One	Ivoclar Vivadent	LC	Yes ¹	No	<5%	No	No	19	23	\$69.00/ml	na	ce
BOND FORCE	Tokuyama America	LC	Yes	Yes	≈5%	Yes	Yes	32	28	\$23.00/ml	\$35.00/ml	ce
Clearfil S ³ BOND	Kuraray America	LC	Yes	Yes	10%	No	Yes	28	23	\$27.50/ml	50 Unit-dose: \$25.20/ml; 100 Unit-dose: \$23.20/ml	Bottle: 92% UD: 98%
G-BOND	GC America	LC	Yes	Yes	5%	No	No	20	20	\$22.40/ml	\$32.00/ml	Bottle: 97% UD: na
go!	SDI North America	LC	Yes	Yes	7%	Yes	Yes	nt	nt	\$23.00/ml	\$23.00/ml	ce
iBOND	Heraeus	LC	Yes	Yes	0%	No	Yes	18	22	\$34.15/ml	40 Unit-dose: \$22.20/ml	Bottle: 92% UD: na
OptiBond All-In-One	Kerr Corporation	LC	Yes	Yes	7%	Yes	Yes	28	28	\$22.70/ml ²	50 Unit-dose: \$16.67/ml; 100 Unit-dose: \$12.50/ml	ce
Xeno IV	DENTSPLY Caulk	LC	Yes	Yes	0%	Yes	Yes	21	25	\$28.00/ml ²	\$19.41/ml	Bottle: 93% UD: na
Xeno IV Dual Cure	DENTSPLY Caulk	DC, LC	Yes	Yes ³	0%	Yes	Yes	25	18	Xeno IV: \$29.41/ml; SC Activator: \$28.20/ml	100 Unit-dose Xeno IV: \$19.41/ml ³	Bottle: 96% UD: na

EDITORS' NOTES: Only products evaluated by THE DENTAL ADVISOR have a rating listed, and are eligible for listing as a recommended product. Some table information provided by manufacturers. Costs are listed for comparison only and are not used to calculate the ratings.

DC = dual-cured, LC = light-cured
nt = not tested

¹ Dispensed in the VivaPen.
² Only available in a kit, no refills are available.
³ Activator (either DC or SC) is not available in unit-dose packaging.

3M ESPE Adper Prompt L-Pop Self-Etch Adhesive + + + + ½

Vol. 20, No. 7, September 2003

3M ESPE
800.634.2249
www.3MESPE.com

Description

3M ESPE Adper Prompt L-Pop Self-Etch Adhesive is a bonding agent with unique packaging that combines all necessary components into a disposable unit-dose applicator. The bonding agent components are stored in two separate foil reservoirs. Upon squeezing the first reservoir, the liquid moves into the middle reservoir containing a second liquid; it is mixed and activated then squeezed again into the third reservoir where it coats the microtipped applicator. A yellow tint to the bonding agent indicates proper activation. The adhesive is then applied to the tooth surface and rubbed with moderate pressure for 15 seconds. A gentle stream of air is directed at the tooth to thoroughly spread the adhesive into a thin film. The surface appears glossy and is then light-cured for 10 seconds. **Adper Prompt L-Pop Self-Etch Adhesive** is available with regular or extra-small applicators. Twenty-five consultants evaluated **Adper Prompt L-Pop Self-Etch Adhesive** in over 670 restorative cases. This product received a 91% clinical rating.

Suggested Retail Cost
• \$93.99/40 unit doses



Consultants' Comments

- ▶ "Excellent product – quick and easy."
- ▶ "I noticed a definite decrease in sensitivity compared to other bonding agents."
- ▶ "Proper activation was difficult at times."
- ▶ "Once bent, the brush did not maintain its position."

Product Features

Consultants were very pleased with the instructions and packaging of **Adper Prompt L-Pop Self-Etch Adhesive**. Most really liked the innovative packaging system, and several mentioned that it was easier to use than the previous formulation. They were very positive about the single-step, unit-dose delivery system. Only one consultant mentioned that it was somewhat difficult to activate. The elimination of a separate etching step and no rinsing were considered to be major advantages. Several consultants noted that **Adper Prompt L-Pop Self-Etch Adhesive** was quick and easy to use, and they appreciated the unit-dose system for simplifying infection control. Seventy percent of consultants indicated that they would both purchase and recommend **Adper Prompt L-Pop Self-Etch Adhesive**. ■

2007
Preferred Product

3M ESPE Adper™ Single Bond Plus + + + + ½

Vol. 22, No. 2, March 2005

3M ESPE
800.634.2249
www.3MESPE.com

Description

3M ESPE Adper Single Bond Plus is a 5th-generation (total-etch, single-bottle) bonding agent, combining a dentin primer and adhesive in a single bottle. It is an improvement on the original **Single Bond** with the addition of 10% by weight of 5-nm spherical silica nano-filler. Use of a phosphoric acid etchant is required, followed by application of two to three coats of the adhesive. Light curing time is 10 seconds. **Adper Single Bond Plus** is indicated for use with direct light-cured restorative materials as well as for the treatment of cervical sensitivity. It may also be used in conjunction with resin cements when bonding laboratory-fabricated composite or ceramic restorations. The adhesive is available in either a 6-g bottle or unit-dose applicators. Each unit-dose applicator contains the adhesive in a foil blister pouch, which must be pressed to deliver the material to the brush tip. The unit-dose kit evaluated contains 40 applicators and a 3-ml syringe of etchant. Thirty consultants used the **Adper Single Bond Plus** in over 480 clinical cases. This product received a 93% clinical rating.

Suggested Retail Cost
• \$153.10/5.6 ml bottle
• \$78.99/40 unit-doses



Consultants' Comments

- ▶ "The unit dose provides fresh material each time."
- ▶ "The addition of filler particles is not evident clinically – this handles just like the original material."
- ▶ "A great all-purpose bonding agent."
- ▶ "Provide more material in unit dose."
- ▶ "Smaller applicator tips would be nice for narrow preparations."

Product Features

Consultants found **Adper Single Bond Plus** to be very useful. The unit-dose applicators are easy to use and provide enough material for bonding procedures on one to two teeth. The brush tip can be bent at an angle for intraoral access. The shallow well in the foil pouch allows the bent brush to be returned for additional adhesive without having to straighten it first. The viscosity of the adhesive coats tooth surfaces well and provides very good wettability. After light curing, an even, glossy coat on the tooth is apparent. Eighty-four percent of consultants would purchase and recommend **Adper Single Bond Plus**.

Clinical Tips

- Press firmly and fold the unit-dose package to dispense product.
- Angle the package down to fully express the material. ■

2007
Preferred Product

3M ESPE Adper Scotchbond Multi-Purpose Plus Adhesive System + + + + +

TDA Plus, Vol. 5, No. 3, May/June 1995

3M ESPE
800.634.2249
www.3MESPE.com

Description

Adper Scotchbond Multi-Purpose Plus Adhesive System is recommended as an excellent all-purpose bonding system. It bonds to enamel, dentin, composite, porcelain, and metal. The adhesive has light-cured and dual-cured options. The kit contains etchant, color-coded and numbered primers, activator, adhesive, and technique guides. Nineteen consultants used **Adper Scotchbond Multi-Purpose Plus Adhesive System** in over 800 various clinical applications. This product received a 97% clinical rating.

Suggested Retail Cost
• \$104.99/activator or catalyst
• \$151.99/primer or adhesive

Product Features

There was an overwhelming positive response to **Adper Scotchbond Multi-Purpose Plus Adhesive System**. Overall, the kit was judged to be versatile and easy to use by both doctors and assistants. The adhesive bonds well to all dental surfaces and has a dual-cured option for cementation of crowns and inlays and bonding amalgam. The numbered vials are color-coded to the brush handles to prevent cross-contamination. The packaging is

conservative with minimal waste. Although the instruction booklet is very detailed, the enclosed technique guides simplify the use of the kit with color pictures and short step-by-step instructions for each procedure. ■



Consultants' Comments

- ▶ "A lubricant should be used on the matrix band for a bonded amalgam restoration."
- ▶ "An amalgam must be placed quickly because bonding agent sets quickly."

Ivoclar Vivadent, Inc.
800.533.6825 • 716.691.0010
www.ivoclarvivadent.us.com

Description

AdbeSE is a two-component, no-mix, self-etching bonding system (6th-generation, Type I) designed for use with direct light-cured composite restorations. The acidic primer (pH 1.6) of **AdbeSE** etches the enamel and dentin surfaces. Primer is applied for 30 seconds then air-dried, followed by application of the bond and a 10-second light cure. As the hydrolysis of methacrylate-based monomers can significantly reduce bond strengths, **AdbeSE** is formulated with a hydrolytically stable monomer that provides consistent bond strengths. The introductory kit includes 5-g bottles of primer and bond, a dispensing well and applicator brushes. About 150 drops can be dispensed from each bottle; one drop from each bottle is adequate for one medium restoration. Sixteen editors used **AdbeSE** in over 350 restorations over a six-week evaluation period. This product received a 96% clinical rating

Suggested Retail Cost

- \$50.00/5 ml primer or bond refill

Editors' Observations

Manufacturer's Instructions

Instructions for use are clear with the clinical procedure well illustrated. The application steps printed on the dispensing well provide an excellent, quick reference for assistants and doctors during use.

Delivery System

Separate priming and bonding steps assure consistent adhesive application. Editors appreciated the green and black bottles

EDITORS' EVALUATION

Editors' Comments

- ▶ *"The adhesive does not bond to the metal matrix band, which is easily removed after use."*
- ▶ *"I like not having to refrigerate this product."*
- ▶ *"Increase the viscosity of the primer slightly to allow more controlled dispensing and application."*

Exclusive Review

of primer and adhesive, which are color-coded to the brushes and dispensing well. The imprinting of the recommended curing time onto the dispensing well was suggested.

Ease of Use

The self-etching bonding system is very easy to use. The adhesive flows evenly and wets the surface well. Editors found the abbreviated instructions on the dispensing well to be very useful. The lack of the need for refrigeration was also appreciated.

Postoperative Sensitivity

Minimal postoperative sensitivity was reported during the six-week evaluation period.

Ease of Band Removal

Removal of the metal matrix band after using **AdbeSE** with a direct composite was not difficult. ■

Editors' Note: Since this evaluation, Ivoclar Vivadent has introduced AdbeSE One; a self-etching, light-cured, single-component, 7th-generation adhesive for direct restorative treatment. It is only available in the VivaPen.

VOCO
888.658.2584
www.vocoamerica.com

Description

Admira Bond SD (SingleDose) is a light-cured bonding agent (5th-generation) designed to be used with the "total-etch" tooth technique. This new, 0.06-ml foil package contains the same chemicals as the original one-bottle dispensing/brush application system, which is still available. The package is about 4.4-cm long and may be readily held in a thumb-finger grasp. The kit includes 50 single-dose packages along with disposable applicators. Each applicator has a fiber-tipped head that is stiff enough to penetrate

Consultants' Comments

- ▶ *"No more sticky bottles to deal with."*
- ▶ *"I like the unit-dose characteristic."*
- ▶ *"Good micro-tip applicator."*
- ▶ *"Does not evaporate rapidly."*
- ▶ *"It would be great if this could be self-etching also."*
- ▶ *"Make the foil a different color so the liquid is easier to see."*

through the foil cover of the **SingleDose** package and fold the foil aside. This action also saturates the fiber tip; the tip is bendable and has minimum rebound. After a 30-second application period, any residual fluid should be dispersed

Pentron Clinical Technologies, LLC
800.551.0283 • 230.265.7397
www.pentron.com

Description

Bond-1 combines the light-cured primer and adhesive for dentin and enamel bonding in a single bottle for use with amalgam, porcelain, crowns, inlays, cores, and composite and for desensitization of dentin. A total-etch technique with 37% phosphoric acid is recommended. **Bond-1** is supplied in a 4-ml dispensing bottle. The kit includes a plastic double well, two 5-ml syringes of etchant, 18 disposable syringe tips for direct etch application, and 50 adjustable, single-use cotton tip applicators. An instruction booklet provides written and pictorial directions for various protocols and technique tips. **Bond-1** was evaluated by 16 consultants and used in over 720 procedures. This product received a 96% clinical rating.

Suggested Retail Cost

- \$69.24/6 ml bond refill

Positive Features

"Ease of use" and "fewer steps" were consistent comments received from dentists and assistants alike. Every consultant reported that **Bond-1** was easy to adapt into their office routine. The instructions and simple packaging received high marks. Several consultants remarked positively



Consultants' Comments

- ▶ *"Similar to other single-bottle products but less expensive."*
- ▶ *"Primer/adhesive has a strong odor."*

about the 37% phosphoric acid gel etchant, which is the traditional blue color, but with less chroma making it fairly translucent. It is less viscous than many gels and was rated good to excellent by 99% of consultants. No bond failures were experienced during the three-month evaluation period. Most consultants stated that they would purchase **Bond-1** and 92% would recommend it to colleagues.

Clinical Tips

- Generate a shiny surface, but do not thin aggressively.
- Cover the dispensing well between uses. Ambient light will cause the liquid to set quickly. ■

by air and light cured for 20 seconds. Other applicator tips or brushes may be used to apply the bonding agent. Twenty-three consultants used **Admira Bond SD** in over 525 restorative cases. This product received an 88% clinical rating.

Suggested Retail Cost

- \$95.00/50 unit-doses

Product Features

The packaging of **Admira Bond SD** was very well received by consultants. This product was called "user-friendly" and "a good contribution to infection control procedures." Packaging, completeness of

the kit, coating of dentin, and the adaptation of the composite to the bonded surface were all rated as excellent characteristics. A few consultants would have preferred to have 2 sizes of packages – one with a greater volume of liquid for multiple preparation cases. Fifty-eight percent of consultants stated that **Admira Bond SD** was equivalent to or better than their current bonding agent, and 43% would both switch to and recommend **Admira Bond SD**. ■

SENIOR CLINICAL CONSULTANTS

E. Alpert, CT
R. Anthony, OH
K. Baker, TX
R. Ciccone, MI
P. Esmond, NY
M. Evans, TN
R. Fisher, OH
G. Franco, NY
P. Grandsire, NY
K. Hamlett, TX
G. Hart, OH
R. Kaprielian, NJ
E. Katkow, MD
L. Katkow, MD
C. Kehr, MI
E. Maitland, NJ
E. Mosso, PA
G. Mosso, PA
D. Peterson, MD
V. Plaisted, NY
T. Poirier, MI
W. Powell, TX
G. Poy, MI
G. Sayre, TX
K. Schwartz, FL
B. Shumaker, NJ
B. Sims, NY
A.M. Thompson, NY
R. Trushkowsky, NY
L. Wee, MI

CLINICAL CONSULTANTS

M. Aksu, MI
A. Albright, NY
A. Alexander, PA
J. Allen, MI
J. Amara, CT
S. Anderson, MI
R.M. Arnett, MI
R. Averbach, CO
M. Bannan, MI
D. Barnes, MD
F. Berman, PA
M. Beyramian, MI
L. Bishop, MI
T. Bizga, OH
J. Bostic, OH
D. Bowen, MI
R. Bozell, MI
M. Braverman, NY
L. Brimhall, MT
M. Briskin, NY
C. Brown, LA
L. Brown, MI
W. Brownscombe, MI
H. Buckwald, NJ
J. Bush, PA
H. Cadorette, MI
Z. Campbell, MI
P. Campo, NY
M. Chaben, MI
D. Chacko, TN
S. Cheff, TX
R. Cherry, FL
P. Chiaravalli, MI
A. Colarusso, NY
M. Conrad, PA
M. Cooks, MI
L. Covato, PA
K. Dancy, GA
M. Danner, IL
S. Dillingham, NY
J. Dingman, WI
J. DiPonziano, NJ
R. Donelli, NY
R. Dost, VA
J. Doueck, NY
M. Dwoskin, MI
M. Eannaccone, NY
B. Eggart, AR
R. Engle, IL
K. Fairbanks, MI
T. Faiver, MI
R. Fay, TX
N. Fehmi, MI
M. Feinberg, NY
L. Feldman, NJ

Pentron Clinical Technologies, LLC
800.551.0283 • 230.265.7397
www.pentron.com

Description

Bond-It is a moist dentin bonding system that is part of a new series of materials designed to meet bonding and cementation needs. **Bond-It** is a highly recommended light- and dual-cured adhesive for bonding composites and amalgams. The kit contains A and B primers, light- and dual-cured resins, and two concentrations of phosphoric acid, as well as necessary mixing implements. Nineteen consultants used **Bond-It** in over 750 applications. This product received a 91% clinical rating.

Consultants' Comments

► “Mixed primers leave a crusty residue on gingival tissues.”

► “Great product for the price.”

- Suggested Retail Cost
- \$37.44/6 ml Primer A refill
 - \$27.24/6 ml Primer B refill
 - \$27.30/6 ml LC resin refill
 - \$17.64/3 ml DC Activator refill

Product Features

Bond-It is well packaged and easy to dispense. The instructions are clear, and the product is easy to use. All evaluators felt that the dual-curing ability was a plus. They especially approved of the lower cost of **Bond-It**, as well as the high bond strength to enamel and dentin. Several commented positively on the ability of **Bond-It** to seal dentin and reduce sensitivity. ■

Kuraray America, Inc.
800.879.1676 • 212.986.2230
www.kuraraydental.com

Description

Clearfil LINER BOND 2V is a self-etching bonding system that can be light-cured, dual-cured, or self-cured. It bonds well to both enamel and dentin. The bonding system can be used with light- and self-cured composites to treat hypersensitive areas and to seal teeth before seating indirect restorations. The kit contains two bottles of Primer A & B, two bottles of Adhesive A & B, a plastic tray that serves as a bottle holder, as well as brushes and small sponges for applying the liquids. **Clearfil LINER BOND 2V** was used by 30 clinical consultants in over 1,650 applications. This product received a 96% clinical rating.

- Suggested Retail Cost
- \$105.99/5 ml Bond A refill
 - \$58.99/3 ml Bond B refill
 - \$41.99/6 ml Primer A or B refill



Consultants' Comments

► “Very versatile kit; great to use for core materials.”

► “Patients had zero postoperative sensitivity.”

► “No odor – patients appreciated that.”

► “Assistants really liked the tray for holding the bottles.”

► “Dual-cured capability is great.”

► “I have used this product over 1,000 times – it is my favorite.”

► “This system has more bottles and it requires more steps.”

Product Features

The clinical consultants overwhelmingly praised the packaging and the manufacturer's instructions for the **Clearfil LINER BOND 2V** kit. They liked the compactness of the kit as well as the plastic tray provided as a holder for the bottles. The instruction cards provide good step-by-step details with excellent graphics. All consultants found the system to be versatile, usable for light-cured, dual-cured, or self-cured applications. While the system was found to be easy to use, mixing the components and waiting 30 seconds after applying the primer to the tooth made it more time-consuming than other systems. The viscosity of the primer was well received, while the resin was rated as somewhat viscous. Ninety percent of consultants liked the fact that the material has a low odor and was not offensive to patients. All consultants reported that they experienced no post-operative sensitivity when using **Clearfil LINER BOND 2V**. Seventy percent of consultants felt that this bonding system was better than the product they were using, while 30% said it was equivalent. Ninety-four percent of consultants indicated they would purchase this product, while 100% said they would recommend it to a colleague. ■

Parkell, Inc.
800.243.7446
www.parkell.com

Description

Brush & Bond is a 6th-generation, single-bottle, self-etching, self-priming, light-cured dentin bonding agent that contains 4-META. This creative bonding system has the initiator in the applicator brush. Mixing the liquid with the brush provided initiates the chemical reaction. Use the activated liquid within three minutes of mixing. Etch uncut enamel with phosphoric acid before applying **Brush & Bond**. It can be used to bond direct and indirect composite and ceramic restorations. It is compatible with light-cured, dual-cured and self-cured resins. It can also be used on dentin surfaces before temporization to minimize sensitivity. Twenty-seven consultants used **Brush & Bond** in over 765 restorations. This product received a 93% clinical rating.

- Suggested Retail Cost
- \$64.99/5 ml liquid refill
 - \$52.99/100 applicator refill

Consultants' Comments

- “Very efficient product and little to no post-operative sensitivity.”

► “Great product; clever system.”

► “I am concerned about the stability of the chemistry in the brushes once the package has been opened.”

► “I would like to see how the bond compares to other products.”

► “Include a smaller brush for easier access.”

Product Features

Consultants were very pleased with **Brush & Bond** and gave it high ratings for completeness of instructions, packaging, viscosity, and the innovative nature of the product. Twenty-four of the 27 consultants noted that the product was very easy to use and required fewer steps, thereby saving time and resulting in almost no post-operative sensitivity. Seven consultants objected to the odor of **Brush & Bond** during placement, and several felt that the size of the applicator brush was too large for narrow preparations and preferred a smaller-tipped brush. Seventy-four percent of consultants indicated that they would purchase **Brush & Bond**, while 85% would recommend it. Interestingly, 93% of consultants stated that **Brush & Bond** was equivalent to or better than their current bonding agent. ■

What's New?

In September of 2007, Tokuyama Dental Corp./Tokuyama America (877.378.3548 • www.tokuyama-us.com) will introduce **BOND FORCE** to the US market. This one-component, self-etching, light-cured dental adhesive is indicated for bonding light- or dual-cured composite materials to cut and uncut enamel or dentin. It is also useful for repairs of fractured ceramic and composite. It requires a one-coat application, light cures in 10 seconds, and releases fluoride. **BOND FORCE** is available in a 5-ml bottle and 50- or 20-count, 0.1-ml unit-dose kits with accessories. This is the first unit-dose product for Tokuyama Dental Corporation. Look for the results of an in-depth clinical evaluation of this new 7th-generation bonding agent in an upcoming issue of THE DENTAL ADVISOR. ■



CLINICAL CONSULTANTS

J. Fine, NJ
K. Fischer, IN
M. Frankman, AZ
S. Galster, ND
D. Garber, CA
R. Gardner, MI
N. Garlisi, OH
L. Gee, OK
A. Giovanardi, MI
B. Goldsmith, NY
I. Goldstein, NJ
K. Goodman, MI
S. Graber, IL
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A. Nazarian, MI
N. Nealis, IL
L. Neuberger, ND

Kuraray America, Inc.
800.879.1676 • 212.986.2230
www.kuraraydental.com

Description

Clearfil PROTECT BOND is a self-etching primer/light-cured bonding system. **Clearfil PROTECT BOND** contains the same proprietary technology and physical properties as **Clearfil SE BOND** with two additional features: long-term fluoride release and the MDPB monomer with an antibacterial, cavity cleansing effect. The introductory kit of **Clearfil PROTECT BOND** includes 6 ml of primer, 5 ml of bond, a dispensing case and accessories. Thirteen consultants, seven of whom had previously used **Clearfil SE BOND**, evaluated **Clearfil PROTECT BOND**. One hundred percent of consultants would both purchase and recommend **Clearfil PROTECT BOND**. This product received a 98% clinical rating.

Suggested Retail Cost

- \$103.99/6 ml primer refill
- \$98.99/5 ml bond refill

Exclusive Review

EDITORS' EVALUATION

Editors' Comments

- ▶ "I love the storage and dispensing system."
- ▶ "Application time printed on the dispensing case is very helpful."
- ▶ "No sensitivity."
- ▶ "Appears to have all of the benefits of Clearfil SE BOND and more."
- ▶ "The antibacterial feature is an added benefit."
- ▶ "Make a smaller orifice on the primer bottle to reduce the flow."
- ▶ "Bonds to metal matrix bands."



Evaluation Protocol

- Thirteen consultants and editors of THE DENTAL ADVISOR clinically evaluated **Clearfil PROTECT BOND** over a six-week period.
- Over 150 restorations were placed.
- **Clearfil PROTECT BOND** was evaluated on a 1-5 rating scale: 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent.

Kuraray America, Inc.
800.879.1676 • 212.986.2230
www.kuraraydental.com

Description

Clearfil S³ BOND is a 7th-generation bonding system that includes the primer and adhesive in one bottle. This light-cured material is water-based and self-etching. The material must be applied to the tooth for 20 seconds. Strong air and high-volume suction are utilized to evaporate the solvent, and then **Clearfil S³ BOND** is light-cured for 10 seconds. Refrigeration is recommended for overnight or long-term storage. **Clearfil S³ BOND** is available in a kit containing a 4-ml bottle, disposable brush tips, brush tip handle, and accessories. Sixteen editors evaluated **Clearfil S³ BOND** in over 500 restorations during a six-week period. Eighty-eight percent would both purchase and recommend **Clearfil S³ BOND**. Eighty-five percent of consultants reported the material was equivalent to or better than their current material, and it received a 92% clinical rating.

Suggested Retail Cost

- \$109.99/4 ml bottle

Bond Strength to Tooth Structure, MPa		
	Enamel	Dentin
Bond Strength	28	23

Editors' Observations

Manufacturer's Instructions

The technique guides are well illustrated with a clear, simple description of each indication for use. Abbreviated directions are also provided on the side of the bottle for quick reference.

Completeness of Kit

The bottle is small, well-balanced and easy to open. Consultants found the directions printed on the bottle to be an excellent addition. Disposable brushes and a sterilizable handle are provided. Disposable fiber-tipped applicators would be preferred.

Ease of Dispensing/Ease of Use

Clearfil S³ BOND has a medium viscosity and is easily dispensed in a controlled volume. The slight yellow color is easy to see, indicating that all surfaces have been covered.

Editors' Observations

Manufacturer's Instructions

The laminated flow chart is well illustrated with clear directions for clinical use. Application and curing times are printed on the dispensing case as an at-a-glance reminder.

Completeness of Kit

The simple system includes a convenient storage and dispensing container that keeps the two bottles together. A dispensing dish, light shield and application brushes are also included.

Dispensing Clearfil PROTECT BOND

The storage and dispensing system is convenient. The flow of the primer and bond is easily controlled; however, firm pressure is often required to express the bond when little remains in the bottle.

Viscosity

The primer and bond wet the tooth evenly. The low-viscosity primer flows readily under gentle air pressure while the more viscous bond may require extended use of air.

The **Clearfil S³ BOND** system is very simple to use and requires a short application time.

Viscosity

The viscosity allows for controlled dispensing and coating of all surfaces; however, it is more difficult to disperse with air.

Initial Postoperative Sensitivity

No sensitivity was reported during the six-week evaluation period of **Clearfil S³ BOND**.

Ease of Matrix Band Removal

The bond strength data is exceptional; however, consultants found it very difficult to remove the metal matrix band after placement of the composite.

Postoperative Sensitivity

No postoperative sensitivity was reported during the six-week evaluation period. Consultants found **Clearfil PROTECT BOND** effective in the reduction of sensitivity when placed on areas of recession or similar areas of sensitive tooth structure.

Matrix Band Removal

Clearfil PROTECT BOND bonds to metal matrix bands, making the bands more difficult to remove than other self-etching bonding systems. Consultants used hemostats and firm pressure to assist in removing matrix bands. Preventing pooling of adhesive against the band was also helpful. ■

EDITORS' EVALUATION

Editors' Comments

- ▶ "Simple system with excellent bond strength."
- ▶ "The directions on the bottle are very helpful."
- ▶ "The slight tint is helpful in confirming complete coverage."
- ▶ "Very strong bond to metal matrix bands."



Clinical Tips

- Use an instrument such as a spoon excavator to remove cured adhesive from the internal aspect of the matrix band before composite placement.
- Use a phosphoric acid etchant on uncut enamel. ■

CLINICAL CONSULTANTS

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D. Young, MI
S. Young, NY
M. Zahn, MI
J. Zanetti, MI
P. Zanetti, MI
G. Zann, FL
S. Zimmer, MI

LABORATORY CONSULTANTS

Alpha Dental Studio, MI
Nellmar Laboratory, LLC, MI

Kuraray America, Inc.
800.879.1676 • 212.986.2230
www.kuraraydental.com

Description

Clearfil S³ BOND Single Dose is a 7th-generation adhesive system that allows simultaneous bonding to both enamel and dentin with one liquid. Each unit is individually packaged in a container with 0.1 ml of liquid and one applicator tip for direct placement into the prepared tooth. To use, push the applicator tip into the container using finger pressure. Remove the moistened tip, apply the tip to the tooth surface, and leave the liquid in place for 20 seconds. Then, thoroughly air dry and light cure for 10 seconds. **Clearfil S³ BOND** is indicated for use with direct composite restorations, cavity sealing, treatment of exposed root surfaces, and core build-up using light- or dual-cured composite. **Clearfil S³ BOND** requires refrigeration. One hundred percent of those who evaluated **Clearfil S³ BOND Single Dose** found it equal to or better than their current adhesive system. Eighty-eight percent would recommend it and 76% would switch. This product received a 98% clinical rating.

Suggested Retail Cost

- \$125.99/50 single-dose package
- \$231.99/100 single-dose package

Evaluation Protocol

- Twenty-seven editors and clinical consultants of THE DENTAL ADVISOR clinically evaluated **Clearfil S³ BOND Single Dose** over a four-week period.

- Over 560 clinical cases were completed.
- **Clearfil S³ BOND Single Dose** was evaluated on a 1 to 5 rating scale: 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent.

Editors' Observations

Manufacturer's Instructions

The different clinical procedures are clearly illustrated with color diagrams and complete instructions in text form. The individual foil packets also have color illustrations with the recommended treatment times.

Packaging/Design of Unit Dose

This was the most liked feature of the product. Editors felt confident that the material they were using was always fresh. The single-dose container is easily activated with gentle finger pressure and is excellent for infection control.

Ease of Dispensing

Activation of the container results in a well-moistened applicator tip. The slight yellow color verifies that the brush is wet. The adhesive does not spill out of the container.

Volume of Adhesive in Each Single Dose

Each container has sufficient adhesive for treatment of two or three teeth, depending on the size of the preparation. Material should be used within three minutes of opening.

Viscosity

The adhesive does not drip from the moistened tip but wets the tooth surface easily to produce a uniform coating.

Exclusive Review



EDITORS' EVALUATION

Editors' Comments

- ▶ **"Faster bonding with fewer steps!"**
- ▶ **"Nice glossy tooth surface after one application indicating good coverage with adhesive."**
- ▶ **"There is plenty of material in each container for treating one quadrant."**
- ▶ **"The opening of the container is small, and the applicator brushes are for small preparations."**
- ▶ **"Cover the adhesive if light curing is delayed because it is sensitive to ambient light."**

Surface Wettability

A glossy appearance of the tooth surface is evident after one, 20-second application of the adhesive. If the surface is not totally wetted, place a second application.

Time Required for Procedure

The procedure is a predictable and easy one-step process that definitely reduces the number of steps for bonding and treatment time.

Odor

There is a slight odor associated with the adhesive, but no negative comments regarding the odor were reported from patients.

Postoperative Sensitivity

No cases of postoperative sensitivity were reported by the consultants. Compared to other adhesive systems,

some consultants noticed a reduction of postoperative complaints from patients when using **Clearfil S³ BOND Single Dose**.

Ease of Band Removal

The adhesive sticks to metal matrix bands, making removal difficult. The band may be lubricated before placement. Use care when applying the adhesive to the cavity preparation to avoid excessive bonding agent on the band.

Sensitivity to Ambient Light

The adhesive is sensitive to ambient light and needs to be covered if opened before use. It is not a problem if the applicator tip is left in the container when it is not being used. ■

2007
Preferred Product

Editors' Choice
Vol. 17, No. 2

Kuraray America, Inc.
800.879.1676 • 212.986.2230
www.kuraraydental.com

Description

Clearfil SE BOND is a self-etching, light-cured bonding agent. **Clearfil SE BOND** consists of two solutions: **SE Primer** (6 ml) accomplishes both etching and priming of dentin and cut enamel, and **SE BOND** (5 ml), a 10% filled light-cured adhesive, completes the procedure. The two bottles are housed in a clear plastic container that allows single-handed loading of the liquids into a two-well dispenser, which is included. The surface preparation by the primer occurs in 20 seconds; it is dried with a light air flow and is not rinsed. The set primer has a neutral pH. The bonding agent is air thinned after application and light cured for 10 seconds. Fourteen consultants used **Clearfil SE BOND** in over 400 procedures

including porcelain repairs and exposed dentin desensitization. This product received a 95% clinical rating.

Suggested Retail Cost

- \$96.99/5 ml bond refill
- \$40.99/6 ml primer refill

Product Features

Ninety-three percent of consultants rated the **Clearfil SE BOND** delivery system as good to excellent. Viscosity and ease of application of the solutions with a disposable brush were highly rated. Consultants reported no bond failures, low post-operative sensitivity and no complaints of an objectionable taste.



Consultants' Comments

- ▶ **"Dispensing unit is innovative – easy to recap and solutions do not leak out if the unit is overturned."**
- ▶ **"Good laminated instruction card."**
- ▶ **"Application and curing times are labeled on the container – a nice reminder."**
- ▶ **"Using Clearfil SE BOND resulted in less postoperative sensitivity."**
- ▶ **"Viscosity of the solutions is low and if excess is delivered, it will run out of the preparation."**

The packaging is simple and convenient. The lack of a separate etching step and ease of use were repeatedly praised. Seventy-seven percent of consultants would purchase **Clearfil SE BOND**, and 92% would recommend it.

Clinical Tips

- Keep the solutions off the gingiva as they leave a white coating.
- Use a disposable micro-tipped applicator for the solutions for better volume control.
- Hold bottles vertically to provide the optimum amount of dispensed solutions.
- Wax matrix band to prevent bonding composite to the band. ■

Editors' Note: Etching is accomplished by an acid group on the phosphate monomer. This is effective on dentin and on cut enamel. When bonding to uncut enamel, prepare it with a standard phosphoric acid etchant.

Zenith Dental/DMG
800.662.6383 • 201.894.5500
www.zenithdentaldmg.com

Description

Contax is a 6th-generation (Type D), self-etching, water-based, fluoride-releasing bonding agent for use on dentin and enamel. It is compatible with all dual-, light-, and self-cured composites and can be used for direct and indirect restorations. It is necessary to scrub the primer into the tooth structure for 20 seconds. Mixing the adhesive with the activator is only necessary when using the dual-cured technique. According to the manufacturer, etching of enamel with phosphoric acid is not required but can be done with no change in the bond strength to enamel. The kit includes 5 ml each of the **Contax** primer, adhesive and dual-cure activator along with accessories. Twenty-five consultants used **Contax** in 411 clinical cases. This product received a 91% clinical rating.

Consultants' Comments

- ▶ *"One of the best dual-cured products I have used."*
- ▶ *"Very good dual-cured bonding agent – reliable with self- and light-cured composites."*
- ▶ *"Dispenses nicely, one drop at a time."*
- ▶ *"Easy to use for bonding composite cores."*
- ▶ *"Change instruction card illustrations to match bottle colors."*

Suggested Retail Cost

- \$76.35/5 ml primer, bond or activator refill

Product Features

Contax is packaged in color-coded bottles for simple and accurate dispensing. While instructions are well-illustrated, the color coding on the instructions does not correspond

to the color of the bottles and brushes. The primer must be scrubbed into the tooth for 20 seconds. Both the primer and adhesive have good viscosity to wet the tooth surface well. The inclusion of the activator addresses the issue of light- and self-cured compatibility and allows the use of **Contax** for all bonding procedures. Lack of post-operative sensitivity was reported as very good. Seventy-one percent of consultants rated **Contax** equivalent to or better than their current bonding agent, 57% would purchase it, and 71% would recommend it. ■

Pulpdent Corporation
800.343.4342 • 617.926.6666
www.pulpdent.com

Description

DenTASTIC is a highly recommended, dual-cured all-purpose system for bonding composites and resin cements to dentin, enamel, porcelain, and metals. **DenTASTIC** is a system of primers, etchants and accessories designed to simplify the process of adhesive bonding in most restorative situations. The package includes a 10% phosphoric acid etchant, hydrofluoric acid, silane, a self-cure unfilled resin, and a system of self-curing primers for metal, amalgam and dentin surfaces. The dentin primer forms a hybrid layer with etched dentin, and the metal primer bonds both chemically and micro-mechanically to metal oxides.

Bond Strength to Tooth Structure, MPa		
	Enamel	Dentin
DenTASTIC	31	21
Probond	21	18
All-Bond 2	23	24

Consultants' Comments

- ▶ *"Hold bottle vertically to properly dispense primer and minimize waste."*

DenTASTIC was evaluated by 15 consultants in over 650 intraoral bonding applications. This product received an 86% clinical rating.

Suggested Retail Cost

- \$50.00/Part A refill
- \$40.00/Part B or C refill
- \$30.00/Part 1 or 2 refill

Product Features

DenTASTIC was rated excellent for overall quality of the bond and ease of use. The plastic instruction booklet gives step-by-step instructions for different bonding surfaces and is designed for chairside use. The instructions were very well received by most consultants. They reported that assistants appreciated having all the materials and technique steps in one kit. Most consultants stated that they would purchase or recommend **DenTASTIC** to their colleagues. ■

Pulpdent Corporation
800.343.4342 • 617.926.6666
www.pulpdent.com

Consultants' Comments

- ▶ *"Effective for root sensitivity."*

Description

DenTASTIC UNO is a single-component PMGDM (pyromellitic dianhydride glycerol dimethacrylate) adhesive primer with a hydrophilic resin in an acetone carrier. **DenTASTIC UNO** is highly recommended for direct and indirect bonding of restorations. The adhesive bonds to tooth surfaces, composite, porcelain, and metal. The kit contains two, 6-ml bottles of adhesive, 5 ml of etchant and accessories. Eighteen consultants evaluated **DenTASTIC UNO** in 570 clinical uses. This product received an 88% clinical rating.

Suggested Retail Cost

- \$61.00/6 ml **UNO** refill

Product Features

The laminated instruction cards are complete with specific instructions for all applicable procedures. A card with basic rules and helpful hints for bonding is

also included. **DenTASTIC UNO** dispenses readily from the bottle, and coats the tooth and restoration surfaces quickly and evenly. Two coats of the adhesive produced the desired glazed surface, and no bond failures were reported during the evaluation period. Seventy-two percent of consultants would recommend **DenTASTIC UNO**, and 61% would purchase it.

Clinical Tips

- Material has low viscosity like other acetone-based bonding agents – do not squeeze the bottle.
- Dispense material just before use to minimize quick evaporation of solvent. ■

Ivoclar Vivadent
800.533.6825 • 716.691.0010
www.ivoclarvivadent.us.com

Description

ExcITE is an alcohol-based enamel and dentin bonding system for bonding of direct and indirect restorations. **ExcITE** is newly formulated to contain 2 reactive photo-initiators, camphorquinone and acylphosphine-oxide. These initiators cover the spectral output of a variety of different light sources including halogen, laser, plasma ARC, and LED. A 10-second cure is sufficient with most lights but may vary. **ExcITE** has a low film thickness and only requires one coat. The bond strength tested by THE DENTAL ADVISOR is 22.3 MPa to enamel and 27.8 MPa to dentin. The **ExcITE Single Dose** introductory kit evaluated contains 50, 0.1-g vessels of **ExcITE**, 2 g of etchant, and 5 finger clips to hold the single-dose vessels. **ExcITE** is also available in a 5-g bottle. Twenty-two consultants evaluated **ExcITE** in 610 clinical applications. This product received a 91% clinical rating.

Suggested Retail Cost

- \$165.99/two, 5 ml refill bottles
- \$99.99/50, 0.1 ml unit-doses



Consultants' Comments

- ▶ *"Simplest single-use bonding system I have used."*
- ▶ *"Very thin coating with a glossy surface."*
- ▶ *"I am glad to see the manufacturer's attention to the issue of light curing their material."*
- ▶ *"Smaller applicator tips are needed."*

Product Features

The viscosity of **ExcITE** rated excellent, and it flows well to produce a thin coat on tooth structure. A thin coat is especially important for indirect restorations. Only one coat is required to produce a readily visible, glossy surface on the tooth. Lack of post-operative sensitivity rated very good. Compatibility with various light sources is a positive feature of **ExcITE**, allowing for shorter curing times depending on the light used. While consultants rated the bonding agent very highly, the delivery system received lower ratings. The vessel containing the bonding agent was easy to use with adequate material; however, most consultants found the applicator brush to be too large for small, conservative preparations. Also, when the brush is bent, it cannot be reinserted into the vessel unless it is straightened. Sixty-eight percent of consultants indicated that they would purchase **ExcITE Single Dose**; 72% would recommend it. ■

Editors' Note: Since this evaluation, **ExcITE** is now available in the new VivaPen. The formula and indications are the same for all three delivery systems.

Ivoclar Vivadent
800.533.6825 • 716.691.0010
www.ivoclarvivadent.us.com

Description

Excite DSC is a 5th-generation, dual-cured single component bonding agent for dentin and enamel. It is indicated for use with dual- and self-cured resin cements, core build-up composites and self- or light-cured restorative composites. The bonding agent is supplied in a unit-dose vessel with a pre-mounted applicator brush coated with the initiator necessary for dual curing. A 15- to 30-second etch with 37% phosphoric acid is required before application of **Excite DSC**. Activation of the dual-/self-cure mechanism occurs when the brush is inserted into the vessel, breaking the seal. One coat of bonding agent is applied to the tooth surface and gentle air is applied to thin the material and to evaporate the solvent. When a dual cure or self cure cement or composite is used, no light curing is required. When a light-cured resin composite or cement is used, polymerize **Excite DSC** using a halogen or LED light according to the manufacturer's instructions. Each unit dose is packaged with an applicator, available in two sizes: regular and

small/endo. The Introductory Kit contains 45, 0.1-g **Excite DSC** regular; five, 0.1-g **Excite DSC** small/endo; and a 2-g syringe of *Total Etch*. Refrigeration is not necessary. Eighty-three percent of the editors would switch to **Excite DSC** and 92% would recommend it. This product received a 91% clinical rating.

Suggested Retail Cost
• \$138.99/50 unit-doses

Evaluation Protocol

- Thirteen editors of THE DENTAL ADVISOR clinically evaluated **Excite DSC** over a six-week period.
- Over 160 restorations were placed.
- **Excite DSC** was evaluated on a 1-5 rating scale: 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent.

Editors' Observations

Manufacturer's Instructions
The instructions for use are thorough and well written. The technique guide clearly illustrates all the steps necessary

for use with direct and indirect, light- and dual-cured procedures.

Unit-dose Delivery System

The unit-dose vessel is conveniently packaged with the pre-mounted, initiator-coated applicator. Each packet is clearly marked with the brush size enclosed. The vessel requires firm pressure to break the seal to gain access to the bonding material. Each capsule contains an adequate amount of material.

Ease of Re-dipping Brush After Use

The applicator brush must be bent 3.7 cm from the head of the brush to enable the dentist to easily re-dip the brush. When the brush was bent at the location most often used by the clinicians, it was difficult to regain access to the vessel.

Viscosity

The material has an adequate viscosity to coat the preparation completely. The clear liquid is difficult to see on the tooth,

EDITORS' EVALUATION

Editors' Comments

- ▶ "Simple system."
- ▶ "Does not require multiple coats."
- ▶ "The short unit-dose vessel with the wide opening is perfect."
- ▶ "Strong bond to metal matrix bands."
- ▶ "Material is more difficult to thin than other similar materials I have used."

Exclusive Review

and some consultants would prefer the addition of a slight yellow tint to ensure full coverage.

Ease of Thinning the Material

With gentle air pressure, the material is readily thinned and the solvent evaporates producing a slightly shiny surface before light curing.

Initial Postoperative Sensitivity

No sensitivity was reported during the six-week evaluation period.

Clinical Tips

- Agitate the brush in the vessel to ensure proper activation of the dual-cured component.
- Apply a second coat of bonding agent to large preparations for complete coverage. ■

FL-BOND + + + + 1/2

Vol. 19, No. 9, November 2002

Shofu Dental Corp.
800.827.4638 • 760.736.3277
www.shofu.com

Description

FL-BOND is a fluoride-containing, self-etching bonding system. It uses a two-step technique with a self-etching primer and a light-cured adhesive. No separate phosphoric acid etching procedure is required. **FL-BOND** is a glass ionomer and resin-based combination that contains a pre-reacted glass-ionomer filler (Giomar) with fluoride-releasing ability. **FL-BOND** can be used with composite restorations and for cementation with resin cement. The system includes 5-ml bottles of Primer A and B, a 5-ml bottle of adhesive, applicator brushes, and a mixing well with cover. Twenty-one consultants used **FL-BOND** in over 570 restorative and cementation procedures. This product received a 91% clinical rating.

Suggested Retail Cost
• \$55.39/5 ml bond refill
• \$51.80/5 ml primer refill

Consultants' Comments

- ▶ "Simple and easy to use."
- ▶ "Excellent wettability of primer."
- ▶ "Provide instructions on a laminated card."

Product Features

FL-BOND is a unique bonding system because it utilizes a self-etching primer with fluoride-releasing filler. Most consultants found **FL-BOND** easy to use and the self-etch to be time saving during practice. The idea of fluoride incorporation was well received, although the effect of the fluoride release from the product has not been established. The efficient packaging of **FL-BOND** was highly rated. The viscosity and wettability of the bonding agent were found to be good, and the lack of post-operative sensitivity was appreciated by consultants. The primer has a strong odor that was noticeable to many consultants. No bond failures were reported during the three-month evaluation period. Fifty percent of consultants found **FL-BOND** to be equivalent to or better than their current bonding agent and would purchase and recommend it.

Clinical Tip

- Do not air thin adhesive as it may decrease bond strength. ■

frog + + + + 1/2

Vol. 23, No. 4, May 2006

SDI North America
800.228.5166 • 630.238.8300
www.sdi.com.au

Description

frog is a 6th-generation, Type I, light-cured, self-etching bonding system for use with direct and indirect restorations, dentin sealing, and repair of restorations. It is available in both two-bottle and unit-dose kits. The system can be used on both dentin and enamel, without the use of a separate phosphoric acid etchant. The bonding agent includes a color dye indicator that turns clear to indicate complete light curing has occurred. The primer must be left on the tooth for 20 seconds, lightly air-blown, followed by bond application, air-blowing, and light curing for 10 seconds. **frog** requires refrigeration when not in use. The introductory kit evaluated includes one, 5-ml bottle of primer; one, 5-ml bottle of bond; 40 disposable brush applicators; two dispensing wells; and instructions. Thirty-three consultants evaluated **frog** in over 750 restorative procedures. This product received a 92% clinical rating.

Suggested Retail Cost

- \$48.99/5 ml bond or primer refill

Consultants' Comments

- ▶ "Good viscosity – primer covers the tooth surface well."
- ▶ "Easier to remove metal matrix bands compared to similar bonding agents."
- ▶ "Postoperative sensitivity was non-existent!"
- ▶ "Longer application time than some other 6th-generation agents."
- ▶ "Color change was not very dramatic."

Product Features

frog was very well-received by consultants. All were familiar with similar 6th-generation bonding agents and found **frog** easy to use. Instructions are easy to follow and packaging is compact. Although consultants preferred a shorter application time for the primer, the overall time for use is not significantly different from similar products. The most highly-

rated features of **frog** include the lack of postoperative sensitivity, the ease of bottle dispensing, and the ease of application. The viscosities of the primer and bond allow proper wetting of tooth structure. A lack of odor was noted to be an advantage over similar products. Although the product can be used for a broad range of applications including repair of porcelain restorations, a dual-curing option would make the system more universal. Overall, 97% of consultants found **frog** to be equivalent to or better than their current 6th-generation bonding agent. Forty-two percent indicated that they would switch to **frog**, and 97% would recommend it to a colleague. ■

Bond Strength to Tooth Structure, MPa		
	Enamel	Dentin
Bond Strength	21	27

VOCO
888.658.2584
www.vocoamerica.com

Description

Futurabond NR (Nanofiller **R**einforced) is a 6th-generation (Type II), light-cured, self-etching adhesive containing 20-nm particles of silica-dioxide. Equal amounts are dispensed from two bottles, mixed and applied as a single coat before light curing. No rinsing is required and the total time for all steps is 40 seconds. **Futurabond NR** is compatible with moist bonding. It is also compatible with all light-cured composites, compomers andOrmocers. The kit contains 4 ml each of liquids A and B, accessories, and laminated instructions. **Futurabond NR** was evaluated by 29 consultants in over 200 bonding procedures. This product received a 93% clinical rating.

Suggested Retail Cost

- \$113.00/kit

Product Features

The illustrated instructions for **Futurabond NR** are complete and clearly presented. The bottles readily dispense a single drop without squeezing. Mixing, solution viscosity, and ease of application received high marks from consultants; however, the applicator tips are too large for some cavities.

Consultants' Comments

- ▶ "Flows well into preparations."
- ▶ "Make brush tip more bendable."
- ▶ "Provide a catalyst for use with self-cure materials."
- ▶ "Put the directions on the bottle."
- ▶ "Design a bolder/dispenser for the bottles."

Air dispersal from the tooth (five seconds) and the curing time (10 seconds) provide a quick, easy procedure. There is little odor from **Futurabond NR** and there were no negative comments regarding effects on soft tissue. Consultants commented on the ease and rapidity of use of **Futurabond NR**. No postoperative sensitivity was reported. One hundred percent of consultants rated **Futurabond NR** equivalent to or better than their current bonding agent. Eighty percent would switch to **Futurabond NR** and 92% would recommend it to colleagues.

Clinical Tips

- Etch enamel that has not been instrumented during cavity preparation; do not etch dentin.
- The solutions do not have to be refrigerated.
- Don't squeeze the bottles or excess material will be dispensed. ■

VOCO
888.658.2584
www.vocoamerica.com

Description

Futurabond NR SingleDose is a 6th-generation (Type II), light-cured, self-etching bonding agent. It is indicated for use with all light-cured direct composite restorations. The adhesive is Nanofiller **R**einforced with 20-nm particles of silica. The single-dose pack is activated when the first blister is compressed and liquid A mixes with liquid B contained in a second blister. The applicator is used to pierce the second blister, coating the tip with adhesive. The adhesive is scrubbed into the tooth for 20 seconds, air-dried for five seconds and light-cured for 10 seconds. **Futurabond NR SingleDose** contains 0.1 ml of material and is available in a 50-count kit or a bulk 200-count kit with instructions, applicators, and accessories. Thirty consultants used **Futurabond NR SingleDose** in over 700 clinical procedures. This product received at 92% clinical rating.

Suggested Retail Cost

- \$108.00/50-count kit

Product Features

Futurabond NR flows nicely, has excellent surface wettability, and spreads evenly when air-dried. The short time required for

Consultants' Comments

- ▶ "I liked the product a lot."
- ▶ "I did not have any complaints of postoperative sensitivity."
- ▶ "Coats the tooth well."
- ▶ "Single-dose packaging prevents evaporation of liquids."
- ▶ "Adhesive is difficult to remove from the blister packaging."

each bonding procedure, the lack of any postoperative sensitivity and the ease of band removal were rated as excellent qualities of **Futurabond NR SingleDose**. The adhesive was easy to use and consultants appreciated the single-step procedure. The all-in-one packaging of **Futurabond NR SingleDose** provides plenty of fresh material for each use and is easy to activate; however, some challenges were noted by consultants. The adhesive can be difficult to get to and see if the

blister foil is not pushed back and once the blister is pierced, the flexible construction can impede removal of the liquid. Eighty-four percent of the consultants found **Futurabond NR SingleDose** equivalent to or better than the adhesive they are currently using, 75% would recommend it to a colleague and 64% would switch.

Clinical Tips

- Pierce the blister with the applicator tip, and then push the foil back to increase the size of the opening.
- After activation, maintain finger pressure on the blister pack to prevent the liquid from flowing back into the first chamber.
- Apply to the surface at least two to three times to ensure that all surfaces are well covered.
- Protect from ambient light. ■

2007
Preferred Product

Editors' Choice
Vol. 22, No. 3

G-BOND™ + + + + +

Vol. 22, No. 3, April 2005

GC America, Inc.
800.323.7063 • 708.597.0900
www.gcamerica.com

Description

G-BOND™ is a self-etching, light-cured bonding system (7th-generation) that does not include HEMA, but uses water and acetone as its solvents, and includes both the primer and adhesive in one bottle. The material must be shaken vigorously before use and then applied for 10 seconds. Strong air and high-volume suction are utilized to evaporate the solvent and **G-BOND** is then light-cured for 10 seconds. No refrigeration is necessary. **G-BOND** is available in unit dose or a 5-ml bottle. Thirteen editors evaluated **G-BOND** in over 150 restorations during a six-week period. Eighty-eight percent would both purchase and recommend **G-BOND**. Four of the thirteen editors using a 7th-generation adhesive system indicated it was better than their current material. This product received a 97% clinical rating.

Suggested Retail Cost

- \$111.99/5-ml bottle
- \$159.99/50 unit-doses

Editors' Observations

Manufacturer's Instructions

The technique guide is well illustrated, with clear text and complete instructions. The adhesive bonding system is simple and requires a short application time. The need to shake the bottle before use and the use of strong air to thin the material are clearly noted.

Delivery System

The bottle is small and well balanced. The unit-dose vials are easy to open and are short, with a wide diameter opening to allow the brush to be easily reinserted for multiple applications.

Viscosity

The thick viscosity allows controlled dispensing and coats all surfaces; however, it is more difficult to disperse with air.

Ease of Thinning the Material

After five seconds of vigorous air drying and high volume suction, the solvent appears to have evaporated. While thinning the material requires more effort, the use of high volume suction reduces the spread of material to other surfaces and minimizes the strong odor of the material.

Initial Postoperative Sensitivity

No sensitivity was reported during the six-week evaluation period. **G-BOND** eliminated sensitivity in several teeth with exposed dentin. ■



Editors' Comments

- ▶ "Simple system with good bond strength."
- ▶ "Does not require multiple coats."
- ▶ "The short unit dose with the wide opening is perfect. I can easily reinsert my brush."
- ▶ "Strong bond to metal matrix bands."
- ▶ "Material is more difficult to thin than other materials I have used."

GC UniFil Bond + + + +

Vol. 20, No. 7, September 2003

GC America, Inc.
800.323.7063 • 708.597.0900
www.gcamerica.com

Description

GC UniFil Bond is a light-cured, self-etching primer/adhesive bonding system (6th-generation, Type I) for use with direct composite restorations. The two-step system requires application of the self-etching primer, followed by the adhesive and light curing for 10 seconds. Included in the kit are 6-ml bottles of self-etching primer and adhesive, an applicator handle with 50 disposable fiber tips, dispensing dish, protective cover, and instructions. Twenty-one consultants evaluated **GC UniFil Bond** in over 350 direct composite restorations. This product received an 89% clinical rating.

Consultants' Comments

▶ *“Simple system –you don’t have to etch separately.”*

▶ *“Good flow of primer and adhesive.”*

▶ *“Self-etching primer has a strong odor.”*

▶ *“Make the two liquids different colors.”*

Suggested Retail Cost
• \$74.95/primer refill
• \$46.25/bond refill

Product Features

GC UniFil Bond is packaged in a complete kit, and most consultants appreciated the laminated technique guide and the color coordination of the bottles to the applicator tips. The manufacturer's instructions are excellent and easy to follow. Among the most-liked attributes of **GC UniFil Bond** were the self-etching feature and the ease of use of the two-bottle system. Time required is comparable to that of etching and application of a one-bottle (5th-generation) adhesive system. The viscosity of the primer and adhesive was highly rated by consultants. The effectiveness of the system in reducing the occurrence of postoperative sensitivity was rated very good, as no postoperative sensitivity was noted by consultants. Seventy-six percent of consultants found **GC UniFil Bond** to be equivalent to or better than their current bonding system; 50% indicated that they would both purchase and recommend it. ■

2007 Preferred Product

Gluma Comfort Bond + Desensitizer + + + + ½

Vol. 17, No. 8, October 2000

Heraeus
800.431.1785 • 914.273.8600
www.heraeus-kulzer-us.com

Description

Gluma Comfort Bond + Desensitizer is a one-bottle, light-cured bonding agent, which contains 3.3% glutaraldehyde and HEMA for desensitization and 4-META to help with adhesion to non-precious metal. It is indicated for bonding composite and amalgam restorations to dentin while preventing postoperative hypersensitivity. It can also be used as the bonding agent on preparations, under crowns, inlays, and onlays. It is supplied in a 4-ml plastic dispensing bottle.

Gluma Comfort Bond + Desensitizer was used in over 521 restorations by 16 consultants. This product received a 92% clinical rating.

Suggested Retail Cost
• \$109.99/4 ml bottle refill
• \$99.99/40 unit-doses

Product Features

More than half of the consultants stated that their favorite feature of **Gluma Comfort Bond + Desensitizer** was its ease of dispensing and use. Some liked the fact that the application technique was the same as other adhesive agents, which eliminated a learning curve. Seventy percent

iBOND + + + + ½

Vol. 20, No. 9, November 2003

Heraeus
800.431.1785 • 914.273.8600
www.heraeus-kulzer-us.com

Description

iBOND is the first, true one-step self-etching bonding agent (7th-generation) for direct and indirect restorations, and it can be used with light- or dual-cured resin cements. It may also be used as a cavity sealer under amalgam restorations. It requires no etching, mixing or dentin priming and contains the active ingredient, glutaraldehyde, from **Gluma Desensitizer**. **iBOND** greatly simplifies the bonding procedure as it is not technique sensitive relative to a wet, moist or dry tooth surface, and it is compatible with halogen, LED and plasma arc lights. It contains an acetone/water solvent and requires an application of three successive coats followed by a 30-second wait prior to air drying to volatilize the solvent completely. Light-curing time is 20 seconds. **iBOND** is available in a 4-ml bottle or in 0.2-ml unit-dose units. Twenty-three consultants evaluated **iBOND** in 672 clinical applications. This product received a 92% clinical rating.

Suggested Retail Cost
• \$136.60/4 ml bottle refill
• \$177.49/40 unit-doses

Consultants' Comments

▶ *“All the characteristics in one bonding agent is amazing – it works!”*

▶ *“Great for pediatric use because of fewer steps.”*

▶ *“Single-dose units were awkward to use –they leaked and became sticky.”*

▶ *“The applicator tips are too large.”*

Product Features
iBOND is packaged with easy-to-follow, laminated instructions for both the bottle and unit-dose units. The highest rated features were the ease of application and the lack of technique sensitivity. The low viscosity of **iBOND** allows a uniform application, which covers the tooth surface with a glossy appearance to indicate good coverage of the adhesive. Lack of postoperative sensitivity was reported by a significant number of consultants. No bond failures were reported during the three-month evaluation period. Eighty-seven percent of consultants rated **iBOND** to be equivalent to or better than their current bonding agent and would both purchase and recommend it.

Clinical Tips

- **iBOND** should be refrigerated when not in use, and the bottle should be tightly capped after use.
- Do not use with self-cured composites.
- Etching of uncut enamel and sclerotic dentin is required. ■

Consultants' Comments

▶ *“Easy to use.”*

▶ *“Very little, if any, sensitivity.”*

▶ *“I liked the fact that it seemed to work equally well in a wet and dry field.”*

▶ *“I would like a self-cured version for crown preparations.”*

of consultants estimated a 50% or greater reduction in sensitivity after using **Gluma Comfort Bond + Desensitizer**. It received an 83% rating for eliminating cervical sensitivity. Several consultants liked the relatively high viscosity, and

many dental assistants appreciated the ease of dispensing the material. Some consultants stated that the product was odiferous and elicited complaints from patients; others did not like the fact that three coats had to be applied to obtain proper wetting of the dentin. Eighty-one percent of consultants stated that they would both purchase and recommend **Gluma Comfort Bond + Desensitizer**.

Clinical Tips

- Use with wet or dry dentin.
- Apply a minimum of three coats and repeat with additional coats until the preparation surface is uniformly shiny. ■

IntegraBond
++++

Vol. 17, No. 3, April 2000

Premier Dental Products Co.
888.773.6872 • 610.239.6000
www.premusa.com

Description

IntegraBond is a one-step, light-cured primer/bonding agent used for priming and bonding direct composite restorations and, when used with an equal amount of *Auto-Cure Activator*, as a self-cured priming and bonding agent for the adhesive cementation of crowns, bridges, inlays, onlays, and amalgam bonding. Following conventional etching and rinsing, the agent is generously applied, left undisturbed for 15 seconds, then blown with air for at least 15 seconds and either light cured or allowed to self cure, depending upon which mode is being used. Both **IntegraBond** and *Auto-Cure Activator* come in 7-ml squeeze bottles and are available separately. Consultants used **IntegraBond** in 182 bonding procedures. This product received an 86% clinical rating.

Consultants' Comments

- ▶ *"A great product – I would purchase it with IntegraCem just to cement posts."*
- ▶ *"I like not having to mix."*
- ▶ *"Easy to use."*
- ▶ *"Difficult to control flow of material from dispensing bottle, resulting in waste."*

Suggested Retail Cost

- \$89.30/7 ml bond or activator refill

Product Features

Ease of use of **IntegraBond** was cited by 67% of consultants as the feature they liked most. Many commented on how they liked not having to mix the product. Also receiving high ratings were the clarity of the instructions, the viscosity of the product, the *Auto-Cure Activator*, the ease of coating the preparation (wettability), and the effectiveness of the bond. Eighty-eight percent of consultants stated that they would recommend **IntegraBond**, 78% said they would purchase it, and 57% said they would switch to it from their present bonding agent. All consultants stated that **IntegraBond** was as equivalent to or better than their current bonding system. ■

Nano-Bond
++++

Vol. 20, No. 9, November 2003

Pentron Clinical Technologies, LLC
800.551.0283 • 203.265.7397
www.pentron.com

Description

Nano-Bond is a reinforced 6th-generation (Type I) dentin bonding agent. This system relies on a self-etch primer that eliminates the need for traditional dentin or enamel acid etching with phosphoric acid; however, an included 37% phosphoric acid etching gel for uncut enamel is strongly thixotropic to allow precise placement. Two coats of the primer solution should be left on for at least 30 seconds followed by an adhesive coating; after 10 seconds of gentle air drying, a 10-second light cure completes the procedure. A dual-cure activator is provided, allowing use with dual- and self-cured materials. The kit contains **Nano-Bond** adhesive and self-etch primer, dual-cure activator, phosphoric acid etching gel in a syringe, and accessories. The bottles of self-etch primer and adhesive have dropper nozzles with the caps and the labels are color-coded for easy identification. Laminated instruction cards describe the uses of **Nano-Bond** in a concise, step-by-step fashion. Twenty-three consultants evaluated **Nano-Bond** in over 475 direct, 35 indirect and 40 desensitizing procedures. This product received an 86% clinical rating.

Consultants' Comments

- ▶ *"This is a nice, complete kit."*
- ▶ *"One product – multiple uses."*
- ▶ *"It is easy to dispense one drop at a time from the bottles."*
- ▶ *"Dual-cured feature is good to have for composite core procedures."*
- ▶ *"Packaging is hard to fit into drawers."*

Suggested Retail Cost

- \$61.98/6 ml adhesive refill
- \$29.58/6 ml SE primer refill
- \$24.96/3 ml DC activator refill

Product Features

Eighty-nine percent of consultants rated **Nano-Bond** a good-to-excellent bonding system. Characteristics such as viscosity, dual-cure capability, ease of use, completeness of the kit, and margins (adaptation and lack of postoperative sensitivity) were listed as the most-liked features. Similarly, lack of odor, packaging and the delivery system all rated well. Consultants who routinely use systems with fewer steps or application times felt that **Nano-Bond** was deficient in this regard. Others would have preferred a less traditional bottle dispensing system. Fifty percent of consultants would purchase and recommend **Nano-Bond**.

Clinical Tips

- Scrub the material while applying it, as the agitation is important for proper bonding.
- Etch uncut enamel with phosphoric acid. ■

One Coat Bond
++++

Vol. 16, No. 6, July/August 1999

Coltène/Whaledent, Inc.
800.221.3046 • 330.916.8800
www.coltenewhaledent.com

Description

One Coat Bond is a highly recommended light-cured, multi-purpose, one-component adhesive. It contains hydroxyethyl and propyl methacrylates, glycerol dimethacrylate, polyalkenoate methacrylized, urethane dimethacrylate, and amorphous silica. It does not contain any solvents such as acetone or ethanol. The contents include a syringe with 1.2 ml of adhesive and two, 1.2-ml syringes of a 15% phosphoric acid gel etchant, 20 syringe tip needles for the etchant, and 50 disposable brushes for the adhesive. It is designed for bonding composites to tooth structure and pretreated ceramics or metals. **One Coat Bond** was evaluated by 20 consultants in 650 clinical cases. This product received an 86% clinical rating.

Suggested Retail Cost

- \$64.99/1.2 ml adhesive refill

Consultants' Comments

- ▶ *"Great etchant."*
- ▶ *"Produces a nice finish coat over composites."*
- ▶ *"I also used the adhesive for indirect composites, amalgam and temporizing laminates."*
- ▶ *"Brush applicator is large for some Class 3 preparations."*
- ▶ *"Provide more syringe tips."*

used **One Coat Bond**. None reported any bond failures over the three-month evaluation period. Fifty percent found **One Coat Bond** to be as effective as their current product, and 30% found it to be better. Fifty-three percent of consultants would purchase **One Coat Bond**, and 63% would recommend it.

Clinical Tips

- Acid etch for 30 seconds rather than 15 seconds because of the lower concentration of phosphoric acid.
- Massage bonding agent into tooth surface for 20 seconds before light curing for 30 seconds. ■

One Coat Self-Etching Bond
++++ 1/2

Vol. 22, No. 5, June 2005

Coltène/Whaledent, Inc.
800.221.3046 • 330.916.8800
www.coltenewhaledent.com

Description

One Coat Self-Etching Bond is a 6th-generation, Type I adhesive system – a two-step system consisting of a self-etching primer and a bonding agent. It is indicated for use with direct and indirect restorations, dentin sealing, and bonding to amalgam. The adhesive is water-based and may be used on wet, moist, or dry dentin. The self-etch formula creates a homogeneous bond layer to cover the dentin and reduce post-operative sensitivity. Application involves rubbing in the primer for 20 seconds, light air stream, rubbing in the bonding agent for 20 seconds, light air stream, and then light curing. The bonding agent is compatible with halogen, LED and PAC lights. Curing time is 10 seconds for high-output lights (>800 mW/cm²) and 20 seconds for lights with lower intensity. It is available in an introductory kit with 5-ml bottles each of primer and bonding agent plus accessories or in 50 single-dose units of 0.1-ml each of the primer and bond. Sixteen consultants evaluated

Consultants' Comments

- ▶ *"Shiny tooth surface is easily visible after application."*
- ▶ *"Color-coding simplifies the procedure."*
- ▶ *"There is quite a bit of waste in the unit dose."*
- ▶ *"There is a strong odor."*

One Coat Self-Etching Bond in 312 clinical applications. This product received a 93% clinical rating.

Suggested Retail Cost

- \$57.91/5 ml primer or bond refill
- \$99.00/50 unit-doses

Product Features

The packaging and the laminated instructions were highly rated along with the ease of dispensing the primer and bond from their respective bottles. The single-dose ampules are individually wrapped in foil with printed instructions on the back of each pouch. The viscosity of the primer and bond is fairly high, yet they coat the tooth well when rubbed into the surface for 20 seconds. The yellow/black color-coding of the applicator brushes to the bottles eliminates cross-contamination of the materials. There were no reports of postoperative sensitivity during the evaluation period. Seventy-five percent of the consultants rated **One Coat Self-Etching Bond** equivalent to or better than their current adhesive, while 67% would recommend it and 47% would switch. ■

Bisco Dental Products
800.247.3368 • 847.534.6000
www.bisco.com

Description

ONE-STEP is an excellent all-purpose adhesive that is very easy to use. It contains one bottle of adhesive, two syringes of *UNI-ETCH* gel (32% phosphoric acid), applicators, and a detailed technique guide. Two coats of adhesive are necessary to achieve a good bond. **ONE-STEP** can be used in conjunction with *RESINOMER* to bond amalgam and other alloys. A total of 21 consultants used **ONE-STEP** in over 1000 restorative procedures. This product received a 96% clinical rating.

Bond Strength to Tooth Structure, MPa		
	Enamel	Dentin
ONE-STEP	29	28
Prime & Bond	21	25
Scotchbond MP	20	18



Consultants' Comments

- ▶ "Wonderful kit – had to order more immediately."
- ▶ "Fewer steps, less mess."
- ▶ "Improve bottle to control dispensing of adhesive."

Suggested Retail Cost
• \$90.00/6 ml bottle

Product Features

Consultants liked the etchant and accessories provided in the kit. They overwhelmingly approved the simplicity of the system and its ease of use. Several commented that it was relatively easy to obtain a glossy surface with two coats and that the

bond to teeth was excellent. Consultants observed that properly coating the tooth also decreased sensitivity. All consultants appreciated that the adhesive could be used on a variety of surfaces including amalgam and ceramics and that the steps were outlined well in the laminated technique guide. Many consultants noted that the adhesive application saved time and that there was little waste. Every consultant who used **ONE-STEP** stated that they would purchase it and recommend it to their colleagues. ■

Tokuyama America, Inc.
800.831.3222 • 949.581.9600
www.tokuyama-us.com

Description

One-Up Bond F Plus is a self-etching, fluoride-releasing, light-cured adhesive for direct restorations and for treatment of cervical sensitivity. The kit contains 5 ml each of Bonding Agent A and B, dispenser, mixing well, and applicator tips. The product must be refrigerated overnight. Bonding Agent B should be shaken well before dispensing to mix the filler particles that may have settled during storage. The color of the pre-mixed A and B solutions is yellow, and it changes to pink once they are mixed. The color indicators provide visual verification of proper mixing and placement on the prepared tooth. The adhesive should be rubbed into the tooth surface for 10 seconds or left for 20 seconds before curing. The color changes to a pale brown when the adhesive is cured. Twenty-six consultants evaluated **One-Up Bond F Plus** in 364 clinical applications. This product received an 86% clinical rating.

Suggested Retail Cost
• \$50.00/5 ml bottle refill Agent A or B



Consultants' Comments

- ▶ "Minimal number of steps reduced the application time."
- ▶ "The color change is a nice feature."
- ▶ "It worked great for cervical tooth sensitivity."
- ▶ "The adhesive has a strong odor."
- ▶ "Note the need for refrigeration as clearly indicated on the exterior packaging."

Product Features

The bonding agent bottles have a small orifice for better control during dispensing. Although the dispenser has a cover, it does not seal the bottles tightly, which may result in evaporation of the liquids. Since no etching, rinsing, or air drying is necessary, the total application time is about 25 seconds, contributing to clinical efficiency. The ease of use and viscosity of the adhesive received a very good rating. The mixed adhesive's pink color is helpful for visualizing correct placement on the tooth surface. No immediate restoration discoloration was reported as a result of the adhesive color. Eighty-three percent of the consultants rated **One-Up Bond F Plus** as equivalent to or better than their current bonding agent; 53% would switch while 83% would recommend it. ■

Bisco Dental Products
800.247.3368 • 847.534.6000
www.bisco.com

Description

ONE-STEP PLUS is a 5th-generation, 8.5% filled, light-cured bonding agent (average filler particle size – 1 µm, average film thickness – 10 µm) with an acetone solvent. It may be used to bond light- and self-cured composite to dentin, enamel, cast metal, set amalgam alloys, and treated ceramic surfaces. It may also be used in combination with resin cement for the luting of indirect resin, metal, or ceramic restorations. Additional suggested uses include the desensitization of tooth preparations and exposed root surfaces. Bonding steps include etching with phosphoric acid or *TYRIAN SPE* (self-priming etchant), applying two consecutive coats of **ONE-STEP PLUS**, air drying, and light curing for 10 seconds. The kit evaluated included two syringes of *UNI-ETCH*® (5 g each), *CAVITY CLEANSER* (3 ml), *AQUA-PREP F* (2 ml), **ONE-STEP PLUS** (6 ml), disposable mixing wells, and accessories packaged

together in a plastic storage container. Twenty-seven clinical consultants evaluated the adhesive in over 450 restorative applications. This product received an 88% clinical rating.

Suggested Retail Cost
• \$93.00/6 ml refill bottle
• \$99.00/60 unit-doses

Product Features

Consultants found the packaging, kit organization, ease of use, handling characteristics, and overall utility as a bonding agent to be very good. Lack of patient sensitivity, a good viscosity and thin film thickness were also mentioned as positive attributes. No separate activation component is required, and storage and use at room temperature were considered time-saving aspects. Some consultants found the suggested 20-second application of *AQUA-PREP F* (a post-etchant rewetting agent) to be a time-consuming additional step. Other consultants saw little benefit in the inclusion in the kit of *CAVITY CLEANSER*, a 2% chlorhexidine

gluconate solution to be used immediately following rotary instrumentation or acid etching. The need to apply the **ONE-STEP PLUS** adhesive in two coats and agitate the layer was also viewed as a step away from simplicity. Eighty-five percent of consultants termed **ONE-STEP PLUS** to be equivalent to or better than their current adhesive. Approximately 33% of the consultants stated their willingness to switch to **ONE-STEP PLUS**, and 75% would recommend it to a colleague. ■

Editors' Note: A 5th-generation bonding agent used with a traditional phosphoric acid etchant requires more time and steps than the newer 6th- and 7th-generation self-etching products. The **ONE-STEP PLUS** kit evaluated contains additional products – *AQUA-PREP F* and *CAVITY CLEANSER* - which add more steps and time to each procedure. While the manufacturer recommends their use to help decrease postoperative sensitivity, their use is optional. **ONE-STEP** was previously evaluated in *THE DENTAL ADVISOR PLUS*, Vol. 5, No. 5, June 1995. It received a 96% rating. **ONE-STEP PLUS** with *TYRIAN SPE* was previously evaluated in *THE DENTAL ADVISOR*, Vol. 21, No.8, December 2004. It received an 86% clinical rating.



Consultants' Comments

- ▶ "Patients did not report an objectionable odor or any post-operative sensitivity."
- ▶ "This is a well-organized kit in a durable box."
- ▶ "Great versatility."
- ▶ "It is difficult to judge the amount of liquid remaining in the bottle."

OptiBond FL + + + + +

TDA Plus, Vol. 5, No. 5, September/October 1995

Kerr Corporation
800.537.7123 • 714.516.7400
www.kerrdental.com

Description

OptiBond FL is a primer and light-cured bonding agent with fluoride-release for use with composite to tooth surface applications. Provided in 8-ml bottles, it is conveniently placed, and the manufacturer recommends it as a replacement for conventional liner materials. Components for dual-curing are optional. **OptiBond FL** was used by 20 clinical consultants and placed in over 400 restorations. This product received a 96% clinical rating.

Consultants' Comments

- ▶ "Material is easy to see on dentin, and not having to mix the adhesive is great."
- ▶ "Excellent fluoride-releasing light-cured bonding agent."
- ▶ "Instructions are excellent."
- ▶ "Adhesive sets quickly. Cover the dispensing."

Suggested Retail Cost

- \$78.40/8 ml refill primer or adhesive

Product Features

In all categories, consultants rated **OptiBond FL** very good to excellent. Flow of the primer and adhesive was excellent and reduced waste during application. The ease of use and two-step procedure was appreciated by consultants, and many commented on the benefits of using the applicators. **OptiBond FL** is "easy to see and easy to place." ■

Bond Strength to Tooth Structure, MPa

	Enamel	Dentin
OptiBond FL	32	31
ONE-STEP	29	28
Prime & Bond	21	25

OptiBond SOLO Plus + + + + 1/2

Vol. 21, No. 1, January/February 2004

Kerr Corporation
800.537.7123 • 714.516.7400
www.kerrdental.com

Description

OptiBond SOLO Plus is a 6th-generation (Type I) self-etching adhesive system with an optional dual-cure activator. It is indicated for light- or self-cured applications such as bonding direct and indirect restorations, posts, and cores. The adhesive is 15% filled by weight with 0.4-µm particles. **OptiBond SOLO Plus** is supplied in unit-dose packaging. The primer and adhesive (0.1 ml each) are contained in a dual-chambered plastic tube, color-coded to differentiate the two solutions. The supplied fiber-tipped applicators readily puncture the chamber seals. For dual-cured applications, a drop of activator is added to the adhesive chamber. No phosphoric acid etchant is necessary for this bonding system. Self-etch priming requires 15 seconds followed by brief air thinning. Two 15-second applications of adhesive followed by 20 seconds of light curing complete the bonding procedure. Twenty-four consultants evaluated **OptiBond SOLO Plus** in over 680 restorative cases. This product received a 92% clinical rating.

Suggested Retail Cost

- \$210.60/50 unit-dose and applicators
- \$119.85/5 ml bottle

Product Features

Consultants found **OptiBond SOLO Plus** easy to use, and the unit-dose packaging was among the most-liked features. Lack of postoperative sensitivity received good to excellent scores from 100% of consultants. Only one bond failure was reported. The odor of the solution received a fair rating as did the total time required for the bonding steps. Instructions were rated very good; the steps printed on each pouch were convenient chairside. Fifty-seven percent of consultants indicated that they would switch to **OptiBond SOLO Plus**, and 59% would recommend it.

Clinical Tips

- For indirect use, keep the layers of the bonding liquid very thin to avoid interference with seating.
- The applicator brush may be bent to about 45° with pressure against the chamber wall when removing it. ■

Consultants' Comments

- ▶ "I had no postoperative sensitivity with the 33 posterior restorations I placed."
- ▶ "I liked not having to look for a mixing well or an applicator in the kit."
- ▶ "The bent applicator can be difficult to reinsert in the chamber to rewet it."
- ▶ "Application is time-consuming."



Prelude + + + + 1/2

Vol. 22, No. 9, November 2005

Danville Materials
800.827.7940 • 925.973.0710
www.danvillematerials.com

Description

Prelude is a nano-hybrid, light-cured dental adhesive system with an optional dual-cured activator. The system includes a self-etching primer; alternatively, the adhesive may be used with the total-etch technique. It is indicated for use with direct or indirect procedures to bond composite to dentin, enamel, and porcelain and is compatible with all composites and compomers. The self-etch technique requires the application of a primer followed by the adhesive and then light curing for 10 seconds. **Prelude Dual/Self-Cure Link** is included for bonding direct self- and dual-cured composites and indirect restorations. The self-etch kit contains one, 5-ml bottle each of primer, adhesive, and dual-cured activator along with accessories. For the total-etch technique, the tooth surface is treated with phosphoric acid and rinsed; then the adhesive is applied and light cured for 10 seconds. The total-etch kit contains one, 5-ml bottle each of adhesive and desensitizer, 5 g of etchant and accessories. Twenty-four consultants evaluated **Prelude** self-etch in 461 clinical restorations. This product received a 91% clinical rating.

Bond Strength to Tooth Structure, MPa

	Enamel	Superficial Dentin
Bond Strength	24.9	27.4



Consultants' Comments

- ▶ "This is a very complete system."
- ▶ "Effectively bonds composite cores."
- ▶ "It is quick to use."
- ▶ "The components have a strong acetone odor."
- ▶ "I prefer a more viscous resin."

Suggested Retail Cost

- \$53.99/5 ml bottle of adhesive, primer or Link
- \$49.99/10 ml bottle of MicroPrime

Product Features

Prelude is neatly packaged in a small plastic box for easy storage, and it contains illustrated and written directions for each clinical technique. **Prelude** dispenses easily from the bottles, and application time is relatively quick. The low viscosity of the primer and adhesive makes application easy; both primer and adhesive wet the tooth surface very effectively. The inclusion of **Prelude Dual/Self-Cure Link** makes this adhesive system versatile, providing the ability to bond self-cured materials such as composite cores. The low film thickness does not interfere with the seating of indirect restorations. The lack of postoperative sensitivity was rated as excellent. Eighty-six percent of consultants rated **Prelude** equivalent to or better than their current bonding system. Seventy-five percent stated they would switch to **Prelude** and 83% would recommend it. ■

DENTSPLY Caulk
800.532.2855 • 302.422.4511
www.dentsply.com

Description

Prime & Bond NT is a self-priming, light-cured bonding agent that contains nanofillers of amorphous silicone dioxide, which differentiates this product from *Prime & Bond 2.1*. In addition to the nanofillers, **Prime & Bond NT** is primarily composed of di- and tri-methacrylate resins, PENTA (dipentaerythritol penta acrylate monophosphate), and contains an acetone solvent. It combines both the primer and adhesive in a single bottle and requires only one application followed by a 10-second light cure. **Prime & Bond NT** is designed to bond composite materials and compomers to enamel and dentin. It is also indicated for the bonding of veneers, composites and ceramics, as well



Consultants' Comments

- ▶ *"I liked the viscosity of this product."*
- ▶ *"Doesn't seem to evaporate as quickly as Prime & Bond 2.1."*
- ▶ *"I could not tell much difference between this material and Prime & Bond 2.1."*
- ▶ *"Some consultants disliked the acetone smell."*

as an adhesive cavity varnish for amalgam. The introductory kit contains one, 4.5-ml bottle of adhesive, 40 disposable brush tips, an applicator brush handle, a re-usable well, an instruction booklet, and a laminated instruction card.

The introductory kit does not contain an etchant; however, the economy kit contains three, 4.5-ml bottles of adhesive, one syringe of etching gel and accessories. Twenty-two consultants evaluated **Prime & Bond NT** in over 450 clinical cases. This product received a 91% clinical rating.

Suggested Retail Cost

- \$235.00/three, 4.5 ml refill bottles

Product Features

Prime & Bond NT was highly rated for its instructions and ease of coating the preparation. Consultants found the system easy to use, and they appreciated the single-bottle, one-step system. The squeezable bottle and good flow of the adhesive contributed to the ease of dispensing. In addition, no bonding problems were reported over the three-month evaluation period. The majority of consultants

found **Prime & Bond NT** to be equivalent to or better than their current adhesive and indicated that they would switch to it. Eighty-two percent of consultants would purchase **Prime & Bond NT**, and 94% would recommend it.

Clinical Tips

- Do not dispense until ready to apply to avoid evaporation of solvent.
- Eugenol-containing dental materials should not be used with **Prime & Bond NT**, because they may interfere with the polymerization of polymeric components. ■

Bond Strength to Tooth Structure, MPa

	Dentin
Bond Strength	21

DENTSPLY Caulk
800.532.2855 • 302.422.4511
www.dentsply.com

Description

ProBOND is an all-purpose adhesive for bonding direct and indirect restorations and for enhancing the bond of composites to metals, amalgam, porcelain, and composite. The kit includes a primer and an adhesive. The primer is a one-part, no-mix, wetting agent. The adhesive (formerly *Prisma Universal Bond 3*) is a one-component, visible light-cured bonding agent. **ProBOND** was used by 26 consultants in over 900 clinical procedures. This product received an 87% clinical rating.

Consultants' Comments

- ▶ *"Improve the odor of the primer."*
- ▶ *"Primer evaporated too quickly."*
- ▶ *"Bottles leaked in the package at times. Tip design changed, problem corrected."*
- ▶ *"Include etchant in the kit."*

Suggested Retail Cost

- \$167.65/primer or adhesive refill

Product Features

Consultants were enthusiastic about **ProBOND's** simple, two-step application process and ease of use. The directions are clear, and the consultants were especially positive about the concise, laminated instruction card. **ProBOND** produces a reliable bond to dentin, enamel, amalgam, metals, composite, and porcelain. The bond strength of **ProBOND** compares favorably to other popular bonding agents tested by THE DENTAL ADVISOR.

Clinical Tips

- To bond composite to amalgam: roughen the amalgam with a coarse diamond or micro-etch it, etch the enamel, apply primer, dry, then apply adhesive and light cure. Apply the composite and light cure.
- To repair porcelain: roughen the fractured porcelain or etch it with hydrofluoric acid gel, rinse and dry, then apply silane to porcelain and dry. Apply primer, dry, then apply adhesive and light cure. Apply the composite and light cure. ■

SDI North America
800.228.5166 • 630.238.8300
www.sdi.com.au

Description

stae is an acetone-based, single-bottle, light-cured dentin/enamel adhesive system. **stae** can be used with direct composites, compomers, composite and porcelain inlays/onlays, and to treat hypersensitive dentin. **stae** contains a resin system that decreases polymerization shrinkage and microleakage. The kit contains two, 5-ml bottles of adhesive, two, 2-ml syringes of *Super Etch* 37% phosphoric acid gel and tips, two plastic applicators and disposable brush tips, and a dispensing pad. Sixteen consultants used **stae** adhesive system over 400 times during the three-month evaluation period. This product received an 86% clinical rating.

Suggested Retail Cost

- \$73.25/5 ml refill bottle

Product Features

stae combines both primer and adhesive in one bottle to simplify and decrease patient chair time. The bottle is easy to use and assistants can readily control the number

of drops dispensed. Consultants and assistants rated **stae** good to excellent in packaging, instructions, ease of coating preparation, and effectiveness of bond to dentin and enamel. Seventy percent of consultants reported the performance of **stae** as the same as or better than their current bonding system. Ninety-four percent of consultants experienced successful bonding with no failures reported during the evaluation period. Seventy percent of consultants indicated that they would recommend **stae** adhesive system.

Clinical Tips

- Hold bottle vertically to dispense a single drop.
- Bend etchant tip to make a contra-angle for easier access.
- Not intended for use with hybrid ionomers. ■

Den-Mat Corp.
800.433.6628 • 805.922.8491
www.denmat.com

Description

Tenure Uni-Bond is a 6th-generation Type II self-etching bonding system. Parts A and B are mixed and applied to the dentin and enamel. **Gloss-N-Seal**, a light-cured resin, is then applied to the tooth surface before placing a restorative composite. **Tenure Uni-Bond** with **Gloss-N-Seal** may also be used for sealing completed composite restorations, glazing provisional restorations and resurfacing old composite restorations. The kit contains 6 ml of **Tenure Uni-Bond A**, 6 ml of **Tenure Uni-Bond B**, 3 g of **Gloss-N-Seal** on foam sponges, two dappen dishes,

and 100 Multibrushes. Twenty-four consultants used **Tenure Uni-Bond** with **Gloss-N-Seal** in over 610 procedures. This product received a 92% clinical rating.

Suggested Retail Cost

- \$103.99/6 ml refill bottle A or B

Product Features

Consultants appreciated the packaging, ease of dispensing, time required for the bond procedure, and the mild odor of **Tenure Uni-Bond** with **Gloss-N-Seal**. Many especially liked the viscosity of both **Tenure Uni-Bond** and **Gloss-N-Seal** and found that the ease of application and the wettability of tooth structure were exceptional. Many consultants felt that the foam sponges containing **Gloss-N-Seal** were too large,

and they would prefer to dispense the material from a bottle. The most-liked feature was the lack of post-operative sensitivity using **Tenure Uni-Bond** with **Gloss-N-Seal**. The least-liked feature of **Tenure Uni-Bond** was the instruction card. Most consultants expressed the desire for simplified, illustrated instructions. Seventy-seven percent of consultants thought that **Tenure Uni-Bond** with **Gloss-N-Seal** was equivalent to or better than the current bonding agent they were using. Fifty percent of consultants would purchase **Tenure Uni-Bond** with **Gloss-N-Seal**, and 81% would recommend it. ■

Consultants' Comments

- ▶ "Gloss-N-Seal provided a smooth, shiny surface and left the restorations looking great!"
- ▶ "Terrific product! I had a significant reduction in post-operative sensitivity."
- ▶ "They kept my anterior temporaries looking great, and patients were impressed by the life-like restorations."
- ▶ "Place Gloss-N-Seal in a bottle to reduce waste experienced with the foam sponges."

2007
Preferred Product

Xeno III + + + + +

Vol. 20, No. 8, October 2003

DENTSPLY Caulk
800.532.2855 • 302.422.4511
www.dentsply.com

Description

Xeno III is a single-step, self-etching dental adhesive (6th-generation, Type II) that bonds direct, light-cured composite restorations to enamel and dentin. The system is designed to reduce both treatment time and post-operative sensitivity while providing high bond strengths to dentin and enamel. Equal amounts of primer and adhesive are mixed before use, applied to the tooth, air dried and light cured. The kit includes 4-ml bottles of self-etching primer and adhesive, 50 applicators and a dappen dish. Refrigeration is not required. Sixteen editors used **Xeno III** in over 350 restorations during a six-week evaluation period. This product received a 96% clinical rating.

Suggested Retail Cost

- \$195.25/kit

Editors' Observations

Manufacturer's Instructions

Directions for use are clear and concise. The technique guide provides excellent illustrations and is a quick reference.

EDITORS' EVALUATION

Editors' Comments

- ▶ "Excellent bond to dentin and enamel."
- ▶ "One-step system is time efficient and very easy to use."
- ▶ "Sensitivity was not an issue."

Delivery System

Editors appreciated the simplicity of using the system. The dropper bottles of self-etching primer and adhesive allow confirmation that equal amounts of each product are dispensed and mixed. When the primer is mixed with the adhesive, the color changes to a light yellow, verifying activation. Some editors indicated that they would prefer a unit-dose system in addition to the two-bottle system.

Ease of Use in General Restorative Procedures

The time efficiency of the single-step system received excellent ratings. The material flows evenly, and it uniformly wets the surface. The use of a single step allows for a quicker procedure in areas that are difficult to keep dry.

Reduction in Sensitivity

Postoperative sensitivity was negligible during the six-week evaluation period.

Ease of Matrix Band Removal

Some self-etching systems bond to metal, making matrix band removal very difficult. Removal of metal matrix bands after using **Xeno III** to bond direct composites is not difficult. ■

2007
Preferred Product

Xeno IV + + + + ½

Vol. 22, No. 6, July/August 2005

DENTSPLY Caulk
800.532.2855 • 302.422.4511
www.dentsply.com

Description

Xeno IV is a 7th-generation dental adhesive containing fluoride. It incorporates a self-etching, light-cured adhesive in a single component with no mixing required and is indicated for use with direct light-cured composite and compomer restorations. **Xeno IV** adhesive is based on a water/acetone formula with a new cross-linking agent, AHPMA, incorporated to enhance the adhesion between the adhesive layer and the uncured restorative material. Due to a special combination of monomers, no separate phosphoric acid etching of dentin or enamel is necessary and is, in fact, contraindicated. Two coats of **Xeno IV** are scrubbed for 15 seconds each into the prepared tooth, followed by five seconds of gentle air to evaporate the solvent, and then light-cured for 10 seconds. The self-etch formula creates a homogeneous bond layer to cover the dentin and enamel to help reduce post-operative sensitivity. This product is available in an introductory kit comprised of a 4.5-ml bottle of adhesive plus accessories or in a unit-dose package with 100 unit-doses plus accessories. Twenty-six consultants evaluated the unit-dose package of **Xeno IV** in over 700 clinical applications. This product received a 93% clinical rating.



Consultants' Comments

- ▶ "Having only one component simplifies the bonding procedure."
- ▶ "Great system for pediatric patients because it is quick and has little odor."
- ▶ "Unit dose helps eliminate the evaporation issue that exists with an open bottle."
- ▶ "The unit dose package is somewhat difficult to open."

Suggested Retail Cost

- \$132.35/4.5 ml refill bottle
- \$242.60/100 unit-doses

Product Features

Application of **Xeno IV** and the surface wetting of the tooth were both highly rated. The two coats provide a glossy surface after removal of the solvent with air. The unit-dose delivery was appreciated for providing fresh material at each application along with the lack of evaporation. There is adequate volume of adhesive in each unit dose for use on multiple preparations. The unit-dose container is too narrow to maintain a bend in the applicator brush when reinserted. A container with a wider opening would be preferred. Seventy-three percent of the consultants rated **Xeno IV** equivalent to or better

than their current adhesive, while 54% would recommend it and 42% would switch.

Clinical Tips

- **Xeno IV** is not indicated for uncut enamel. Place a bevel on enamel when using for Class III, IV and V restorations.
- Do not use phosphoric acid on dentin before placing **Xeno IV**. Phosphoric acid penetrates the dentin tubules too deeply and can lower the bond strength. ■

Editors' Note: As with many new adhesive systems, consultants are hesitant to recommend or switch to them until long-term clinical data are available.

Bond Strength to Tooth Structure, MPa		
	Enamel	Dentin
Bond Strength	21	25

DENTSPLY Caulk
800.532.2855 • 302.422.4511
www.dentsply.com

Description

Xeno IV Dual Cure is a 7th-generation one-step, self-etching, self-priming dental adhesive. Inclusion of the dual-cure activator allows bonding of indirect composite restorations, core materials, and cements to enamel and dentin. After mixing the adhesive and dual-cure activator, two 15-second applications should be scrubbed into the tooth. **Xeno IV Dual Cure** requires a 10-second light cure by standard techniques. The kit contains one 4.5-ml bottle each of bonding agent and dual-cure activator, 100 applicators, a mixing well, and a laminated instruction card. Twenty-four consultants used **Xeno IV Dual Cure** in over 600 cases including direct anterior and posterior restorations, core placement, and restoration cementation. This product received a 96% clinical rating.

Suggested Retail Cost

- \$132.35/4.5 ml refill **Xeno IV**
- \$126.90/4.5 ml refill SC activator

Bond Strength of Xeno IV Dual Cure/FluoroCore 2 to Human Teeth, MPa

	Light-cured	Self-cured
Ground enamel	25	18
Superficial dentin	18	21
Deep dentin*	20	23

*Editors' Note: The in-vitro strength of **Xeno IV Dual Cure/FluoroCore 2** to deep dentin is very high compared with other bonding agents and core materials tested.



Consultants' Comments

- ▶ "Works well with standard restorative procedures."
- ▶ "The dual-cure feature is great for post cementation."
- ▶ "Dispensing from the bottle is easy."
- ▶ "Very easy to use – just follow the simple directions."
- ▶ "The literature suggests etching uncut enamel."

Product Features

Consultants reported that **Xeno IV Dual Cure** was easily incorporated into office routines. Packaging is uncomplicated, the laminated instruction card is straightforward, and dispensing and application are easy. The bonding agent wets both dentin and enamel surfaces well, leaving a shiny surface that assures that coverage is achieved. Neither odor during application nor postoperative sensitivity was a problem. Eighty-eight percent of consultants rated **Xeno IV Dual Cure** as equivalent to or better than their current dual-cure bonding agent, 74% would switch to **Xeno IV Dual Cure**, and 83% would recommend it to colleagues.

Clinical Tips

- **Xeno IV Dual Cure** should be refrigerated between uses.
- Take the solution out of the refrigerator at the beginning of the appointment.
- To avoid evaporation, wait to dispense until ready to use. ■

Cosmetic and Restorative Dentistry "Best Kept Secrets"

John W. Farah, D.D.S., Ph.D., Editor

Sept. 14, 2007	Northern California Dental Society (Red Bluff, CA)	Dr. Michael Viale – 530.872.5233
Sept. 21, 2007	2007 College of Dental Surgeons (Saskatoon, SK)	Dr. D. Blaine Friesen – 306.244.5072
Oct. 5, 2007	Third District Dental Society (Albany, NY)	Ms. Kathy Moore – 518.782.1428
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