kuraray

Compilation of Scientific Abstracts and study results

CLEARFIL™ S³ BOND PLUS
CLEARFIL™ DC CORE PLUS

COMPILATION OF SCIENTIFIC **ABSTRACTS AND STUDY RESULTS**

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COMPANY PROFILE

More than 85 years of Kuraray

Kuraray Co. Ltd., established in 1926 in Kurashiki, Japan, was originally involved in the industrial production of fibers out of viscose. Today, thanks to Kuraray's technological strength and comprehensive experience, the company successfully covers the sectors polymer chemistry, chemical synthesis, and chemical engineering developing and producing a broad range of high-quality and innovative products.

In 1973, Kuraray entered the business field of dental materials with the objective to respond to requirements of dental practice precisely and carefully – with products which convince users by their reliability and high quality.

Inventor of the bonding system

In 1978, Kuraray introduced the first bonding system to the market: CLEARFIL™ BOND SYSTEM-F, the start of the age of adhesive dentistry. At the same time, the company developed the total-etch technique for enamel and dentin.

Today, Kuraray continues to steadily produce innovative quality products which meet the requirements of a profession that also develops constantly. Its products that make history – such as PANAVIA™ F2.0, CLEARFIL™ PROTECT BOND, CLEARFIL™ SE BOND, CLEARFIL™ AP-X and ESTENIA™ C&B – are proof of Kuraray's capability to develop solutions for practice from the results of their pioneering research.

Our dedication

As science and society continue to develop, new questions and challenges also arise for dental materials. Thus, Kuraray has set itself the goal of meeting demands and requirements of dentistry to the very best of its ability, now and in the future.

With this compilation of abstracts Kuraray is delighted to present the most recent and informative scientific information on our clinically tested and evaluated products.

Dedicated to develop and produce high quality products, the external verification of the products' quality is vital for us. Hence, Kuraray expresses its gratitude to the universities for including Kuraray's products in their research.

Please feel invited to contact us in case of questions –
We are happy to provide even more information.

Trademarks of Kuraray

CLEARFIL™ S³ BOND PLUS

(code name: MTB-200)

CLEARFIL™ S³ BOND PLUS · MTB-200

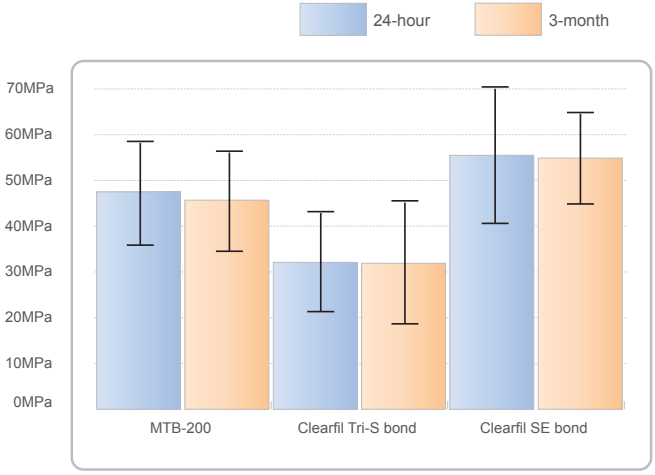
1090 Bond-durability of an Experimental 1-bottle Self-adhesive After 3-months Water Storage

M. HANABUSA, *N. AKIMOTO, K. OHMORI, T. MIYAUCHI, T. TOKIWA, and Y. MOMOI, Department of Operative Dentistry, Tsurumi University, Yokohama, Japan · 89th IADR General Seesion in 2011, San Diego*

Objective: Studies have established the clinical success of 1-bottle self-adhesive systems. The purpose of this study was to evaluate dentin bond-durability using an experimental one-bottle self-adhesive over 3-months water storage.

Methods: 30-non-carious extracted human molars were prepared with a diamond saw & the dentin surfaces were prepared with a 600-grit SiC paper & randomly divided into 3-adhesive groups: an experimental 1-bottle self-adhesive MTB-200 (Kuraray Medical, Tokyo, Japan), 1-bottle self-adhesive Clearfil Tri-S Bond (Kuraray Medical, Tokyo, Japan) & 2-step self-etch adhesive Clearfil SE Bond (Kuraray Medical, Tokyo, Japan). Each adhesive was applied to the dentin surface following manufacturer's instructions. Clearfil AP-X resin composite (Kuraray Medical, Tokyo, Japan) was incrementally built to bonded area 1.0 x 1.0mm & a height of 10mm & light cured. After 24-hours or 3-months storage in distilled water at 37ºC, micro-tensile bond-strength tests (CHS=1.0mm/min) were performed using an Instron 4443 (n=45). Data were analyzed by ANOVA & Tukey's test ($p<0.05$).

Results: The table shows mean & S.D. in MPa. Same superscript indicates no statistically significant difference.



Conclusion:

Statistical analysis showed no differences between the bond-strengths after 24-hours or 3-months storage times for the 3-adhesives. Our data suggests the dentin bond-strength of MTB-200 was very stable & not negatively affected by 3-month storage in water.

CLEARFIL™ S³ BOND PLUS · MTB-200

1088 Adhesive Property of a New Self-etching Bond System "MTB-200"

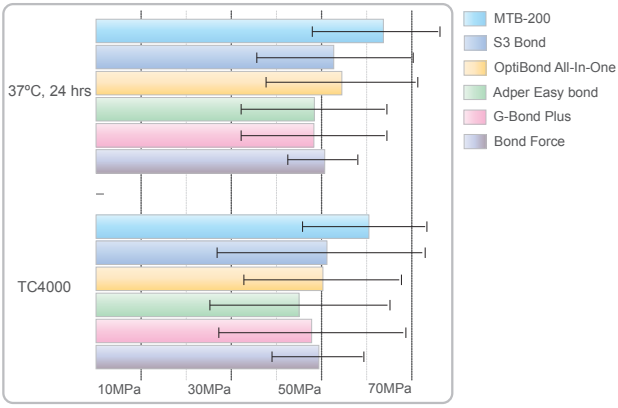
A. HINAMOTO, Kuraray Medical Inc, Kurashiki, Japan, N. NISHIGAKI, Kuraray Medical Inc, Tokyo, Japan, and ***M. TAKEI,*** *Dental Material Division, Kuraray Medical Inc, Kurashiki, Japan · 89th IADR General Seesion in 2011, San Diego*

Kuraray Medical Inc. has developed a new self-etching bond system "MTB-200". "MTB-200" is a single-component and light-cured single-step fluoride-releasing bonding system comprised of an adhesive phosphate monomer (MDP), methacrylate monomers, water, ethanol, initiators, sodium fluoride and filler. It contains a new photo-initiator for enhanced curing characteristic and a new hydrophobic methacrylate for reduced water absorption.

Objectives: The purpose of this study was to compare the micro-tensile bond strength (μTBS) of "MTB-200" to human dentin with other 5 commercial single-step adhesives; CLEARFIL S3 BOND/ Kuraray Medical, OptiBond All-In-One/ Kerr, Adper Easy Bond/ 3M ESPE, G-BOND PLUS/ GC and BOND FORCE/ Tokuyama.

Methods: Crowns of extracted human molars were removed using a low-speed cutting device to create flat dentin surfaces. Surfaces were finished with 600-grit SiC paper and adhesives were applied according to the manufacturer's instructions. CLEARFIL AP-X (Kuraray Medical) was used for composite build-up to a thickness of 4mm. After storage in 37˚C water for 24 hrs, the specimens were cut in two perpendicular directions to obtain sticks with approx. area of 1.0mm2. Sticks of each group were further divided into two groups, and half of the sticks were subjected to thremocycling (4˚C-60˚C, 1 min. each, 4,000 cycles: TC4000). The μTBS was measured using a universal testing instrument (Shimadzu).

Results: The μTBS after 24 hrs immersion and TC4000 are shown in Table 1. "MTB-200" showed the highest bond strengths to human dentin both after 24hrs and TC4000 among the single-step adhesives tested in this study.



Conclusion:

This result indicated that the μTBS of "MTB-200" might exhibits reliable clinical performance equal or superior to single-step adhesives used in this study.

CLEARFIL™ S³ BOND PLUS · MTB-200

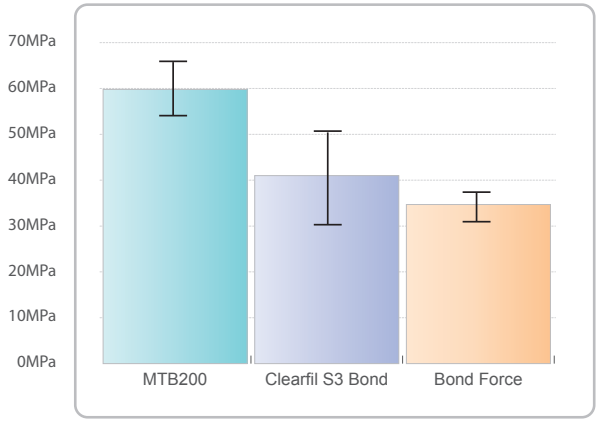
1902 Microtensile Bond Strength of the newly developed one-step adhesive

K. HOSAKA[1], M. NAKAJIMA[1], M. TAKAHASHI[1], Y. SHINODA[1], R. KISHIKAWA[1], S. KUNAWAROTE[1], W. SAKANO[1], P. TAWEESAK[2], and J. TAGAMI[2], [1]Cariology and Operative Dentistry, Tokyo Medical & Dental University, Tokyo, Japan, [2]Cariology and Operative Dentistry & GCOE Program, Tokyo Medical & Dental University, Tokyo, Japan · 89th IADR General Seesion in 2011, San Diego

Objectives: To evaluate the newly developed one-step adhesive system bonded to dentin, compared with commercially available one-step adhesives.
Methods: Flat coronal dentin surfaces of extracted third human molars were prepared. One-step adhesive systems, MTB-200 (Kuraray Medical Inc.), Clearfil S3 Bond (Kuraray) and Bond Force (Tokuyama Corp.) were applied to the dentin surfaces according to the manufacturer's instructions. A hybrid resin composite (Clearfil AP-X, Kuraray) was used for the coronal build-up. After storage in water for 24h, the specimens were vertically sectioned into slabs that were trimmed to hourglass shapes and subjected to micro-tensile bond testing (μTBS). The data were statistically analyzed using a one-way ANOVA and Dunnett T3 test (α=0.05).
Results: Values are in MPa±S.D.(n=10). Groups identified by the different superscript letter are significantly different ($p<0.05$).

	MTB200	Clearfil S3 Bond	Bond Force
mTBS	59.8±6.8A	41.0±9.6B	34.7±3.1C

MPa (SD)



Conclusion:
μTBS of newly developed one-step adhesive was significantly higher than other one-step adhesives tested in this study. Supported by GCOE program at TMDU and #20791382 from MEXT of Japan.

CLEARFIL™ S³ BOND PLUS · MTB-200

3203 Early No Interfacial-Gap Incidence vs. Flexural Modulus with Injectable Composites

M. IRIE[1], Y. TAMADA[2], Y. MARUO[2], G. NISHIGAWA[2], M. OKA[3], S. MINAGI[3], K. SUZUKI[4], and D.C. WATTS[5], [1]Biomaterials, Okayama University, Okayama, Japan, [2]Occlusion & Removable Prosthodontics, Okayama University Hospital, Okayama, Japan, [3]Department of Occlusal and Oral Functional Rehabilitation, Okayama University, Okayama, Japan, [4]Graduate School of Medicine Pharm. Sciences, Okayama University, Okayama, Japan, [5]School of Dentistry, University of Manchester, Manchester, England, Uk · 89th IADR General Seesion in 2011, San Diego

Objectives: A major research concern is the relationship between the no interfacial-gap incidence in restorations (NG) and their flexural modulus (FM) (Dent Mater 2010; 26: 608-615). This study was analyzed the relationship between NG and FM with injectable composites/self-etching adhesives [Sure-Fil SDR Flow/Xeno IV, Dentsply/Caulk (SX); Premise Flowable/Kerr SE Adhesive System, Kerr (PK); G-aenial Universal Flo/G-Bond Plus, GC (GG); Beautifil Flow Plus F03/FL Bond II, Shofu (BF); Estelite Flow Quick/DBC-510, Tokuyama (ED); Clearfil Majesty Flow /MTB-200, Kuraray (CM)].

Methods: Class II cavities were placed in extracted premolars. Restorative procedure were performed according to manufacturers' instructions and via incremental technique. Groups of restored teeth were polished and then sectioned in a mediodistal direction through the center of the restoration immediately (IM) and after one-day storage (1-D). The presence or absence of gaps around the restorations was measured at 14-points (each 0.5 mm apart) along the cavity restoration interface (N=10; total points measured=140). The incidence of tooth/adhesive interfaces with no gaps for 10 specimens was expressed as a percentage of measured total points (NG). The flexural moduli were measured for the same composite materials and conditions (FM). Statistical analyses were conducted by Mann-Whitney U-test (for NG) and t-test (for FM). Possible correlation between pairs of two parameters was analyzed by linear regression.

Results: NG (%), FM (GPa, Mean (SD), N=10) SX PK GG BF ED CM IM 94, 1.0 (0.1) 93, 1.9(0.3) 93, 5.5(0.8) 94, 4.0(0.3) 94, 4.1(0.4) 94, 4.7(0.4) vs. NS, S NS, S NS, S NS, S NS, S NS, S 1-D 94, 7.2(0.3) 94, 6.7(0.3) 94, 8.6(0.6) 96, 8.7(0.5) 94, 9.2(0.6) 96, 10.2(0.6) S: Significant different ($p<0.05$), NS: Not significant different ($p>0.05$). No relationship was found between two parameters ($r=-0.42$, $p>0.50$, N=12).

Conclusion:

There was no relationship between NG and FM in injectable composites.

CLEARFIL™ S³ BOND PLUS · MTB-200

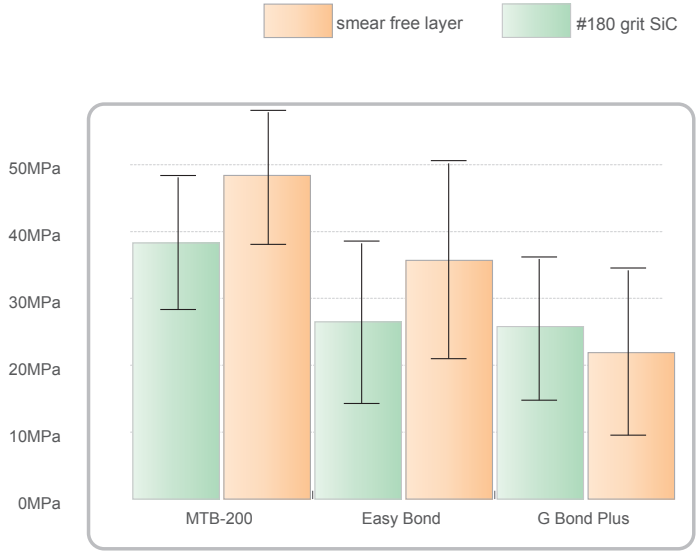
2462 Influence of Dentin Surface Conditions on Bond-strength with 1-bottle Systems

N. AKIMOTO, *M. HANABUSA, T. MIYAUCHI, T. TOKIWA, and Y. MOMOI, Department of Operative Dentistry, Tsurumi University, Yokohama, Japan*
89th IADR General Seesion in 2011, San Diego

Objectives: The purpose of this study was to compare the influence of dentin surface conditions on microtensile bond-strength tests of 1-bottle self-adhesive systems.

Methods: Eighteen non-carious extracted human third-molars were prepared using a diamond saw to expose the dentin surface and then prepared with a 180-grit SiC paper, or a diamond paste to create a smear free layer. Teeth were randomly divided into 3-groups of 1-bottle self-etching systems, MTB-200 (experimental, Kuraray Medical, Japan), Adper Easy Bond Self-Etch Adhesive (3M, USA) and G Bond Plus (GC, Japan). Each adhesive was applied to the dentin surface following manufacturer's instructions and Clearfil AP-X resin composite (Kuraray Medical) then incrementally built on a bonded area of 1.0 x1.0mm to a height of 10mm and light-cured. After 24-hour storage in distilled water at 37ºC, microtensile bond tests were performed at CHS=1.0mm/min on an Instron 4443 (n=27). Data were analyzed by ANOVA & Tukey's test ($p<0.05$).

Results: Table shows mean and S.D. in MPa. Same superscript in the table indicates no statistically significant difference.



Conclusion:

There were statistically significant differences between the bond-strength of the dentin surface conditions with the experimental 1-bottle adhesive MTB-200 and Easy Bond. Our data show the dentin bond-strength of MTB-200 and Easy Bond were affected by dentin surface conditions.

CLEARFIL™ S³ BOND PLUS · MTB-200

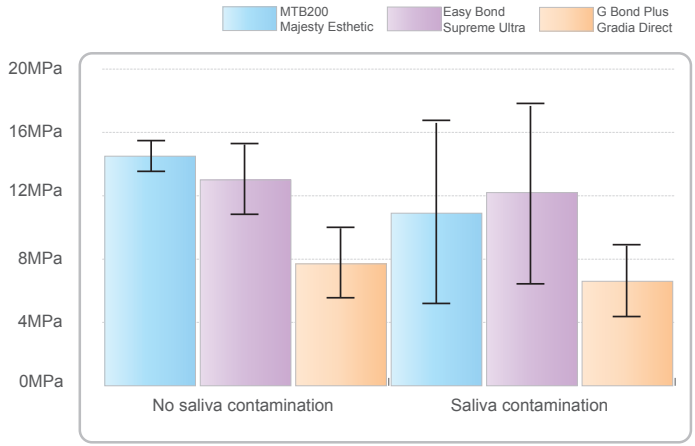
2464 Influence Saliva Contamination on Dentin Bonding Using Experimental Adhesive

T. TOKIWA, K. OHMORI, N. AKIMOTO, and Y. MOMOI, Department of Operative Dentistry, Tsurumi University, Yokohama, Japan · 89th IADR General Seesion in 2011, San Diego

Objective: To evaluate the influence of saliva contamination on dentin bond-strength of a new experimental 1-bottle self-etch adhesive.

Methods: Flat dentin surface was prepared on 60-bovine teeth and then attached to plastic molds by a self-curing acrylic resin. The labial surface was ground with 180-grit Si-C paper to expose the dentin and create a smeared layer. Teeth were randomly divided into 6-groups (n=10). Dentin surfaces were treated with 1-bottle self-etch adhesives, MTB-200 (experimental, Kuraray Medical), Adper Easy Bond (3M) and G Bond Plus (GC) per manufacturers' instructions for control groups. In the saliva contaminated group, human saliva was applied for 20-secs before adhesive application. A split polyethylene mold (inner diameter; 4mm) was placed onto the dentin surface and resin composite (Majesty Esthetic (Kuraray Medical), Supreme Ultra (3 M) and Gradia Direct (GC)) was filled into the mold and light cured for 40-secs. Shear bond-strength test was carried out after storage in distilled water at 37 °C for 24-hrs (CHS= 1.0 mm/min). Data was statistically analyzed (one-way ANOVA and t-test, p= .05).

Results: The table shows both mean and S.D. in MPa. Same superscript indicates statistically significant differences.



Conclusion:

Saliva contamination did not affect the dentin shear bond-strength of the experimental 1-bottle self-etch adhesive MTB-200 system.

CLEARFIL™ S³ BOND PLUS · MTB-200

1557 Long term bonding performance of contemporary and experimental self-etching adhesives

S. KAKUDA[1], *A. HINAMOTO[2], J. FU1, M. TAKE[2], N. NISHIGAKI[3], K. OKUYAMA[1], Y. NAKAOKI[1], T. IKEDA[1], and H. SANO[1], [1]Department of Restorative Dentistry, Hokkaido University, Sapporo, Japan, [2]Kuraray Medical Inc, Kurashiki, Japan, [3]Kuraray Medical Inc, Tokyo, Japan · 89th IADR General Seesion in 2011, San Diego*

Objectives: The objective of the present study was to evaluate the long-term bonding performance of two commercial self-etching systems (SESs) and one experimental SES using a PCR thermal cycler.

Methods: Twelve human third molars were used in this study and every four teeth were randomly assigned to each system. The adhesives employed were two commercial all-in-one SESs, CLEARFIL TRI-S BOND (TriS, Kuraray), BeautiBond (SHOFU), and one experimental all-in-one SES, MTB-200 (Kuraray). BeautiBond was a HEMA-free adhesive, whereas TriS and MTB-200 were HEMA-contain adhesives. MTB-200 also incorporated hydrophobic monomers. After removal of crown segment, #600 SiC paper was employed to polish the dentin surface under water. Then the adhesives were applied following the instruction of each manufacture and followed by the resin composite build-up. After storage in 37oC distilled water for 24 hours (1day) or in PCR thermal cycles for 20,000 times (TC20k), the specimens were sectioned into the beams with the cross sectional area 1.0mm2 for the micro-tensile bond strength test (MTBS) at a crosshead speed of 1mm/min. The obtained data were expressed as MPa and statistically analyzed with one-way ANOVA and Tukey HSD test.

Results: The mean±SD of MTBS in descending order were: 72.52±17.17 (MTB-200, 1day), 69.70±19.30 (MTB-200, TC20k), 64.78±14.19 (TriS, 1day), 58.71±12.86 (TriS, TC20k), 31.03±17.08(BeautiBond, 1day), 26.89±14.78 (BeautiBond, TC20k). In statistical analysis, MTB-200-1day showed a significantly higher MTBS ($p<0.05$) than the TriS-TC20k.

Conclusion:

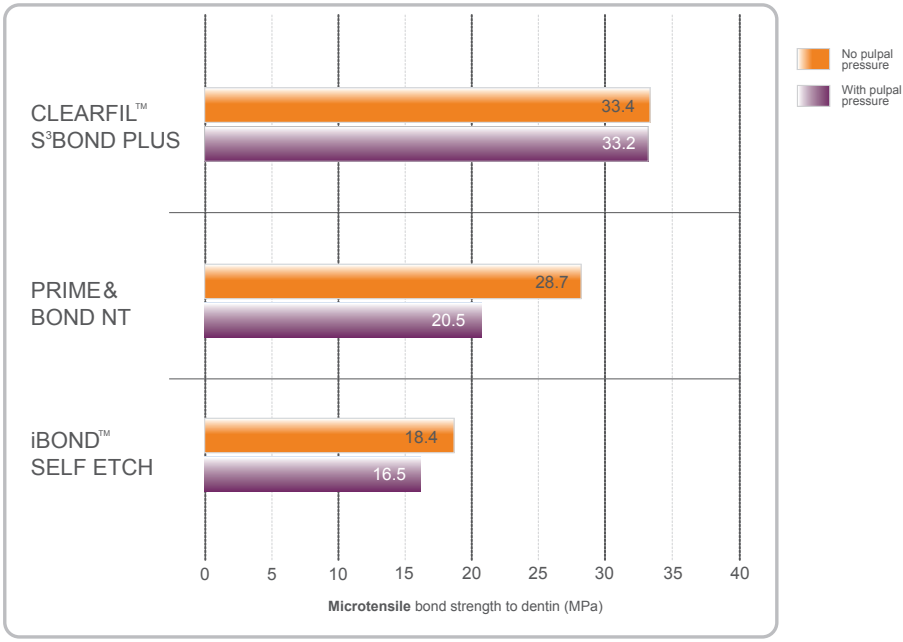
Newly developed SES (MTB-200) showed comparable or better bonding performance compared to marketed SESs over time.

CLEARFIL™ S³ BOND PLUS · MTB-200

Microtensile bond strength to dentin

Prof. Dr. H. Pashley and Prof. Dr. F. R. Tay, Georgia Health Sciences University, USA.

This graph shows the water-sensitivity of self-etching adhesive systems and etch & rinse adhesives. Among the tested adhesives, CLEARFIL™ S³ BOND PLUS shows as the only one excellent performance – there was no difference in the bond strength in the absence or presence of simulated pulpal pressure caused by water. While other adhesives lose their bond strength in case of pulpal pressure, CLEARFIL™ S³ BOND PLUS stays strong and reliable.

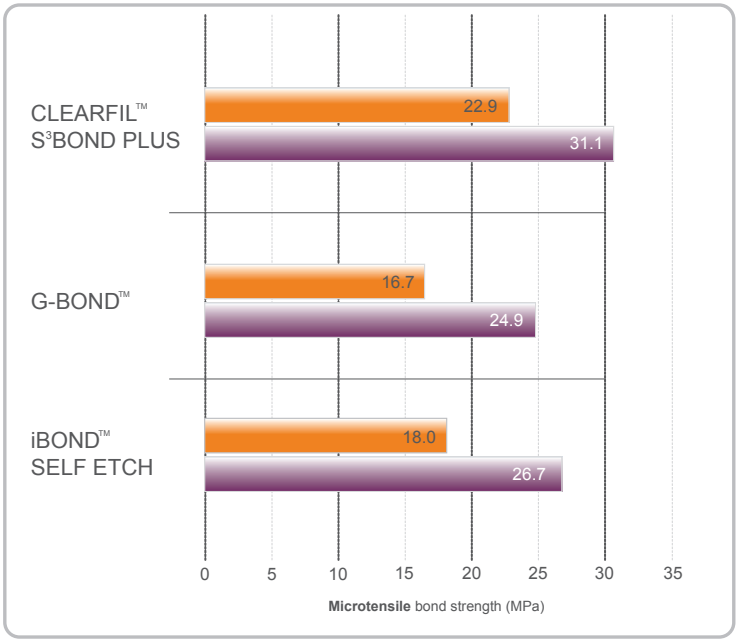


CLEARFIL™ S³ BOND PLUS · MTB-200

Microtensile Bond Strength

Prof. Dr. B. Van Meerbeek, Catholic University of Leuven, Belgium

The adhesive values of CLEARFIL™ S³ BOND PLUS are at a new high – setting standard among one-step adhesives. New research on enamel and dentin after 1 week prove the remarkable adhesive bond strength of CLEARFIL™ S³ BOND PLUS in comparison with other one-step adhesives.

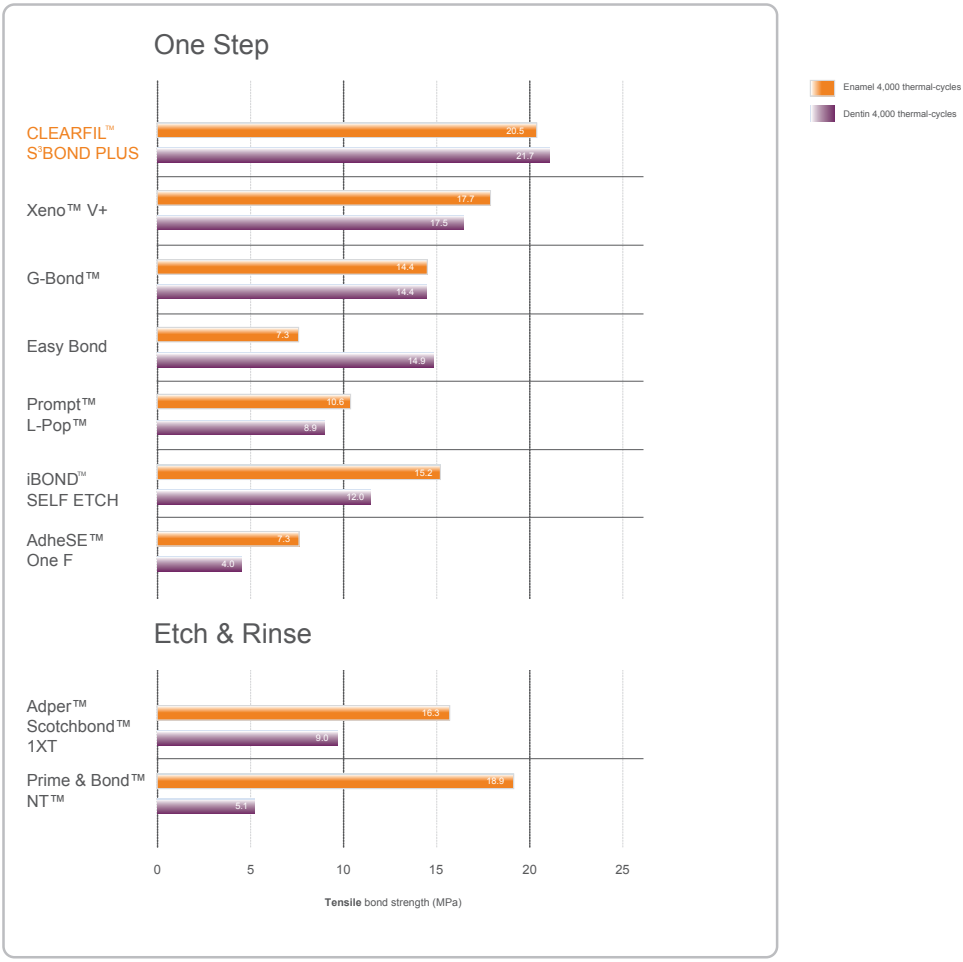


CLEARFIL™ S³ BOND PLUS · MTB-200

Tensile bond strength

Kuraray Medical Inc.

Even in comparison with etch & rinse systems hardly any differences are noticeable.



NOTES

CLEARFIL™ DC CORE PLUS

(code name: NDC-100)

CLEARFIL™ DC CORE PLUS and CLEARFIL™ S³ BOND PLUS · NDC-100 and MTB-200

1110 Characteristics of a New Core Build-up System "NDC-100" and "MTB-200"

K. SUZUKI, *M. KAWANA, M. TAKEI, and M. KAWASHIMA, Development Department Dental Material Division, KURARAY MEDICAL INC, Okayama, Japan · 89th IADR General Seesion in 2011*

Kuraray Medical Inc. has developed a core build-up system consisted of a new dual-curing composite resin "NDC-100" and a new one bottle self-etching bond system "MTB-200". "NDC-100" is a two-paste formula composed of methacrylate monomers, initiators, new polymerization accelerator and fillers delivered in an auto-mix dual-syringe. "MTB-200" is a single-component and light-cured single-step bonding system which contains an adhesive phosphate monomer (MDP) and chemical initiator to work effectively with "NDC-100" in self-curing mode.

Objectives: The purpose of this study was to compare tensile bond strength of the core build-up system "NDC-100" and "MTB-200" with those of other commercially available core materials (CLEARFIL DC CORE AUTOMIX; Kuraray medical, LuxaCore Dual; DMG, Rebilda DC; VOCO, ESHTELITE-CORE QUICK; Tokuyama Dental, Unifil Core EM; GC).

Methods: Bovine dentin surfaces were treated with core build-up systems according to each manufacturer's instructions. All the specimens were immersed in water at 37˚C for 24 hours prior to performing the tensile bond strength test.

Results: Table 1 showed the tensile bond strength of each core build-up systems to bovine dentin.

Core build-up system			Curing condition	Composite/Bond
Core material	**Bond**	**Bonding system**	**light/light**	**self/self**
NDC-100	MTB-200	One Bottle One Step	18.5(6.4)	12.4(2.8)
DC Core Automix	DC BOND	Two Bottle One Step	17.6(5.1)	7.5(1.3)
LuxaCore Dual	Contax	Three Bottle Two Step	9.9(2.7)	2.3(2.2)
Rebilda DC	Futurabond DC	Two Bottle One Step	6.2(3.0)	1.3(1.2)
Esthelite Core Quick	Esthelite Core Quick Bond	Two Bottle One Step	17.3(6.4)	10.2(5.5)

MPa (SD)

Conclusion:

New core build-up system "NDC-100" and "MTB-200" showed the highest bond strength to bovine dentin both in light/light and self/self mode among the evaluated core build-up systems.

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CLEARFIL™, PANAVIA™ and ESTENIA™ are trademarks of the company Kuraray Medical Inc..

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