

# 도재-금속보철물의 기공제작 과정 중 도재의 축성 및 소성

- Biobond porcelain을 중심으로 -

학회 학술부

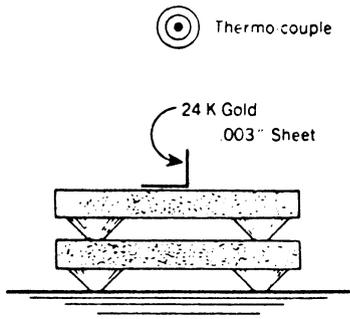
## I . The Procelain Structure

Porcelain phase metal Substructure, porcelain phase Metal substructure preparation 1,750 1 1,100 1,725 porcelain Porcelain porcelain 가 Porcelain 가 Biobond porcelain porcelain bonding alloy Biobond porcelain 1,750 porcelain 0 Porcelain furnace porcelain firing glazing Porcelain 가 gypsum carbon, Biobond Porcelain 28inch Procelain (discoloration), (porosity), porcelain (void), (blister) porcelain stress 25 35 28 30inch Vacuum pump metal substructure 가 Vacuum pump furnace 가, pump가 furnace overfusion porcelain structure 가

Pump oil  
 Oil  
 Dentsply Multimat automatic furnace  
 Systemat pump 30  
 Biobond Opacing Medium  
 Biobond opaque  
 porcelain  
 가

## II. Muffle의 내부온도와 Pyrometer의 교정

Biobond porcelain muffle furnace  
 1,762  
 pyrometer  
 furnace calibration check  
 Muffle L  
 0.002 0.004inch L  
 sagger  
 pure gold foil  
 Muffle floor sagger gold  
 ( 7 ) Furnace sagger  
 sagger 1,800 muffle  
 가 gold  
 gold 가 가  
 pyrometer가 1,945  
 가  
 pyrometer



7.

## III. Opaque의 도포와 소성

Biobond opaque porcelain metal  
 가 Opaque 3가  
 a.  
 b. 0.1mm(0.004 ")  
 c. Opaque Trubyte  
 Bioform Shade " V " Shade  
 body enamel  
 Opaque  
 a. 가 가

, Opaque  
 b. opaque 가 가  
 c. furnace muffle sagger가  
 1,850  
 degassing( Soldering)  
 porcelain furnace  
 가  
 Muffle porcelain sagger  
 porcelain  
 가 가  
 degassing furnace soldering  
 가, 2  
 furnace 2,100 2,150  
 8 muffle

Vacuum  
 " hold " Vacuum line

; Dentsply Multimat Systemat  
 furnace vacuum pump가

# Shade Formula Chart for all BIOBOND<sup>®</sup> 1750<sup>°</sup>F. V.F. Porcelain Shades

## BIOFORM "B" SHADES

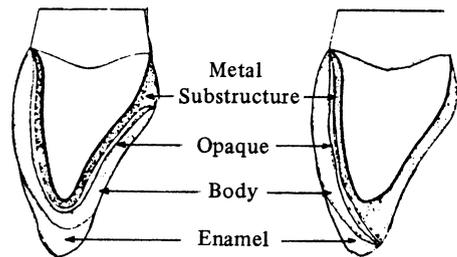
Shade	Opaque	Body	Enamel	Shade	Opaque	Body	Enamel	Insert Color
B59	O1	B59	E2	B51	O8	B51	E6	IBL
B62	O2	B62	E2	B52	O8	B52	E6	IOR
B64	O4	B64	E2	B53	O9	B53	E6	IBL
B65	O3	B65	E2	B54	O9	B54	E6	IOR
B66	O3	B66	E2	B55	O12	B55	E6	IBR
B67	O3	B67	E2	B56	O12	B56	E5	IBR
B68	O4	B68	E2	B91	O10	B91	E6	IBL
B69	O5	B69	E3	B92	O8	B92	E6	IOR
B70	O6	B70	E4	B93	O9	B93	E6	IBR
B77	O6	B77	E3	B94	O11	B94	E6	IBR
B81	O6	B81	E3	B95	O11	B95	E6	IBR
B82	O7	B82	E4	B96	O13	B96	E5	IBR

## BIOBOND "V" SHADES

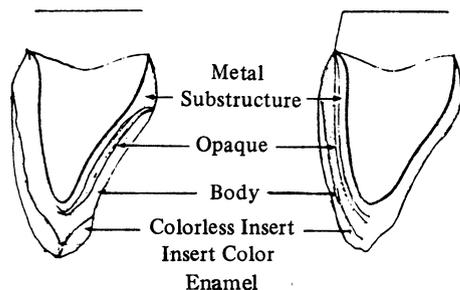
Shade	Opaque	Body	Enamel	Insert Color	Colorless Powder
A1	O14	A1	E8		IC
A2	O14	A2	E8	I1	IC
A3	O15	A3	E9	I2	IC
A3.5	O21	A3.5	E9	I2	IC
A4	O16	A4	E10	I2	IC
B1	O17	B1	E7		IC
B2	O18	B2	E9	I1	IC
B3	O18	B3	E9	I1	IC
B4	O16	B4	E9	I2	IC
C1	O19	C1	E10		IC
C2	O19	C2	E9	I1	IC
C3	O20	C3	E9	I2	IC
C4	O20	C4	E10	I2	IC
D2	O19	D2	E10	I1	IC
D3	O15	D3	E9	I2	IC
D4	O22	D4	E9	I1	IC

NOTE: Dentsply BIOBOND 1750<sup>°</sup>F. V.F. Porcelain is available in BIOFORM "B" Shades and in BIOBOND "V" Shades. Use the diagrams below for build up of body enamel.

### Using the BIOFORM "B" Shades



### Using the BIOBOND "V" Shades



7A.

(Self-cleaning) furnace

d. opaque Overfiring opaque color

e. metal substructure 가 porcelain metal 가

1. Trubyte Bioform shade chart “ V ” shade Biobond opaque color porcelain

2. Opaque Biobond Opaquing Medium thick cream 가

Opaquing Medium binder Biobond opaque가

Biobond Opaque Medium Opaque Control vibration opaque가 Biobond Opaque mix

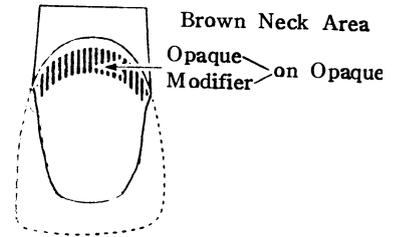
Opaquing Medium Opaque

Medium opaque 가

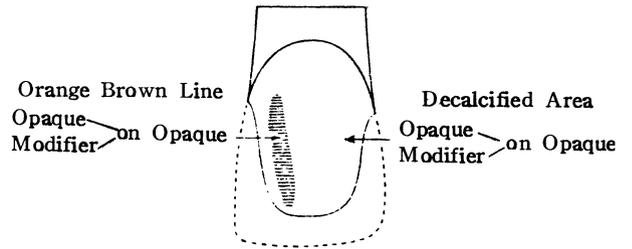
3. Trubyte Bioform Shade Shade shade opaque No porcelain body enamel

Trubyte Bioblend shade Biobond Procelain Modifier Kit 6가 Biobond Opaque Modifier

Modifier opaque Biobond Opaque



8.



9.

**OPAQUE MODIFIERS**

MW	WHITE
MBG	BLUE GRAY
MY	YELLOW
MO	ORANGE
MBr	BROWN
MP	PINK

shade

Modifier

8

internal brown discoloration

Opaque stain

9

internal characterization

Opaque

porcelain

opaque 가

1,710 1,725

1,750

Biobond opaque stain porcelain

Using the Dentsply™ SYSTOMAT™ Fast Firing Porcelain Furnace:

Procedure	Left Chamber (Maturing & Glazing)			Right Chamber (Dry & Pre-Heat)	
	Temp.	Lift Timer	Vacuum Pump Timer	Temp.	Pre-heat Timer
Opaque 1st Firing	960°C	1 minute	¼ minute	600°C	3 minutes
Opaque 2nd Firing	960°C	2½ minutes	2 minutes	600°C	3 minutes
Build-Up	940°C	2½ minutes	2 minutes	600°C	3 minutes
Patch Bake	940°C	2½ minutes	2 minutes	600°C	3 minutes
Glaze	960°C	2-4 minutes*	No vacuum	600°C	2 minutes
Stain & Overglaze	900°C	1 minute	No vacuum	600°C	1 minute
Add-On Build-Up	815°C	3 minutes	2½ minutes	600°C	3 minutes
Add-On Final Glaz	905°C	2 minutes	No vacuum	600°C	3 minutes

Note: When only 1 opaque application is to be applied, use 2nd Opaque firing schedule.

\* Depends on load and finished glaze desired.

Firing cycles may vary because of:

- The method and amount of condensing utilized in the build-up of the porcelain.
- The bulk (size) of the porcelain build-up being fired.
- The character of surface glaze desired.

Using the Dentsply™ MULTIMAT™ Fast Firing Porcelain Furnace:

Procedure	Temp. Controller			Push Buttons					
	W2	W1	Lift Control Timer	Vacuum Red-Up Minutes Green-Down	Vacuum Red-Air Green-Vacuum	Slow Cool Red-Normal Green-Slow Cool	Dry/Pre-Heat Bypass		Green-In Cycle
							Red-Normal Green-Bypass	Red-Normal Green-Bypass	
1st Opaque	600°C	960°C	2	green	green	red	red	green	
2nd Opaque	600°C	960°C	2	green	green	red	red	green	
Build-Up Bake	600°C	940°C	2	green	green	red	red	green	
Patch Bake	600°C	940°C	2	green	green	red	red	green	
Glaze Bake	600°C	940°C	2	green	red	red	red	green	
Stain and Overglaze	600°C	900°C	1	green	red	red	red	green	
Add-On Build-Up	600°C	815°C	3	green	green	red	red	green	
Add-On Glaze	600°C	905°C	2	green	red	red	red	green	

Note: Green denotes button activated.

Red denotes button inactive.

4. opaque 가 single unit simple bridge 1/4mm 1/5mm opaque . Opaque , Opaque Medium Mix Opaque Medium 가 가 large bridge span masing opaque
5. Opaque가 firing sagger
6. Opaque firing chart Opaque firing
7. opaque 가 가, shrinkage crack 가,
8. Opaquing , porcelain Preparation of porcelain-to-metal alloys. ceramic alloy Biobond metal porcelain preparation treatment가 Alloy type alloy

**Suggested Firing Charts For Dentsply Biobond® 1750°F V. F. Procelain**

**Using Conventional Porcelain Furnaces**

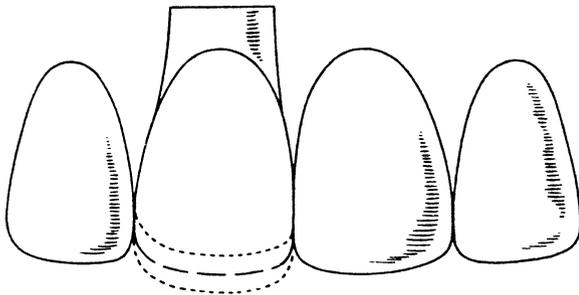
OPERATION			TEMPERATURE (°F.) & TIME
1. Opaque Bake	Vac.	Dry Firing	4 to 8 min. 1350 to 1750°
2. Build-Up Bake	Vac.	*Dry Firing	4 to 10 min. 1100 to 1725°, plus 0 to 1 min. hold
Patch Bake	Vac.	Dry Firing	4 to 8 min. 1100 to 1725°, plus 0 to 1 min. hold
3. Final Glaze Bake	Air	**Preheat Firing	4 to 10 min. 1450 to 1750° plus 0 to 3 min. hold as required
Add-On Build-Up	Vac.	Dry Firing	4 to 10 min. 1300 to 1550°
Add-On Final Glaze	Air	Preheat Firing	4 to 10 min. 1300 to 1650° plus 1 to 3 min. hold as required
Stains and Overglaze	Air	Preheat Firing or	4 to 10 min. 1300 to 1600° plus 1½ min. hold 1300 to 1700° plus 1 min. hold

# IV. Body와 enamel의 축성 및 소성

1. Trubyte Bioform shade Formula chart  
body enamel porcelain

porcelain 가  
Biobond Body Porcelain ceramist가  
body enamel  
blending

(color  
coded)  
preheating  
shade  
7가  
Concentrate Biobond Porcelain  
shade enamel  
" B " " V "



1. Time etch

## CONCENTRATES

CW	WHITE
CBI	BLUE
CG	GRAY
CO	ORANGE
CB1	BROWN
CR	RED
CY	YELLOW

Concentrates Biobond  
Porcelain Transparent(T) Biobond  
Porcelain Neutral Diluent(ND)

concentrates inlay  
decalcified area, fillings, subsurface  
coloration

Biobond Porcelain " T "  
Ceramist enamel  
Biobond Porcelain ND  
body porcelain

2. Porcelain

clearlacquer  
Porcelain  
ridge  
varnish  
tissue paper

Opaquing die

3. Body porcelain

paste  
gauze  
porcelain 가 Porcelain

가  
가

Build up porcelain  
single unit

1, 3 4 bridge  
3 Biobond Opaque Medium

4. body portion  
porcelain

Body  
enamel  
enamel 가  
.( 10)  
Porcelain 가  
brush stroking

porcelain shade 1.0mm  
가

Porcelain color 가 가  
 a. shade 가

b. Opaque

c. Opaque Modifier opaque color

d. Porcelain concentrats body color

e. stain 가 body  
 5. bevel enamel porcelain  
 ( 11)

enamel portion  
 ( 12)

6. Enamel

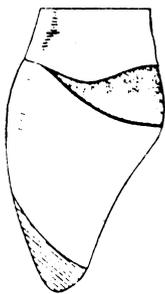
body가  
 enamel  
 ( 12)

3/4mm 1mm shade  
 enamel enamel body blend

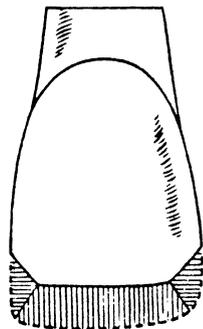
enamel 20% 33# body  
 porcelain 가  
 blend

7.

8. bridge unit



11.



12.

opaque Proximals proximal  
 9.

Ridge area  
 Tissue paper

Restoration proximal gingival under-wet  
 contoured porcelain Die  
 firing sagger crown  
 porcelain 가

10. Firing chart (p11)  
 12 firing chart ) 1  
 porcelain low glaze

porcelain(body or enamel)  
 porcelain 가  
 porcelain  
 porcelain

firing chart  
 patch baking

### V. Insert Color의 도포

: Biobond Supplementary Porcelain Kit  
 Bioform shade B 51 B56 B91  
 B96 insert color가 가  
 가

1. Body enamel insert  
 가 incisal 1/3 1mm

- insert material brush
- enamel 가
- enamel
- 2. ceramist insert color , insert
- 1,700 low biscuit가 insert가
- insert color groove enamel
- 1725 가 1
- maturation ,
- glazing . 2가 가
- 3. insertfm
- insert
- Biobond stain
- Stain
- 1750 final glazing
- porcelain glazing

**VI. 수정, 삭제와 Final glaze bake**

- 1. Bridge units proximal contact gingival saddle extension porcelain
- 2. Firing chart patch bake
- 3. 가

ADD-ONS	
AE	NEUTRAL ENAMEL
ALY	LIGHT YELLOW
ADY	DARK YELLOW

- metal abrasive Stone porcelain
- 4.
- 5. pit Biobond over glaze powder 가 Biobond Add on Porcelain
- Final baking
- Add-on 가
- Biobond stain , 1750
- final glaze baking porcelain
- multiple unit bridge interdental space
- 가
- overglaze Biobond stain나 final glaze baking
- 1,600 1,700
- 6. sagger firing chart porcelain self glazing Biobond
- Final glaze baking

- 7. pit가
- 7. **VII. Final Glaze Bake후의 부분수정**

- 1. rubber wheel fine pumice smooth dentsply porcelain finishing polish
- 2. Master Stain Glaze Kit 20가 stain color가 . Stain Biobond Liquid

# Shade Formula Chart for all BIOBOND<sup>®</sup> Porcelain Shades and SHADEMATE<sup>™</sup> Opaque

## BIOFORM “B” SHADES

Shade	Shademate Opaque	Body	Enamel	Shade	Shademate Opaque	Body	Enamel	Insert Color
B59	O59	B59	E2	B51	O51	B51	E6	IBL
B62	O62	B62	E2	B52	O52	B52	E6	IOR
B64	O64	B64	E2	B53	O53	B53	E6	IBL
B65	O65	B65	E2	B54	O54	B54	E6	IOR
B66	O66	B66	E2	B55	O55	B55	E6	IBR
B67	O67	B67	E2	B56	O56	B56	E5	IBR
B68	O68	B68	E2	B91	O91	B91	E6	IBL
B69	O69	B69	E3	B92	O92	B92	E6	IBR
B70	O70	B70	E4	B93	O93	B93	E6	IBR
B77	O77	B77	E3	B94	O94	B94	E6	IBR
B81	O81	B81	E3	B95	O95	B95	E6	IBR
B82	O82	B82	E4	B96	O96	B96	E5	IBR

### OPAQUE MODIFIERS

SMW	WHITE
SMBG	BLUE GRAY
SMY	YELLOW
SMO	ORANGE
SMBr	BROWN
SMP	PINK

### Shademate<sup>™</sup> Opaque Modifiers

Medium porcelain firing chart kit manual

### 3. Biobond Over glaze

glazing  
stain  
Overglaze porcelain shade  
“ Trubyte Bioblend

67+ biobond shademate opaque modifier ”

Shademate modifier opaque Biobond shademate Opaque

shade 8 gingive internal brown discoloration shademate Modifier

modifiers 9 internal discoloration opaque Stain furnace opaque 가 1,100 1,850

Overglaze Biobond Liquid Medium porcelain

### 4. Biobond Add-on Porcelain

# SHADEMATE™ Opaque Firing Charts

## Using Conventional Furnaces

OPAQUE	DRYING	FIRING (Rate 100°F Per Minute)
Slurry	Apply Opaque using Medium or Water and dry in muffle on tweezers for 10 seconds.	1100°F to 1850°F in vacuum.
1st Layer Opaque	Same as Slurry.	1100°F to 1825°F in vacuum.
2nd Layer Opaque	Same as Slurry.	Same as 1st Layer.

## Using the Dentsply SYSTEMAT® Furnace

OPAQUE	DRYING	FIRING
Slurry	Set temperature at 600°C. Apply Opaque using Medium or water and dry in muffle on tweezers for 10 seconds. Place on sagger, Bypass lower position.	Set temperature at 1010°C. Place sagger on platform. Set left timer for one minute. Set center timer (Vacuum) for ¾ minute.
1st Layer Opaque	Same as Slurry.	Set temperature at 995°C. Set left timer for 2½ minutes. Set center timer (Vacuum) for 2 minutes.
2nd Layer Opaque	Same as Slurry.	Same as 1st layer.

## VIII. Shademate™ Opaque

Shademate™ Opaque porcelain opaque "bisque" "egg shade shell" Shademate Opaque . 24 Bioform shade 16 Porcelain Shade Opaquing medium Shademate opaque Shademate™ Opaque preheating regular Biobond modifier Shademate opaque Modifier Shademate Opaque furnace regular Biobond opaque modifier chart Biobond 1750 V.F porcelain . Biobond Shademate Opaque Porcelain shades shade formular chart .

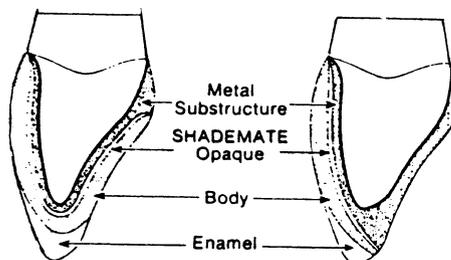
## Shade Formula Chart

### BIOBOND<sup>®</sup> "V" SHADES

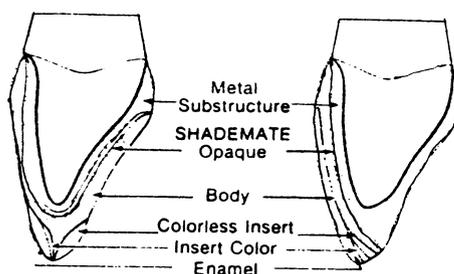
Shade	Shademate Opaque	Body	Enamel	Insert Color	Colorless Powder
A1	OA1	A1	E8		IC
A2	OA2	A2	E8	I1	IC
A3	OA3	A3	E9	I2	IC
A3.5	OA3.5	A3.5	E9	I2	IC
A4	OA4	A4	E10	I2	IC
B1	OB1	B1	E7		IC
B2	OB2	B2	E9	I1	IC
B3	OB3	B3	E9	I1	IC
B4	OB4	B4	E9	I2	IC
C1	OC1	C1	E10		IC
C2	OC2	C2	E9	I1	IC
C3	OC3	C3	E9	I2	IC
C4	OC4	C4	E10	I2	IC
D2	OD2	D2	E10	I1	IC
D3	OD3	D3	E9	I2	IC
D4	OD4	D4	E9	I1	IC

NOTE: Dentsply BIOBOND<sup>®</sup>1750<sup>°</sup>F. V.F. Porcelain is available in BIOFORM<sup>®</sup>"B" Shades and in BIOBOND "V" Shades. Use the diagrams below for build up of body, enamel and opaque.

### Using the BIOFORM "B" Shades



### Using the BIOBOND "V" Shades



NOTE: BIOBOND SHADEMATE Opaques are shaded for each body shade of BIOBOND Porcelain. There is little need for use of modifiers. When special effects are desired, *only BIOBOND SHADEMATE Opaque Modifiers should be used*. Regular BIOBOND Opaque Modifiers (or other) are *not* compatible with SHADEMATE Opaques.

### Using the Dentsply MULTIMAT<sup>®</sup> Furnace

OPAQUE	DRYING	FIRING
Slurry	Set W2 at 600 <sup>°</sup> C. Apply Opaque using Medium or water and dry in muffle on tweezers for 10 seconds. Place on sagger.	Set W1 at 1010 <sup>°</sup> C. Set timer for one minute. Push lift control, vacuum, bypass, and start.
1st Layer Opaque	Same as Slurry.	Set W1 at 995 <sup>°</sup> C. Remaining procedure same as for Slurry.
2nd Layer Opaque	Same as Slurry.	Same as 1st layer.