

# 石膏系 및 磷酸鹽系 매몰재의 Liquid 온도에 따른 주조체 적합도에 관한 실험적 연구

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=Abstract=

## An Empirical Study on the Fitness of Casting Body Depending to Liquid Temperature of Gypsum-bonded and Phosphate-bonded Investment

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Among investment for dental casting, we selected 4 kinds of investment(2 Gypsum-bonded and 2 Phosphate-bonded) and prepared 120 specimen by dividing into two cast of using Ring and Ringless case from 0 to 30 at interval of 10 to invest in influence on the fitness of casting body according to the liquid temperature of Gypsum-bonded and Phosphate-bonded investment. The result was as follows;

1. Gypsum-bonded investment showed best fitness at 30 representing difference of significance in order of 20, 10, and 0, From the difference of investment, Deguvest was proved superior than Cristobalite.
2. Phosphate-bonded investment showed no severe difference at 10 and 20, but showed better fitness at 10, representing difference of significance in order of 0, 30, difference of significance was shown between investment also.
3. In Ringless investing method, there were no difference of significance in Deguvest CF and Unovest.
4. When using a Ring with a Sheet of asbestos liner installed, there was some difference of significance representing superiority of Ringless investing method.

차 례

2.

1.

# I. 서론

製工藝品, 青銅, 가, Sawada Coloidal silica 溶液  
 硬化棋戰, 水化膨脹  
 가 Benvento Cellini(1558), Kato 3, 練化時  
 1907 Taggart가, 間, Junner Stevens  
 鑄造機 Gold inlay  
 Silica 耐火性, Matsuya Yamane  
 water or special liquid 混合, 가, 膨脹法, Fusayama, et al.  
 가 經過, 臨床, 正縮度  
 料 無機材, (Thermal expansion  
 燒成用 陶材, technic), (hygroscopic expansion  
 燒煥, ethyl silica, (semihygroscopic expansion technic)  
 (Colloidal sillical Sol)  
 가 1928 Coleman, 燒煥 ring  
 熱膨脹, “ (Fine-tune) ” liquid  
 National Bureau of Standard  
 1913 Fenner 가 Cristobalite  
 liquid  
 1937 Moosdorf Wolski, 究明  
 1940 知見  
 Proson 1949-1945 Moore. Watts  
 Co-Cr, Ni-Cr

## II. 실험재료 및 방법

### 1. 실험재료

, 加熱條件, 2 2  
 .( 1)  
 補助  
 器具 2

1.

Code No	Investment	Manufacturer & Country	W/P	Kind of Investment
G-1	Cristobalite	Whip - mix/U.S.A	0.40	Gypsum bonded
G-2	Deguvest california	Degussa/Germany	0.32-0.40	gypsum bonded
P-1	Unovest	부평화학/Korea	0.16	Phosphate bonded
P-2	Deguvest CF	Degussa/Germany	0.14-0.16	Phosphate bonded

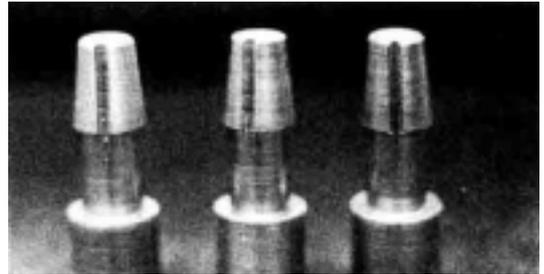
2.

Materials or instruments	Manufacturer	Country
CB-80	Sankin K.K.	Japan
Pantom alloys	Metalor	Switzerland
Casting wax	S.S. White	U. S. A.
Dipping was	Bell de st. claire	U. S. A.
Vacuum mixer	Whip mix co.	U. S. A.
Wetting agent	G-C Dental Inc.	Japan
Casting machine	Kerr Inc.	U. S. A.
Dipper	Whip mix Co.	U. S. A.
Dial Caliper	Mitutoyo	Japan

## 2. 실험방법

### 1) 蠟原型

精密金  
 型製作所 8.0mm,  
 6.6mm 6. 가 die  
 3 ,  
 V-groove



1.

.( 1) Coping  
 wax Dipping wax(Belle de st. claire,  
 U.S.A) Dipping(Wip mix Co. U.S.A)  
 0.4 0.5mm wax carving  
 margin Margin Wax(Metalor,  
 Switzerland) 가 .

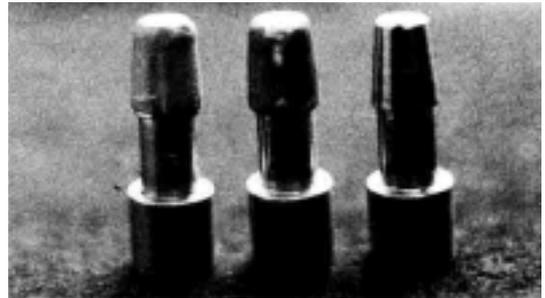
Wetting  
 agent(G-C dental Inc.)  
 Cristobalite(Whip mix  
 Co.) Deguvent California(Degussa Co.)

### 2) 燒環

8 gauge  
 direct sprue method  
 鑄造 thermal zone

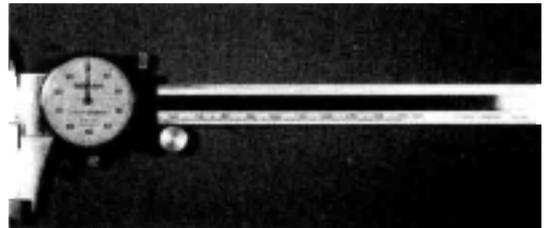
(Whip Mix Co. U.S.A)

綿帶 (asbestos lining) Ring 石  
 , Korea) Uno-Vest( Deguvest CF (Degussa, Germany) 前例



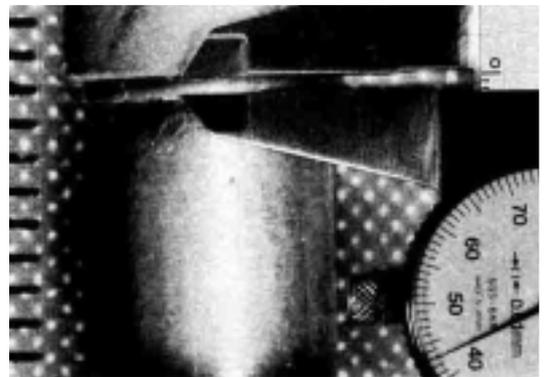
1. Time etch

ring (asbestos lining) TRI-SET MP (Metalor, Switzerland) Ring ringless



1. Time etch

가 ring 1 700  
 ring wax  
 除去 30 430 溪流  
 30 850



1. Time etch

3) 現存 加 普遍  
 的 Kerr spring tension (Kerr Co. U.S.A.) Ring  
 熔融 30 Propane-Oxygen ring 技  
 工過程 Pantom alloys (Metalor, Switzerland) ,  
 Ni-Cr CB-80 (Sankin Industry Co. Japan) 加  
 aluminum oxide (80μm) sand blasting

#1, #2, #4 round bur  
 .( 2)

加  
 Scale

100/1mm

4)

liquid (0 , 10 가 200/1mm  
 , 20 , 30 ) 5 , Mitutoyo Dial Caliper (Japan)  
 , 埋沒條件 120 .( 3, 4)

邊緣

liquid

Ringless group    Deguvest CF  
 Unovest가    0.068 ± 0.064, 0.100 ± 0.034fh  
 가    . 20  
 Deguvest California가  
 0.096 ± 0.065, Cristobalite    0.170 ± 0.067  
 Deguvest CF  
 0.448 ± 0.131, Unovest 0.566 ± 0.069  
 Ringless    Deguvest CF    0.093 ±  
 0.043, Unovest 0.134 ± 0.037    10  
 . 30  
 Deguvest California가    0.000 ± 0.000,

(Two-way ANOVA)  
 T-test

事後檢定  
 統計

III. 실험결과

2  
 liquid

2

ring

ringless

3

4

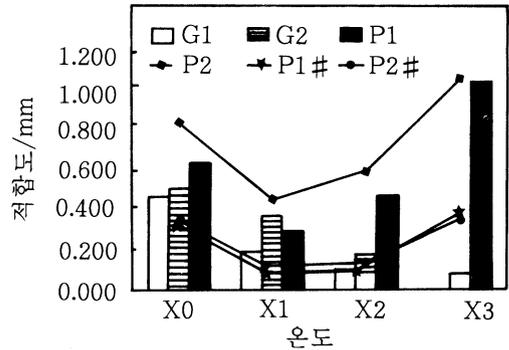
4. Liquid

3

liquid

0

Deguvest California가  
 0.440 ± 0.099fh Cristobalite    0.484 ± 0.166  
 가  
 Deguvest CF    0.602 ± 0.073,  
 Uno-vest 0.789 ± 0.125    ringless  
 Deguvest CF    0.304 ± 0.102, Unovest  
 0.333 ± 0.112    . 10  
 Deguvest California가    0.184 ± 0.031,  
 Cristobalite 0.025 ± 0.099



3. Liquid

(mean ± s.d)

Group	X0	X1	X2	X3
G1	0.440 ± 0.099	0.184 ± 0.031	0.096 ± 0.065	0.000 ± 0.000
G2	0.484 ± 0.166	0.352 ± 0.099	0.170 ± 0.067	0.076 ± 0.036
P1	0.602 ± 0.073	0.279 ± 0.040	0.448 ± 0.131	0.992 ± 0.221
P2	0.789 ± 0.125	0.427 ± 0.096	0.566 ± 0.069	1.004 ± 0.133
P1 #	0.304 ± 0.102	0.068 ± 0.064	0.093 ± 0.043	0.369 ± 0.200
P2 #	0.333 ± 0.112	0.100 ± 0.034	0.134 ± 0.037	0.334 ± 0.139

X0 : Liquid    0

X1 : Liquid    10

X2 : Liquid    20

X3 : Liquid    30

G1 : Deguvest California

G2 : Cristobalite

P1 : Deguvest CF (With ring)

P2 : Unovest (with ring)

P1 # : Deguvest CF (Ringless)

P2 # : Unovest (Ringless)

Cristobalite 0.076 ± 0.036  
가  
Deguvest CF 0.992 ± 0.221,  
Unovest 1.004 ± 0.133 Ringless  
Deguvest VF 0.369 ± 0.200, Unovest  
0.334 ± 0.139 가  
二元分散分析(two-way ANOVA)  
= 46.34 > 2.90 (P < 0.05)  
F = 11.22 > 4.15  
가 .( F  
5)

5. (2 )

변동의 요인	제공합	자유도	제공평균	F 비	P-값
0, 10, 20, 30	1.0145075	3	0.338169167	46.338	0.000*
G1, G2	0.0819025	1	0.0819025	11.222	0.002*
교호작용	0.0216275	3	0.007209167	0.987	0.410*
잔차	0.233528	32	0.00729775		
계	1.3515655	39			

\* P < 0.05

6. (2 )

변동의 요인	제공합	자유도	제공평균	F 비	P-값
0, 10, 20, 30	2.496534738	3	0.832178246	63.206	0.000*
P1, P1#, P2, P2#	3.690621738	3	1.230207246	93.437	0.000*
교호작용	0.433615213	9	0.048179468	3.659	0.000*
잔차	0.8426288	64	0.013166075		
계	7.463400487	79			

\* P < 0.05

7. T-test

비 교	평 균	평균의차	자유도	t-값	유의성(P)
G1과 G2의 비교	0.18/0.27	-0.090	19	-4.2619	0.000*
P1과 P2의 비교	0.58/0.69	-0.116	19	-2.5669	0.018*
P1#과 P2#의 비교	0.20/0.22	-0.017	19	-0.6228	0.540
P1과 P1#의 비교	0.58/0.20	0.371	19	7.118	0.000*
P2와 P2#의 비교	0.69/0.22	0.471	19	11.5868	0.000*

\* P < 0.05

= 63.20 > 2.74 (P < 0.05)

Neiman Sarma

F

= 93.43 > 2.74

( 6)

가

liquid

가

7) T- G1 G2 , P1 P2 , P1 P2 #

30 가

20

, P2 P2 #

, 10 , 0

가

P1 # P2 #

가

基材

(P < 0.05)

(base material)

(binder)

3

#### IV. 총괄 및 고찰

35

操作 가

Deguvest California가 Cristobalite

resin

操作

liquid

ring

resin

ringless

粉末

10 20

가

凝固收縮

T-test

<

(dimensional change)가

7 >

G1

0.18, G2

0.27

Deguvest

California가 Cristobalite

P < 0.05

가

補償  
齒冠修復物

가

P1

0.58, P2

0.68

Deguvest CF가

가

內裝 ring

ringless

P1(0.58), P1 # (0.20) P2(0.69), P2 # (0.22)

Ringless

가

燒煥

ring

liquid

種流,

(Colloidal silical sol)

(fine-tune) ”

Earnshaw

Ringless

가  
with Ring

石綿效果

ringless

P1# 0.20, P2# 0.22  
 가 ringless  
 가 liquid  
 가 技工臨床 liquid  
 가 ringless 水中沈清法 溪流  
 bridge ring ring  
 ring

20, 10, 0  
 가 Deguvest가 Cristobalite  
 2. 10 20  
 10  
 0, 30  
 3. Ringless Deguvest CF  
 Unovest 가 ring  
 4. ringless Ringless

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### V. 결 과

Liquid  
 2 4 0 30  
 10 5 ,  
 ring ringless  
 120 liquid  
 1. 30 가

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