

# Protemp™ 4

## Temporization Material



## Technical Data Sheet

### Indications

For single and multiple unit temporaries

- Crowns
- Bridges
- Inlays and onlays
- Veneers
- Also indicated for long term temporization



### Introduction

Temporary restorations are an indispensable part of the complete crown and bridge restorative procedure, and the roles which a temporary restoration must fulfill have become more demanding over time. In the past, the functional aspects of temporary restoration predominated. However, with recent advancements in restorative dentistry, there is an ever increasing demand placed on esthetics as well as structural strength.

3M ESPE, with more than 40 years of experience in temporization, meets this demand with the introduction of Protemp™ 4 Temporization Material. This unique bis-acrylic material sets new industry standards with the following key features:

- The first bis-acrylic composite with a new generation of sophisticated fillers – a result of advances by 3M ESPE in nanotechnology.
- Even stronger and longer lasting than the well proven Protemp™ 3 Garant™ Temporization Material.
- Highly esthetic through natural gloss and fluorescence.
- Easy handling with no polishing necessary.<sup>1</sup>

Protemp 4 temporization material joins a family of high quality, reliable temporization materials designed to meet the evolving needs of the dental professional.

## With a String of Unparalleled Features, Protemp™ 4 Temporization Material is Unique in the Market

Protemp™ 4 Temporization Material is the latest development of bis-acrylic composite crown and bridge material in the 10:1 Garant™ Cartridge from 3M ESPE.

Protemp 4 temporization material was developed to fulfill the most demanding customers' requirements such as:

- **High fracture resistance and strength**
- **High esthetics**
- **Easy handling and fast procedure**

In vitro tests show that Protemp 4 temporization material ranks high or even highest in these important mechanical characteristics:

- **Fracture toughness**
- **Flexural and compressive strength**

Results from mastication testing which comes closest to the in vivo situation corroborate these findings.

The high mechanical performance profile of Protemp 4 temporization material translates not only into enhanced clinical safety, but also into enhanced convenience for patients and dentists.

Additionally, Protemp 4 temporization material with its top-of-the-class fracture resistance and remarkable esthetics is well equipped to be the first choice for the most demanding discipline in temporization, i.e. as a long-term temporary.

## Record Breaking Toughness — In Every Respect!

Protemp 4 temporization material is the best-in-class material in a test that indicates its durability under in vivo stress.

### Material Toughness

Material toughness can be measured as “fracture work” which shows the energy that a material can absorb until fracture. The higher this value the more likely the material will resist to fracture under stress.

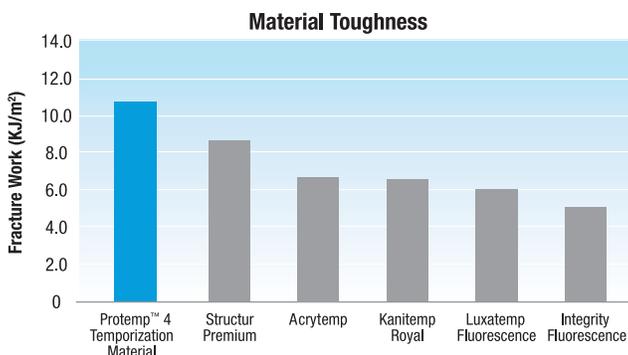


Fig. 1: Material toughness. (V. Babic, R. Perry and G. Kugel, Tufts University, Boston, MA, USA, AADR 2008, #0371)

<sup>1</sup> In case excess material has to be removed or adaptations have to be made the resulting surface needs to be finished and polished as usual.

### Fracture Toughness (determined as K1c value)

Fracture toughness is a quantitative way of expressing “A material’s resistance to crack propagation when a crack is present”. The higher the value the higher the resistance of the material to fracture.

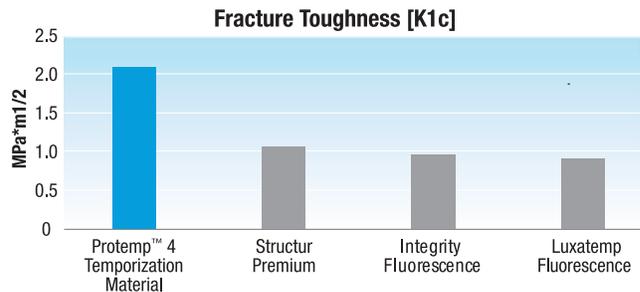


Fig. 2: Fracture toughness. (Dr. Rosentritt, University of Regensburg, Germany – K1c value [MPa\*m1/2] Test)

### Mechanical Strength Under Stress

The various toughness measurements indicate a higher chance of survival in real life for Protemp 4 temporization material. To simulate this as close as possible to the in vivo situation, the temporization materials were subjected to mastication simulations. Again, Protemp 4 temporization material showed best mechanical strength and maintained this mechanical strength even after prolonged stress.

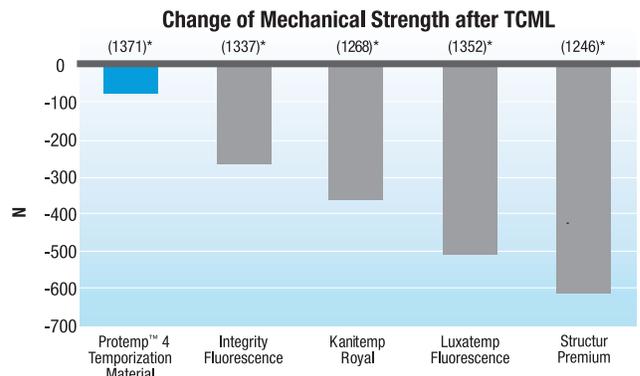


Fig. 3: Change of mechanical strength after thermocycling (5-55°C, 3,000 thermocycles) and mechanical loading (480,000 loading cycles; 100N). 3M ESPE internal TCML study results corresponding to 2 years mastication simulation with 3 unit-bridges.

\* Mechanical strength of control group without TCML.

Consequently, Protemp 4 temporization material showed the highest survival rate in a mastication simulation of 3 unit-bridges:

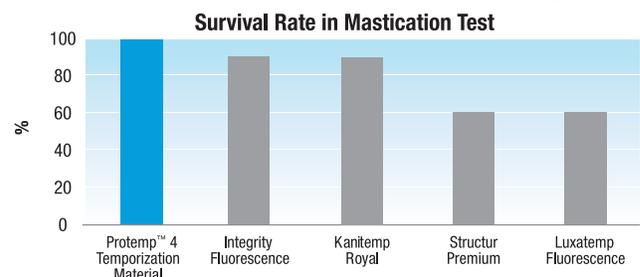


Fig. 4: Survival of 3-unit bridge in the mastication tests: 10 samples of each product tested with 450,000 loading cycles (100N) and 3,000 thermocycles (5-55°C). (3M ESPE internal data)

## Outstanding Compressive Strength

Mechanical study results comparing Protemp™ 4 Temporization Material to competitive materials further confirms the excellent mechanical properties of Protemp 4 temporization material.

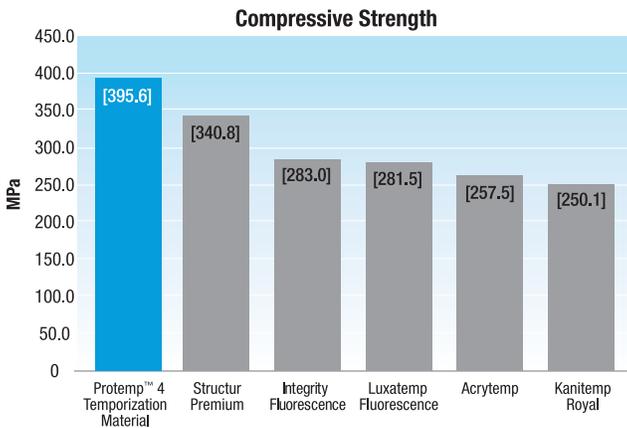


Fig. 5: Compressive strength (resistance to compression). (V. Babacic, R. Perry and G. Kugel, Tufts University, Boston, MA, USA, AADR 2008, #0371)

## Dentist's Gave Best Rating to the Overall Strength of Protemp 4 Temporization Material

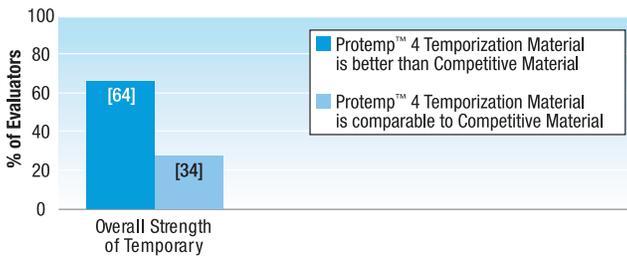


Fig. 6: Rating of the overall absolute strength in comparison to currently used temporization materials. (3M ESPE Protemp™ 4 Temporization Material field evaluation 2008)

## Outstanding Esthetics

### Brilliant, Natural Gloss Without Polishing

According to the 2008 3M ESPE Protemp 4 temporization material field evaluation, dentists and their patients agree that Protemp 4 temporaries are highly esthetic and natural looking.

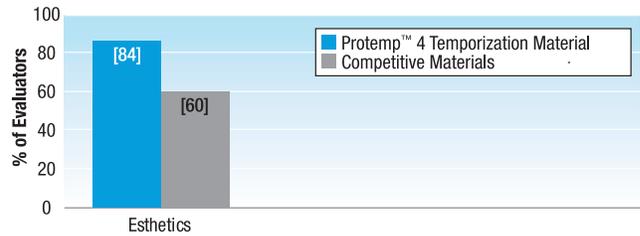


Fig. 7: Ratings for Esthetic attributes of Protemp™ 4 Temporization Material and competitive temporary materials currently used by evaluators. (Top 2 box results on a 5 scale from "excellent" to "very poor" from the 3M ESPE Protemp™ 4 Temporization Material field evaluation 2008)

## Fluorescence Close to Nature

Protemp 4 temporization material fluorescence pigments match very well with the fluorescence of natural teeth, creating temporaries that look naturally beautiful in various lighting conditions.

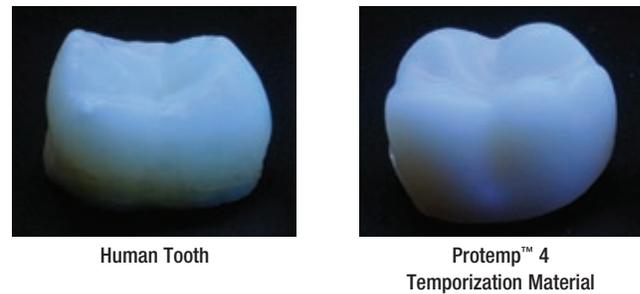
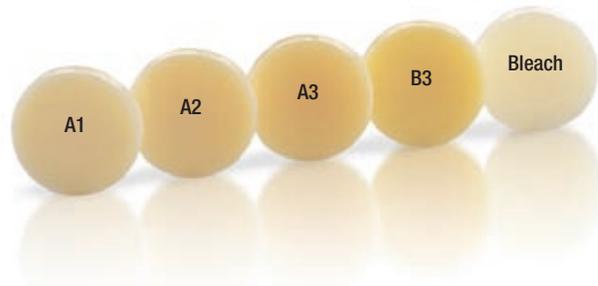


Fig. 8: Temporary single crowns fluorescence compared to human teeth — Protemp™ 4 Temporization Material looks almost the same as nature.

## Five Shades that Match with Filtek™ Supreme XT Flowable Restorative

Five fluorescent shades are available and designed to match with Filtek Supreme XT flowable restorative:

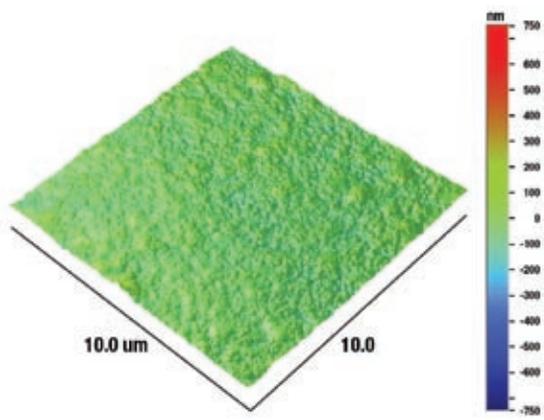


# No Polishing, No Glaze Required

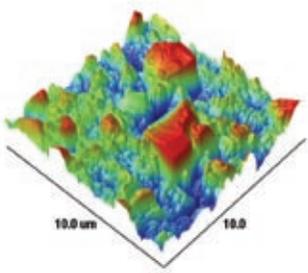
## Benchmark In Surface Quality Makes Polishing Unnecessary

Due to its new sophisticated generation of fillers, 3M ESPE sets new industry standards. Right from the beginning, the unique surface quality of Protemp 4 temporization material is obvious (see AFM topography pictures below) compared to common materials. Just wiping off with ethanol will get the surface glossy and shiny immediately, making the whole procedure faster as the polishing and glaze working step is no longer required.

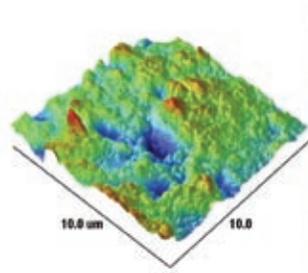
### Protemp™ 4 Temporization Material



### Luxatemp Fluorescence



### Kanitemp Royal



### Structur Premium

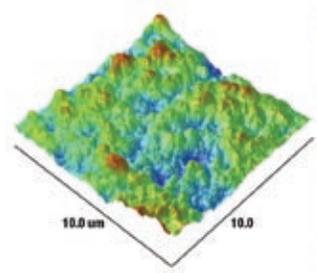


Fig. 9: Surface topology of Protemp™ 4 and other temporization materials after removing the inhibition layer with alcohol and no further polishing. (3M ESPE internal data – Atomic Force Microscopy (AFM) images by 3M Corporate Research Analytical Laboratory – CRAL)

The excellent surface quality of Protemp 4 temporaries will immediately be felt and seen by the patient. This was confirmed during the field evaluation test.

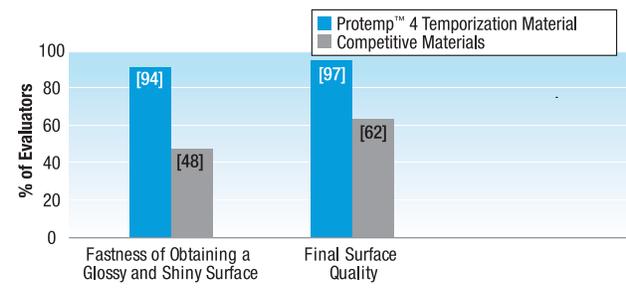


Fig. 10: Fastness of obtaining a glossy and shiny surface, final surface quality testimonials. (Top 2 box results on a 5 scale from “excellent” to “very poor” from the 3M ESPE Protemp™ 4 Temporization Material field evaluation 2008)

## Better Color Stability Thanks to Improved Surface Quality

	Before	After
Protemp™ 4 Temporization Material A3		
Luxatemp Fluorescence A3		
Integrity Fluorescence A3.5		
Kanitemp Royal A3.5		
Structur Premium A3		

Fig. 11: Coffee test: 3 days immersed in coffee at 36°C. (3M ESPE internal data)

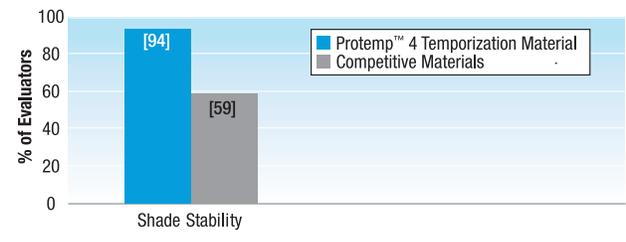


Fig. 12: Ratings for shade stability of Protemp™ 4 Temporization Material and competitive temporary materials currently used by evaluators. (Top 2 box results on a 5 scale from “excellent” to “very poor” from the 3M ESPE Protemp™ 4 Temporization Material field evaluation 2008)

## Easy Handling — Minimal Preparation for Maximum Results!

### Tangibly Less Inhibition Layer That Is Easier to Remove: Feel the Difference!

No more messy or sticky procedures. Feel the difference with Protemp™ 4 Temporization Material which has tangibly less inhibition layer compared to common bis-acrylic materials. This earned high credits from the dentists in the 2008 3M ESPE field evaluation.

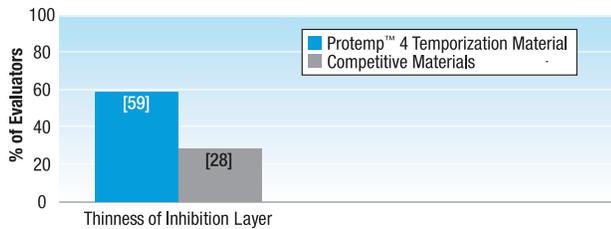


Fig. 13: Ratings for Thinness of Inhibition Layer of Protemp™ 4 Temporization Material and competitive temporary materials currently used by evaluators. (Top 2 box results on a 5 scale from “excellent” to “very poor” from the 3M ESPE Protemp™ 4 Temporization Material field evaluation 2008)

## Gingival Health

### Easy to Clean and High Wearing Comfort

Due to the smooth surface of Protemp 4 temporization material, plaque can be easily cleaned. Patients have a high wearing comfort with Protemp 4 temporaries according to 3M ESPE field evaluation results. In a 3M ESPE in vitro experiment with full human saliva based plaque 48 hours on Protemp 4 temporization material basement cleaned 5 seconds with Aronal® tooth paste on electrical tooth brush Oral-B® Professional Care® 5000, Protemp 4 temporization material excellent surface quality properties showed clearly that plaque can be easily removed and cleaned.

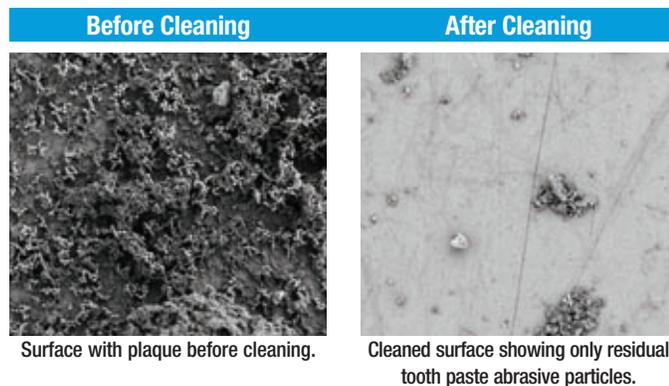


Fig. 14: SEM photos of Protemp™ 4 Temporization Material surface with plaque before cleaning and after cleaning: 500 fold magnification. (3M ESPE Internal data)

## Customer Satisfaction

As with all new 3M ESPE products, Protemp 4 temporization material was tested in dental offices before market introduction. The Protemp 4 temporization material field test was carried out in 2008 and involved more than 200 dental offices in Germany, Italy, Switzerland, and the UK. During the 8 week test period approximately 4400 temporary restorations were fabricated and placed. The main indications were single unit crowns and bridges, but temporary inlays, onlays, and veneers were also fabricated with Protemp 4 temporization material.

Many of Protemp 4 temporization materials' attributes were highly rated by evaluators leading to an overall satisfaction level of more than 90%. In addition, 95% of all evaluators would recommend Protemp 4 temporization material to their colleagues.



Fig. 15: Overall satisfaction. (Top 2 box results on a 5 scale from “excellent” to “very poor” from the 3M ESPE Protemp™ 4 Temporization Material field evaluation 2008)

## The First-class Solution for Temporaries!

### What Dentists are Saying About New Protemp™ 4 Temporization Material From 3M ESPE

“Is easier to trim and finish, less smear layer than with Protemp™ 3; is better removable from the tooth than Protemp 3, surfaces can be worked out and polished well.”

— Dr. Kustermann

“We are testing right now your Protemp™ 4 and are totally enthusiastic. Use Snap so far. That is for sure no comparison at all.”

— Dr. Menrath

“The four single temporary crowns which I inserted until now, were so easily done. Even individualization with thin margin survived excellently to the wearing time of 7–14 days. Also at removal, this thin margin did not crack as it usually happens with other materials.”

— Dr. Riedl

“The material can be repaired very easily, especially because one can simply use readily available flowable (Filtek™ Supreme XT Flowable Restorative). No stock keeping of a special repair material is necessary anymore. The margins are hardly visible.”

— Dr. Vetter

## Key Benefits for You at a Glance:

### Record Breaking Toughness

- High fracture resistance
- Better abrasion stability through new sophisticated filler technology
- Also indicated for long term temporization

### Outstanding Esthetics

- Brilliant, natural gloss without polishing
- 5 fluorescent shades (Bleach, A1, A2, A3, B3) matched with Filtek™ Supreme XT Flowable Restorative
- Excellent color stability, virtually no color change

### Easy and Fast Handling

- Tangibly less inhibitor layer than other bis-acrylic materials
- No polishing required — just cleaning with ethanol will get the surface immediately shiny!
- No glaze necessary

### Gingival Health

- Plaque can be easily cleaned
- Pleasant wearing comfort for patients

## Protemp™ Temporization Material Family... Innovative Solutions for Your Temporary Needs.



**3M ESPE**

#### Dental Products

3M Center  
Building 275-2SE-03  
St. Paul, MN 55144-1000  
USA

#### 3M ESPE AG

ESPE Platz  
82229 Seefeld Germany  
E-Mail: info3MESPE@mmm.com  
Internet: www.3MESPE.com

Please recycle. Printed in USA.  
© 3M 2008. All rights reserved.

3M, ESPE, Filtek, Garant and Protemp are trademarks of 3M or 3M ESPE AG. Aronal, Integrity, Kanitemp, Luxatemp, Oral B, Professional Care, and Structur are not trademarks of 3M or 3M ESPE AG.