Protemp™ 3 Garant™
Composite for temporary crown and bridge restorations

The basis for successful indirect restorations

A good temporary restoration is essential for indirect restorations such as crowns and bridges. It represents an important step in the sequence of treatment and is essential for flawless cementation of the permanent restoration.

**The role of the temporary restoration**

Therefore, the temporary restoration should also meet very many of the demands on a permanent restoration. Temporary restorations with which prepared teeth can be treated quickly and effectively must be well-tolerated by the pulp, must protect the exposed dentine reliably and keep the prepared teeth in position. In situations demanding difficult aesthetic, phonetic and masticatory adjustments, a modifiable temporary restoration also contributes to diagnostic and prognostic assessment of the planned permanent restoration.

**The requirements of the dental surgery**

From the dentist’s point of view, the most important criterion of a good temporary restoration is fracture resistance. Standard materials cannot yet meet this requirement to the optimum. Other considerations are dimensional stability, precision fit with accurate marginal seal, and biocompatibility.

The traditional needs of the dentist, such as economical, simple application also appear at the top of the dental surgery’s list of requirements, in addition to aesthetic aspects and the patient’s physical and mental well-being.
Protemp 3 Garant - the new Protemp generation

Protemp from 3M ESPE is a classic product for chairside crown and bridge temporary restorations that has already been tried and tested millions of times. The innovative new generation composite Protemp 3 Garant is in a class of its own. As a consistent development in 3M ESPE’s Protemp product range, this new material has very high strength and an extremely low tendency to fracture.

Incomparably high fracture resistance

The new formulation leads to a fracture rate that is markedly below the values for all previous temporary crown and bridge materials. A “shock absorber” system intrinsic to the material cushions short-term peak forces without leading to material fracture or chipping of the temporary restoration’s margins.

Easy to use

As a result of the complete modification of the chemical composition and the new 3M™ ESPE™ Garant™ 2 dispenser system, it is also particularly easy to use. One goal during product development was the elimination of the material-specific disadvantages of conventional composites. Therefore, unlike standard temporary restoration composites, Protemp 3 Garant can be easily added to at any time, has a thin inhibition layer, and thanks to the innovative filler technology, it is very easy to use.

Ideal for crowns, bridges, inlays and onlays

The innovative temporary restoration material for crowns and bridges thus meets all the demands on a top-class, direct temporary restoration tailored to the practical needs of the dental surgery, for

- crowns
- bridges
- inlays
- onlays
Teeth are exposed to tremendous masticatory stress. Masticatory forces can reach up to several hundred Newtons, leading to extreme concentrations of pressure on smaller occlusal cusps, for example. Protemp 3 Garant is particularly strong and durable. Fractures in temporary restorations, which are troublesome for both patient and dentist, are extremely rare with this innovative material.

**Excellent test results in vitro and in vivo**

Standardised bridges made from various temporary restoration materials were exposed to changes in temperature and mechanical stress in mastication simulator trials. In these tests, Protemp 3 Garant achieved the very high values for fracture resistance under constant stress, surpassing standard temporary composites and PMMA materials. As another comparative trial verified, the edge strength of Protemp 3 Garant is three times as high as that of conventional temporary restoration composites, which considerably simplifies finishing the margins of temporary restorations. These results were impressively confirmed by an application trial conducted by 3M ESPE, with a fracture rate of only 1.3 percent in more than 1,000 temporary restorations.

**Approximal and occlusal perfection**

Protemp 3 Garant keeps its shape under stress. As a result of the high compressive and flexural strength of the material, which retains its stability under abrasion, occlusal contacts and approximal support are preserved for the entire period of wear. On the basis of this all-round high stability, temporary restorations with Protemp 3 Garant also create the best conditions for the precision fit of the final restoration.
The new formulation

The monomer matrix of Protemp 3 Garant was completely modified, possessing elastising properties and containing finer fillers. This meant that it was possible to produce a more flexible material whilst still retaining excellent mechanical strength. Protemp 3 Garant is far more resistant to fracture than standard temporary materials. Therefore it is particularly suitable for posterior restorations, which carry a heavy masticatory load, and for bridges with wide spans. It is also considerably easier to finish and polish with rotary instruments.

![Fracture resistance after load test in mastication simulator](image)

Result of load test Dr. R. Lang, et al., University of Regensburg, AADR lecture March 2001, Chicago

User test: fracture rate of 1% with N = 1014

![User test: fracture rate of 1% with N = 1014](image)

Result of 3M ESPE in-house application test, 2000
Accurately fitting protection for tooth and periodontium

Due to the low polymerisation shrinkage of Protemp 3 Garant, the temporary restorations have great accuracy of fit and marginal integrity. This means that finishing work is reduced to a minimum, the exposed dentine has reliable protection, and tissue irritation is avoided.

**Excellent marginal adaptation**

Smooth and accurate transition are also gentler on the periodontium and provide the best conditions for fastidious periodontal hygiene.

An excellent fit is also beneficial in maintaining the position of the prepared teeth relative to antagonists and adjacent teeth. This means that not only the prepared tooth but its entire oral environment is perfectly prepared for the final restoration.

![Exposed dentine surface](image)

*Quantitative image analysis of the exposed dentine in pixels. PD Dr. Ernst et al., University of Mainz, accepted for IADR, June 01, Chiba Japan.*

**Scientifically verified**

In a scientific trial to quantify marginal accuracy, a prepared crown stump was coloured up to the preparation margin and then fitted with temporary crowns made from various materials. The uncovered, coloured dentine surfaces were recorded by means of digital image analysis. As the results verify, the marginal adaptation is significantly better with Protemp 3 Garant than with the comparable materials Integrity and Trim.
Excellent biocompatibility minimizes irritation

The innovative temporary restoration material is very well tolerated by patient and dentist. The modern, directly applicable cartridge product can be used very hygienically. The risks of hypersensitivity reactions are reduced to a minimum for patients and virtually excluded for the dentist.

No residual monomers

Unlike PMMA materials, Protemp 3 Garant contains no monofunctional MMA, which is considered to be the dental profession’s most common occupational allergen. Other monofunctional (meth)acrylates such as HEMA, for example, could not be detected with Protemp 3 Garant, either. In this respect, Protemp 3 Garant differs from other composite materials available on the market in a positive way.

Low reaction heat

Thanks to the new initiator system Protemp 3 Garant displays only slight generation of heat during the setting process, as comparative material trials with heat measurements in the pulp cavity and in the material itself verify. This results in a very high level of tolerance with regard to pulp, gingiva and periodontium.
Protemp 3 Garant permits good colour matching with the three shades, A1, A3 and B3. The temporary restoration composite offers a high level of colour stability thanks to its low water absorption. For straightforward customisation of colour and shape, flowable composites without a bonding step or 3M ESPE’s veneering composite 3M™ ESPE™ Sinfony™ can be applied. Protemp 3 Garant itself can also be used as an add-on composite for shape correction.

Since the material is amenable to finishing with cutting wheels and burs, a naturally-shaped bridge interdental area is readily achieved, and optimal periodontal care by the patient is ensured.

**High surface quality**

As a result of the new filler technology, temporary restorations made from Protemp 3 Garant have a smoother surface even before polishing, as is demonstrated in a comparison with a conventional temporary composite under the scanning electron microscope. The excellent surface finish after simple polishing enhances the aesthetic appearance, protects against tartar and therefore also offers the best conditions for optimal periodontal hygiene.

For unrestricted wearing comfort, Protemp 3 Garant is also odourless and flavourless.
From preparation to temporary restoration in a few steps

The prepared crown stump

Finishing the temporary restoration

Application of Protemp 3 Garant into the silicone key

Filling the crown with 3M™ ESPE™ Procem™

Reinsertion of the silicone key filled with Protemp 3 Garant

Removal of excess material

Detachment of the set temporary restoration with the probe

Finished anterior temporary restoration using Protemp 3 Garant
Protemp 3 Garant consistently offers high application convenience with fast, clean working procedures.

**The new Garant 2 dispenser system**

With the Garant 2 system, the material can be mixed homogeneously and void-free. Protemp 3 Garant can be dispensed accurately and applied directly and quickly without a great deal of preliminary preparation or additional instruments. The new Garant 2 dispenser system delivers more material in a shorter time with little ejection force. The temporary restoration key can also be filled quickly for more extensive work. Separate openings for base paste and catalyst preclude the risk of cross-contamination. Moreover, the new colour coding ensures completely error-free application.

**Fast work flow**

Protemp 3 Garant is compatible with all impression materials. It flows very well onto the temporary restoration key material. The duration of the elastic phase has been optimised by the new initiator system and the material can be removed from the mouth without effort. All subsequent finishing can be organised efficiently. Since various working procedures are dispensed with and overall time required has been reduced, the fast work flow due to the ease of use contributes considerably to economic efficiency.
The accurate fit is maintained perfectly even after the material has set, thanks to the extremely low polymerisation shrinkage. Adjustment work is minimised.

It has been possible to reduce the inhibition layer on surface of the temporary restoration markedly as a result of the new formulation.

**Efficient and reliable finishing**

Another advantage of the modified chemical composition is the ease of finishing. Even for intricate adjustments, Protemp 3 Garant can be accurately abraded with rotary instruments and polished easily. Protemp 3 Garant can be added to, corrected or aesthetically modified without a bonding step.

It only requires simple roughening of the temporary restoration prior to application of a flowable composite materials or 3M ESPE Sinfony, even intraorally.

With this convenience of application, the innovative temporary restoration composite meets the demands of the dental surgery and the patient for a modern temporary restoration in every respect.
The coordinated system of impression material, temporary restoration material and luting cement simplifies the entire temporary restoration making process and provides the dental surgery with a top-quality and at the same time economical solution. Moreover, it is considerably easier to take a preliminary impression, which can then be filled with self-curing temporary restoration material, than to make the temporary restoration with light-curing materials and templates.

**Temporary restoration key**

3M™ ESPE™ Position™ Penta™ is an impression material for machine mixing, based on A-silicone, and was developed specially for impressions where alginate was formerly indicated. It can be dispensed exactly and mixed in a 3M™ ESPE™ Pentamix™ mixing unit, void-free and homogeneously at the press of a button. Position impressions are dimensionally stable and can be cast as often as required. A new temporary restoration can be produced at any time and at low cost. The material is also available in the fast-setting variant 3M™ ESPE™ Position™ Penta™ Quick.

**Temporary restoration material**

Protemp 3 Garant is perfectly coordinated with Position Penta and flows very well, without the preliminary impression having to be isolated. This means that air pockets are avoided when the temporary restoration key is filled. The temporary restoration can cure without any problem either in the impression or in the mouth. Prior isolation of the abutment teeth is not necessary.
Luting the temporary restoration

One of the demands made on a modern temporary cement is that it should have no effect on the subsequent permanent cementation.

In the past, problems occurred here due to the adhesive technology, in particular. For this reason, it must be guaranteed that the polymerisation of composites is not impaired by the preceding temporary restoration. From the physical/technical point of view, the parameters of film thickness and compressive strength play a major role. The eugenol-free zinc oxide cement, Procem, supports the temporary restoration with Protemp 3 Garant optimally, due to its thin film thickness and high compressive strength. Application of the paste-paste system is simple. Excess material can be removed easily, and after the temporary restoration has been removed the stump is to a large extent cement-free and the final restoration can be implemented immediately.
## Protemp 3 Garant

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<th>Material and equipment properties</th>
<th>Application advantages</th>
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| New monomer system/optimised fillers                      | – High strength  
– High fracture resistance  
– Easy to use/polishability                                                             |
| Minimal polymerisation shrinkage                          | – Excellent precision of fit  
– Little marginal gap  
– Perfect protection for tooth, exposed dentine and periodontium                        |
| High compressive and flexural strength                    | – No drifting of prepared abutment teeth, no periodontal stress due to deflection of the material/occlusion  
– Optimal space maintenance, very good edge strength                                        |
| Low setting temperature                                  | – No irritation of pulpal tissue or oral mucosa                                            |
| No release of HEMA                                        | – Non-irritant for both dentist and patient                                               |
| Reduced inhibition layer                                  | – Easier, faster to use                                                                   |
| Good polishability                                        | – High surface smoothness prevents the accumulation of plaque and resultant periodontal problems |
| Low water absorption                                      | – Little swelling, high dimensional and colour stability                                  |
| Good addition and customisation                           | – Modification and supplementation of shape and colour with flowable composites with no separate bonding step |
| Advantages of the new cartridge system (Garant 2-System)   | – More material in less time, no cross-contamination of the pastes, colour coding for safety, little physical effort |
At a glance

Filling and reinsertion

Intraoral setting

Removal from the mouth

Complete setting

0:50

0:50 0:45

1:35

0:55 2:30

2:30 5:00

Application tips

- To improve the stability of the temporary restoration, remove the interdental tags in the impression.
- If there are teeth missing or gaps in the molar area, make a groove in the impression to obtain a stable, ridge-shaped junction in the temporary restoration.
- Before taking the impression, fill in gaps between anterior teeth with preformed teeth as space maintainers; interlock several preformed teeth.
- Finish with fine carbide burs with subsequent polishing, if wished.
- Shape can be corrected quickly and easily with Protemp 3 Garant or Sinfony without a bonding step.
- Colour can be customised with composites such as the 3M ESPE Sinfony colour range, which is now also available for intraoral applications.

- Cementation, for example, with Procem (eugenol-free) or 3M™ ESPE™ Scutabond™ (contains eugenol) or other standard temporary cements.
- Where aesthetic demands are very high (e.g. front teeth), a shiny surface can be achieved on the temporary restoration by the simple application and curing of a bonding agent (e.g. 3M™ ESPE™ Prompt™ L-Pop).
- Protemp 3 Garant can be used to supplement or repair the same material (leaving the inhibition layer in place) without intermediate steps such as bonding or roughening.
- The surface inhibition layer produced by atmospheric oxygen can be removed from unprepared parts with organic solvents such as alcohol.