Adhesive Resin Cements

Simplicity is key
GC’s adhesive resin cement solutions

**G-CEM® Veneer**
Light-cured adhesive resin cement

**G-CEM LinkForce®**
Dual-cure adhesive resin cement

Applications

For indirect restorations with thin thickness (<2mm) that enables the use of a purely light-cured mode.
One PRIMER, One BOND, Two CEMENTS

G-Multi PRIMER

G-Premio BOND

G-CEM LinkForce
G-CEM Veneer
G-Multi PRIMER

One primer for all substrates

G-Multi Primer uses three different chemical bonding agents to ensure perfect adhesion in all situations to all substrates. By adding silane to the primer (and not to the dentine adhesive), stability of adhesion is assured.¹

Strong chemical bonding to all substrates

Shear Bond Strength

<table>
<thead>
<tr>
<th>Material</th>
<th>Shear Bond Strength (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconia</td>
<td>65</td>
</tr>
<tr>
<td>LiSi Press</td>
<td>62</td>
</tr>
<tr>
<td>Lithium disilicate</td>
<td>58</td>
</tr>
<tr>
<td>Porcelain</td>
<td>55</td>
</tr>
<tr>
<td>Hybrid ceramic</td>
<td>45</td>
</tr>
<tr>
<td>Gold alloy</td>
<td>40</td>
</tr>
</tbody>
</table>

Simple application

- Apply and air dry, no waiting
- Same procedure for all substrates, no confusion

Stabilised formulation

- No refrigeration
- 2-year shelf life


Measuring chemical bonding capabilities

The chemical bonding capabilities of G-Multi PRIMER are measured by testing adhesion to highly polished substrate surfaces without using mechanical retention. This chemical bonding potential is achieved in addition to the micro-mechanical adhesion provided by prior surface treatment e.g. AlO₂ sandblasting. Adhesion durability is best achieved with a combination of chemical bonding and micro-mechanical retention.

MDP: 10-methacryloyloxydecyl dihydrogen phosphate
MDTP: 10-methacryloyloxydecyl dihydrogen thiophosphate
CASE STUDY

CERASMART™ hybrid ceramic bonded with G-CEM LinkForce

**LINK 1: G-Multi PRIMER to the prepared indirect restoration**

After trial fit, the CERASMART onlay is cleaned.

Pre-treat with 5% HF (Hydrofluoric acid) for 60 secs.

Clean with water and dry.

Brush apply a thin layer of G-Multi PRIMER to create a durable chemical bond. Dry with an air syringe.

Clinical images courtesy of Dr Anthony Mak, Australia

**Strong, reliable and consistent**

G-CEM LinkForce is a universal resin cement solution built on three strong links that ensure consistent and reliable adhesion.²

This interface is shown in the adjacent SEM picture of CERASMART hybrid ceramic treated with G-Multi PRIMER (A), bonded to dentine (D) using G-Premio BOND (C) and G-CEM LinkForce (B).

R&D Dept. GC Corporation
G-Premio BOND

One universal bonding agent

Featuring three functional monomers in a proven formulation, G-Premio BOND delivers a no-compromise adhesive performance to all prepared tooth surfaces including liners and composite or metal cores.

Convenient application

- Suitable for all etching techniques
- Visible when applied, invisible after curing

Stronger bond layer

- High-density, single-dispersion nanofiller
- HEMA-free to resist breakdown and discolouration
- Low 3μm film thickness

Strong dentine bonding

Fluid consistency

- Exceptional wetting characteristics
- Rapid chemical bonding
- Quick and easy application

Optional dual-cure mode

- When selecting dual-cure mode, mix DCA (Dual Cure Activator) with G-Premio BOND in a 1:1 ratio

Stabilised formulation

- No refrigeration
- 2-year shelf life
Case study

CERASMART hybrid ceramic bonded with G-CEM LinkForce

LINK 2: G-Premio BOND applied to the prepared tooth

Selective etch of enamel, rinse and dry.

G-Premio Bond was applied to the prepared enamel, dentine and composite liner and left for 10 secs.

The surface was then dried with maximum air pressure for 5 secs to remove all water from the bond layer and light-cured for 10 secs.

Clinical images courtesy of Dr Anthony Mak, Australia

Light-cure mode

A quick and convenient option is to simply apply G-Premio BOND and light-cure.

This immediately seals the dentine, and the low film thickness of just 3μm ensures that there is no risk of the bond thickness compromising fit.

Apply G-Premio BOND, wait for 10 secs.

Dry with MAXIMUM AIR PRESSURE for 5 secs.

Light-cure for 10 secs.
G-CEM LinkForce dual-cure adhesive resin cement

Strength and aesthetics

G-CEM LinkForce provides durable retention and long term margin aesthetics through enhanced dual-cure polymerisation systems and incorporation of high-density, single-dispersion glass filler technology.¹

Very low film thickness

- Just 4µm
- Excellent adaptation

<table>
<thead>
<tr>
<th>Film Thickness</th>
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</thead>
<tbody>
<tr>
<td>G-CEM LinkForce</td>
</tr>
<tr>
<td>Product A</td>
</tr>
<tr>
<td>Product B</td>
</tr>
<tr>
<td>Product C</td>
</tr>
</tbody>
</table>

Consistent handling and clean up

The extruded excess G-CEM LinkForce has minimal slump, so after 1-2 secs tack-curing, excess cement is simple to remove, breaking cleanly from the margins.

High strength and wear resistance²

- High-density, single-dispersion glass fillers
- Excellent polish
- Less chance of plaque retention

Occlusal Wear


Clinical image courtesy of Dr Yoshikazu Kawamoto, Japan

Case study

CERASMART hybrid ceramic bonded with G-CEM LinkForce

LINK 3: G-CEM LinkForce

- **G-CEM LinkForce** is applied to the internal surface of the CERASMART onlay.
- After seating, light-cure for 1–2 secs. Excess is removed.
- Apply air barrier (optional) and light-cure all surfaces.
- CERASMART onlay bonded with G-CEM LinkForce.

Clinical images courtesy of Dr Anthony Mak, Australia

Consistency in aesthetics

Available in a range of 4 shades, with tooth-like fluorescence, convenient automix delivery and matching Try-In Pastes. When bonding veneers, or for more aesthetically demanding applications, there is a clear path to follow for shade checking and achieving predictable aesthetic outcomes.

- **Translucent**
  - (clear translucent)
  - Perfect for very thin restorations to preserve the original shade.

- **A2**
  - (A2 translucent)
  - The standard for luting most of your prostheses.

- **Opaque**
  - (universal opaque)
  - Used to mask discoloured substrates when needed.

- **Bleach**
  - (bleach opaque)
  - Adapted for ultra-white restorations to increase opacity and value.
G-CEM LinkForce – simple application steps

1. Before

Defective occlusal filling and cracked tooth exhibiting symptoms of pain on biting.

2. Tooth preparation

Secondary caries and crack removal with conservation of buccal cusps.

3. Immediate dentine sealing

Immediate dentine sealing and resin coat with GC G-ænial Universal Injectable.

4. Fabrication of the partial coverage crown

Milled partial coverage GC Initial LiSi Block.
5. Pre-treatment
Surface treated with hydrofluoric acid etch and G-Multi PRIMER.

7. Cementation
G-CEM LinkForce applied to intaglio surface of restoration and seated.

6. Apply G-Premio BOND
Tooth treated with air abrasion, selective enamel etch and G-Premio BOND.

8. Final
GC Initial LiSi partial coverage restoration adhesively bonded.

Clinical images courtesy of Dr Reina Yang, Australia
G-CEM Veneer light-cured adhesive resin cement

G-CEM Veneer: predictable aesthetics, high mechanical properties and unique flow.*

G-CEM Veneer has all the ingredients to deliver a stunning result for a confident smile. The secret is in its optimally balanced formula with Full-coverage Silane Coating (FSC) technology. This innovative filler treatment allows a high filler rate to be achieved with homogeneous repartition of fillers in the matrix. The result: unique handling and excellent physical properties.*

Excellent polymerisation*

G-CEM Veneer can be efficiently light-cured through restorations <2 mm with sufficient translucency. Indicated for composite and ceramic veneers, inlays and onlays.

Extremely wear-resistant*

The smooth and glossy surface is maintained over time due to high wear resistance, preventing marginal gap formation, and withstanding discolouration. The FSC technology and improved matrix prevent particle loss ensuring a homogeneous distribution of the fillers.

Low film thickness

The benefit of combining strength with the perfect flow: a high-quality fit, without the need for preheating!

Advantages of thixotropy

- G-CEM Veneer stays in place when untouched, but is fluid when put under pressure.
- G-CEM Veneer covers the entire surface of a restoration uniformly without voids, while the film thickness is kept to a minimum.
- G-CEM Veneer is not sticky; it is easy to apply with high precision and it allows easy excess removal.
- G-CEM Veneer’s unique consistency allows for an optimally balanced flow, without the need for preheating.
- G-CEM Veneer is well suited for the cementation of aesthetic restorations and offers high colour stability.

* Data on file [ISO 4049:2000 Depth of cure, 3-body wear, Flexural strength] available from info.australasia@gc.dental.
**G-CEM Veneer**

Bond strength to enamel (MPa) before and after thermocycling (20 000 cycles)

![Graph showing bond strength](image1)

Three-body wear (μm)

![Graph showing three-body wear](image2)


**G-CEM Try-in Paste**

The shades of G-CEM Try-in Paste perfectly match the four shades of G-CEM Veneer and G-CEM LinkForce. They are water-based for easy removal after application.

- **A2**
  - The standard for luting most of your prosthetic pieces.

- **Translucent**
  - Designed for very thin restorations to preserve the natural shade.

- **Opaque**
  - Used to mask discoloured substrates when needed.

- **Bleach**
  - Used to increase opacity and brightness when pearly white teeth are desired.
G-CEM Veneer – simple application steps

1. Before

2. Restoration try-in

Four aesthetic shades
G-CEM Veneer comes in four different shades. They were carefully selected to cover all aesthetic needs.

Predictable shade integration
With the use of G-CEM Try-in Paste, you can easily predict the final colour match. It helps in selecting the correct shade and opacity.

3. Preparation etching

Choose your etching mode
Etch the enamel margins or use a total-etch approach for minimal preparations that are localised mainly in the enamel.

4. Apply G-Premio BOND

Bonding to all substrates
G-Premio BOND is purposely designed to bond to all substrates. It is separately cured with a very low 3μm film thickness and it does not interfere with the seating of the restoration.
5. Apply G-Multi PRIMER

Bonding to all restorations
After correct pre-treatment (etching or sandblasting), G-Multi PRIMER ensures stable adhesion* to all aesthetic restoratives.

6. Cementation

Precise application
Thixotropy and long working time allow for precise application.

7. Excess removal

Easy clean-up
Tack-curing for 1-2 seconds before removal is optional. After the final light curing, margins can be easily finished and polished to a high gloss to minimise plaque retention.

8. Final

Durable outcome
High colour stability combined with excellent mechanical properties: a high-quality, durable and aesthetic fit.*


Clinical images courtesy of Dr. J Tapia Guadix, Spain
**Q&A**

**Do GC make their own MDP?**
Yes we do. We are on our 3rd generation of MDP as we constantly improve and refine our functional monomers.

**How does the silane in G-Multi PRIMER remain stable and active for 2 years without requiring refrigeration?**
The wide functionality and overall stability of G-Multi PRIMER is a key development from our R&D team. Unfortunately this formulation detail is proprietary and is not able to be disclosed.

**Will G-Premio BOND adhere to any core substrate?**
Yes it will. Whether glass ionomer cement, composite or metal. This is due to the effectiveness of the three functional monomers; 4MET, MDP and MDTP.

**Can we use G-Premio BOND with the Immediate Dentine Sealing technique?**
Yes. Whilst we don’t specifically endorse this technique, our laboratory testing of Immediate Dentine Sealing procedures with G-Premio BOND and G-CEM LinkForce showed effective adhesion and no reduction in bond strengths.

**What is the working time of mixed G-Premio BOND (GPB) + Dual Cure Activator (DCA)?**
Working time is 2-3 mins after mixing.

**Why is application time (20 secs) longer for mixed GPB+DCA compared to application time (10 secs) for G-Premio BOND when used alone?**
Application time is longer because, when mixed with DCA, there is dilution of the acid level, thus the strength of etching effect is reduced and application needs to be longer.

**How many cement applications are available from a syringe of G-CEM LinkForce?**
Up to 20 applications.

**What are the storage recommendations for G-CEM LinkForce?**
The G-CEM LinkForce cement should be stored in the refrigerator. G-Multi PRIMER, G-Premio BOND, Dual Cure Activator and Try-In Pastes can be stored at room temperature or refrigerated.

**When is G-CEM Veneer not indicated?**
G-CEM Veneer is not indicated for restorations with a thickness above 2mm or opaque restorations, preventing light to be transmitted and complete light-curing.

**What are the advantages of G-CEM Veneer compared to other flowable composites and pre-heated composites?**
G-CEM Veneer benefits from clear advantages versus other composites, mainly pre-heated ones:
There is no need for heater, no risk of change of physical properties due to non-controlled and repeated temperature increase.
The thixotropy enables removal of the excess in an easy way, without flowing around the preparation. The placement is also easier: easier to place restorations without risk of breaking thin ceramic pieces, no need for ultrasonic device to ensure adaptation and no risk of non-flowing material and over-occlusion.
The high physical properties such as flexural strength & wear resistance, higher than most conventional composites. Wear resistance ensures long lasting margins, even on occlusal surfaces.\(^5\)
# A guide to pre-treatment technique

<table>
<thead>
<tr>
<th>Substrate</th>
<th>Pre-treatment at lab or chairside</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
<th>Step 6 Primer Application</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feldspathic ceramics, Leucite-reinforced ceramics</td>
<td>Etching at chairside</td>
<td>Try-in</td>
<td>Rinse thoroughly &amp; dry</td>
<td>Etch inner surface for 60 secs with 5% HF acid</td>
<td>Rinse &amp; dry</td>
<td>Clean with alcohol &amp; dry</td>
<td>G-Multi PRIMER Apply &amp; dry</td>
<td>Adhesion of G-Multi PRIMER through silane</td>
</tr>
<tr>
<td>Lithium disilicate</td>
<td>Etching at chairside</td>
<td>Try-in</td>
<td>Rinse thoroughly &amp; dry</td>
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<td>Rinse &amp; dry</td>
<td>Clean with alcohol &amp; dry</td>
<td>G-Multi PRIMER Apply &amp; dry</td>
<td></td>
</tr>
<tr>
<td>Zirconia Alumina</td>
<td>Sandblasting at chairside</td>
<td>Try-in</td>
<td>Rinse thoroughly &amp; dry</td>
<td>Sandblast</td>
<td>Rinse &amp; dry</td>
<td>New sandblasting or clean with Ivoclean*</td>
<td>G-Multi PRIMER Apply &amp; dry</td>
<td>Do not clean the Zr oxide surfaces with phosphoric acid.</td>
</tr>
<tr>
<td></td>
<td>Already sandblasted by lab</td>
<td>Try-in</td>
<td>Rinse thoroughly &amp; dry</td>
<td>Rinse thoroughly &amp; dry</td>
<td>New sandblasting or clean with Ivoclean*</td>
<td>G-Multi PRIMER Apply &amp; dry</td>
<td>Adhesion of G-Multi PRIMER through MDP</td>
<td></td>
</tr>
<tr>
<td>Metal Composite Hybrid Ceramics</td>
<td>Sandblasting at chairside</td>
<td>Try-in</td>
<td>Rinse thoroughly &amp; dry</td>
<td>Sandblast**</td>
<td>Rinse &amp; dry</td>
<td>Clean with alcohol &amp; dry</td>
<td>G-Multi PRIMER Apply &amp; dry</td>
<td>Adhesion of G-Multi PRIMER through silane (to glass fillers), MDP (for non-precious metal, resins) and MDTP (for precious metal)</td>
</tr>
<tr>
<td></td>
<td>Already sandblasted by lab</td>
<td>Try-in</td>
<td>Rinse thoroughly &amp; dry</td>
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<td>G-Multi PRIMER Apply &amp; dry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibre Post</td>
<td>At chairside</td>
<td>Try-in</td>
<td>Rinse thoroughly &amp; dry</td>
<td>Clean with alcohol &amp; dry</td>
<td>G-Multi PRIMER Apply &amp; dry</td>
<td>G-Multi PRIMER Apply &amp; dry</td>
<td></td>
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</tr>
</tbody>
</table>

* Ivoclean is not a trademark of GC Corporation

** in case of Hybrid Ceramics, acid etching with HF acid for 60 secs can also be used

HF: Hydrofluoric acid
When to cement?

A glass ionomer cement has the preferred characteristics for an ideal cementation material. The following clinical aspects will define your choice for the optimal CEMENTATION procedure:

<table>
<thead>
<tr>
<th>Retentive preparation</th>
<th>Isolation not possible</th>
<th>Moderate aesthetics needed</th>
<th>Extra protection needed</th>
</tr>
</thead>
</table>

When to bond?

Bond with a resin cement when aesthetics are of the utmost importance or when extra adhesion is required.

<table>
<thead>
<tr>
<th>Preparation is not retentive</th>
<th>Isolation possible</th>
<th>High aesthetics needed</th>
<th>Extra adhesion needed</th>
</tr>
</thead>
</table>
## A guide to cement selection

### Glass Ionomers

<table>
<thead>
<tr>
<th></th>
<th>Self-cure</th>
<th>Resins</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional</td>
<td>Resin Modified</td>
</tr>
<tr>
<td></td>
<td>G-C Fuji I</td>
<td>GC Fuji PLUS &amp; FujiCEM</td>
</tr>
</tbody>
</table>

### Resins

- **Self-cure**
  - Conventional
  - Resin Modified
- **Dual-cure**
  - Self-adhesive
  - Universal Self-adhesive
- **Light-cured**
  - Adhesive
  - Adhesive

### Crowns & bridges
- Metal
- Zirconia
- Lithium disilicate (e.g. Initial LiSi Block, Initial LiSi Press)
- Composite
- Feldspathic & Leucite reinforced ceramics
- Hybrid ceramics (e.g. CERASMART270)

### Inlays & onlays
- Metal
- Zirconia
- Lithium disilicate (e.g. Initial LiSi Block, Initial LiSi Press)
- Composite
- Feldspathic & Leucite reinforced ceramic
- Hybrid ceramics (e.g. CERASMART270)

### Veneers
- Lithium Disilicate (e.g. Initial LiSi Block, Initial LiSi Press)
- Composite
- Feldspathic & Leucite reinforced ceramics
- Hybrid Ceramics (e.g. CERASMART270)

### Posts & inlay cores
- Metal
- Zirconia
- Fibre reinforced

† For indirect restorations with thin thickness (< 2mm) that enables the use of a purely light-cured mode.
Scientific References


**G-CEM LinkForce System Kit**

1 x G-CEM LinkForce A2 8.7g (5mL)
1 x G-CEM LinkForce Translucent 8.7g (5mL)
30 x GC Automix Tip Regular
5 x GC Automix Tip Endo
1 x G-Multi PRIMER (5mL)
1 x G-Premio BOND (5mL)
1 x G-Premio BOND DCA (3mL)
1 x GC ETCHANT 4.8g (3.6mL)
1 x G-CEM LinkForce Try-In Paste A2 1.5g (1.2mL)
1 x G-CEM LinkForce Try-In Paste Translucent 1.5g (1.2mL)
20 x Disposable dispensing dish
50 x Disposable applicator (fine)

**G-CEM LinkForce Starter Kit**

1 x G-CEM LinkForce A2 OR Translucent 8.7g (5mL)
20 x GC Automix Tip Regular
1 x G-Multi PRIMER (5mL)
1 x G-Premio BOND (5mL)

**Refills**

G-CEM LinkForce 8.7g (5mL)
(Translucent / A2 / Opaque / Bleach)
G-Premio BOND, 5mL

G-Premio BOND DCA, 3mL
G-Multi-Primer, 5mL

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**G-CEM Veneer Starter Kit**

2 x G-CEM Veneer Refill A2 & TR
2 x Try-in Paste Refill A2 & TR
1x G-Multi PRIMER
1 x G-Premio BOND
45 x needle tips

**G-CEM Veneer Refill 1 ml (1.7g)**
+ 10 dispensing tips

1 x G-CEM Veneer A2
1 x G-CEM Veneer Translucent (TR)
1 x G-CEM Veneer Opaque (OP)
1 x G-CEM Veneer Bleach (BL)

**G-CEM Try-in paste 1.2 ml (1.5g)**

1 x G-CEM Try-in Paste A2
1 x G-CEM Try-in Paste Translucent
1 x G-CEM Try-in Paste Opaque
1 x G-CEM Try-in Paste Bleach

**Related products**

GC dispensing tips long needle (30 pcs.)

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**THESE PRODUCTS ARE NOT AVAILABLE FOR PURCHASE BY THE GENERAL PUBLIC. ALWAYS READ AND FOLLOW THE DIRECTIONS FOR USE.**