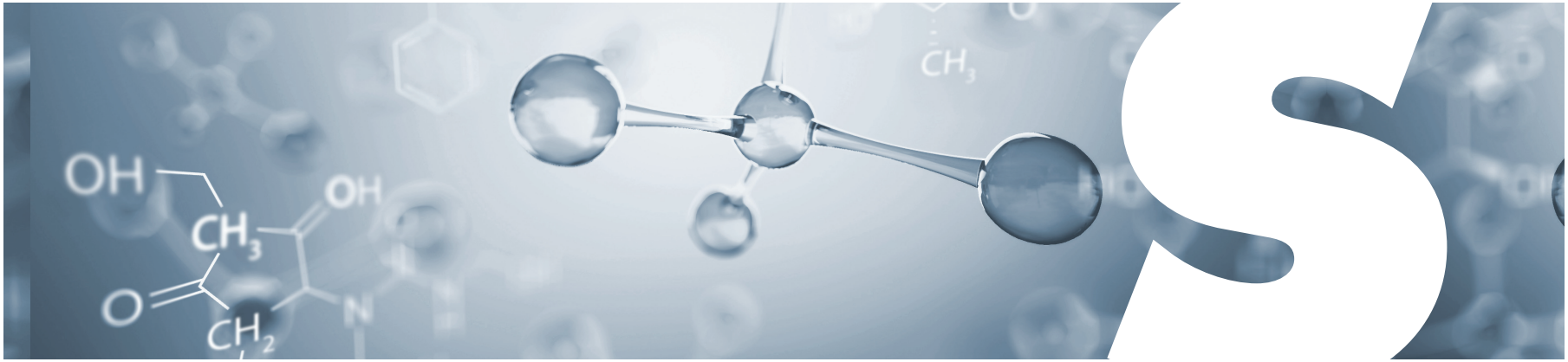
Silmet Luting Guide



SILMET

Dental cement

Dental cement is used to bond restorative materials, such as crowns, inlays, and onlays, to natural teeth. The main difference between cement is in their bonding mechanisms.

Luting cement relies on mechanical retention and is typically based on water and reactive alkaline fillers. They do not adhere to any surfaces.

The preparation to receive the restoration must have long axial walls. Ideally, there is a slight 6-degree gingival to incisal taper to the preparation three dimensionally circumferentially around the tooth, and the restoration must have a precise fit of about 30 to 100 µm.

Much, if not all, of the retention, depends on mechanical attributes: both the external surface of the tooth preparation and the internal surface of the restoration must be precise and complementary. If there is any significant variation from this adaptation model, the restoration will be lost rather quickly.

The known disadvantages of conventional glass ionomers (short working time, slow development of ultimate properties, sensitivity to both moisture exposure and dehydration during setting, and, when compared with resin cement, lower cohesive strength) have been largely addressed in the resin-modified GIC. The resin component hardens immediately after exposure to the light, resulting in an initial cement set.

The expanding resin-modified glass ionomer cement often exerts greater forces than ceramic can withstand, which can fracture under stress.

Although resin-modified glass ionomer cement can be used for metal full crowns and porcelain-fused-to-metal full crowns and bridges, they are contraindicated for all-ceramic restorations and veneers.

Adhesive cement is stabilized by adhesive bonding to both tooth structure and restoration, creating a monobloc. They are based on anhydrous and salinized nonreactive filler materials.

Adhesive cementation relay in a controlled environment. The earlier resin cement required that moisture be strictly controlled by effective isolation. Any moisture diminished or eliminated the bond strength.

The strengths of the adhesion at the various component interfaces, such as the tooth cement, and cement restoration, are all greater than the cohesive strength of the dentin itself.

Earlier composite resins required separate etchers, primers, and adhesives, necessitating many steps, and did not release fluoride. Because they hardened so well and quickly, it was important to remove any excess cement fast, before complete polymerization. Their major drawback is the need for separate procedures.

The one-step composite resin cement is the most recent addition to the cement family, it was first introduced in the early 2000s. it has high adhesion to restorative and enamel dentin surfaces.

The recent development of alumina and zirconia crowns and bridges has made many of the existing cement obsolete. Most current resin materials do not adhere to either the alumina or zirconia, and thus become luting rather than adhesive. For these restorations, a new category of resin-based cement has been developed, which includes an innovative primer (containing MDP) for the alumina and zirconia surfaces and the dual-cure resin cement. This cement is compatible with the treated restorative surface and the remaining enamel, dentin, or composite buildup of the abutment. If a restoration affixed with such cement needs to be removed from the tooth, it must be cut off.

Cement selection

To handle all the different restorative options, these days, a dentist would need three different types of cement at his disposal:

- Resin-modified glass ionomer.
- Adhesive resin cement.
- Self-adhesive resin cement and.

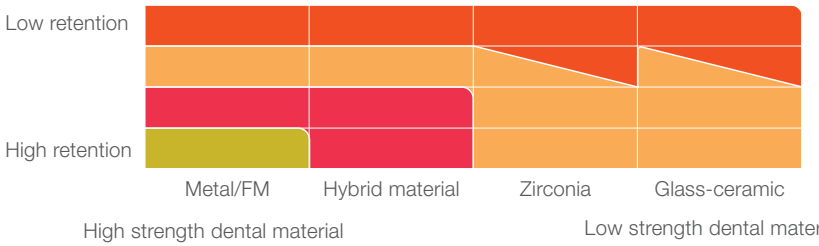
Glass ionomer cement has the easiest cleanup and is the least technique sensitive that comes at a price as it is also the least retentive to tooth preparation.

Resin cement all have specific properties that make them ideal for use in different situations. Resin cement is also the most aesthetic choice.

In summary, more retentive tooth preparation and stronger restorative material used, require less need for a self-adhesive/ adhesive resin cement.

The main criteria for the selection of the cement are the type of restorative material used and the retentiveness of the tooth preparation. There is a difference in the inherent strength of the restorative materials, for example, a glass ceramic restoration versus a Zirconia or PFM restoration. As the material strength decreases the need to choose a stronger bonded cement increases on the other hand zirconia is a very strong material, therefore it doesn't need strength to come from the cement, so a less technique-sensitive cement is suitable.

There are always several other factors that play into cement decisions, like the ability to maintain moisture control, Access to the area, patient cooperation, the prep design, and the need for speed or simplicity.



Glass ionomer cement | Resin modified cement | Self-adhesive resin cement | Self-adhesive universal resin cement

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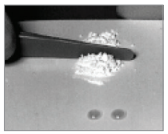
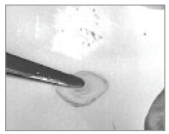
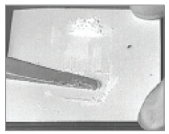
ProGlass™ One

Glass Ionomer Luting Cement

Designed for final cementation of metal inlays, onlays, posts, and orthodontic brackets.

- Chemically bonds to tooth structure & metal providing excellent strength and marginal integrity for long-term restorations.
- Self-curing.
- Releases substantially higher fluoride to assist with remineralization of the natural dentition.
- Does not contain resin, thus eliminating the problem of volumetric shrinkage after curing.
- Ideal for avoiding post-operative sensitivity.
- BPA free.
- Cost efficient solution.
- Quick and easy, without the need of etching and bonding steps of the tooth.


Applications	Metal / PFM	Porcelain / Ceramics	Zirconia / Alumina	Resin / Composite
Inlays / Onlays	■	■	N.A	■
Crowns / Bridges	■	■	-	■
Posts / Inlay cores	■	N.A	-	N.A

Features & Benefits

Sustained Fluoride Release

Resin Free

ProGlass™ Plus

Resin Reinforced Glass Ionomer Luting Cement

Combines the advantages of Glass ionomer with the benefits of Resin chemistry.

- Ideal in cases where the preparation provides sufficient retention or where isolation is difficult.
- Bonds chemically and mechanically to the tooth structure and all types of the core material.
- Ideal for avoiding marginal discoloration.
- Chemically bonds to dental tissue with good sealing ability.
- Used in self-care, light-cure, or dual-cure modes.
- Moisture tolerant solution, when a dry field cannot be assured.
- Quick and easy, without the need of etching and bonding steps of the tooth.
- Radiopaque and allows for useful diagnostic and excellent identification under x-ray.

Applications	Metal / PFM	Porcelain / Ceramics	Zirconia / Alumina	Resin / Composite
Inlays / Onlays	■■	■	N.A	■
Crowns / Bridges	■■	■	■	■
Posts / Inlay cores	■■	N.A	■	N.A

Features & Benefits

Sustained Fluoride Release

Moisture Tolerant

Light Cured

Radiopaque

ProGlass™ Plus CEM

Resin Modified Glass Ionomer Luting Cement

10 MDP MONOMER

Adhesive Resin Cement, that is Ideal for everyday use such as PFMs, zirconia, and metal and pediatric crowns. It chemically bonds to dental tissue with good sealing ability.

- Used in self-care, light-cure, or dual-cure modes.
- No pretreatment required.
- Light cure option and rubbery consistency that allows easy removal of excess and shortens cleanup to seconds.
- Releases substantially higher fluoride to assist with remineralization of the natural dentition.
- No post-operative sensitivity.
- Moisture tolerant solution, when a dry field cannot be assured.
- Radiopaque and allows for useful diagnostic and excellent identification under x-ray.
- Does not require refrigeration.
- Low glass thickness.





* Available in a dual syringe with a mixing tip!

Applications	Metal / PFM	Porcelain / Ceramics	Zirconia / Alumina	Resin / Composite
Inlays / Onlays	■■	■	N.A	■
Crowns / Bridges	■■	■	■	■
Posts / Inlay cores	■■	N.A	■	N.A
Veneers	N.A	■	-	-

Features & Benefits

- Sustained Fluoride Release
- Low Film Thickness
- Light Cured
- Ready For Application
- Radiopaque

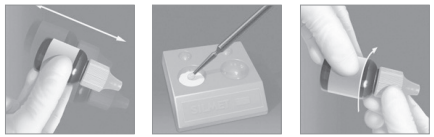
ProLink™ CEM

Self-Adhesive Resin Cement

A universal adhesive resin Cement with high adhesion to restorative and enamel. Ideal to use whenever additional retention is needed.

- Secure addition in all situations.
- Used in self-cure, or dual-cure modes.
- Moisture tolerant solution, when a dry field cannot be assured.
- A universal, aesthetic and powerful solution to all your adhesive cementation challenges.
- Radiopaque and allows for useful diagnostic and excellent identification under x-ray.

Applications	Metal / PFM	Porcelain / Ceramics	Zirconia / Alumina	Resin / Composite
Inlays / Onlays	■	■	N.A	■■
Crowns / Bridges	■	■	■	■■
Posts / Inlay cores	■	N.A	■	N.A
Veneers	N.A	■	■	■



ProLink™ CEM Primer

Primer For Zirconia & Glass Ceramic

10 MDP MONOMER

A preferable choice for low-retention surfaces as it enhances adhesion between indirect restorative materials and cement.

- Can be used with both adhesive and self-adhesive resin cement.
- Used in both self-cure and light cure modes.
- Single bottle delivery offers ease of dispensing.
- Contains dual coupling agents, 10-MDP, and silane methacrylate for increased bond strength to zirconium, alumina, glass-ceramics, metal alloys, and composites.
- Easy to use - just apply, wait 60 seconds, and dry.
- No pretreatment of restoration is required.
- Invisible, wear resistant margin for aesthetic outcomes.
- Radiopaque and allows for useful diagnostic.

Features & Benefits

Low Film Thickness

High Bond Strength

Moisture Tolerant

Light Cured

Radiopaque

Highly Esthetic

ProLink™ CEM Plus

Self-Adhesive Universal Resin Cement

Self-adhesive Universal resin cement

- The perfect choice when there is adequate retention. Offers one of the most secure holds with no need for additional bond, prime or etching steps.
- No pre-treatment of tooth or application of primer s for metal & zirconia.
- Thin film thickness (< 0.3 mm) ensures excellent fit of the prosthesis.
- Excellent color stability for long lasting aesthetic results.
- Predictable handling, optimized flow of the paste allows for exceptional ease of use and easy removal of excess material.
- Used in self-cure, light-cure, or dual-cure modes.
- Superior self-etch adhesive technology.
- Radiopaque and allows for useful diagnostic and excellent identification under x-ray.
- High and long-term fluoride release.
- No need for refrigeration.

* Available soon, in a dual syringe with a mixing tip!

* Also available in translucent



Applications	Metal / PFM	Porcelain / Ceramics	Zirconia / Alumina	Resin / Composite
Inlays / Onlays	■■	■■	N.A	■■
Crowns / Bridges	■■	■■	■■	■■
Posts / Inlay cores	■■	N.A	■■	N.A
Veneers	N.A	■	■	-

Features & Benefits


Low Film Thickness


High Bond Strength


Moisture Tolerant


Light Cured


Ready For Application


Radiopaque

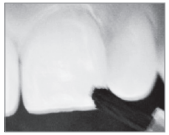

Highly Esthetic

ProVeneer™ flow

Veneer Resin Cement

Offers ideal adhesive cementation with high mechanical properties for ceramic or composite restorations with Low thickness (< 2.0 mm).

- Easy to apply with high precision and easy to remove excess, due to its non-sticky consistency and optimally balanced flow.
- Used in both self-cure and light cure modes.
- High translucency for highly esthetic results.
- Simple and direct application.
- Provides perfect connection thanks to innovation in filler technology.
- Low film thickness ensuring a closer fit of the restoration
- Efficient in comparison with highly flowable or pre-heated conventional composites.
- Radiopaque and allows for useful diagnostic and excellent identification under x-ray.


Applications	Metal / PFM	Porcelain / Ceramics	Zirconia / Alumina	Resin / Composite
Veneers	N.A	■	-	■■

Features & Benefits


Low Film Thickness


Light Cured


Ready For Application


Radiopaque


Highly Esthetic

Adhesive agents

Adhesive agents are used to bond restorative materials.Dental adhesives provide retention to composite fillings or composite cement. In addition to withstanding mechanical forces, and particular shrinkage stress from the lining resin composite, a good adhesive also should be able to prevent leakage along the restoration's margins. Clinically, failure of restorations occurs more often due to inadequate sealing, with subsequent discoloration of the cavity margins, than due to loss of retention.

The adhesive capacity of dental adhesives is based on a twofold adhesion. First, the adhesive adheres to enamel and

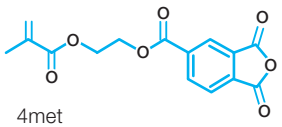
dentin, and second, the adhesive binds the lining resin composite. The latter is a process of co-polymerization of residual double bonds in the oxygen inhibition layer.

As for the bond to enamel and dentin, micromechanical adhesion is assumed to be the prime bonding mechanism. This is achieved by an exchange process by which inorganic tooth material is replaced by resin monomers that become interlocked in the retentions upon curing. Diffusion and capillarity are the primary mechanisms to obtain micro-mechanical retention.

However, recent self-etch adhesives with a mild pH do not completely expose collagen anymore. An additional mechanism of ionic bonding of acidic monomers and calcium in hydroxyapatite is established, which may explain the good clinical performance of some of these mild self-etch adhesives. Prolink Universal is such!

Chemical bonding can be achieved by adding Adhesive phosphate monomers (4-Met). This together with Carboxylic acid functional polymer (10-MDP) reacts with and bonds to hydroxyapatite. The presence of many carboxylic acid groups along a polymeric backbone/chain allows multiple bonds to the tooth surface

MDP



4met

Cross-linkers directly provide mechanical strength to the adhesive system. TEGDMA is usually used in conjunction with Bis-GMA or UDMA to form dens polymers. The higher flexibility of TEGDMA will compensate for the rigidity of Bis-GMA and admixture will result in resins with a higher conversion rate.

4-MET provides acidic and demineralizing properties and also enhances the wetting of metals. Many have reported improved adhesion to enamel and dentin due to the addition of 4-MET. 4-MET can establish an ionic bond with calcium in hydroxyapatite, though, less intense than other functional monomers, such as 10-MDP

10-MDP is mainly used as an etching monomer. Structurally, the long carbonyl chain renders this monomer quite hydrophobic. 10-MDP will be relatively hydrolysis stable, as water will be kept at a distance. This monomer is capable of forming strong ionic bonds with calcium. 10-MDP was rated as the most promising monomer for chemical bonding to hydroxyapatite of enamel or dentin, as opposed to 4-MET

Solvents drastically improve the wetting behavior of the adhesive. The wet nature of dentine only allows good wetting when a hydrophilic bonding is applied. This is done by adding hydrophilic monomers on the one hand, and a solvent on the other hand.

The remaining solvent in the adhesive may jeopardize polymerization due to the dilution of the monomers and may result in voids and hence permeability of the adhesive layer. Water is a strong polar solvent with a high dielectric constant, capable of dissolving ionic lattices and polar compounds and forming strong hydrogen bonds. However, water is a poor solvent for organic compounds (such as monomers), which are usually rather hydrophobic. This difficulty can be overcome by the addition of a secondary solvent, such as ethanol or acetone.

Unbalanced mixtures of ingredients may lead to reduced bonding effectiveness, durability, shelf life, and to phase-separation reactions, while a well-thought-out formulation will be the key to long-term clinical success.

Even though most adhesives contain the same components, they may differ significantly considering the proportional amount of ingredients. The chemical composition of contemporary adhesives determines their clinical success

The development of new ingredients and custom-made monomers seems most promising for further significant improvement of adhesives. Silmet will always continue to be at the forefront of such R&D.

Product/features	ProLink / ProLink Ethanol Single-Step Dental Adhesive	ProLink SE Self-Etch Adhesive	ProLink Universal Universal Dental Adhesive	ProLink Cem Primer
				
Solvent	Acetone / Ethanol	Acetone, Ethanol	Ethanol, Water	Ethanol, Water
Functional group	**TEGDMA, Bis-GMA**	**Bis-GMA, GPDM**	**RDX, MPTMS**	**GPDM**
Polymerizable Group	**Penta / 4-Met**	**Hema, 4-Met**	**10-MDP, 4- Met**	**10-MDP, 4- Met**
Number of steps	2	1	1	1
Generation	5	7	8	**N.A**
Light-Cured	■	■	■	N.A
Compatible with Light, Dual, and Self Cured Materials	■	■	■	■
Total-Etch Technique	■		■	
Self-Etch Technique		■	■	■
Selective-Etch Technique			■	
Single Bottle	■	■	■	■
Compatible with Both Direct & Indirect Restorations	■	■	■	
Compatible With Zirconia & Oxide Ceramics	■		■	■
Compatible with veneers				■
Best Uses	Direct Composite or Compomer restorations in the total-etch bonding technique.	One component dentin / enamel bonding agent. single component that combines etch, primer and Adhesive, for ease of application.	To be used with self or dual-cure composite in any bonding technique. One adhesive in the clinic for all restorations.	One universal primer for all your indirect restorations with enhanced adhesion between indirect restorative material and cement.

Cements

ProGlass One	171001 (35g/14ml) / 171002 (8g/5ml)
ProGlass Cem	17P001 (15g/9ml) / 17P002 (8g/15ml)
ProGlass Plus Cem	17P9UN-C (9g) / 17P3UN-C (3g), 17P9UN-CM (9g) / 17P3UN-CM (3g)
ProLink Cem	15C8UN (8g), 15C5UN (5g), 15C8TR (9g), 15C5TR, (5g)
ProLink Cem Primer	150501-P
ProLink Cem Plus	15C8PUN (8g), 15C5PUN (5g), 15C8PTR (9g), 15C5PTR, (5g)
ProVeneer Flow	183PV2

Adhesives

ProLink	150005 (5ml)
ProLink Ethanol	150005-ET (5ml)
ProLink SE	15SEKT (4ml)
ProLink Universal	1505UN(5ml), 1503UN (3ml)

Silmet has been a preferred provider of restorative materials for OEM and private label services for more than 50 years among numerous dental manufacturers and major international brand names.

We employ state-of-the-art technology, sophisticated automated equipment, and QA monitoring systems.

The USA, North America, Europe, Asia, and Latin America are all regions where our products are sold.

The key to Silmet's success is the 8% of sales that is set aside annually for product development, design, and research, as well as for new and creative distribution methods.

Health Canada Santé Canada ISO 13485 CE FDA 510(K) MDSAP

SILMET

SILMET Ltd.

12 Hasadna st. Or-Yehuda 6022011, israel, Tel: 972-3-5331474, www.pro-veneer.com, info@silmet.co.il, www.silmetdental.com