

**3M** Science.  
Applied to Life.™

# Ketac™ Universal Aplicap™ Glass Ionomer Restorative

## Technical Data Sheet



# Introduction

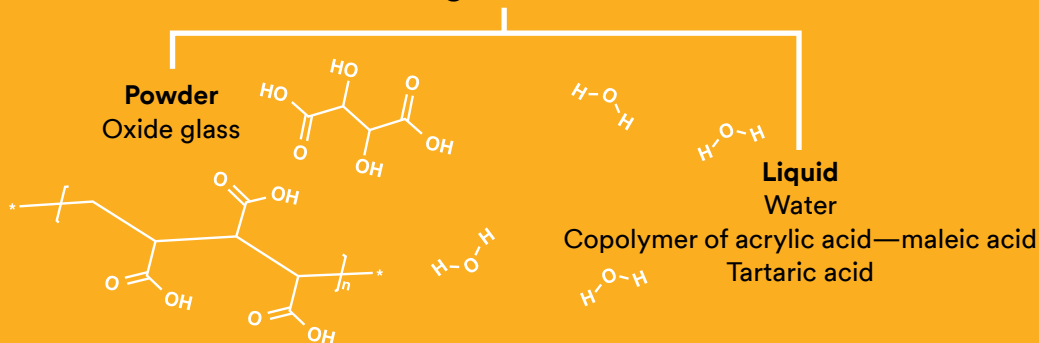
Ketac™ Universal Aplicap™ Glass Ionomer Restorative is the latest development in a long history of proven glass ionomer technology from 3M. It's designed to save steps for a faster procedure, so it's ideal for treating pediatric, geriatric and teenage patients—who can be the most caries-prone and the most restless. Ketac Universal Aplicap restorative offers low stickiness for easy handling AND reduces chair time with a simple one-step placement ... so you can finish faster. The material can be used without preconditioning the cavity and without a coating, so it eliminates steps—yet still delivers compressive strength and surface hardness that are higher than several competitive glass ionomers which require a coating. Ketac Universal Aplicap restorative is mixed in triturated capsules to initiate the acid-base setting reaction of the glass ionomer. The capsule has a tapered nozzle, which enables better access to the cavity for the one-step procedure. The material is indicated for an extended range of indications, making it a universal solution for the dental practice.

## Indications for Use

- Linings for single- and multiple-surface composite fillings
- Core build-up prior to crown placement
- Primary tooth fillings
- Stress-bearing Class I restorations with at least one additional support outside of the filling area
- Stress-bearing Class II restorations when the isthmus is less than half of the intercuspal distance and with at least one additional support outside of the filling area
- Cervical fillings, if aesthetics is not the prime consideration
- Single- and multiple-surface temporary fillings
- Fissure sealing

## Composition

### Ingredients\*

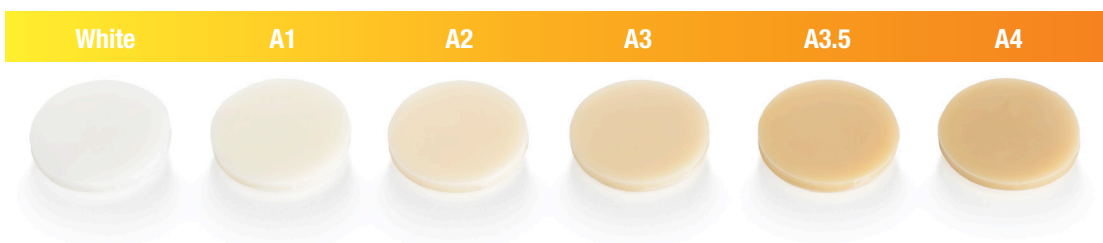


### BPA free

None of the ingredients present in the composition of Ketac™ Universal Aplicap™ Glass Ionomer Restorative are BPA or substances using the BPA backbone in their structure. There are no BPA derivatives present, either.

## Shades

Ketac Universal Aplicap restorative is available in 6 shades: White, A1, A2, A3, A3.5 and A4.

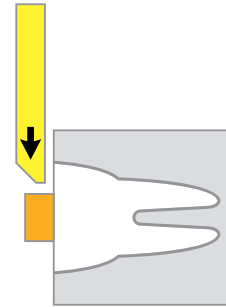


\*Refer to MSDS for more information

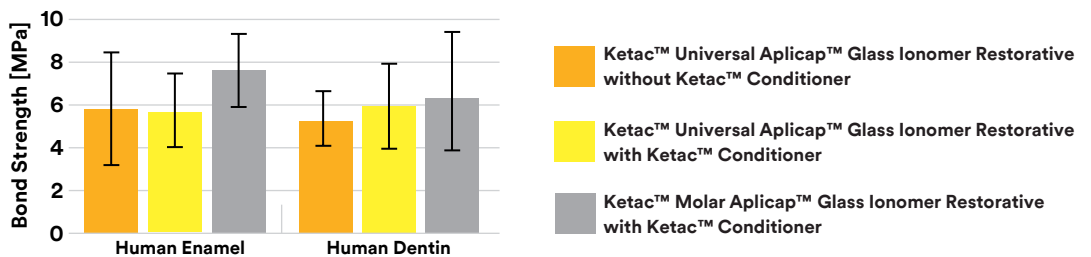
## No need for conditioner

### Adhesion

To evaluate the influence of the conditioning step, adhesion was tested with and without a conditioner. Bond strength on human teeth was measured using a Shear Bond Test. The material was cured on exposed human enamel/dentin. Specimens were then kept at 36°C and over 95% relative humidity for 24 hours. Adhesion was subsequently tested in a universal testing machine cell until failure.



### Bond Strength of Ketac™ Universal Aplicap™ Glass Ionomer Restorative to Enamel and Dentin



**Figure 1: Adhesion to enamel and dentin. The adhesion values of Ketac™ Universal Aplicap™ Glass Ionomer Restorative without a conditioner are comparable to the adhesion values of Ketac™ Universal Aplicap™ Glass Ionomer Restorative and Ketac™ Molar Aplicap™ Glass Ionomer Restorative with a conditioner. Therefore, the application of a conditioner prior to placement of Ketac Universal Aplicap restorative is not necessary.**

Source: 3M internal data



**Ketac Universal Aplicap restorative offers comparable adhesion values whether used with or without a conditioner, so a conditioner is not necessary.**

The results are in line with multiple in vivo and in vitro studies, which have shown that using a conditioner does not necessarily improve the adhesion of glass ionomers to the natural tooth structure. Literature shows that application of a conditioner prior to placement of the filling is successful in removing the “smear” layer. However, this step is not necessary, possibly because there is adequate free acid in glass ionomers to dissolve the smear layer at the time of the restoration placement.\*

\*Yassen, G. (2009). One-year survival of occlusal ART restorations in primary molars placed with and without cavity conditioner. *J Dent Child.* 76:136-141.

van Dijken, J. W. V. (1996). Four-year evaluation of the effect of 10% polyacrylic acid or water rinsing pretreatment on retention of glass polyalkenoate cement. *Eur J Oral Sci.* 104:64-66.

Tyas, M. J. (1994). The effect of dentine conditioning with polyacrylic acid on the clinical performance of glass ionomer cement—3-year results. *Aust Dent J.* 39:220-221.

Bortoletto, C. C., Junior Miranda, W. G., Motta, L. J., Bussadori, S. K. (2013). Influence of acid etching on shear strength of different glass ionomer cements. *Braz J Oral Sci.* 12: 11-15.

# Strong enough for stress-bearing indications

A faster, easier procedure is great—but you want assurance that reducing chair time doesn't mean compromising on performance. Ketac™ Universal Aplicap™ Glass Ionomer Restorative saves time by eliminating the need for a coating—yet still delivers compressive strength and surface hardness that are higher than several competitive glass ionomers which require one.

## Compressive Strength

Compressive strength is particularly important because of chewing forces. To test this, simultaneous forces are applied to the opposite ends of a rod-shaped sample of material. The sample failure is a result of shear and tensile forces.

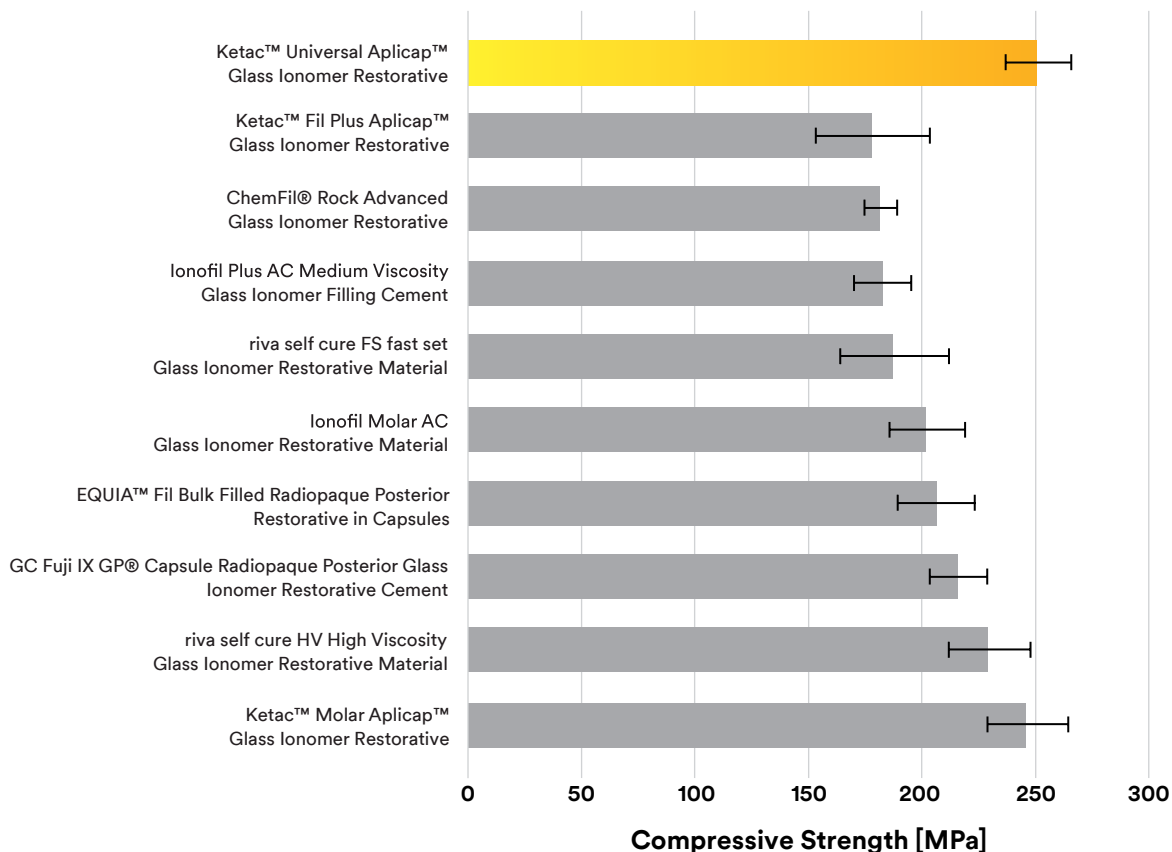
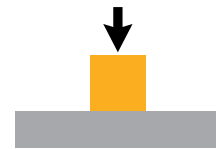


Figure 2: Compressive strength of common glass ionomer restoratives.

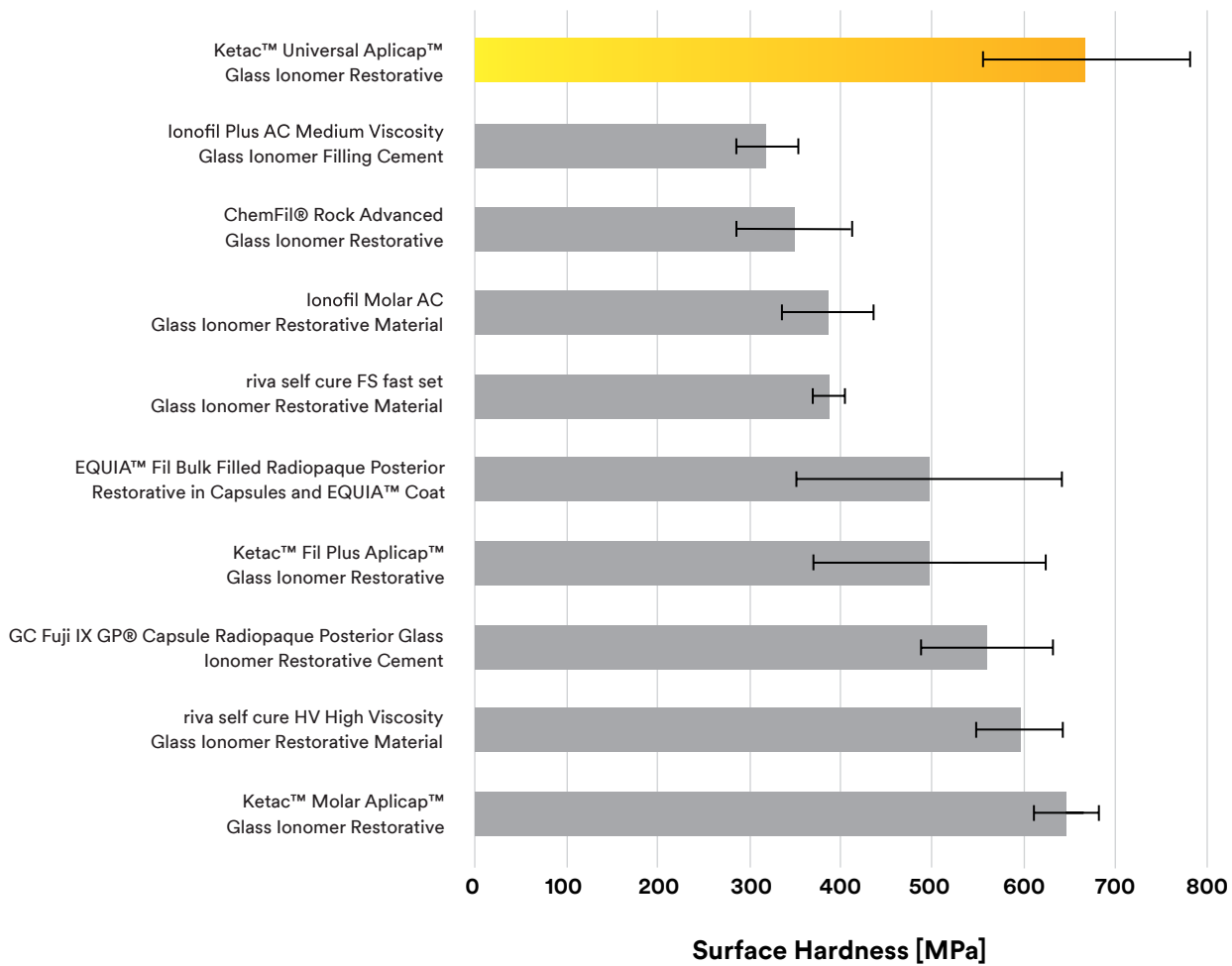
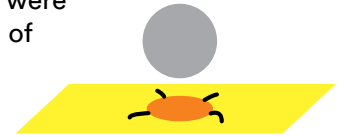
Source: 3M internal data



The compressive strength of Ketac Universal Aplicap restorative is significantly higher than several competitive glass ionomer restoratives in capsules, including GC Fuji IX GP Capsule, EQUIA Fil, ChemFil Rock, Ionofil Plus AC, Ionofil Molar AC, riva self cure FS fast set and Ketac™ Fil Plus Aplicap™ Glass Ionomer Restorative.

# Surface Hardness

Surface hardness was measured on disc-shaped specimens (diameter: 6 mm) 24 hours after mixing the restorative. A testing machine with a ball-shaped indenter (diameter: 5 mm) was used. Samples were loaded with a force of 357.9 N for 30 seconds. Thereafter, depth of penetration was measured and the surface hardness calculated.



**Figure 3: Surface hardness of common glass ionomer restoratives.**

Source: 3M internal data

The surface hardness of Ketac™ Universal Aplicap™ Glass Ionomer Restorative is higher than Ionofil Plus AC, ChemFil Rock, Ionofil Molar AC, riva self cure FS fast set, EQUIA Fil and Ketac™ Fil Plus Aplicap™ Glass Ionomer Restorative, and equivalent to GC Fuji IX GP Capsule, riva self cure HV and 3M's own Ketac™ Molar Aplicap™ Glass Ionomer Restorative.

# Viscosity

This test mechanically simulates a ball-shaped metal plunger (sphere diameter: 3 mm, speed: 5 mm/sec.) placed onto the restorative material during its setting phase. The force needed to move the ball a certain distance (3 mm) into the paste is measured. The higher this force is, the higher the viscosity of the tested material.

Ketac™ Universal Aplicap™ Glass Ionomer Restorative has a medium viscosity.

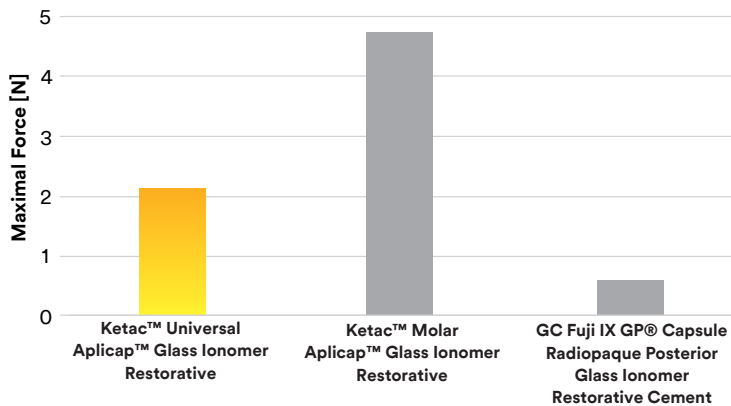
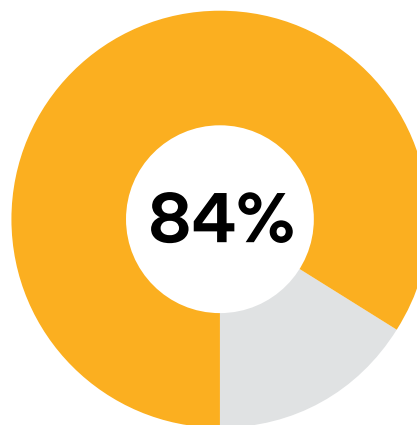


Figure 4: Viscosity of glass ionomer restoratives.

**84% of dentists who evaluated Ketac Universal Aplicap restorative clinically agreed or fully agreed that the design of the nozzle leads to better access to deep cavities. The viscosity is lower than Ketac™ Molar Aplicap™ Glass Ionomer Restorative, enabling the extrusion of the mixed paste through the new tapered nozzle for better access to the cavity.**

Source: 3M internal data



# Stickiness

The quality of being non-sticky is a fundamental factor for the practitioner. While a restorative material should not stick to dental instruments while filling the cavity, it should be sticky enough to stay in the prepared cavity.

This laboratory test mechanically simulates a ball plunger being placed onto restorative material and removed, highlighting the level of “pull back” or stickiness of a material—as seen in the pictures below.

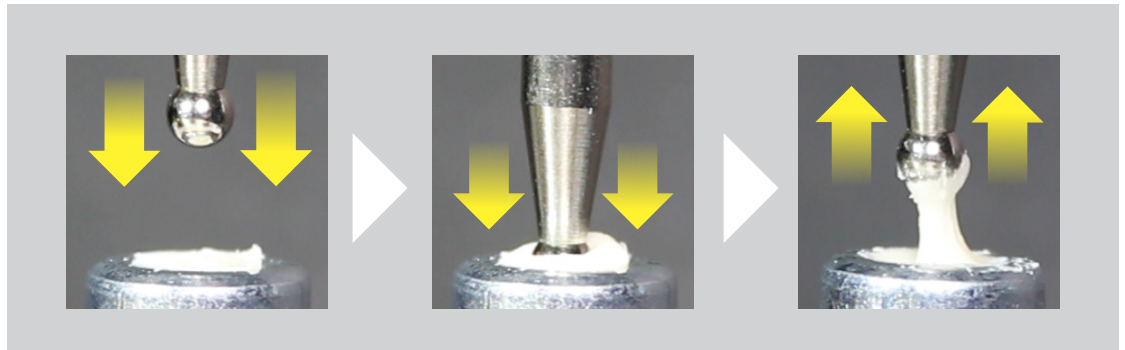


Figure 5: Test method: dipping of the plunger into the mixed paste and withdrawal immediately afterwards.

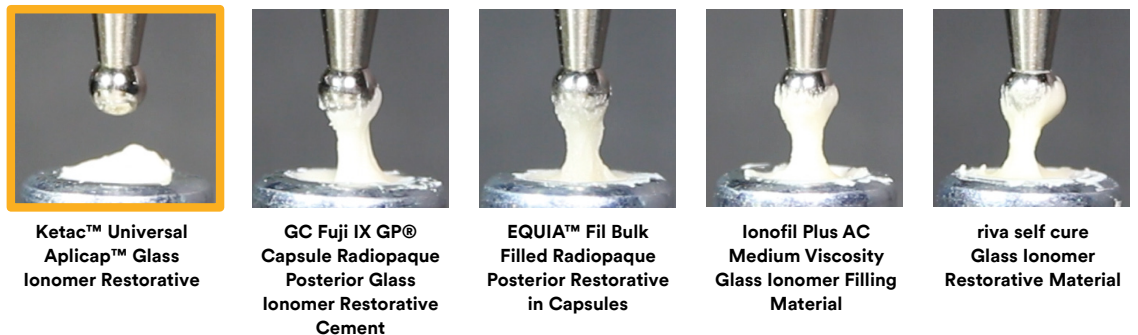


Figure 6: Stickiness test: different materials after withdrawal of the steel ball.

Source: 3M internal data



While Ketac™ Universal Applicap™ Glass Ionomer Restorative does not stick to the metal ball, other glass ionomer materials display a clear “pull back” effect when the ball plunger is lifted.

[www.3M.com/KetacUniversal](http://www.3M.com/KetacUniversal)



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