<table>
<thead>
<tr>
<th>Provisional Cements</th>
<th>TempoSIL Coltene/Whaledent</th>
<th>Cling Clinician’s Choice</th>
<th>TempoCem DMG/Zenith</th>
<th>TempoCem NE DMG/Zenith</th>
<th>TempoCem Soft DMG/Zenith</th>
<th>Temp-Bond Kerr</th>
<th>Temp-Bond NE Kerr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost/g Kits</td>
<td>$2.56</td>
<td>$4.99</td>
<td>$4.59</td>
<td>$4.82</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Refills</td>
<td>$1.99</td>
<td>$1.94–$3.16</td>
<td>$2.04–$3.16</td>
<td>$1.94</td>
<td>$0.54</td>
<td>$0.29</td>
</tr>
<tr>
<td></td>
<td>Refills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composition</td>
<td>Zinc Oxide, polydimethylsiloxane</td>
<td>Zinc Oxide, Polycarboxylate Resin</td>
<td>Zinc Oxide, Eugenol, Resin</td>
<td>Zinc Oxide, Eugenol, Resin</td>
<td>Zinc Oxide, Eugenol, Resin</td>
<td>$1.94</td>
<td>$0.29</td>
</tr>
<tr>
<td>Curing</td>
<td>Self</td>
<td>Self</td>
<td>Self</td>
<td>Self</td>
<td>Self</td>
<td>Self</td>
<td>Self</td>
</tr>
<tr>
<td>Shade</td>
<td>White</td>
<td>Light Yellowish Cream</td>
<td>Light Cream</td>
<td>Light Cream</td>
<td>Light Cream</td>
<td>Light Cream</td>
<td>Light Cream</td>
</tr>
<tr>
<td>Translucency/opacity (%)</td>
<td>99</td>
<td>98</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Delivery</td>
<td>Automix Syringes</td>
<td>Automix Syringes</td>
<td>Automix Cartridges, Automix Syringes</td>
<td>Automix Cartridges, Automix Syringes</td>
<td>Automix Cartridges, Automix Syringes</td>
<td>Tubes</td>
<td>Foil Packets</td>
</tr>
<tr>
<td>Flow</td>
<td>5.0</td>
<td>5.0</td>
<td>4.0</td>
<td>5.0</td>
<td>3.0</td>
<td>4.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Extraoral Working Time (min)</td>
<td>50 seconds</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
<td>2.5</td>
<td>2.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Excess Cement Removal Time (min)</td>
<td>2.0</td>
<td>3.0</td>
<td>2.0</td>
<td>3.0</td>
<td>4.5</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Effect on Bond Strength (MPa) compared to control</td>
<td>Cleaned w/ Consepsis</td>
<td>None</td>
<td>None</td>
<td>Slightly Lower</td>
<td>Higher</td>
<td>None</td>
<td>Slightly Lower</td>
</tr>
<tr>
<td></td>
<td>Cleansed w/Preppies w/ICB</td>
<td>None</td>
<td>None</td>
<td>Slightly Lower</td>
<td>Slightly Lower</td>
<td>Slightly Lower</td>
<td>Slightly Lower</td>
</tr>
<tr>
<td>Mixing tips</td>
<td>Per Cartridge</td>
<td>N/A</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Per Syringe</td>
<td>10</td>
<td>12</td>
<td>5</td>
<td>5</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

None = Equal To Control  Lower = Lower Than control
Higher = Higher Than Control  DNT = Did not test

1 0% 100%
TRANSLUCENT OPAQUE

2 0.0 1.0 2.0 3.0 4.0 5.0
MOST FLOW LEAST FLOW

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## Provisional Cements

<table>
<thead>
<tr>
<th>Provisional Cements</th>
<th>Kits</th>
<th>Refills</th>
<th>Composition</th>
<th>Curing</th>
<th>Shade</th>
<th>Translucency/Opacity (%)</th>
<th>Delivery</th>
<th>Flow</th>
<th>Extraoral Working Time (min)</th>
<th>Excess Cement Removal Time (min)</th>
<th>Effect on Bond Strength (MPa) compared to control</th>
<th>Mixing tips Per Cartridge</th>
<th>Mixing tips Per Syringe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Durelon</strong> 3M ESPE</td>
<td>N/A</td>
<td>N/A</td>
<td>Poly-Carboxylate Resin, Fluoride</td>
<td>Self</td>
<td>Pinkish-White Translucent</td>
<td>96</td>
<td>Automix Capsules 3.5</td>
<td>5.0</td>
<td>2.5</td>
<td>5.5</td>
<td>Higher Slightly Lower None</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Temp-Bond Clear</strong> Kerr</td>
<td>N/A</td>
<td>$2.46</td>
<td>Zinc Oxide, Carboxylic acids</td>
<td>Dual</td>
<td>Translucent</td>
<td>12</td>
<td>Syringes 4.5</td>
<td>4.0</td>
<td>2.0</td>
<td>4.5</td>
<td>None Slightly Lower Lower</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Zone</strong> Dux</td>
<td>N/A</td>
<td>$1.20</td>
<td>Poly-Carboxylate</td>
<td>Self</td>
<td>Cream-like with a yellowish hue</td>
<td>99</td>
<td>Dual-barrel Hand-mixed Syringes 5.0</td>
<td>5.0</td>
<td>1.5</td>
<td>4.0</td>
<td>None None None DNT</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>UltraTemp Ultradent</strong></td>
<td>N/A</td>
<td>$3.00</td>
<td>Poly-Carboxylate</td>
<td>Self</td>
<td>Light Cream</td>
<td>96</td>
<td>Autonmix Syringes 5.0</td>
<td>5.0</td>
<td>1.5</td>
<td>4.0</td>
<td>None None None DNT</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Cost/g
- Kits: N/A
- Refills: N/A
- Refills: $2.46
- Refills: $8.42
- Refills: $2.50
- Refills: $9.38
- Refills: $0.75
- Refills: $1.20
- Refills: $4.00
- Refills: $2.46
- Refills: $8.42
- Refills: $2.50
- Refills: $9.38
- Refills: $0.75
- Refills: $1.20
- Refills: $3.00

### Composition
- Poly-Carboxylate
- Resin, Fluoride
- Zinc Oxide, Carboxylic acids
- Poly-Carboxylate
- Zinc Oxide, Eugenol
- Zinc Oxide, Poly-organic Acids
- UDMA, BIS-GMA, Silica Filler, Potassium Nitrate, Benzoyl Peroxide
- Zinc Oxide, Diurethane dimethacrylate monomer
- Zinc Oxide, Potassium Nitrate, Sodium Fluoride, Chlorhexidine, Levulinic Acid

### Curing
- Self
- Dual
- Self
- Self
- Self
- Self
- Self

### Shade
- Pinkish-White
- Translucent
- Cream-like with a yellowish hue
- Light Cream
- Off-white
- Off-white
- White
- Light Pink
- Light Cream

### Translucency/Opacity (%)
- 96
- 12
- 99
- 96
- 99
- 12
- 100
- 73
- 75
- 76
- 97

### Delivery
- Automix Capsules
- Syringes
- Dual-barrel Hand-mixed Syringes
- Automix Syringes
- Tubes
- Foil Packets
- Automix Syringes

### Flow
- 3.5
- 4.5
- 5.0
- 5.0
- 4.0
- 5.0
- 5.0
- 4.5
- 4.5
- 3.0
- 4.0-4.5
- 3.5
- 3.0
- 4.5

### Extraoral Working Time (min)
- 2.5
- 2.0
- 1.5
- 2.5
- 2.5
- 2.5
- 2.5
- 5.0

### Excess Cement Removal Time (min)
- 5.5
- 4.5
- 4.0
- 4.5
- 4.0
- 4.0
- 4.5
- 4.5
- 3.0
- 3.5
- 3.0
- 3.5
- 3.0
- 3.5

### Effect on Bond Strength (MPa) compared to control
- Cleaned w/ Consepsis
- Slightly Lower
- None
- Higher
- Slightly Lower
- Lower
- None
- Higher
- Slightly Lower
- Lower
- None
- Higher
- None
- Higher

### Mixing tips
- Per Cartridge: N/A
- Per Syringe: N/A
- Per Cartridge: N/A
- Per Syringe: N/A
- Per Cartridge: N/A
- Per Syringe: N/A
- Per Cartridge: N/A
- Per Syringe: N/A
- Per Cartridge: 15
- Per Syringe: 10
- Per Cartridge: 15
- Per Syringe: 12
- Per Cartridge: 15
- Per Syringe: 12
- Per Cartridge: 15
- Per Syringe: 12

## Provisional Cements

<table>
<thead>
<tr>
<th>Provisional Cements</th>
<th>RelyX Temp E 3M ESPE</th>
<th>RelyX Temp NE 3M ESPE</th>
<th>SensiTemp Resin Sultan Healthcare</th>
<th>TNE Temrex</th>
<th>Temp Advantage GC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost/g</td>
<td>Kits: N/A</td>
<td>Refills: $0.62</td>
<td>Refills: $0.57</td>
<td>$2.00-$4.08</td>
<td>$3.80</td>
</tr>
<tr>
<td></td>
<td>Refills: $0.62</td>
<td>$0.57</td>
<td>$2.00-$5.29</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Composition: Zinc Oxide, Eugenol</td>
<td>Zinc Oxide, Poly-organic Acids</td>
<td>UDMA, BIS-GMA, Silica Filler, Potassium Nitrate, Benzoyl Peroxide</td>
<td>Zinc Oxide, Diurethane dimethacrylate monomer</td>
<td>Zinc Oxide, Potassium Nitrate, Sodium Fluoride, Chlorhexidine, Levulinic Acid</td>
</tr>
<tr>
<td></td>
<td>Curing: Self</td>
<td>Self</td>
<td>Self</td>
<td>Self</td>
<td>Self</td>
</tr>
<tr>
<td></td>
<td>Shade: Off-white</td>
<td>Off-white</td>
<td>White</td>
<td>Light Pink</td>
<td>Light Cream</td>
</tr>
<tr>
<td></td>
<td>Translucency/Opacity (%)</td>
<td>96</td>
<td>100</td>
<td>73</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Delivery: Tubes</td>
<td>Tubes</td>
<td>Automix Cartridges, Automix Syringes</td>
<td>Hand-mixed syringes</td>
<td>Automix Syringes</td>
</tr>
<tr>
<td></td>
<td>Flow</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>Extraoral Working Time (min)</td>
<td>2.5</td>
<td>1.5</td>
<td>1.75</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Excess Cement Removal Time (min)</td>
<td>4.5</td>
<td>3.0</td>
<td>4.0-4.5</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Effect on Bond Strength (MPa) compared to control</td>
<td>Cleaned w/ Consepsis: None</td>
<td>Slightly Lower</td>
<td>Higher</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Cleansed w/Preppies w/ICB</td>
<td>Lower</td>
<td>None</td>
<td>Higher</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Mixing tips Per Cartridge</td>
<td>N/A</td>
<td>N/A</td>
<td>15</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Mixing tips Per Syringe</td>
<td>N/A</td>
<td>N/A</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>
A dislodged provisional is a major inconvenience to both dentists and patients. This event usually happens in the evening, weekends, or when the dentist or patient is out of town. Therefore, luting a provisional so it does not dislodge prematurely is an important requirement for a provisional cement.

On the other hand, too much retention is not good either, since you don’t want to place undue pressure on the tooth or restoration when it’s time to remove it so the definitive restoration can be luted. Thus provisional cements are almost in a no-win position.

They are most commonly used for the period between the preparation and seating of a definitive restoration, but we also need cements for long-term provisionals. For these latter types, a more “permanent” type of cement such as a polycarboxylate may be used.

Besides good retention and stress-free removal, we also need a material that will clean up easily after it sets. In addition, it should be easily removed from inside a provisional restoration just in case you need to recement it, should be easily removed from the tooth preparation, and should not affect the adhesion of the definitive restoration.

**Bond Strength**

We tested all the provisional cements concerning their effect on bond strength after cleaning the tooth with either Preppies, using an ICB in a slowspeed handpiece, or Consepsis.

Note that, due to different testing periods, the controls may be different for different cements. That is the reason you should compare the individual bond strengths to the controls, not to those of other cements. The results are listed in the commentary for each product.

**Translucency/Opacity**

Discs of all products in 100µ thicknesses (to simulate the thickness of the cement under a provisional restoration) were measured for relative degrees of translucency/opacity in a spectrophotometer. The scale was 0–100, with 0 being totally clear and 100 being totally opaque. Our findings are in each product’s commentary.

While the shade of a provisional cement is not critical, it can certainly affect the appearance of a thin provisional crown, especially if the provisional material is more translucent than opaque. This is especially true of the white or off-white, opaque cements that can shine through a provisional restoration.

Therefore, if you are seating a provisional restoration that is 1.0mm or less in thickness, you may want to select a more translucent cement. Unfortunately, the list of these translucent cements is quite short, although the products that fall into this niche are good, solid performers.

**Extraoral Working Time**

If you have an assistant and are using an automix material, you will rarely if ever have to worry about the cement prematurely setting up in
the restoration before you fully can seat it. However, if you are working alone, seating multiple provisionals at one time, and/or using a hand-mixed version, you may find yourself going through the inconvenience of removing a partially seated provisional restoration to try again. Therefore, having adequate working time is very important in saving you from the aforementioned scenario.

Extraoral working time could be especially critical when you are working alone. In this scenario, you (the dentist) would most likely mix and load the provisionals with cement and then place them on the bracket table or cart. You would then redirect your attention to the patient, hoping he or she has not closed in the interim, which would require you to rinse and dry the preparations once again. You then retrieve and seat the provisionals in the patient’s mouth, hoping the cement has not prematurely set. Therefore, the time between mixing, loading, and seating the provisionals could be critical.

To test this working time, we used a test restoration and standardized preparation. For the control, we loaded cement into the test restoration (crown) and immediately seated it on the preparation and visually assessed the marginal integrity. We then repeated the test, but instead of seating the restoration immediately after mixing and loading the cement, the crown was allowed to sit on the countertop for a duration consistent with the manufacturer's stated extraoral working time (if the manufacturer gave a range, we tested the shortest and longest times).

Then the crown was seated and the marginal integrity was again assessed. If there was no difference between the control and test specimens, we concluded that the stated working time was accurate. However, if the working time was not correct and a marginal gap was created by the partially set cement, we made note of that fact. In this instance, you would be well advised to seat your restorations before the working time expired. The results can be found in each product’s commentary.

**Excess Cement Removal Time**

We mixed each cement, loaded it quickly into a provisional crown, seated it on an extracted tooth, and placed it in the T/H chamber. When the cement was set to the point that the excess could be removed cleanly, we recorded the time, which is noted in each product’s commentary.

**Description**

Self-cure, zinc oxide/polydimethylsiloxane-based, automix.

**Consistency and Handling**

5.0  Viscosity prevents dripping, but it still allows easy seating of the restoration. Removing excess cement is very easy. One evaluator thought it was sticky.

**Effect on Bond Strength**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>BOND STRENGTH (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>Cleaned w/Consepsis</td>
<td>19.1</td>
</tr>
<tr>
<td>Cleaned w/Preppies using an ICB</td>
<td>21.9</td>
</tr>
<tr>
<td>TempoSIL</td>
<td></td>
</tr>
<tr>
<td>Cleaned w/Consepsis</td>
<td>19.9</td>
</tr>
<tr>
<td>Cleaned w/Preppies using an ICB</td>
<td>21.7</td>
</tr>
</tbody>
</table>

**Extraoral Working Time**

About 50 seconds (directions say 50 seconds).

**Excess Cement Removal Time (minutes)**

About 2.0.

**Shade**

White.

**Translucency/Opacity (T/O %)**

99