Technical Manual

GC GRADIA
Total Aesthetic Harmony

New concept
Light curable micro-ceramic-composite for Crown & Bridge, Inlays and Veneers with unsurpassed durability, natural opalescence and excellent lifelike aesthetics.
# INDEX

**Introduction** ............................................................... 1

1. **GC GRADIA Components** ........................................ 2
2. **Shade Combination Chart** .................................... 4
3. **GC GRADIA Features** ........................................... 5
4. **Clinical Procedures** .............................................. 9
5. **Composite Build-up Procedure** ............................... 12
   1) Anterior veneer crown (incisal free metal backing) ....... 12
   2) Anterior jacket crown ............................................. 17
   3) Posterior inlay ..................................................... 20
   4) Posterior jacket crown / total-coverage composite crown .... 22
   5) Anterior veneer crown (incisal metal backing) ............. 24
6. **Physicals / Cure Times / Cure depth** ......................... 28
7. **Packaging** .......................................................... 29
8. **Contents of Kits and Refill Packages** ....................... 30
9. **Questions and Answers** .......................................... 31
10. **Precautions** .......................................................... 33
Light-cured composites for dental restorations have become popular thanks to their excellent physical properties and ease of use. With growing demands for higher aesthetics in dental treatments, also superior quality has become a crucial requirement. This implies a higher availability of composites of superior aesthetics and quality, next to ceramics. Dentists and Dental Technicians likewise were seeking a durable dental composite that rivaled the aesthetics of porcelain: however so far, composite fillers affected the translucency and opalescence of C&B composite systems. With this as background, GC GRADIA has been developed with all these requirements in mind. New GC GRADIA resulted in a high-strength micro-hybrid composite system with the brightness, translucency and warmth in the oral environment likewise porcelain, useful for inlays, veneers and crowns. The aesthetic potential of this composite has been thoroughly reviewed. Instead of the pale colour that is typical for traditional C&B composites, GC GRADIA features a bright and warm colour that makes it similar to the best ceramic now available. Once in the mouth, GC GRADIA has an appearance that closely resembles the natural tooth, which was not feasible with traditional composites.

GC GRADIA features a high mechanical strength, thanks to its hybrid MFR formulation of polymer that has reinforced bonding between the organic-inorganic filler and the lightly filled matrix resin. GC GRADIA shows excellent physical properties such as surface smoothness (typical of MFR composites) and wear-resistance. It is bio-compatible and kind to opposing dentition. In addition to the lifelike tooth shades GC GRADIA offers easy to apply opaque materials with excellent flow and cure properties. The thin, even layers of FOUNDATION OPAQUE and OPAQUE shades mask color effectively and are easily and quickly light cured. All shades of GC GRADIA polymerize completely with short irradiation times using the GC STEPLITHT SL-I during layering and characterization followed by the GC LABOLIGHT LV-III for final curing. Polymerization results in no change to GC GRADIA’s colour allowing technicians to see subtle colours of the final restoration throughout all phases of fabrication.

GC GRADIA introduces a new standard for dental composites with better aesthetics and a wider range of clinical applications. We believe GC GRADIA will meet the needs of dentists and laboratory technicians as a restorative material for both anterior and posterior applications in the mouths of the most aesthetically demanding patients.
1. GC GRADIA COMPONENTS

- **FOUNDATION OPAQUE (FO):** 1 shade
  A paste-type opaque with exceptional light-curing characteristics. Flows readily into small areas. Polymerizes even in undercut areas of framework and has a bright light yellow color, as an ideal base for additional opaque applications.

- **OPAQUE (O):** 16 shades
  A paste-type opaque that applies readily, flows easily yet will not drip or run. Exceptional masking properties. The 16 shades express all of the basic tooth shades.

- **MARGIN OPAQUE (MO):** 1 shade
  Usually applied after the FOUNDATION OPAQUE in widths of 1 mm around the cervical margin. Effective in masking unwanted alloy show through around the margin. Can also be used on molar occlusal and lingual surfaces of jacket crowns. Easy to apply and fluid without running. It can be used in combination with OPAQUE to modify the standard colour.

- **OPAQUUS DENTIN (OD):** 22 shades: 16 based on Vita® shades and 6 shades of OPAQUUS DENTIN INTENSIVE
  When thick layers of composite can not be applied, OPAQUUS DENTIN (opaque dentin) can be used instead of the regular DENTIN to reduce the white shade of OPAQUE and express a deeper colour. OPAQUUS DENTIN can also be used as a cervical colour (choosing one shade darker than the crown’s, for instance ODA3.5 for an A3) in order to achieve deeper shades in the cervical and root areas.

- **SHOULDER DENTIN (SD):** 6 shades
  Used, among other things, to make custom shades. SHOULDER DENTIN creates deeper, richer cervical and root colours and reproduces the reflective brightness of natural teeth. In addition, can be used to mask the underlying alloy.

- **DENTIN (D):** 16 shades
  Has exceptional elongation properties and strength. These features permit forming it into delicate, long, finger-like strands or other like shapes. Masking ability is superb and exhibits a brighter colour which can reflect through a larger amount of Enamel. Superior to conventional dentin materials.

- **INTENSIVE COLOR (IC):** 15 shades
  This group consists of 14 colours, frequently used in porcelain, and one Clear (IC0), which can also be used to subdue the colour intensity of the 14 shades. The stains can be used after applying OPAQUE, DENTIN and ENAMEL. Where incisel is backed by alloy and lacking clarity, applying (IC7) Lavender creates an appearance of translucency.

- **ENAMEL (E):** 4 basic shades
  Enamel shades eliminate a too strong opalescence and the pale, whitish look of conventional materials. These exhibit warmth and true translucency.
■ HALO ENAMEL (HE): 1 shade
Frames and contours the tooth when applied at the incisal edge, the proximal surfaces or the occlusal of posterior teeth. Comes in easy-to-apply, delicate yellow colored paste.

■ PEARL ENAMEL (PE): 2 shades
White pastes used at cusp tips to create decalcification spots and other white blemishes found in natural teeth.

■ ENAMEL INTENSIVE (EI): 3 shades
Highly translucent. In a multi layering application, deep colour and depth can be obtained by using in the same manner as a conventional Enamel. In particular, it can be used for the occlusal surfaces of posterior teeth.

■ TRANSLUCENT (T): 5 shades
Five different degrees of translucent matching subtleties found in natural teeth.

■ CERVICAL TRANSLUCENT (CT): 3 shades
Highly translucent with a light amber colour. Can be applied cervically or in the incisal area to obtain deeper translucency. It is also used as dentin for inlays and posterior crowns, providing the resin with an aesthetic finish while maintaining the tooth colour.

■ MAMELON STAIN (MS): 3 shades
Used to create mamelon striations and other effects found in natural teeth.

■ GC GRADIA DIE HARDNER
Die Hardner, when coated on dies, hardens and preserves the surface during fabrication of inlays, jacket crowns, etc.

■ GC GRADIA SEPARATOR
A composite resin separator that is applied to working stone models when making inlays and onlays. It functions optimal on a Die Hardner treated stone surface.

■ GC GRADIA DIAPOLISHER
Developed specifically for the GC GRADIA System, this fine diamond-containing material is used on a felt wheel to apply a lustrous finish to restorations.

■ GC GRADIA AIR BARRIER
This agent creates an air barrier to guarantee a complete polymerization of the composite surface and avoid the inhibition layer.

■ GC COMPOSITE PRIMER
It is a light-curing bonding agent used for the additional application of composite layers and for repair works. GC COMPOSITE PRIMER can also be used as a modeling liquid to lubricate the spatula when applying the resin pastes.

■ GC METALPRIMER II
A tenacious bonding agent between the first composite layer e.g. FOUNDATION OPAQUE and the metal framework.
2. SHADE COMBINATION CHART
3. GC GRADIA CHARACTERISTICS

1. NATURAL AESTHETICS

1) GC GRADIA colour tones and translucency similar to those of natural teeth
Its level of brightness and light transmission is similar or closer to porcelain than conventional composites. Where required, the underlying tooth preparation can be masked while maintaining a natural, life-like appearing anterior jacket crown. Thus the GC GRADIA’s build-up technique mirrors those used for ceramics.

2) Reduction of pale opalescence typical for composites
The opalescence and fluorescence features typical for composites could not be avoided so far, especially with translucent colours. When a crown was seated under the light conditions found in the mouth, the excessively opalescent colour would make it impossible to reproduce the natural colour. These features have been changed in GC GRADIA by optimizing the filler particle size, thereby controlling and adjusting the diffusion of light through the material. This allows to maintain the desired colour, created at dentin level, also when the restoration is seated in the mouth.

3) GC GRADIA’s complete spectrum of colours
GC GRADIA has a complete spectrum of colours comparable to natural dentition offering wider range than other composite systems.

1. OPAQUUS DENTIN (OD) is used to express the deep cervical colours. SHOULDER DENTIN (SD) follows the same concept as shoulder ceramic bodies.
2. MAMELON STAIN (MS) allows to easily reproduce the dentin structure in the mamelon area. INTENSIVE COLOR (IC) is available in 15 shades and is effective in characterizing crowns with cracks, decalcification areas, etc.
3. ENAMEL INTENSIVE (EI) shades create the appearance of depth. CERVICAL TRANSLUCENT (CT) has a translucent amber color that is particularly suitable for the cervical area.
4. HALO ENAMEL (HE) is used to clearly express the contour of the tooth. PEARL ENAMEL (PE) is applied to express white lines/zones and cusp tips.

GC GRADIA’s wide range of colours enables restorations to appear more like porcelain than other composites.

Comparison of translucency

Comparison of opalescence

Comparison of fluorescence

A comparison of GC GRADIA’s translucent colour tones with its competitors demonstrates that colours and translucency are similar. However, a comparison of fluorescence on a black background – as in the mouth – shows that GC GRADIA features a more natural fluorescence compared with other products.
2. HIGH MECHANICAL STRENGTH FOR USE IN A WIDE RANGE OF CASES

GC GRADIA provides superior physical properties and beautiful, natural aesthetics. The unique chemistry of GC GRADIA couples its micro-fine ceramic/pre-polymer filler with urethane dimethacrylate matrix to produce a unique ceramic composite with exceptionally high strength and wear resistance. As a consequence, GC GRADIA can be safely used also in those cases in posterior areas where often chipping and cracking problems occur.

■ Stress-strain curve (fracture resistance)

Product A = MFR conventional composite
Product B = Last-generation composite for restorations
Product C = Hybrid ceramic

■ Flexural strength

<table>
<thead>
<tr>
<th></th>
<th>GC GRADIA</th>
<th>Product A</th>
<th>Product B</th>
<th>Product C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MPa)</td>
<td>124</td>
<td>61</td>
<td>123</td>
<td>158</td>
</tr>
</tbody>
</table>

■ Flexural energy

<table>
<thead>
<tr>
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<th>Product A</th>
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<th>Product C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MPa)</td>
<td>1.5</td>
<td>0.65</td>
<td>0.13</td>
<td>0.82</td>
</tr>
</tbody>
</table>

■ Occlusal wear – Horizontal slide with a load of 1.7 MPa on bovine enamel (200,000 times)

Wear depth (vs. bovine tooth enamel): 200,000 times

<table>
<thead>
<tr>
<th></th>
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<th>Product A</th>
<th>Product B</th>
<th>Product C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(μm)</td>
<td>8.7</td>
<td>15.1</td>
<td>12.3</td>
<td>5.7</td>
</tr>
</tbody>
</table>

■ Wear depth of bovine tooth enamel (surface roughness)
3. EXCELLENT HANDLING CHARACTERISTICS

1) Ease of application
FOUNDATION OPAQUE flows readily into undercut areas made from 100 μm RETENTION BEADS II SSS. The thixotropic properties of OPAQUE allow a uniform application without pooling. The texture of DENTIN ENAMEL pastes permits easily controlled spreading on all surfaces, also on complex surfaces such as occlusals of inlays and posterior crowns.

2) Simple Light pre-curing
By using the new GC STEPLIGHT SL-I pre-curing light unit, the precuring time of GC GRADIA pastes (excluding opaque materials) is reduced to 10 sec.

3) Easy polishing
GC GRADIA’s durable micro-ceramic composite surface is easily brought to a lustrous gloss with the GC GRADIA DIAPOLISHER.

4) Easy Intra-Oral Repairs
Using GC COMPOSITE PRIMER and a conventional operatory curing light makes intra-oral repairs quick and easy.
4. NEW ENVIRONMENTALLY FRIENDLY SYRINGE

The screw section of the syringe can be re-used by simply replacing the barrel that contains paste, thus eliminating waste.

1) Remove the used syringe barrel.

2) Rotate hub to unlock.

3) Remove plunger.

4) Attach new syringe barrel to hub, insert plunger and lock hub.
Determine whether GC GRADIA is suitable for the patient.

**Indications:**
1. Anterior and posterior jacket crowns. Full coverage crowns.
2. Anterior veneer metal-backed crowns, with or without incisal support.
3. Inlays, onlays, laminate veneers.
4. Implant superstructures.

**Contra indications:** Malocclusions, bruxism or clenching.

Tooth preparation and design of restorations vary according to circumstances. The instructions for a correct preparation are illustrated below.

**Anterior veneer crown**
*(With Incisal Support)*
The preparation is similar to a PFM crown. The margins should have a deep chamfer or shoulder with minimum depth of 0.8mm. Thickness of metal framework on the labial side should be 0.3mm.

**Anterior jacket crown**
Prepare abutment tooth similar to a PFM crown (minimum of 1.3mm labial). Margin-design can be a deeper chamfer or shoulder (0.8mm).

**Posterior jacket crown**
The occlusal reduction should be at least 1.3mm. Margins should have 1.3mm depth with a deep chamfer or shoulder.

**Inlay**
Contour the cavity with rounded internal line angles. Avoid contact of opposing occlusion with the margins of restoration. The pit & fissure minimum depth should be 1.0mm, the width of occlusal surface at least 2.0mm with only shoulder margins occlusally. Interproximally, it should be box shaped.

**Onlay**
Contour the cavity with rounded internal line angles. Avoid contact of opposing occlusion with the margins of the restoration. Pit & fissure depth minimum should be 1.0mm and cusp at least 1.3mm.

**Margin preparations**
Prepare deep chamfers (1) or shoulders (2).
Repart gingiva in normal manner. Use a vinyl silicone impression material such as GC EXAMIX NDS, GC EXAFAST NDS, GC EXAJET or GC EXAFLEX.

Use GC EXABITE II to make occlusal or bite registration. Select a shade from the Vitapan® classical shade guide.

Fabricate temporary restoration with GC UNIFAST TRAD / GC UNIFAST LC or GC REVOTEK LC and cement with a eugenol-free temporary cement such as GC FREEGENOL.

Pour and prepare working model with a Type IV die stone such as GC FUJIROCK EP.

Refer to COMPOSITE BUILD-UP PROCEDURE, pages 12 - 27
Remove temporary restoration, sealing material or cement. Clean cavity. Rinse and dry cavity thoroughly.

**Internal Metal bonding surface**
Sandblast the metal surface with aluminum oxide (+/- 50 microns) and apply a thin layer of GC METALPRIMER II. After applying the primer, carefully avoid contaminating the metal surface before cementing the restoration.

**Precaution:** Apply one or two thin coats of GC METALPRIMER II. A too thick coat can reduce adhesive strength.

**GC GRADIA internal bonding surface (metal free restorations)**
Apply thin layer of GC COMPOSITE PRIMER to internal bonding surface then light cure with conventional operatory curing light for 20 sec.
When using LABOLIGHT LV-II/LV-III, light-cure for one minute.

Cement with GC FUJI PLUS or comparable dental cement per manufacturer’s instructions.

Adjust occlusal surface with diamond or carborundum point then use silicone points. Finally, add GC GRADIA DIAPOLISHER to felt or chamois wheel and buff to a lustrous finish.
5. COMPOSITE BUILD-UP PROCEDURE

1. ANTERIOR VENEER CROWN (INCISAL FREE METAL BACKING)

1. PREPARING MASTER MODEL

Prepare the master model in the usual manner using GC Fujirock EP. Margins pencilled in red. Underlying wax colour acts as a depth guide. Scribe 1 mm from incisal and proximal areas, establishing where metal casting limits will be. Using a wax bur or instrument, remove 1 mm depth of wax incisal/lingual.

2. WAX-UP

Apply GC Multisep to the master die. Use different coloured wax in order to easily identify the thickness of wax during veneer cut-out. Fully contour the wax-up. Underlying wax colour acts as a depth guide.

3. PREPARE SILICONE INDEX

Make lingual silicone impression index. Remove excess of silicon incisally to an angle of 45°. This silicon index is later used in building up Dentin and Enamel.

4. MAKING CASTINGS

Wax up die with GC Inlay Wax. Retention Beads II SSS (particle size: 100μ) enhance mechanical bond strength between casting and GC GRADIA composite veneer. Used in combination with GC Metalprimer II bonding agent. Apply a thin layer of Adhesive II for GC Retention Beads II SSS. Let surface dry and become tacky.

Sprinkle a layer of GC Retention Sprue and invest using a GC Beads II SSS evenly over wax phosphate bonded investment and cast in a normal way.
5. PREPARE CASTING

Remove beads within 0.5 mm from margin area with a carbide bur.
Finish and polish metal casting in a usual manner.
Sandblast metal surface that requires application of GC METALPRIMER II with clean 50μ aluminium oxide.
Blow surface with clean, dry air and immediately apply GC METALPRIMER II.
Note: There will be no change in surface look after coating.

6. FOUNDATION OPAQUE (FO)

Note: Remove any Opaque remaining on nozzle syringe tip with tissue paper.

Apply GC METALPRIMER II, one or twice by using a clean brush. Allow drying for a few seconds. Immediately start to apply FOUNDATION OPAQUE to avoid contamination of the bonding surface.

FOUNDATION OPAQUE shade serves as foundation of all shades. Dispense FOUNDATION OPAQUE into disposable pallet and shield with light protective cover.

Apply layer of FOUNDATION OPAQUE about 100μ thickness with GC LABOLIGHT LV-III: see chart 1 above.
Note: If Opaque gets too thick, stir with brush to restore fluidity.

7. MARGIN OPAQUE (MO)

For deeper, richer cervical colours, apply MARGIN OPAQUE in 1 mm width cervically using a round brush.
MARGIN OPAQUE, if applied after Opaque layer of the tooth shade, may create a whitish line showing through final composite layer.

To entire surface, apply two thin coats of OPAQUE (O) using a flat brush.
First layer
Second layer

Light cure: chart 1
Light cure: chart 1
Light cure: chart 1

8. OPAQUE (O)

To entire surface, apply two thin coats of OPAQUE (O) using a flat brush.
Avoid to use a too thick layer, the curing process might turn out to be insufficient.

Light cure: chart 1
Light cure: chart 1
Light cure: chart 1

Chart 1 – Curing time for Opaque pastes

<table>
<thead>
<tr>
<th>GC LABOLIGHT LV-II, III</th>
<th>1 minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>3 minutes</td>
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</table>

Note: GC METALPRIMER II is a metal adhesive primer with monomer containing thiophosphoric metacrylate (MEPS). Note: GC METALPRIMER II is very volatile. Replace bottle cap immediately after use.
9. OPAQUE DENTIN (OD)

For deeper, richer cervical, increase chroma by selecting next most saturated shade i.e., ODA3.5 for an A3. Apply OPAQUUS DENTIN (OD) in 2-3 mm widths in cervical area.

Note: To reproduce an individual colour for the cervical area following the individual patient case, SHOULDER DENTIN (SD) can also be used. SHOULDER DENTIN is available in 6 shades.

10. DENTIN (D)

Attach silicone index lingually. Apply Dentin paste leaving room for ENAMEL.

Note: To prevent voids, smooth DENTIN surface with flat brush.

Create mamelons 1,5 mm from incisal edge. Note: Apply MAMELON STAIN to accentuate striations.

Note: To increase appearance of translucency, apply INTENSIVE COLOR (IC7 Lavender).

11. ENAMEL (E)

Apply appropriate ENAMEL shade starting at 1 mm from incisal edge towards center of crown, with silicone index still in place.

ENAMEL characterization completed.
12. CERVICAL TRANSLUCENT (CT)

For deeper, richer color, apply (CT) at cervical area towards tooth center.

13. ENAMEL INTENSIVE (EI)

Apply ENAMEL INTENSIVE at incisal edge towards cervical area for natural appearance.

14. HALO ENAMEL (HE)

Add HALO ENAMEL to proximal areas to accentuate tooth contour.

15. FINAL BUILD-UP

Application is complete on labial surface.

16. AIR BARRIER

Remove silicone index. Apply ENAMEL INTENSIVE (EI) on the lingual surface as needed.

17. FINAL LIGHT CURING

Immediately coat surface with GC GRADIA AIR BARRIER to eliminate air inhibition layer and to ensure complete polymerization.

After applying GC GRADIA AIR BARRIER, light cure. Remove GC GRADIA AIR BARRIER with water, after final polymerization.

18. ADJUST CONTOUR

Adjust contour with diamond and/or carbide burs. Refer to page 16 for additional composite applications.

Apply added material, DENTIN, ENAMEL or ENAMEL INTENSIVE and light cure 3 min. Then characterize surface with diamond and carborundum points.

Adjust surface texture with diamond or carborundum points. Smooth with silicone points.

Finish surface with Robinson Brush together with GC GRADIA DIAPOLISHER.

Polish & Buff Use GC GRADIA DIAPOLISHER on felt or chamois wheel for a lustrous finish.

Chart 2 – Curing time for Dentin/Enamel bodies and intensive colours

<table>
<thead>
<tr>
<th>Product</th>
<th>Slag</th>
<th>GC LABOLIGHT LV-III</th>
<th>GC LABOLIGHT LV-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 sec</td>
<td>30 sec</td>
<td>60 sec</td>
</tr>
</tbody>
</table>

Chart 3 – Final curing time

<table>
<thead>
<tr>
<th>Product</th>
<th>Slag</th>
<th>GC LABOLIGHT LV-III</th>
<th>GC LABOLIGHT LV-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-III</td>
<td>3 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>5 min</td>
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</tbody>
</table>
19. COMPLETED VENEER CROWN

Roughen composite surface with bur.

Coat surface with a tin layer of GC COMPOSITE PRIMER.

Light cure 1 min. with GC LABOLIGHT LV-III or 20 sec. with conventional operatory curing light.

Apply desired additional shades. Note: For extensive additions, cure with GC LABOLIGHT LV-III. If using conventional operatory curing light, cure for 1 min.

Refer to page 15 for finishing steps.

<table>
<thead>
<tr>
<th>Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours</th>
<th>Chart 3 - Final curing time</th>
</tr>
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<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 seconds</td>
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<tr>
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<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>60 seconds</td>
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SHADE A3 AND GC GRADIA CROWN

GC GRADIA’s brighter, deeper and richer colours provide superior aesthetics and vitality versus conventional composites.

Additional Build-Up & Repairs

Roughen composite surface with a tin layer bur.

Coat surface with GC COMPOSITE PRIMER.

Light cure 1 min. with GC LABOLIGHT LV-III or 20 sec. with conventional operatory curing light.

Apply desired additional shades.

Note: For extensive additions, cure with GC LABOLIGHT LV-III. If using conventional operatory curing light, cure for 1 min.

Refer to page 15 for finishing steps.

Light cure: see chart 2

Light cure: see chart 3
2. COMPOSITE BUILD-UP PROCEDURE

1. MODEL PREPARATION
Prepare GC Fujirock EP dies in normal manner. Pencil margins in red.

2. PREPARE SILICONE INDEX
Wax-up. Form silicone index lingually. Cut-off 1 mm from incisal. (Refer to page 12 – Prepare Silicone Index).

3. GC GRADIA DIE HARDNER
Coat dies with thin layer of GC GRADIA DIE HARDNER.

4. GC GRADIA SEPARATOR
Apply thin coat of GC GRADIA SEPARATOR.

5. JACKET CROWN ON NATURAL DIE
Special pre-curing treatment for Jacket crown on a natural die, without discolouration. Apply thin coat of INTENSIVE COLOR (IC0 Clear).

6. JACKET CROWN ON ALLOY CORE
Special pre-curing treatment for Jacket crown on alloy core. Apply OPAQUE (O) to entire die surface. Than MARGIN OPAQUE (MO) to cervical and lingual surface.

7. SHOULDER DENTIN (SD)
Apply SHOULDER DENTIN (SD2, 3, 4 or 5) cervically. If SD is not available, underlying alloy then apply SD2, or 5 in cervical area.

Note: Followed step by step procedure illustrates the composite buildup process for a Jacket crown on alloy core.

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Chart 1 – Curing time for Opaque pastes
- GC LABOLIGHT LV-II, II: 1 minute
- GC LABOLIGHT LV-I: 3 minutes

Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours
- GC STEPLIGHT SL-I: 10 seconds
- GC LABOLIGHT LV-II, III: 30 seconds
- GC LABOLIGHT LV-I: 60 seconds

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- GC LABOLIGHT LV-II, II: 1 minute
- GC LABOLIGHT LV-I: 3 minutes

Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours
- GC STEPLIGHT SL-I: 10 seconds
- GC LABOLIGHT LV-II, III: 30 seconds
- GC LABOLIGHT LV-I: 60 seconds

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Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours
- GC STEPLIGHT SL-I: 10 seconds
- GC LABOLIGHT LV-II, III: 30 seconds
- GC LABOLIGHT LV-I: 60 seconds
Apply appropriate CERVICAL TRANSLUCENT (CT) covering cervical 1/3 of crown. Add ENAMEL INTENSIVE (EI) and INTENSIVE COLOR (IC13 Crack liner) in vertical layering, then INTENSIVE COLOR (IC5 Brown) to create effect on hairline crack.

Apply HALO ENAMEL (HE) to proximal areas to complete the labial build-up procedure.

**Chart 2 – Curing time for Dentin/Enamel bodies and intensive colours**

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>60 seconds</td>
</tr>
</tbody>
</table>

**Notes:**
- Re-applying stains may create shadow under TRANSLUCENT layer.
- Characterize incisal with MAMELON STAIN or by mixing INTENSIVE COLORS (IC3 & 4).
- Using silicone index, add DENTIN, leaving room for ENAMEL and characterizations and taken in consideration final shape of composite crown.
15. COMPLETING LINGUAL

Apply appropriate MAMELON STAIN to prevent natural tooth from showing through resin surface.

Light cure: see chart 2

16. COMPLETING LABIAL

17. AIR BARRIER

Immediately coat surface with GC GRADIA AIR BARRIER to eliminate air inhibition layer and guarantee complete polymerization.

Light cure: see chart 3

18. FINAL LIGHT CURE

19. REMOVE CROWN

Adjust shape and contour surface. Polish by buffing. (see page 15)

Light cure: see chart 2

20. ADJUST & POLISH

21. COMPLETED CROWNS

Excellent fit and marginal integrity

Light cure: see chart 2

Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>60 seconds</td>
</tr>
</tbody>
</table>

Chart 3 - Final curing time

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>3 minutes</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>35 minutes</td>
</tr>
</tbody>
</table>

Add HALO ENAMEL to proximal areas. Slightly over contour proximals to allow grinding and polishing.

Apply OPAQUS DENTIN INTENSIVE to cervical 1/3.

Progressively add HALO ENAMEL from incisal toward cervical.
3. COMPOSITE BUILD-UP PROCEDURE

1. MODEL PREPARATION
Pour model using GC FUJIROCK. Apply thin coat of GC GRADIA DIE HARDNER on die surface.

2. UNDERCUTS
Block-out undercuts with wax. Coat cavity with GC GRADIA SEPARATOR.

3. GRADIA SEPARATOR
Coat cavity with GC GRADIA SEPARATOR.

4. CERVICAL TRANSLUCENT (CT)
Apply thin layer of INTENSIVE COLOR (IC0 Clear). Add CERVICAL TRANSLUCENT as dentin colour. Natural tooth colour will show through.

4. CERVICAL TRANSLUCENT (CT)
If tooth is discolored, first apply OPAQUE (O), MARGIN OPAQUE (MO) or OPAQUE DENTIN (OD) to cavity floor.

5. ENAMEL INTENSIVE
Apply appropriate ENAMEL INTENSIVE or ENAMEL and contour.

6. COMPLETED BUILD-UP
Immediately coat surface with Final light cure 3 minutes. Wash off GC GRADIA AIR BARRIER to GC GRADIA AIR BARRIER with water to eliminate air inhibition layer (see page 15).

7. AIR BARRIER
Refine surface texture with diamond or carborundum points. Smooth with silicone points. Finish surface with Robinson Brush. Apply GC GRADIA DIAPOLISHER with felt or chamois wheel.

8. CONTOUR & POLISH
Light cure: see chart 2
Light cure: see chart 2

Chart 2 – Curing time for Dentin/Enamel bodies and intensive colours

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>60 seconds</td>
</tr>
</tbody>
</table>

Chart 3 – Final curing time

<table>
<thead>
<tr>
<th>Product</th>
<th>Final Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-II</td>
<td>3 minutes</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>3.5 minutes</td>
</tr>
</tbody>
</table>
Example of clinical cases
4. POSTERIOR JACKET CROWN / FULL COVERAGE COMPOSITE CROWN

1. PREPARE MODEL

Pour model in GC FUJIROCK EP. Make cast coping in usual manner. Note: This step procedure is also suitable to a metal supported full coverage composite crown.

2. FOUNDATION OPAQUE (FO), OPAQUE (O), ETC.

Apply FOUNDATION OPAQUE then OPAQUE to facial. Add MARGIN OPAQUE to occlusal & lingual then OPAQUES DENTIN to cervical. After each application light cure.

3. DENTIN (D)

Apply DENTIN in usual manner.

4. CHECK DENTIN HEIGHT

DENTIN build-up should have 1 mm freeway space. Note: Maintain 1 mm infra-occlusion, referring to adjacent and antagonist teeth.

5. CERVICAL TRANSLUCENT (CT)

Add CERVICAL TRANSLUCENT to occlusal surface.

6. CONFIRM FREeway SPACE

Before light curing (CT), check to ensure there is adequate space for interproximal contacts.

7. ENAMEL

Apply ENAMEL while checking occlusal relationship.

---

Chart 1 – Curing time for Opaque pastes

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-II</td>
<td>1 minute</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>3 minutes</td>
</tr>
</tbody>
</table>

Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>40 seconds</td>
</tr>
</tbody>
</table>
8. AIR BARRIER
Coat surface with GC GRADIA AIR BARRIER and light cure. Wash off GC GRADIA AIR BARRIER with water.

9. COMPLETED CROWN

Completed crown after adjusting, contouring and polishing.

Clinical example of a GC GRADIA metal supported 3 unit bridge.

Chart 3 – Final curing time

<table>
<thead>
<tr>
<th>Product</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-II, II</td>
<td>3 minutes</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>3-5 minutes</td>
</tr>
</tbody>
</table>
5. COMPOSITE BUILD-UP PROCEDURE

1. MODEL PREPARATION

Pour model using GC FUJIROCK EP. Prepare in normal manner.

2. FRAMEWORK

Coat die with GC MULTISEP, wax separator, wax-up crown and create veneer (window).

Note: Suggest making coping in different colour wax from build-up. Colour contrast will determine depth of veneer.

Cut out veneer or window, preserving proximal contact in metal.

Apply thin layer of GC ADHESIVE II for GC Retention Beads II SSS. Allow to dry. Surface will get tacky.

Note: To get thinner coat cut tip of brush (See sketch of bead pattern to the right)

Sprinkle uniform layer of GC Retention Beads II SSS on surface. Note: Resin will bond to alloy with application of GC METALPRIMER II.

Bead coating design allows maximum room for shade reproduction and obtains a suitable mechanical retention strength.

Sprue then invest with GC’s phosphate bonded within 0,5 mm of outer margins of investments. Remove any metal retention beads. Cast and finish in normal manner.
3. PREPARING METAL CASTING

Sandblast with clean 50μ aluminium oxide. Blow surface clean with clean-dry air and immediately prepare to apply GC METALPRIMER II.

Apply one or two thin coats of GC METALPRIMER II. Allow to dry. Surface will appear unchanged.

4. FOUNDATION OPAQUE (FO)

Apply FOUNDATION OPAQUE, a 100μm layer (thickness of RETENTION BEADS II SSS). Note: If OPAQUE gets a little thick, simply stir it with the brush to restore fluidity.

Opaques can ONLY be light cured with GC LABOLIGHT LV-II/LV-III. GC STEPLIGHT SL-I can not be used for opaque pastes.

For deeper, richer cervical colour, apply MARGIN OPAQUE with round brush.

Note: MARGIN OPAQUE (MO) is applied onto FOUNDATION OPAQUE (FO). To avoid white line, do not apply (MO) over opaque.

5. MARGIN OPAQUE (MO)

For deeper, richer cervical colour, add INTENSIVE COLOR (IC7) to incisal area. Use round brush.

To create translucency, add OPaquUS DENTIN in 2-3 mm widths around the cervical area. Make (OD) one shade higher than the crown.

6. OPAQUE (O)

Apply two thin layers of OPAQUE using flat brush. A too thick layer may not polymerize as well. Light cure first coat. Light cure second coat.

A too thick layer may not polymerize as well. Light cure first coat.

Light cure second coat.

Light cure: see chart 1

Light cure: see chart 1

7. INTENSIVE COLOR (IC7)

Light cure: see chart 2

Light cure: see chart 2

8. OPAQUUS DENTIN (OD)

Light cure: see chart 2

Light cure: see chart 2

Chart 1 – Curing time for Opaque pastes

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>1 minute</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>3 minutes</td>
</tr>
<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>60 seconds</td>
</tr>
</tbody>
</table>

Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours

<table>
<thead>
<tr>
<th>Product</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC STEPLIGHT SL-I</td>
<td>10 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>60 seconds</td>
</tr>
</tbody>
</table>

Note: GC METALPRIMER II is very volatile. Replace bottle cap immediately after use.

As soon as surface is dry, immediately apply FOUNDATION OPAQUE to prevent surface contamination.
9. DENTIN
Build-up DENTIN to form and shape crown. Leave room for ENAMEL. Create mamelons from incisal to about center of crown.

10. ENAMEL (E)
Apply ENAMEL, starting from incisal and feathering down to about the center of crown. Note: For deeper cervical colour, add CERVICAL DENTIN.

11. AIR BARRIER
Coat surface with GC GRADIA AIR BARRIER in usual manner.

12. FINAL LIGHT CURING
Use GC LABOLIGHT LV-II/LV-III for final cure then wash off GC GRADIA AIR BARRIER with water.

13. FINAL SHAPING
Shape, form and refine crown anatomy, with diamond and carborundum points then smooth with silicone points. Accentuate surface features with diamond and carborundum points.

Polish & Buff
Use Robinson Wheel or similar on felt and/or chamois wheel for a together with GC GRADIA DIAPOLISHER. DIAPOLISHER, taken care not to damage the surface texture.

---

Chart 2 - Curing time for Dentin/Enamel bodies and intensive colours

<table>
<thead>
<tr>
<th>Light Cure Method</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC STEPLEIGHT SLI</td>
<td>10 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-II, III</td>
<td>30 seconds</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>60 seconds</td>
</tr>
</tbody>
</table>

Chart 3 – Final curing time

<table>
<thead>
<tr>
<th>Light Cure Method</th>
<th>Curing Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC LABOLIGHT LV-II, II</td>
<td>3 minutes</td>
</tr>
<tr>
<td>GC LABOLIGHT LV-I</td>
<td>3-5 minutes</td>
</tr>
</tbody>
</table>
14. COMPLETED CROWN

Completed GC GRADIA crown – labial view

Comparison of GC GRADIA crown to shade guide – Shade A2
GC GRADIA’s brighter, deeper and richer colours provide superior aesthetics and vitality versus conventional composites.
6. PHYSICALS / CURING TIMES / CURING DEPTHS

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>GC GRADIA</th>
<th>Product A</th>
<th>Product B</th>
<th>Product C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural strength (MPa)</td>
<td>124</td>
<td>61</td>
<td>123</td>
<td>158</td>
</tr>
<tr>
<td>Flexural modulus (MPa)</td>
<td>6.92</td>
<td>3.94</td>
<td>9.13</td>
<td>15.34</td>
</tr>
<tr>
<td>Flexural energy (MPa)</td>
<td>1.92</td>
<td>0.65</td>
<td>1.13</td>
<td>0.82</td>
</tr>
<tr>
<td>Occlusal wear (microns*)</td>
<td>8.7</td>
<td>7.7</td>
<td>12.3</td>
<td>5.7</td>
</tr>
</tbody>
</table>

* After 200,000 horizontal slide with a load of 1.70 MPa

**IRRADIATION TIME FOR THE PRE-CURING AND FINAL CURING PROCESSES**

<table>
<thead>
<tr>
<th>Light curing unit</th>
<th>GC LABOLIGHT LV-II, III</th>
<th>GC LABOLIGHT LV-I</th>
<th>GC STEP LIGHT SL-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation Opaque, Opaque, Margin Opaque</td>
<td>Pre-cure</td>
<td>Final cure</td>
<td>Pre-cure</td>
</tr>
<tr>
<td>Dentin Opaqus Dentin Opaqus Dentin intensive Shoulder Dentin Enamel Pearl Enamel Halo Enamel Enamel Intensive Cervical Translucent</td>
<td>1 min.</td>
<td>3 min.</td>
<td>Pre-cure</td>
</tr>
<tr>
<td>Pre-cure</td>
<td>Final cure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 sec.</td>
<td>3 min.</td>
<td>1 min.</td>
<td>5 min.</td>
</tr>
</tbody>
</table>
| * For each surface of a single crown

**CURING DEPTH (WITH GC LABOLIGHT LV-III)**

<table>
<thead>
<tr>
<th>IRRADIATION TIME: 30 SEC.</th>
<th>CURING DEPTH IN MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentin</td>
<td>Opaqus Dentin Opaqus Dentin intensive</td>
</tr>
<tr>
<td>DA1,DA2,DB1, DB2,DC1,DD2</td>
<td>DDA1,DDA2,DDA3,DDA4</td>
</tr>
<tr>
<td>1.8</td>
<td>1.3</td>
</tr>
<tr>
<td>OA1,OA2,ODA1,ODA2</td>
<td>ODDA1,ODD3,ODD4</td>
</tr>
<tr>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td>SHOULDER DENTIN</td>
<td>ENAMEL</td>
</tr>
<tr>
<td>SDA1,SDA2,SDA3,SDA4</td>
<td>Sai,E1,E2,E3,E4</td>
</tr>
<tr>
<td>1.6</td>
<td>1.1</td>
</tr>
</tbody>
</table>

**CURING DEPTH: 1 MINUTE**

<table>
<thead>
<tr>
<th>IRRADIATION TIME: 1 MINUTE</th>
<th>CURING DEPTH IN MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUNDATION OPAQUE</td>
<td>OPAQUE</td>
</tr>
<tr>
<td>FO</td>
<td>MO</td>
</tr>
<tr>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>ODA1,ODA2,ODA3.5, SD1,SD2,SD3,SD4</td>
<td>ODA1,ODA2,ODA3</td>
</tr>
<tr>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>MAMELON STAIN</td>
<td>INTENSIVE COLOR</td>
</tr>
<tr>
<td>MS2,MS3,MS5</td>
<td>IC1(Melon),IC2(Yellow), IC3(Brown),IC4(Black), IC5(Crack liner)</td>
</tr>
<tr>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>IC1(Melon),IC2(Yellow), IC3(Brown),IC4(Black), IC5(Crack liner)</td>
<td>IC1(M1),IC2(Y1),IC3(B1),IC4(B2),IC5(C1)</td>
</tr>
<tr>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>IC1(M1),IC2(Y1),IC3(B1),IC4(B2),IC5(C1)</td>
<td>IC10(Black),IC11(Red), IC12(Dark red brown)</td>
</tr>
<tr>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>
7. PACKAGING

**GC GRADIA MASTER SET (10 shades)**
A1, A2, A3, A3.5, B2, B3, B4, C2, C3, D3

**GC GRADIA STANDARD SET (6 shades)**
A2, A3, A3.5, B2, B3, C2

**GC GRADIA INTENSIVE COLOR SET**
(11 shades)

**GC GRADIA SEPARATOR**

**GC GRADIA DIE HARDNER**

**GC COMPOSITE PRIMER**

**GC METALPRIMER II**

**GC GRADIA DIAPOLISHER**

**GC GRADIA AIR BARRIER**

**GC GRADIA PASTE (2.9ml)**

**GC GRADIA SYRINGE PLUNGER**

**GC GRADIA SHADE GUIDE KIT**

(11 shades)
### 8. KIT CONTENTS AND INDIVIDUAL ITEMS

<table>
<thead>
<tr>
<th>Master Set (10 shades)</th>
<th>Standard Set (6 shades)</th>
<th>Intensive Color Set (11 shades)</th>
<th>Refill Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC GRADIA Foundation Opaque</td>
<td>FO</td>
<td>FO</td>
<td>FO</td>
</tr>
<tr>
<td>GC GRADIA Margin Opaque</td>
<td>MO</td>
<td>MO</td>
<td>MO</td>
</tr>
<tr>
<td>GC GRADIA Opaque</td>
<td>0A1, 0A2, 0A3, 0A5</td>
<td>0A1, 0A2, 0A3, 0A5</td>
<td>0A1, 0A2, 0A3, 0A4, 0A4, 0A4, 0A4</td>
</tr>
<tr>
<td>GC GRADIA Opaque Dentin</td>
<td>0B1, 0B2, 0B3, 0C1, 0C2</td>
<td>0C1, 0C2</td>
<td>0B1, 0B2, 0B3, 0C1, 0C2</td>
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<tr>
<td>GC GRADIA Opaque Dentin Intensive</td>
<td>0D1, 0D2, 0D3, 0D4, 0D5, 0D6, 0D7</td>
<td>0D1, 0D2, 0D3, 0D4, 0D5, 0D6, 0D7</td>
<td>0D1, 0D2, 0D3, 0D4, 0D5, 0D6, 0D7</td>
</tr>
<tr>
<td>GC GRADIA Porcelain Dentin</td>
<td>0E1, 0E2, 0E3, 0E4, 0E5, 0E6, 0E7</td>
<td>0E1, 0E2, 0E3, 0E4, 0E5, 0E6, 0E7</td>
<td>0E1, 0E2, 0E3, 0E4, 0E5, 0E6, 0E7</td>
</tr>
<tr>
<td>GC GRADIA Enamel</td>
<td>E1, E2, E3</td>
<td>E1, E2, E3</td>
<td>E1, E2, E3</td>
</tr>
<tr>
<td>GC GRADIA Enamel Intensive</td>
<td>E6, E7, E8</td>
<td>E6, E7, E8</td>
<td>E6, E7, E8</td>
</tr>
<tr>
<td>GC GRADIA Pearl Enamel</td>
<td>P1.1, P1.2, P1.3</td>
<td>P1.1, P1.2, P1.4, P1.5</td>
<td>P1.1, P1.2, P1.4, P1.5</td>
</tr>
<tr>
<td>GC GRADIA Transparent</td>
<td>T1, T2, T3</td>
<td>T1, T2, T3</td>
<td>T1, T2, T3</td>
</tr>
<tr>
<td>GC GRADIA Composite Translucent</td>
<td>CT1, CT2, CT3, CT4</td>
<td>CT1, CT2, CT3, CT4</td>
<td>CT1, CT2, CT3, CT4</td>
</tr>
<tr>
<td>GC GRADIA Metal Primer</td>
<td>11, 12, 13, 14, 15</td>
<td>11, 12, 13, 14, 15</td>
<td>11, 12, 13, 14, 15</td>
</tr>
<tr>
<td>GC GRADIA Composite Primer</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>GC GRADIA Air Barrier</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>GC GRADIA Stain</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>GC GRADIA Die Hardner</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>GC GRADIA Dispenser</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Accessories</td>
<td>○ → 3</td>
<td>○ → 3</td>
<td></td>
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<td>2. GC GRADIA No. 1 Flat brush: 10 pieces</td>
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<td>3. GC GRADIA No. 7 Brush: 3 pieces</td>
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<td>4. GC GRADIA Brush handle (ivory or white): 1 piece</td>
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<td>5. GC GRADIA Dispersible mixing pad: 3 pieces</td>
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<td>6. GC GRADIA Mixing pad cover: 1 piece</td>
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<td>7. GC GRADIA No. 72 Mixing blocks: 1 set</td>
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<td>8. GC GRADIA Shade chart: 1 piece</td>
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<td>9. GC GRADIA Shade guide kit: 1 piece</td>
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**Note:**
1) The shade combination chart is not available separately.
2) The 2.9 ml syringe refill package does not include the re-usable plunger.

### GC LIGHT CURING UNITS AND SPECIFICATIONS

**GC STEPLIGHT SL-I**
- **Power:** AC 220 V 50/60 Hz
- **Electric power consumption:** 170VA
- **Lamp rating:** 150 W
- **Dimensions:** 115mm (width)
  - 220mm (depth)
  - 275mm (height)
- **Weight:** 2 kg
- **Package:** 1 main body

**GC LABOLIGHT LV-III**
- **Power:** AC 220 V 50/60 Hz
- **Electric power consumption:** 90VA
- **Lamp rating:** 27 W (3 pieces)
- **Turntable operating area:** 90 mm (diameter) x 70mm (height)
- **Dimensions:** 185mm (width)
  - 245mm (depth)
  - 275mm (height)
- **Weight:** 10 kg
- **Package:** 1 main body (with 2 turntables, 2 supporting mounts, 8 supporting posts – 8 pieces each long/short)
Q1. After sandblasting, if alloy surface is touched with fingers will bond strength of GC METALPRIMER II be affected?
A1. Yes. Sandblast alloy surface again and reapply GC METALPRIMER II.

Q2. Should sandblasted metal be ultrasonic or steam cleaned?
A2. No! The water may contain oil. Simply use filtered air pressure to remove aluminium oxide residue.

Q3. Opaque is a little thick when dispensing from syringe. Is this a problem?
A3. Not a problem! GC GRADIA pastes are thixotropic (certain gels exhibit this property but they become more fluid when stirred or put into motion, e.g. a syringe plunger). The thixotropic property helps control flow and prevents OPAQUE from pooling in undesired areas.

Q4. Can OPAQUE be diluted to improve flow?
A4. No, other than stirring it with a brush or spatula. GC COMPOSITE PRIMER and/or GC GRADIA INTENSIVE COLORS should not be used to dilute opaque pastes.

Q5. Can OPAQUE tooth shade be used instead of FOUNDATION OPAQUE?
A5. Yes, but it may require four very thin layers (each layer being light cured) in order to polymerize fully in undercut areas.

Q6. Is it possible to cover to the top of RETENTION BEADS II SSS with a single layer of FOUNDATION OPAQUE?
A6. Yes! The SSS BEADS are 100μ, the curing depth of FOUNDATION OPAQUE is 300μ. A single layer of FOUNDATION OPAQUE will be polymerized correctly in the underent areas of the RETENTION BEADS II SSS.

Q7. OPAQUE did not cure.
A7. The OPAQUE layer might be too thick. Remove it and apply two very thin layers instead of one thick layer.

Q8. Is there a way of preventing cracks in composite bridges?
A8. Yes,
   a) Avoid applying large amounts of resin at one time between light cures.
   b) Create breaks where materials overlap.
   c) Build veneer by applying several thin layers, light curing them at each stage.

Q9. How can entrapping air bubbles be prevented?
A9. There are two ways:
   1. Before applying resin, lightly tap top of the paste surface with a spatula (spatula edge should not be nicked or rough. That will cause bubbles).
   2. Apply thin coat of GC COMPOSITE PRIMER to roughened resin surface. Light cure 1 min. before applying next paste layer.

Q10. Which paste should be used on hollow part of a pontic?
A10. Build-up with TRANSLUCENT. Contour to conform to adjacent area, light cure, then apply OPAQUE and light cure again.

Q11. Which light curing unit should be used?
A11. Those compatible with GC GRADIA – GC LABOLIGHT LV-III, GC STEPLIGHT SL-I. Units radiating ultraviolet light can not be used. They may cure surface monomer excessively, creating a non-bonding barrier between it and the next composite layer.

Q12. Can the brushes be cleaned?
A12. Yes! Clean thoroughly with pure alcohol (ethanol) after applying GC METALPRIMER II, GC GRADIA DIE HARDNER, GC GRADIA SEPARATOR, OPAQUES. Make sure that the ethanol dries off before re-using the tools. After using GC GRADIA AIR BARRIER, wash brush thoroughly with water.

Q13. Is it hard to remove composite inlays from working model?
A13. No! Apply GC GRADIA DIE HARDNER, block-out undercuts with wax then apply the GC GRADIA SEPARATOR.
Q14. How can the GC GRADIA SEPARATOR be removed from the composite surface?
A14. Either sandblast it off or clean it thoroughly with ethanol. Any residual separator on the composite surface has a negative effect on the adhesive cementation.

Q15. Can not get a good gloss on the composite?
A15. Apply GC GRADIA DIAPOLISHER to clean felt and/or chamois wheel and buff. Avoid using other polishing materials. A suitable silicone points finishing before final polishing allow to achieve better brightness.

Q16. Paste starts curing while working with it.
A16. Avoid working in bright sunlight (near a window) or within 30 cm from lab light. GC GRADIA is designed to promptly react to light for better physical properties.

Q17. Are there any contra indications?
A17. See page 33 of manual (Precautions). GC GRADIA can not be used with patients affected by mal occlusion, bruxism or clenching. There should be no occlusal contacts at metal composite margins.

Q18. How should GC GRADIA be stored?
A18. Store at room temperature and away from direct sunlight. For long term storage, keep in a dark, cool place. If refrigerated, remove at least 30 min before using for easy handling.
10. PRECAUTIONS

1. For use by dental professionals only.
2. GC GRADIA should not be used with patients having known sensitivity to methacrylates.
3. Persons similar effected should immediately stop using it and consult a physician.
4. Avoid contact with oral tissue, skin or eyes. If contact made, wash with water. If the eye is involved, immediately flush with water and seek medical attention.
5. Do not ingest or inhale any components of GC GRADIA.
6. Do not use these liquids near open flames, other sources of heat or sunlight. Flammable liquids are GC COMPOSITE PRIMER, GC METALPRIMER II, GC GRADIA SEPARATOR and GC GRADIA DIE HARDNER.
7. Do not mix components of this product with other products.
8. Do not use ultraviolet lights or visible light curing units that can radiate ultraviolet light.
9. Do not look directly into curing lights.
10. Product can be refrigerated but must be brought to room temperature for easy handling (approximately 30 minutes).
11. The material should be used immediately after extrusion from syringe. Keep tightly sealed.
12. Avoid inhaling dust while grinding or polishing. Use a dust mask.
13. Brushes in the kit should be used exclusively with this product.
14. Do not use this product in any way other than as indicated in the instructions.

Note:
1. Use GC GRADIA within 2 years from manufacturing date.
2. Keep light curing units clean and replace lamps when required.
3. Remove excess liquid paste from around syringe nozzle.
4. GC METALPRIMER II brush should be used exclusively for that purpose.

Note: Vita® is a registered trademark of Vita Zahnfabrik, Bad Säckingen, Germany.
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