

## **THREE-DIMENSIONAL OBTURATION**

### **CALAMUS DIRECTIONS FOR USE**

#### **CONE-FIT & PLUGGER SELECTION**

- 1) Prepare the canal optimally recognizing shaping facilitates 3-D cleaning and filling.
- 2) Fit a nonstandardized, fully tapered master cone in a fluid-filled canal that visually goes to the working length, exhibits apical tugback and is confirmed radiographically.
- 3) Select a larger size manual plugger that will work passively and effectively over a range of a few millimeters in the coronal one-third of the canal.
- 4) Select a medium size manual plugger that will work passively and effectively over a range of a few millimeters in the middle one-third of the canal.
- 5) Select a smaller size manual plugger that will work passively, effectively and deeper in the straightaway portion of the canal and to within 4-5 mm of the canal terminus.
- 6) Select the Calamus Electric Heat Plugger (EHP) that will passively fit through the straightaway portion of the canal and optimally to within 5 mm from the working length. Set the silicone stop at this depth to promote safety and accuracy.
- 7) Dry the canal with appropriately sized paper points to determine final working length.
- 8) Trim the master cone back to the canal terminus based on the paper point drying technique.
- 9) Lubricate the master cone lightly with sealer and gently insert it to length. Remove the master cone and inspect its surface to ensure it is evenly coated with sealer. If the master cone is devoid of sealer then re-butter before re-inserting the cone.

When the master cone is seated, the clinician may choose one of the following three (3) Calamus Pack downpack techniques to fill root canal system: The Vertical Condensation Technique, the Continuous Wave Technique, or the Hybrid Technique.

**CALAMUS DOWNPACK: VERTICAL CONDENSATION**

- 1) Activate the Calamus EHP and sear off the master cone at the level of the orifice.
- 2) Select the larger size, prefit manual plugger and step its working end around the circumference of the canal using short, firm strokes to move gutta percha apically, clean the canal walls and flatten the material.
- 3) Use this larger manual plugger and press for 5 seconds to compact warm gutta percha vertically and laterally into this region of the root canal system (1<sup>st</sup> Wave of Condensation).
- 4) Activate the Calamus EHP and plunge 3 to 4 mm into the previously compacted material, deactivate, hesitate for 1 second, then remove the cooling instrument along with a “bite” of gutta percha.
- 5) Select the medium size, prefit manual plugger and step its working end around the circumference of the canal using short, firm strokes to, again, move gutta percha apically, clean the canal walls and flatten the material.
- 6) Use this medium manual plugger and press for 5 seconds to compact warm gutta percha into this region of the root canal system (2<sup>nd</sup> Wave of Condensation).
- 7) Activate the Calamus EHP and plunge deeper, another 3 to 4 mm, into the gutta percha, deactivate, hesitate for 1 second, then remove the cooling instrument along with another bite of gutta percha.
- 8) Select the small size, prefit manual plugger and step its working end around the circumference of the canal using short, firm strokes to, again, move gutta percha apically, clean the canal walls and flatten the material.
- 9) Use this small manual plugger and press for 5 seconds to deliver warm gutta percha into the apical one-third of the root canal system and to offset shrinkage during the cooling phase (3<sup>rd</sup> Wave of Condensation).
- 10) Select the Calamus Flow delivery system to optimally “backpack” the canal.  
(See *Backpack Technique*)

**CALAMUS DOWNPACK: CONTINUOUS WAVE TECHNIQUE**

- 1) Activate the Calamus EHP and sear off the master cone at the level of the orifice.
- 2) Select the larger size, prefit manual plugger and step its working end around the circumference of the canal using short, firm strokes to move gutta percha apically, clean the canal walls and flatten the material.
- 3) Use this larger manual plugger and press for 5 seconds to compact warm gutta percha vertically and laterally into this region of the root canal system (1<sup>st</sup> Wave of Condensation).
- 4) Activate the Calamus EHP and, in one deliberate and continuous motion, firmly press the heated plugger through the thermosoftened gutta percha until the silicone stop is 2 mm from the reference point. This procedure must be limited to 2 to 3 seconds to prevent thermal injury.
- 5) Deactivate the Calamus EHP and continue to maintain firm apical pressure on the cooling instrument until the silicone stop reaches the reference point.
- 6) Maintain firm apical pressure for 10 seconds to compact the mass of warm gutta percha into the apical one-third of the root canal system and to offset shrinkage during the cooling phase.
- 7) Activate the Calamus EHP for 1 second, then deactivate and remove the plugger from the root canal using a back and forth motion. This procedure separates and removes gutta percha from the coronal two-thirds of the canal without disturbing the gutta percha in the apical one-third.
- 8) Select the small size, prefit manual plugger and step its working end around the circumference of the canal using short, firm strokes to clean the canal walls and re-condense the most coronal aspect of the gutta percha within the apical one-third.
- 9) Select the Calamus Flow delivery system to optimally “backpack” the canal.  
(See Backpack Technique)

**CALAMUS DOWNPACK: HYBRID TECHNIQUE**

*(A combination of Vertical Condensation & Continuous Wave Techniques)*

- 1) Activate the Calamus EHP and sear off the master cone at the level of the orifice.
- 2) Select the larger size, prefit manual plugger and step its working end around the circumference of the canal using short, firm strokes to move gutta percha apically, clean the canal walls and flatten the material.
- 3) Use this larger manual plugger and press for 5 seconds to compact warm gutta percha vertically and laterally into this region of the root canal system (1<sup>st</sup> Wave of Condensation).
- 4) Activate the Calamus EHP and plunge 3 to 4 mm deeper into the heat softened gutta percha, deactivate, then maintain firm apical pressure for 5 seconds to compact the warm mass into this region of the root canal system.
- 5) Activate the Calamus EHP and, again, plunge another 3 to 4 mm deeper into the heat softened gutta percha, deactivate, then maintain firm apical pressure for 5 seconds to three-dimensionally compact the warm mass into this region of the root canal system.
- 6) Continue to activate and progressively pack warm gutta percha deeper into the canal until the silicone stop is 2 mm short of the reference point, then deactivate and maintain firm apical pressure until the predetermined working depth is reached.
- 7) Maintain firm apical pressure for 10 seconds to compact the mass of warm gutta percha into the apical one-third of the root canal system and to offset shrinkage during the cooling phase.
- 8) Activate the Calamus EHP for 1 second, then deactivate and remove the plugger from the root canal using a back and forth motion. This procedure separates and removes gutta percha from the coronal two-thirds of the canal without disturbing the gutta percha in the apical one-third.

- 9) Select the small size, prefit manual plugger and step its working end around the circumference of the canal using short, firm strokes to clean the canal walls and re-condense the most coronal aspect of the gutta percha within the apical one-third.
- 10) Select the Calamus Flow delivery system to optimally “backpack” the canal.  
*(See Backpack Technique)*

**CALAMUS FLOW BACKPACK**

- 1) Heat soften, condense and downpack the master cone to within 5 mm of length. Choose the vertical condensation, continuous wave or other hybrid filling technique for the downpack.
- 2) Position the tip of the warm needle against the previously packed material for 5 seconds.
- 3) Press the activation cuff on the Calamus Flow handpiece and dispense a small 2 to 3 mm segment of warm gutta percha into this region of the canal.
- 4) Hold the Calamus Flow handpiece lightly so it will “back-out” of the canal when syringing thermosoftened gutta percha into the canal.
- 5) Select the smaller size, prefit manual plugger and step its working end circumferentially around the canal using short, firm strokes to clean the canal walls and flatten the dispensed warm gutta percha.
- 6) Use the same smaller size manual plugger and press for 5 seconds to three-dimensionally compact warm gutta percha into this region of the canal and to offset shrinkage during the cooling phase.
- 7) Position the tip of the warm needle against the previously packed material for 5 seconds.
- 8) Press the activation cuff on the Calamus handpiece and dispense a little longer, 3 to 4 mm, segment of warm gutta percha into this region of the canal.
- 9) Select the medium size, prefit manual plugger and step its working end circumferentially around the canal using short, firm strokes to clean the canal walls and flatten the dispensed warm gutta percha.
- 10) Use the same medium size manual plugger and press for 5 seconds to three-dimensionally compact warm gutta percha into this region of the canal and to offset shrinkage during the cooling phase.
- 11) Continue the backfilling technique, in the manner described, until the canal is completely filled or stop at any point to accommodate a post to facilitate the restorative needs.