Frequently Asked **Questions**

3M™ Lava™ Esthetic Zirconia – what is it?

Lava Esthetic zirconia is a CAD/CAM disc for dental lab fabrication of esthetic all-ceramic full-contour restorations. It is a pre-shaded, high translucent cubic zirconia material with a natural color gradient optimized for esthetic full-contour restorations.

What is cubic zirconia?

A new all-ceramic material class based on zirconia. Compared to conventional zirconia, cubic zirconia offers a significantly higher translucency at a reduced strength level. Cubic specifies the dominant crystal structure present in Lava Esthetic zirconia. In conventional zirconia products like 3M™ Lava™ Plus Zirconia, the tetragonal crystal structure is dominant.

How does the composition of Lava Esthetic zirconia compare to Lava Plus zirconia?

Both are “polycrystalline” materials, this means that they consist of many small crystals. The crystals are composed of zirconium dioxide (syn. zirconia) with a small addition of yttrium oxide (syn. yttria) (3 mol% – 5 mol%). The yttria content determines the so-called “phase or structure” of the crystals, i.e. how the Zr and O atoms are arranged in the crystal lattice. Zirconia has three distinct phases: monoclinic, tetragonal and cubic.

Conventional zirconia such as Lava Plus zirconia contains around 3 mol% yttria and the crystal phase is predominantely tetragonal. Under mechanical stress the crystals can undergo a phase transformation to monoclinic. This leads to a local volume increase that impedes crack propagation and makes conventional zirconia the strongest and toughest ceramic used in dentistry.

Lava Esthetic zirconia contains 5% mol, the crystal phase is predominantely cubic. Cubic grains are larger and have isotropic (same in all directions) optical properties. This leads to less scattering of light and therefore greatly improved translucency.

What is the main difference between Lava Esthetic zirconia and other cubic zirconia?

The Lava Esthetic zirconia discs are gradient pre-shaded with a new proprietary shading chemistry with four shading elements. This enables a true color match to VITA classical shades and makes Lava Esthetic zirconia the first zirconia with inherent tooth-like fluorescence built into the disc.

What is tooth-like fluorescence and why does it matter?

Sunlight and artificial light contain invisible ultra-violet (UV) light. Natural teeth look blue in UV light because they absorb UV light and emit visible blue light. This is called fluorescence. To look natural in all light conditions restorative materials have to mimic this effect.

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How can I achieve the best final shade match?

Lava Esthetic zirconia offers a built-in shade gradient and inherent fluorescence for a true match to VITA classical shades. Glaze restorations to achieve best match to selected shade. Lava Esthetic zirconia has a high translucency so that dark preparations may shine through. Communicate the stump shade to your lab to ensure shade match.

Will Lava Esthetic zirconia replace any of the current Lava zirconia products?

No, Lava Esthetic zirconia comes in addition to the current portfolio. It is a new type of zirconia for productive high-esthetic full-contour restorations. Lava Plus zirconia remains our versatile high strength zirconia option.

What is the strength of Lava Esthetic zirconia?

Lava Esthetic zirconia offers a 3-point bending strength according to ISO 6872:2015 of 800 MPa and is qualified for Type II, class 4 indications: Crowns, bridges with one pontic between two crowns, inlays, onlays and veneers. Lava Esthetic zirconia has a significantly higher flexural strength than IPS e.max® CAD. Lava Esthetic zirconia has higher flexural strength than other leading super-high translucent cubic zirconia, but less than Lava Plus zirconia.

What is the fracture toughness of Lava Esthetic zirconia?

Lava Esthetic zirconia has a fracture toughness of 4.4 ± 0.5 MPa m½ measured by the SEVNB method according to ISO 6872:2008. And, it has a significantly higher fracture toughness than IPS e.max CAD.

What indications can be covered with Lava Esthetic zirconia?

- Crowns
- Bridges (max. 1 pontic between two crowns)
- Inlays, onlays, veneers

Please refer to Instructions for Use for details.

What is the minimum wall thickness and minimum connector cross section requirement for Lava Esthetic zirconia?

	Wall thickness	Bridge connector cross section
Anterior	≥ 0.8 mm	≥ 12 mm²
Posterior	≥ 0.8 mm	≥ 14 mm²

Can Lava Esthetic zirconia restorations be used on implants?

Yes, Lava Esthetic zirconia crowns and bridges (with max. 1 pontic between two crowns) can be used on implant abutments.

Can Lava Esthetic zirconia be used for adhesive bridges such as Maryland bridges or inlay/onlay bridges?

No, Lava Esthetic zirconia is released for bridges with maximum 1 pontic between two full coverage crowns.

Can Lava Esthetic zirconia be used for cantilever bridges?

No, Lava Esthetic zirconia is released for bridges with maximum 1 pontic between two full coverage crowns.

Can bruxism patients use Lava Esthetic zirconia?

For cases with very limited space or parafunctional patients requiring ultimate strength, choose Lava Plus zirconia.

In what shades is Lava Esthetic zirconia available?

There are eight shades available at launch: Bleach, A1, A2, A3, A3.5, B1, C1, D2. Additional shades are under development and will be available in 2017.

Is a white Lava Esthetic zirconia disc for liquid shading available?

No. There are no white discs and no liquids available. All Lava Esthetic zirconia discs are pre-shaded and must not be used in combination with liquids.

In what formats is Lava Esthetic zirconia available?

Lava Esthetic zirconia is available in 98 mm disc format with step in three heights: 14, 18 and 22 mm.

Is Lava Esthetic zirconia available on a CEREC® mandrel?

No, Lava Esthetic zirconia is available in 98 mm disc format with step.

Is Lava Esthetic zirconia available in frame format?

No, Lava Esthetic zirconia is available in 98 mm disc format with step.

Which milling systems are compatible with Lava Esthetic zirconia discs?

Lava Esthetic zirconia discs fit into open milling machines compatible with 98 mm disc format with step suitable for dry milling of zirconia, e.g.:

- Roland DWX-50, DWX-51D
- Sirona InLab MC X5
- VHF K3, K4, K5, S1, S2
- imes-icore CoRiTEC 245i, 250i, 350i, 650i, 850i
- Yenadent D14, D15, D40, DC40, D43

This list is for guidance purposes only - many other compatible milling systems exist and new systems enter the market frequently. Always check with milling system suppliers for compatibility.

Lava Esthetic zirconia discs are not compatible with Zirkonzahn Mx, Sirona Inlab/CEREC MC XL, 3M™ Lava™ Form and 3M™ Lava™ CNC milling systems.

How should Lava Esthetic zirconia be milled?

Lava Esthetic zirconia discs are optimized for dry milling processes and can be milled with CAM strategies and parameters suitable for zirconia.

However, the surface quality of milled restorations and the yield rate greatly depend on set milling parameters, machine and tool types and the interaction of Lava Esthetic zirconia discs with your system. Thus, the following milling parameters are recommended:

Job	Feed (mm/min)	Step down (mm)	Step over (mm)	Spindle speed (RPM)	Carbide tool diameter (mm)
Roughing	600	0.4	0.6	10,000	2
Rest material roughing	600	0.3	0.3	30,000	1
Finishing inside 3D/occlusal	1,350	n.a./0.15	0.15	25,000	2
Finishing margin line 3D	500	n.a.	0.1	25,000	2
Finishing outside cavity	800	0.15	0.15	25,000	2
Fine finishing inside 3D	1,000	n.a.	0.12	20,000	1
Fissure machining	800	1	0.2	30,000	1
Fine fissure machining	500	0.5	0.15	30,000	0.5

Please ask your CAM module and mill supplier for help to adapt the parameters in your system if necessary.

Is Lava Esthetic zirconia compatible with 3M™ Lava™ Frame or Lava Plus dyeing liquids?

No. Lava Esthetic zirconia must not be used in combination with any dyeing liquids. The use of dyeing liquids can reduce the strength of the material and compromise fluorescence and shade match.

What is the sintering cycle for Lava Esthetic zirconia?

Cycle Stages	Cycle Parameters
Heating	20 °C/min to 800°C 10 °C/min to 1,500°C
Holding time	120 min at 1,500°C
Cooling	Max. 15 °C/min to 800°C Max. 20 °C/min to 250°C

In our lab we already use certain sintering cycles for zirconia. Is it ok to sinter Lava Esthetic zirconia with my current cycles?

No. Lava Esthetic zirconia must be sintered with the cycle displayed above. Using a different sintering cycle can have negative effects on strength, translucency and/or shade.

What is the drying time of Lava Esthetic zirconia after shading with liquids? Is there a special sinter program including a drying step?

There is no drying time because Lava Esthetic zirconia must not be used in combination with any dyeing liquids. The use of dyeing liquids can reduce the strength of the material and compromise fluorescence and shade match.

What is the recommended finishing for full-contour Lava Esthetic zirconia restorations?

It is recommended to glaze restorations to achieve the best match to the selected shade and a natural, esthetic appearance.

Alternatively, the restoration can be polished using rubber polishers and polishing brushes with diamond polishing paste. This may cause a change in the shading results. This can be avoided, in part, if a shade lighter than desired is selected.

Which stains and glazes can be used?

Low-temperature (< 900 °C) firing glazes and stains suitable for use with zirconia must be used. A vacuum during the glaze firing holding time is not recommended. When Lava Esthetic zirconia is used in combination with a glaze, the manufacturer´s instructions for use must be observed.

Examples of compatible glazes:

- Creation ZI/ ZI-F Glaze
- IPS e.max® Ceram Glaze
- VITA AKZENT® Plus LT Glaze
- Amann Girrbach Ceramill® Glaze

Examples of compatible stain systems:

- IPS e.max® Ceram Shades
- IPS Ivocolor™ Universal Stains
- VITA AKZENT® Plus
- Amann Girrbach Ceramill® Stains
- Noritake Cerabien ZR External Stain Kit

3M™ Lava™ Esthetic

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How can I cement a restoration made of Lava Esthetic zirconia?

For final cementation of crowns and bridges, 3M recommends using **3M™ RelyX™ Unicem 2 Self-Adhesive Resin Cement** offering high bond strength and ease of use without compromising reliability and esthetics.

Depending on the requirements, Lava Esthetic zirconia restorations may be cemented either conventionally (e. g. with glass ionomer cements such as 3M™ Ketac™ Cem Glass Ionomer Luting Cement or a resin-modified glass ionomer cement such as 3M™ RelyX™ Luting Plus Cement) or adhesively (e. g. with 3M™ RelyX™ Unicem 2 Self-Adhesive Resin Cement or 3M™ RelyX™ Ultimate Adhesive Resin Cement).

How do I pre-treat the bonding surface of Lava Esthetic zirconia?

Bonding surface must be sandblasted (30 – 50 µm median particle size alumina, 2 bars/30 PSI). HF etching does not work.

If sandblasting is done in the lab, please make sure to clean the restoration surface with 5.4% NaOCl solution (Sodium Hypochlorite Bleach Solution), rinse and dry after the final try-in right before applying the cement. **Do not clean with phosphoric acid.**

Can sandblasting or diamond grinding reduce strength?

Yes. In general, strength is lowered by surface roughening of a ceramic material. This is true for mechanical treatment of all cubic zirconia materials as well as for HF etching of glass ceramics.

If adaptations were made to a restoration with diamond tools, make sure scratches or rough surfaces are smoothened with rubber polishers used for ceramics before cementation.

Fatigue studies conducted at the University of Alabama, Birmingham, have shown that sandblasting does not have a negative impact on the durability of Lava Esthetic zirconia restorations when cemented with RelyX Unicem 2 cement.[1]

Do I need a primer for Lava Esthetic zirconia?

Follow the instructions of the cement you use – if it says use a certain primer for zirconia then you should do that. 3M recommends using RelyX™ Unicem 2 cement which does not require a separate primer for cementation of Lava Esthetic zirconia crowns and bridges.

How can restorations made of Lava Esthetic zirconia be adjusted and polished intra-orally?

Lava Esthetic zirconia is easier to adjust and remove in comparison to conventional zirconia. Adjust as needed with fine-grain diamond bur and water cooling. Make sure to maintain a minimum wall thickness of 0.8 mm. Polish adjusted areas with rubber polishers used for ceramics.

[1] Lawson N., Burgess J. (University of Alabama, Birmingham, U.S.A.), Morris G. (3M Oral Care).
Fracture Strength of Zirconia Crowns With and Without Alumina Abrasion, J Dent Res 96 (Spec Iss A): 2002, 2017