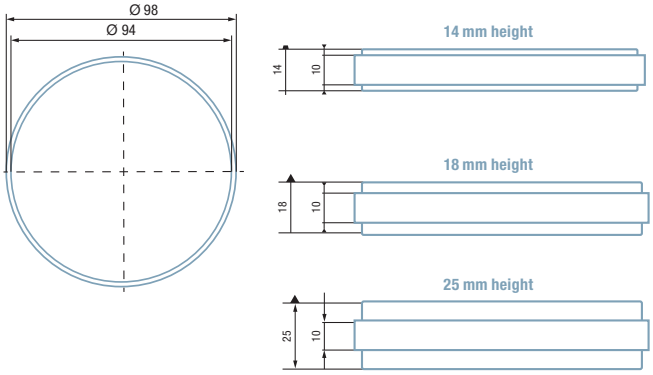
Handling guideline for the milling of Lava™ Plus High Translucency Zirconia

With more than 13 years of clinical experience and millions of cases worldwide, Lava™ Plus High Translucency Zirconia is now available in a disc format in order to fit most open sourced milling systems. The restorations are designed using dental CAD software and the data is converted into a machine tool path by a CAM software program.

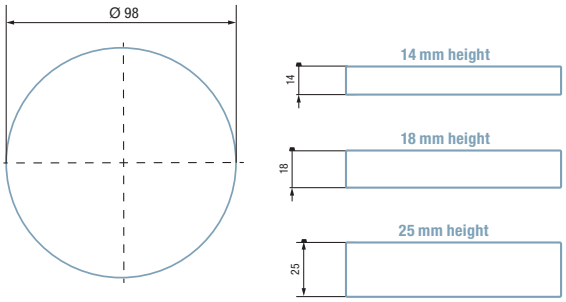
Lava™ Plus High Translucency Zirconia Disc Specification

Lava Plus zirconia disc is available in 2 sizes, 98 mm diameter with a step and 98 mm diameter without a step.
Three heights are available: 14, 18 and 25 mm.

98 mm diameter with a step



98 mm diameter without a step



Indications

- Single crowns
- Bridges with a maximum of two pontics next to one another in the posterior area and a maximum of four pontics next to one another in the anterior area. A maximum of four dies is approved for 5-unit and 6-unit bridges.
- Crowns on implants and 3-unit bridges on two implants
  - Lava Plus Zirconia restorations on implants are contraindicated for patients with bruxism.
  - Lava Plus Zirconia restorations on implants should have a passive (tension-free) fit.
- Splinted crowns (maximum 4 splinted crowns)
- Cantilever bridges with a maximum of 1 pendant at the position of a premolar or incisor
  - Cantilever bridges are contraindicated for patients with bruxism.
- 3-unit inlay/onlay and 2-unit or 3-unit Maryland bridges
  - Inlay/onlay and Maryland bridges are contraindicated for patients with bruxism.
- Zirconia build-up for two-piece abutments
- Primary crowns

Handling guideline for the milling of Lava™ Plus High Translucency Zirconia

To ensure the best results, carry out the following milling and processing recommendations for Lava Plus zirconia:

Scaling Factors

All restorations must be enlarged by a certain factor before milling in order to compensate the shrinkage of the material during sintering. The scaling factor is shown on the Lava™ Plus High Translucency Zirconia Disc and must be entered in the CAM software. The indicated scaling factor applies to undyed Lava Plus zirconia.

The scaling factor must be adjusted for restorations which will be dyed with the Lava™ Plus High Translucency Zirconia Dyeing Liquids, because the dyeing chemistry slightly reduces the shrinkage during sintering. The corrective value of the specific dyeing liquid must be subtracted from the scaling factor shown on the Lava Plus zirconia disc. The table below shows recommended corrective values for some of the dyeing liquid:

Dyeing liquid	Corrective value of the scaling factor
A1, A2, B1, B2, B3, C2, D3, D4	**- 0.0017**
A3, A3.5, A4, B4, C3, C4	**- 0.0030**

Example for dyeing liquid A4: The scaling factor shown on the Disc is 1.2432. Subtract the corrective value 0.0030. The resulting scaling factor to enter in the CAM software for this restoration is 1.2402.

Using CAM Software to Set Sintering Support Structures

Some of the CAM software releases include a function for the placement of sintering pins or supporting design elements on restorations. The design elements are recommended for long-span, thin-walled and bent bridges.

Processing in the Milling Unit

Clean the milling chamber of the milling unit before processing Lava Plus zirconia restorations. We recommend the following parameters, using dry and uncoated milling tools with 2 flutes for processing Lava Plus zirconia discs:

Job	Feed [mm/min]	Step Down [mm]	Step Over [mm]	Spindle Speed [rpm]	Tool Diameter [mm]	Tool Type
Roughing	600	0.4	0.6	10,000	2	carbide
Rest material roughing	600	0.3	0.3	30,000	1	carbide
Finishing inside 3D / Finishing occlusal	1,350	NA/ 0.15	0.15	25,000	2	carbide
Finishing margin line 3D	500	NA	0.1	25,000	2	carbide
Finishing outside cavity	800	0.15	0.15	25,000	2	carbide
Fine finishing inside 3D	1,000	NA	0.12	20,000	1	carbide
Fissure machining	800	1	0.2	30,000	1	carbide
Fine fissure machining	500	0.5	0.15	30,000	0.5	carbide

Removal of the Milled Restorations from the Disc

We recommend using a turbine handpiece to remove milled restorations. If no turbine is available, fine cross-cut tungsten carbide cutters can also be used-rotary speed ≤ 20,000 rpm.

Cleaning

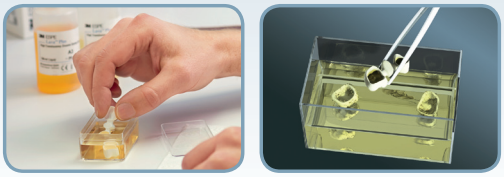
To ensure a consistent coloring, the restoration must be clean, free of oils, and completely dry prior to dyeing.

Shading Options

3M ESPE Dental invented dental zirconia shading. Lava Plus zirconia is a comprehensive system offering a high translucency zirconia combined with a unique shading system that gives full control to create highly esthetic monolithic or layered restorations. Each Lava Plus Zirconia dyeing liquid is a fine-tuned mixture of three ionic components. The wide range of 18 dyeing liquids provides an excellent match to the 16 VITA® classical A1-D4 shades, plus two bleach shades. The incisal area can be shaded with 3 enamel dyeing liquids (medium, light and bleach) to achieve an even better, more natural esthetic.

Shading occurs before the restoration is sintered. All-zirconia restorations and frameworks can be produced with monochrome dip shading, a fast and easy 2-minute process in which the shading liquid is evenly and completely absorbed throughout the zirconia. The shading system can also be used by artisans to produce natural gradient shading.

Dip Shading: The simple way to a high esthetic monochrome tooth color.



Customized Shading: Close to natural tooth.

Lava Plus zirconia can be shaded as detailed in the tables below. Dyeing liquids EB (Enamel, bleach), EL (Enamel, light) and EM (Enamel, medium) are only for the usage of customized accentuation in the incisal area.

Lava™ Plus High Translucency Zirconia Dyeing Liquid		Lava™ Plus High Translucency Zirconia Dyeing Liquid Enamel
VITA® Classic	VITA 3D-Master® System	
W1*	0M1	EB
W3*	0M3	EB
A1	1M2	EL
A2	2M2	EL
A3	2R2.5	EL
A3.5	3R2.5	EM
A4	4M2	EM
B1	1M1	EL
B2	2L1.5	EL
B3	2M3	EL
B4	3M3	EM

Lava™ Plus High Translucency Zirconia Dyeing Liquid		Lava™ Plus High Translucency Zirconia Dyeing Liquid Enamel
VITA® Classic	VITA 3D-Master® System	
C1	2L1.5	EL
C2	3L1.5	EL
C3	4L1.5	EL
C4	5M2	EM
D2	2L1.5	EL
D3	3L1.5	EL
D4	3L2.5	EM

For more detailed shading information, please refer to the Lava™ Plus Shading Video and Lava™ Plus Step-by-Step Shading Guide.

*3M ESPE shades are not part of the VITA Classical Shade Guide.

Sintering

Before sintering, please make sure the furnace is calibrated and can support the heating rates and maximum temperatures as noted in the tables below.

PLEASE NOTE:

The sintering cycles in the tables below have been developed for predictable color and translucency. Dyed restorations need to be dried a minimum of two hours at room temperature prior to sintering. Shorter drying times or different sintering cycles can result in a different shade.

Standard Sintering Cycle

Cycle Stage	Temperature Start	Temperature End	Heating Rate	Time
Drying	room temperature	room temperature		2 hr
Heating	room temperature	800°C	20°C/min.	39 min.
Heating	800°C	1450°C	10°C/min.	65 min.
Dwell time	**1450°C**	**1450°C**	–	**120 min.**
Cooling	1450°C	800°C	15°C/min.	43 min.
Cooling	800°C	250°C	20°C/min.	28 min.

Speed Sintering Cycle

Cycle Stage	Temperature Start	Temperature End	Heating Rate	Time
Drying	room temperature	room temperature		2 hr
Heating	room temperature	900°C	40°C/min.	22 min.
Heating	900°C	1200°C	20°C/min.	15 min.
Heating	1200°C	1500°C	15°C/min.	20 min.
Dwell time	**1500°C**	**1500°C**	–	**30 min.**
Cooling	1500°C	1000°C	15°C/min.	33 min.
Cooling	1000°C	400°C	60°C/min.	10 min.

Finishing the Sintered All-Zirconia Restoration

After completing the sintering process, the restoration can be customized with stains, glaze and glaze firing. We recommend stains and glazes for firing which are approved for zirconia material. A **glaze application** may not only help to achieve a better match of the selected shade, but will also provide a more natural esthetic appearance.

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