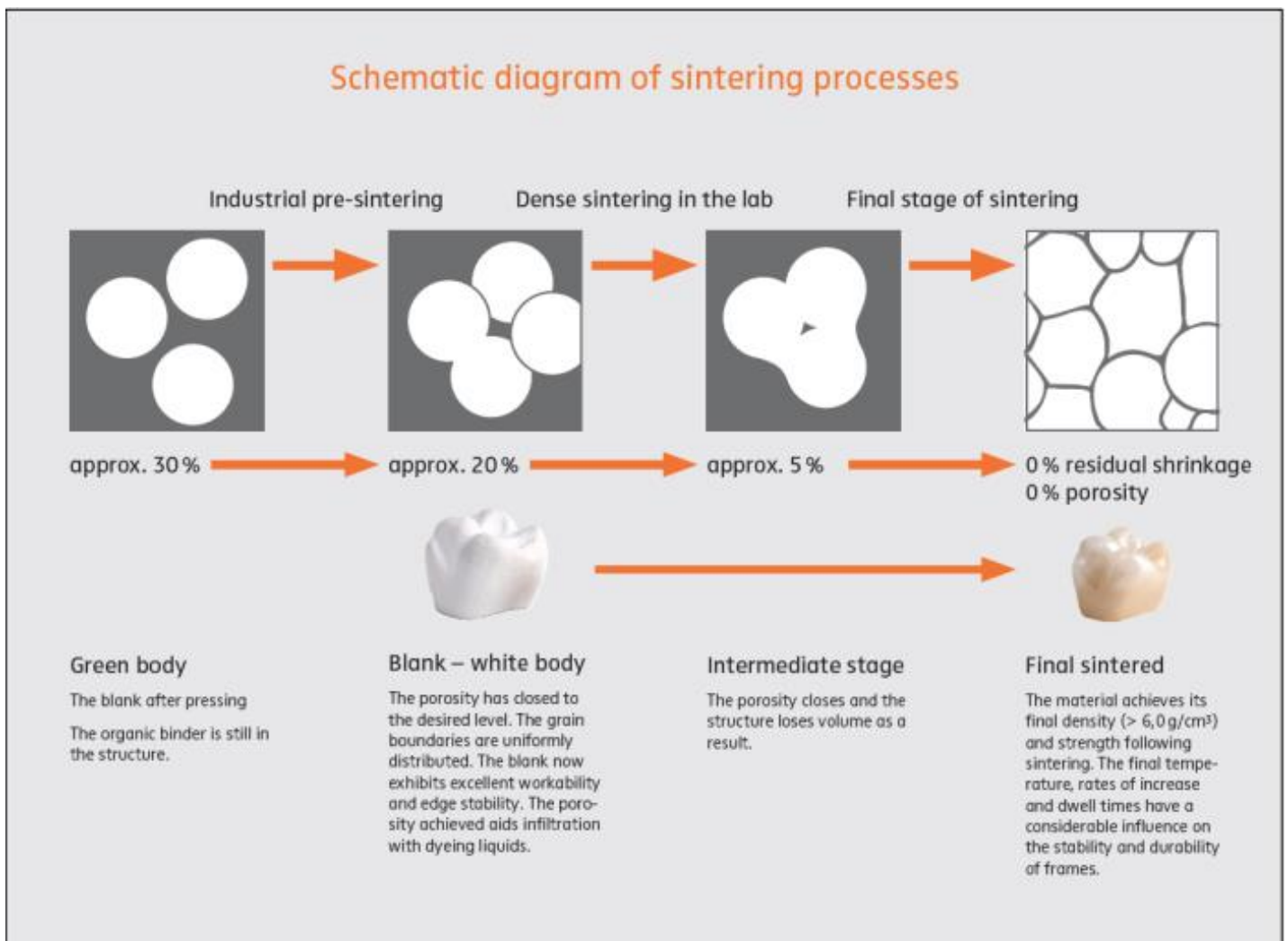




Sintering instruction – DD medical zirconia

The firing curves listed are matched to our zirconium dioxide materials. For optimal sintering results these are our recommendation. As a measurement of the actual temperature in each furnace can lead to different results, adjustments of individual furnace parameters through trial firing with PTC rings may be necessary in individual cases. We will be more than happy to advise you in this respect.

Dental restorations made of zirconium dioxide should be fired in a furnace which is only used for these products. Firing restorations made of another ceramic material or baking of liquid ceramics in the same furnace can lead to impairment of sintering behavior or local discoloring.



We reserve the right to make changes because of the continuous development of our products. Please observe the detailed Dental Direkt instruction for use for each product. Please find the current version of the instruction manual on our website:

www.dentaldirekt.de/en

This version replaces all previous versions.



dentaldirekt.de/
en/downloads

I. RECOMMENDATION PRIOR TO SINTERING

1. „Sintering drops“

If you have the option of placing "sinter drops" on the occlusal surfaces, this is recommended. The drops are used to stabilize constructions during the sintering process. At least four drops must be placed to securely support the constructions. Single copings do not require drops.

- Anterior bridges with three units don't need drops. Posterior bridges should always be designed with drops.
- End units should always have drops.
- Pontics and molar copings should always have drops.
- Anterior and premolar copings do not have to receive drops, but every second unit should be provided with a drop.
- Drops must be attached alternating in oral and vestibular region. The drops should not be placed directly on the edge of the occlusal surface.

2. Detaching

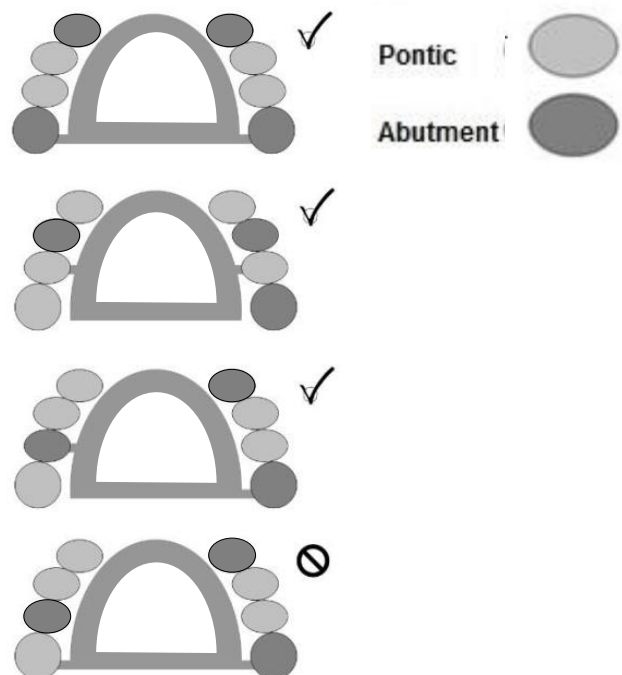
It is sufficient to use a turbine without cooling water, but you should work with low speed and sharp cutting tools. To prevent tension and premature damage of the zirconium dioxide construction we recommend to cut every bar half way through. Subsequently cut bars until predetermined breaking point before separating the construction. After the work has been carefully removed from the blank, the protruding holding bars can be ground down.

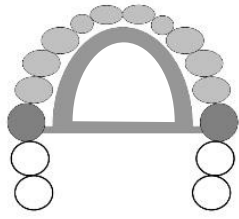
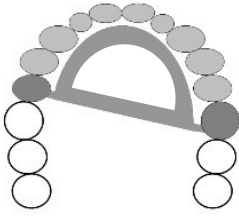
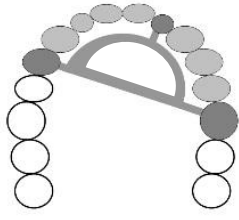
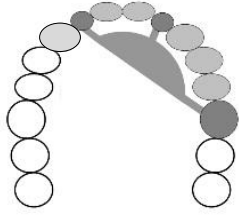
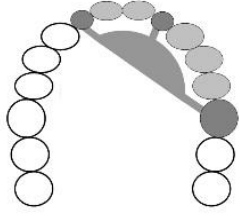
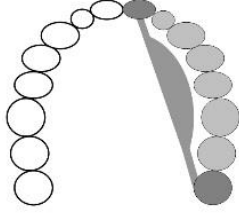
3. Generating a sintering holder/bar if the CAM software does not have this option (when using DD Bio Z, DD Bio ZX² und DD cube ONE[®])

Bridges with 8 units or more

To achieve optimal sintering results large spanned bridges of 8 or more units must not be completely removed from the blank. With large spanned bridges the amount of bar remaining depends upon the curvature of the bridge (arc). When you leave a massive piece of the blank

- The holding bars should only remain attached to matching units. Bars should either remain attached to copings or to pontics.
- If possible, the holding bars should remain to the end units. If the end units are not of the same type the holding bar should be attached to the next matching unit.
- It is possible to leave two bars attached, if the bridge is roughly symmetrical, i.e. the same number of units in each quadrant. These bars remain attached according to the first rules to the end units.
- Three holding bars remain attached if the bridge is asymmetrical, e.g. if the bridge spans from 33 to 46. In accordance with the first two rules two of the holding bars remain attached to the end units. The third holding bar remains attached to another unit.



situation	schematic drawing	regulation
12 units, symmetrical		2 holding bars, end position, oral
11 units, almost symmetrical		2 holding bars, end position, oral
10 units, asymmetrical		2 holding bars, end position, oral 1 holding bar within the arc, oral
9 units, asymmetrical		1 holding bar, end position, oral 1 holding bar orally attached to the coping next to the cantilever bridge 1 holding bar within the arc, oral
8 units, asymmetrical		2 holding bars, end position, oral 1 holding bar within the arc, oral
unilateral		2 holding bars, end position, oral

4. Drying process when wet milling or grinding has been realized

In case of wet processing, a drying process should be realized in a (ceramic) furnace or fan-assisted oven* to remove coolant or lubricant from the porous structure.



Please note: *User information „DD Bio ZS“ und „DD Bio ZX² 19“*

DDBioZS

User information

After milling and before further processing the dental restorations should be cleaned from residue. Therefore you can carefully use water or steam. Afterwards it is necessary to dry the framework, to remove water and milling additives from the porous structure.

Drying process is required for an homogenous coloration of the framework by coloring liquid.

We recommend: Drying of restorations at 700 °C (for 5 min.)

Consult instructions for use
Rev.01_2017/09

DDBioZX²19

User information

After milling and before further processing the dental restorations should be cleaned from residue. Therefore you can carefully use water or steam. Afterwards it is necessary to dry the framework, to remove water and milling additives from the porous structure.

Drying process is required for an homogenous coloration of the framework by coloring liquid.

We recommend: Drying of restorations at 80 °C (for 30 min.) or 150 °C (for 10 min.)

Consult instructions for use
ZS_drying_Info_Rev_02_2017/07

5. Dyeing with DD Shade Concept[®]

Important:

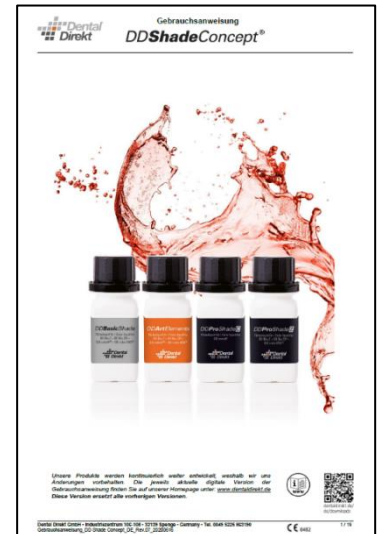


Do not color wet frames. Only completely dry frames should be colored.

Please adhere to the specified drying times.



Please note: *Instruction for use „DD Shade Concept[®]“*



6. Inspection of the milled work

- No material pitting
- No identifiable cracks
- No adhesion of zirconia dust (removal by means of compressed air, brush, and/or immersion in water followed by drying in fan-assisted oven*)
- No surface discoloring
- No glossy patches on the surface

The construction should not be used for the manufacture of dental prostheses if one of the deficiencies listed is detected.

*This fan-assisted oven must not be used for the preparation of food.

II. SINTERING PROCESS

1. General information

In addition to the use of the correct sintering program, including final temperature, dwell time and heating and cooling rates, the quality of sintered frames can depend on:

- the firing capacity and chamber volume of the furnace used
- the size and volume of individual constructions
- the mass in the firing chamber (auxiliary sintering media and quantity of constructions)

To achieve ideal results a sintering program should be selected that heats up all the constructions in the furnace uniformly. All bridges require a somewhat longer time to heat up uniformly and for temperature equalization, due to the differing material thickness of (abutment) crowns and bridge elements. Local differences in sintering caused by heating too rapidly can lead to warping and the formation of cracks. This effect is particularly observed in the case of long-span and solid bridges. When your furnace is loaded with numerous parts and additional elements such as hoods or similar the thermal energy may, depending on the furnace type involved, prove inadequate to ensure flawless sintering of all the parts. Solid covers can absorb large quantities of energy which is then no longer available for dental work. Therefore the optical characteristics might be impaired.



General rule:

Selecting a slower sintering cycle is favorable to improve the quality of the zirconia structure.

2. Final firing temperatures

All mentioned temperatures are recommendations.

The actual temperature varies from sintering furnace to sintering furnace. You can check your furnace with PTC rings. We are more than happy to advise you in this respect.

An opaque result can be an indication of a wrong furnace temperature.

DDBioZ & DDcubeONE[®] & DDcubeX²[®] → 1450°C

DDBioZX² → 1450°C – 1530°C

Important:



Do not place milled work in the furnace when the maximum residual temperature is greater than 70°C, due to the danger of temperature shock.

Never open the furnace door at a temperature exceeding 200°C, as damage to heating elements and/or the fired objects can occur due to thermo shock.

3. Sintering program for all product variants

3.1 Standard program: Max. temp. 1450°C (till 1530°C for DD Bio ZX²) / Duration ~ 9 Std.

For full contour crowns, bridges, and all constructions without sintering support structures						
Furnace filling	Low to medium (without cover)					
Program line	C0 L0 T008.A900 L9 T1800 T003.C1450 T7200 T010.C200 C0 L0 T2					
	Temp. 1 [°C]	Temp. 2 [°C]	Heating rate [°C/h]	Heating rate [°C/min]	Dwell time [min]	Time [min]
Heating	20	900	480	8	-	110
Dwell	900	900	-	-	30	30
Heating	900	1450	200	3	-	183
Dwell	1450	1450	-	-	120	120
Cooling*	1450	200	600	10	-	125
					Total time:	568 min. 9,4 h

*Alternative: Uncontrolled cooling by turning off the heating. Do not open the furnace before 200°C.

3.2 Massive program: Max. temp. 1450°C (till 1530°C for DD Bio ZX²) / Duration ~ 11 Std.

For full contour crowns, solid bridges, and all constructions with sintering support structures						
Furnace filling	High					
Program line	C0 L0 T008.A900 L9 T1800 T002.C1450 T7200 T010.C200 C0 L0 T2					
	Temp. 1 [°C]	Temp. 2 [°C]	Heating rate [°C/h]	Heating rate [°C/min]	Dwell time [min]	Time [min]
Heating	20	900	480	8	-	110
Dwell	900	900	-	-	30	30
Heating	900	1450	100	2	-	275
Dwell	1450	1450	-	-	120	120
Cooling*	1450	200	600	10	-	125
					Total time:	660 min. 11 h

*Alternative: Uncontrolled cooling by turning off the heating. Do not open the furnace before 200°C.

4. Speed-Sintering programs: Only for single crowns with maximum wall thickness 4 mm

Dekema Austromat 664 (DD Argus fire speed)					
Furnace filling	Sintering only on one plane, maximum 3 crowns per sintering process				
Program lime	C0 L0 T060.A990 L9 T010.C1350 T015.C1450 T3000 T010.C1350 C990 C0 L0 T2				
	Temp. 1 [°C]	Temp. 2 [°C]	Heating rate [°C/min]	Dwell time [min]	Furnace lift position
Heating	20	990	60	-	closed completely
	990	1350	10	-	-
	1350	1450	15	-	-
Dwell	-	1450	-	50	-
Cooling	1450	1350	10	-	-
	1350	990	as quick as possible	-	-
	-	990	-	-	opened completely, heating off

Dekema Austromat 674 (DD Argus fire 674)					
Furnace filling	Sintering only on one plane, maximum 6 crowns per sintering process				
Program line	C0 L0 T060.A990 L9 T010.C1350 T015.C1450 T4800 T010.C1350 C990 C0 L0				
	Temp. 1 [°C]	Temp. 2 [°C]	Heating rate [°C/min]	Dwell time [min]	Furnace lift position
Heating	20	990	60	-	closed completely
	990	1350	10	-	-
	1350	1450	15	-	-
Dwell	-	1450	-	80	-
Cooling	1450	1350	10	-	-
	1350	990	as quick as possible	-	-
	-	990	-	-	closed completely, heating off

Attention: The use of speed programs leads to minimal, but not significant deviations in color, translucency and mechanical properties. The specified speed sintering cycles were validated in the Dekema Austromat 664/674 furnaces mentioned above. The use of programs in other sintering furnaces may lead to deviating results, in regard of color and translucency of the constructions. This is among other reasons due to different chamber volume.

5. Speed-and Superspeed-sintering programs with the furnace mv-r from Mihm-Vogt:

⚠ Procedure:

For optimum sintering results in the DD Speed and DD Superspeed programs, the furnace must be started at room temperature. It is to be sintered with the standard program mode (heating rate up to 120 °C/minute or 216 °F/minute, respectively). The sintering firings are carried out with the SiC tray.

After sintering, the SiC sintering tray can be removed with crucible tongs at 750°C or lower, which should be done focused and quickly! The tray must be placed on a heat-resistant, insulating base (e. g. support fleece 100). The restorations can then be picked up with the tongs and placed onto another heat-resistant base for faster cooling, e. g. the sintering material support 40/12. After approx. 10 minutes the restoration has cooled down and can be processed further. Do not cool down with water or compressed air, as this will considerably shorten the service life of the restoration! The tongs may scorch when the tray is removed, but they can still be used. To protect the furnace, close the furnace after removal.

⚠ The programs are validated only for the furnace mv-r!

Speed sintering with the furnace mv-r from Mihm-Vogt					
Furnace loading	One 3-unit bridge or up to 6 single crowns				
Limitation of the approved materials	Only DD cubeX ² ML in all 16 VITA-colors!				
Program mode	Standard program mode (sintering up to 120°C/min with sintering tray)				
Sinter duration	130 minutes				
	Temp. 1 [°C]	Temp. 2 [°C]	Heating rate [°C/min]	Dwell time [min]	
Heating	20	990	60	-	
	990	1350	10		
	1350	1450	15		
Dwell	-	1450	-	50	
Cooling	1450	1350	10	-	
	1350	990	40		
	990	750	60		

Attention: The use of the speed program leads to minimal, but not significant deviation in color, translucency and mechanical properties.

Super-speed sintering with the mv-r furnace from Mihm-Vogt

Furnace filling	Up to 3 single crowns per sintering process (up to 4 mm wall thickness)				
Limitation of the approved materials	Only DD cubeX ² ML in all 16 VITA-colors!				
Program mode	Standard program mode (sintering with sintering tray up to 120°C/min)				
Sinter duration	85 minutes				
	Temp. 1 [°C]	Temp. 2 [°C]	Heating rate [°C/min]	Dwell time [min]	
Heating	20	1300	120	-	
	1300	1450	10	-	
Dwell	-	1450	-	35	
Cooling	1450	750	120	-	

Attention: The use of the super-speed program leads to minimal, but not significant deviation in color, translucency and mechanical properties.