

The sintering curves have been matched to our materials and are therefore our recommendation for optimal sintering results. As the actual temperature (energy) can differ from furnace to furnace and may deviate from the programmed parameters, it is advisable in individual cases to determine and adjust the individual furnace parameters by means of a test firing with PTC rings. We will gladly advise you:

info@dentrepublic.de



Zirconia restorations should be fired in a furnace that is used exclusively for these products. If other ceramic materials or flux ceramics are also fired in the same furnace, this may impair the sintering behaviour or cause discolouration.

Final temperatures:

republicZr® classic

3Y-TZP

WHITE | MONOCHROME

All positions in the dental arch – reduced veneering frameworks, hybrid abutments

republicZr® Y-ML unlimited

3Y-TZP & 4Y-PSZ

Multi Yttrium (Y_2O_3) blanks with shade and translucency gradient

All positions in the dental arch – monolithic posterior translucency

republicZr® Y-ML pioneer

4Y-PSZ & 5Y-PSZ

Multi Yttrium (Y_2O_3) blanks with shade and translucency gradient

All positions in the dental arch – monolithic anterior translucency

(1480) – 1500 °C



(1480) – 1500 °C



1530 °C



Effect of temperature (energy) on the material properties:

An adequate energy supply during the sintering process is essential for the excellent mechanical properties (strength) of the materials. Shade and translucency are likewise significantly influenced by the energy applied. The influencing factors are:

- 🕒 **Time:** Especially with bulky restorations (long-span bridges with connected pontics, milled gingival portions, etc.), slow heating rates, dwell points and the holding time at final temperature are important for uniform heating.
- 🌡️ **Temperature:** The final temperature in particular is relevant. Depending on the zirconia chemistry (Y_2O_3 content, colouring oxides) the shade and translucency change. As a rule of thumb:
 3Y TZP: higher temperature = less chromatic, higher translucency
 lower temperature = less translucency, "darker", more intense shades
 >4Y PSZ (multi-yttrium):
 higher temperature = less chromatic ("paler"), less incisal translucency
 lower temperature = over-saturated chroma (e.g. dominant yellow), less translucency
- 📖 **Furnace load:** The thermal energy is distributed over everything inside the firing chamber. With "full" furnaces it is advisable to select slower heating rates (standard programs) for aesthetic results.

e.g.: republicZr®Y-ML **pioneer**

If the final temperature is too high, the result is less chromatic (pale). The translucency in the incisal area decreases. → image right



If the temperature is too low, the shade shows over-saturated chroma (yellow-brown dominance). With monolithic restorations the effect is markedly intensified after glazing. ←image left, ↓image below



(All images taken under different conditions. They serve only to illustrate the effect.)

Inspection of the milled restorations

- ✓ No chipping, cracks or other damage
- ✓ No adhering zirconia dust. It sinters firmly onto the surface, and removal after sintering is time-consuming and not gentle on the material. Remove with compressed air or a brush
- ✓ No discolouration or foreign particles on the surface. Avoid contamination with metal dust or swarf in particular, for example if CoCr is finished at the same workstation as ZrO₂. Metallic residues on the surfaces oxidise during sintering and produce spot or partly extensive discolouration.
- ✓ No shiny areas on the surface
- ✓ The restorations must be dry. If wet processing was used, a drying firing should be carried out in a ceramic furnace to remove the coolant and/or lubricant from the porous structure. If colouring liquid was used (even only partially), allow sufficient drying time (observe the liquid manufacturer's instructions). In general, convection dryers ("food dehydrators") have proven helpful for drying infiltration shades.

If you find any of the defects listed and it cannot be remedied as described, the restoration should not be used for the fabrication of dental prostheses.



Please also observe the operating instructions of the respective sintering furnace.

Before using the fast sintering programs, make sure that your sintering furnace is designed for the heating rates and final temperatures.

For your own protection (risk of burns!), please note that zirconia stores heat for a long time and therefore stays hot accordingly. The restorations should also never be cooled abruptly (e.g. placed on a cold surface after removal without a firing tray). This can cause "thermal shock", resulting in cracks and fractures.

Sintering programs:

Program selection at a glance

Material	Standard	Long program	Ultra Speed	Speed GT1 pro	Speed 4h	Speed 2h
republicZr® classic	✓	✓	–	–	✓	✓
republicZr® Y-ML unlimited	✓	✓	–	–	✓	crowns only
republicZr® Y-ML pioneer	✓	✓	crowns only	crowns only	–	–

✓ approved – not approved. Long program: high-mass and long-span restorations, sintering supports, high furnace loads. Ultra Speed and Speed GT1 pro: Y-ML pioneer only, single crowns only. Speed 4h and Speed 2h: bridges with max. 3 units and max. 1 pontic. For final temperatures and times see the tables; for the effect of temperature and furnace load see page 1.

classic · Y-ML unlimited · Y-ML pioneer republicZr® **Standard (universal)**

Ramp	Parameter	Y-ML unlimited & pioneer	classic
Heating rate 1	↗ 8 °C/min. to 1150 °C	Final temperature	
Holding time 1	↔ 30 min. at 1150 °C		
Heating rate 2	↗ 2 °C/min. to 1300 °C		
Heating rate 3	↗ 4 °C/min. to final temperature →	1500 °C	1530 °C
Holding time 2	↔ 120 min. at final temperature		
Cooling rate 1	↘ 8 °C/min. to 800 °C		
Cooling rate 2	↘ free cooling to 200 °C (opening temperature), alternatively 5 °C/min.		
Total time	⌚ to 200 °C, controlled (5 °C/min.)	10 h 24 min	10 h 35 min
Total time	⌚ to 200 °C, free from 800 °C (empirical value)	9 h 54 min	10 h 05 min

DEKEMA Classic programs:

Y-ML pioneer/unlimited: C0 L0 T008.A900 L9 T008.C1150 T1800 T002.C1300 T004.C1500 T7200 T008.A800 T005.A200 C0 L0 T2

Zr classic: C0 L0 T008.A900 L9 T008.C1150 T1800 T002.C1300 T004.C1530 T7200 T008.A800 T005.A200 C0 L0 T2

classic · Y-ML unlimited · Y-ML pioneer republicZr® **Long program (gentle)** for high-mass and long-span restorations, in particular with sintering supports, and for high furnace loads

Ramp	Parameter	Y-ML unlimited & pioneer	classic
Heating rate 1	↗ 8 °C/min. to 900 °C	Final temperature	
Heating rate 2	↗ 4 °C/min. to 1150 °C		
Holding time 1	↔ 30 min. at 1150 °C		
Heating rate 3	↗ 2 °C/min. to final temperature →	1500 °C	1530 °C
Holding time 2	↔ 120 min. at final temperature		
Cooling rate 1	↘ 8 °C/min. to 800 °C		
Cooling rate 2	↘ free cooling to 200 °C (opening temperature), alternatively 4 °C/min.		
Total time	⌚ to 200 °C, controlled (4 °C/min.)	12 h 15 min	12 h 34 min
Total time	⌚ to 200 °C, free from 800 °C (empirical value)	11 h 15 min	11 h 34 min

DEKEMA Classic programs:

Y-ML pioneer/unlimited: C0 L0 T008.A900 L9 T004.C1150 T1800 T002.C1500 T7200 T008.A800 T004.A200 C0 L0 T2

Zr classic: C0 L0 T008.A900 L9 T004.C1150 T1800 T002.C1530 T7200 T008.A800 T004.A200 C0 L0 T2

Y-ML pioneer republicZr® Ultra Speed for single crowns only

Ramp	Parameter	Y-ML pioneer
Heating rate 1	↗ 99 °C/min. to 1100 °C	Final temperature
Heating rate 2	↗ 3 °C/min. to 1400 °C	
Heating rate 3	↗ 8 °C/min. to final temperature →	
Holding time 1	↔ 15 min. at final temperature	1550 °C
Cooling rate 1	↘ 70 °C/min. to 800 °C	
Cooling rate 2	↘ free cooling to 200 °C (opening temperature), alternatively 10 °C/min.	
Total time	🕒 to 200 °C, controlled (10 °C/min.)	3 h 35 min
Total time	🕒 to 200 °C, free from 800 °C (empirical value)	4 h 05 min

DEKEMA Classic programs:

Y-ML pioneer: C0 L0 T099.A990 L9 T099.C1100 T003.C1400 T008.C1550 T900 T070.A800 T010.A200 C0 L0 T2

Note: Not feasible in every furnace – check 99 °C/min. and 1550 °C beforehand. **Only one layer per tray; no multiple loading.**

Y-ML pioneer republicZr® Speed GT1 pro for single crowns only

Ramp	Parameter	Y-ML pioneer
Heating rate 1a	↗ 50 °C/min. to 999 °C	Final temperature
Heating rate 1b	↗ 30 °C/min. to 1100 °C	
Heating rate 2	↗ 3 °C/min. to 1400 °C	
Heating rate 3	↗ 8 °C/min. to final temperature →	1550 °C
Holding time 1	↔ 30 min. at final temperature	
Cooling rate 1	↘ 50 °C/min. to 800 °C	
Cooling rate 2	↘ free cooling to 200 °C (opening temperature), alternatively 10 °C/min.	
Total time	🕒 to 200 °C, controlled (10 °C/min.)	4 h 07 min
Total time	🕒 to 200 °C, free with furnace opening from 800 °C	4 h 07 min

DEKEMA Classic programs:

Y-ML pioneer: C0 L0 T050.A999 L9 T030.C1100 T003.C1400 T008.C1550 T1800 T050.A800 T010.A200 C0 L0 T2

Note: In the Advanced Setting of the GT1 pro, activate the furnace opening from 800 °C. Can also be run on other furnaces permitting 1550 °C. **Only one layer per tray; no multiple loading.**

classic · Y-ML unlimited republicZr® Speed 4h for bridges with max. 3 units and max. 1 pontic

Ramp	Parameter	Y-ML unlimited	classic
Heating rate 1	↗ 40 °C/min. to 1150 °C	Final temperature	
Holding time 1	↔ 10 min. at 1150 °C		
Heating rate 2	↗ 10 °C/min. to final temperature →	1510 °C	1550 °C
Holding time 2	↔ 120 min. at final temperature		
Cooling rate 1	↘ 40 °C/min. to 800 °C		
Cooling rate 2	↘ free cooling to 200 °C (opening temperature), alternatively 10 °C/min.		
Total time	🕒 to 200 °C, controlled (10 °C/min.)	4 h 32 min	4 h 37 min
Total time	🕒 to 200 °C, free from 800 °C (empirical value)	5 h 02 min	5 h 07 min

DEKEMA Classic programs:

Y-ML unlimited: C0 L0 T040.A990 L9 T040.C1150 T600 T010.C1510 T7200 T040.A800 T010.A200 C0 L0 T2

Zr classic: C0 L0 T040.A990 L9 T040.C1150 T600 T010.C1550 T7200 T040.A800 T010.A200 C0 L0 T2

Note: Not every sintering furnace permits 1550 °C. Check the maximum temperature of your furnace before programming.

classic · Y-ML unlimited republicZr® **Speed 2h** for bridges with max. 3 units and max. 1 pontic / Y-ML unlimited
crowns only

Ramp		Parameter	Y-ML unlimited	classic
Heating rate 1	↗	50 °C/min. to 1150 °C	Final temperature	
Heating rate 2	↗	8 °C/min. to final temperature →	1550 °C	
Holding time 1	↔	30 min. at final temperature		
Cooling rate 1	↘	50 °C/min. to 800 °C		
Cooling rate 2	↘	free cooling to 200 °C (opening temperature), alternatively 10 °C/min.		
Total time	⌚	to 200 °C, controlled (10 °C/min.)	2 h 58 min	
Total time	⌚	to 200 °C, free from 800 °C (empirical value)	3 h 28 min	

DEKEMA Classic programs:

Y-ML unlimited / Zr classic: C0 L0 T050.A990 L9 T050.C1150 T008.C1550 T1800 T050.A800 T010.A200 C0 L0 T2

Note: Not every sintering furnace permits 1550 °C. Check the maximum temperature of your furnace before programming. **Only one layer per tray; no multiple loading.**

Times calculated from 20 °C using the rates stated; for free cooling 800 → 200 °C an empirical value of 90 min. has been applied, for the Speed GT1 pro with furnace opening from 800 °C 60 min. The actual duration depends on furnace type, insulation and load.

Using the fast sintering programs may produce a shade and translucency result that differs from the standard program.



- Do not place the milled restorations into the furnace above a maximum residual temperature of 70 °C and do not remove them before 200 °C (thermal shock).
- In most sintering furnaces, the best results with republicZr® Y-ML in the Universal and Long program are achieved at 1500 °C

“Sintering makes the smile last.”

We wish you much enjoyment and consistently beautiful sintering results. If something is not right, please do not hesitate to contact us. We love zirconia and will gladly advise you on optimising your processes and results.

Warranty / Disclaimer

recommendations, whether provided orally, in writing, or through practical instruction, are intended solely as guidelines. Our products are subject to continuous development and are tested in accordance with the state of the art and applicable legal requirements. We reserve the right to make resulting changes to handling and composition. The current valid version of the instructions for use is available at www.dentrepublik.de/downloads This version supersedes all previous versions.

Application-related