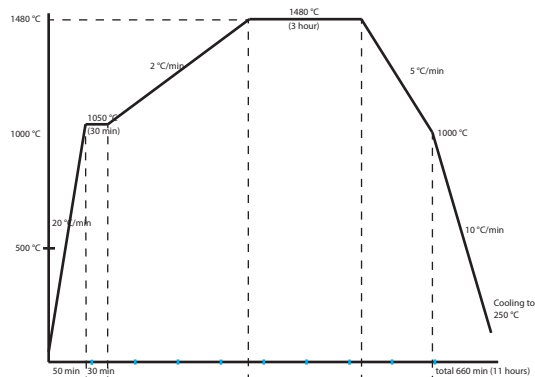


Program D. Bridges with Thick Pontic

	Stage	Rate / min	Ramp Time	Hold Time
1	Ramp to 1050 °C	20 °C / min	50 min	30 min
2	Ramp to 1480 °C	2 °C / min	215 min	180 min at 1480 °C
3	Cooling to 1000 °C	5 °C / min	100 min	n/a
4	Cooling to 250 °C	10 °C / min	75 min	n/a
	Total time		11 hours	

Extended sintering time and cooling time (11 hours) ensures better pontic aesthetics, minimal distortion and stress-free bridges.

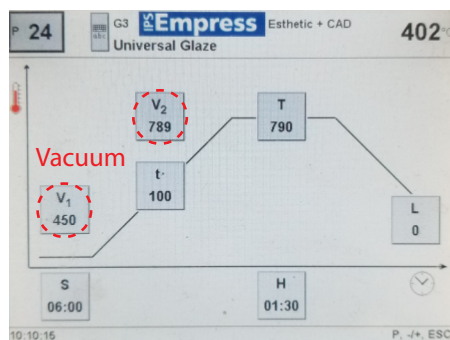


Parameters for Pre-shaded Multi Zirconia Glaze Firing

	Preheating Temp	Drying Time	Temp Speed (Heat Rate)	Final Temp	Holding Time	Vacuum Start	Vacuum End
	B [C/F]	S [min]	t [C/F/min]	T [C/F]	H [min]	V1 [C/F]	V2 [C/F]
Glaze Firing	403 / 757	6:00	100 / 212	<u>790</u> / 1454	1:30	450	789

Be sure to APPLY VACUUM, as shown to the right. Without vacuum, crowns will look opaque and shades will be light.

We have been recommending no vacuum for white zirconia, but it is required for our pre-shaded discs.



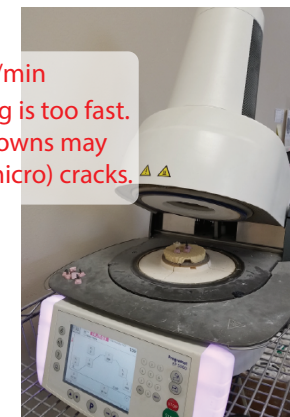
Beyond+ Multi[™] Zirconia Glazing Cool Down Parameters

It is important to have enough cooling time after sintering (1500° C) and glazing (800° C) to avoid possible (micro) cracks in your zirconia restoration. Cooling too fast may result in cracks in the areas between thick pontics and a thin wall. Please follow the CSP (Cooling Shock Protection) guidance below, created by Ivoclar for their industry standard porcelain oven with which we carry out our R&D for zirconia glazing.

	Option 1 (Standard)	Option 2 (Extended time for big bridges)
	L = 0	L = 600 (oven starts to open at 600 °C)
800 °C	Oven starts to open slowly	Oven does not open
700 °C	54 seconds	1 min 19 seconds
600 °C	2 min 26 seconds (cumulative)	4 min 03 seconds
500 °C	4 min 47 seconds (cumulative)	6 min 51 seconds
400 °C	7 min 18 seconds (cumulative)	10 min 50 seconds
300 °C	8 min 22 seconds (cumulative)	11 min 20 seconds
Total glazing time	about 23 minutes (from start to finish)	about 29 minutes

	Example of cooling that is too fast and will cause cracks
	L = 0
800 °C	Oven starts to open slowly
700 °C	39 seconds
600 °C	54 seconds (cumulative)
500 °C	1 min 20 seconds (cumulative)
400 °C	2 min 34 seconds (cumulative)
300 °C	5 min 20 seconds (cumulative)
Total glazing time	about 19 minutes (from start to finish)

200 °C/min
 This cooling is too fast. Zirconia crowns may develop (micro) cracks.



Sintering Principles: 1450_c - 1530_c

- First, calibrate your oven. Use a ceramic temperature test ring, measure the ring for actual temperature and adjust your setting (ex. 1500° C).
- There is no translucency change between the temperature range 1450° - 1530° for *Beyond+ Multi* disc.
- The standard sintering temperature we recommend is 1500° C.
- [If your restoration comes out light after sintering, then lower the temperature incrementally by 20° C.](#)
- If your restoration comes out darker than the shade tab, raise the temperature incrementally by 20° C.



Example	1530°C	A1	Standard A2 Shade will be lightened up at a higher temp
	1500-1480°C	A2	Standard A2
	1450°C	A3	Standard A2 Shade will be darkened at a lower temp

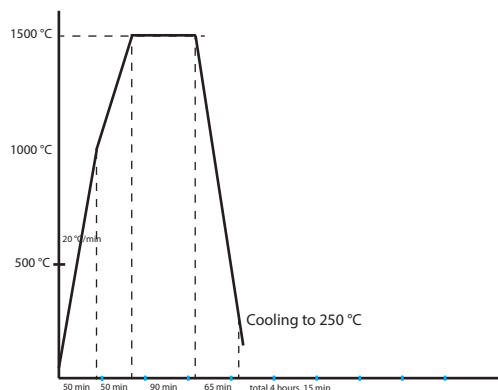
Program A. Single Crowns (up to 30 per batch)

Stage	Rate / min	Ramp Time	Hold Time
1 Ramp to 1000 °C	20 °C / min	50 min	0 min
2 Ramp to 1500 °C	10 °C / min	50 min	90 min at 1500 °C
3 Cooling to 250 °C	20 °C / min	65 min	n/a
Total time		4 hours, 15 min	

Optimal program for quick sintering of single crowns.

Whereas white zirconia is limited to 15 units in this quick cycle, up to 30 pre-shaded zirconia units can be sintered.

3 unit bridges with a small pontic can also be sintered with this program.

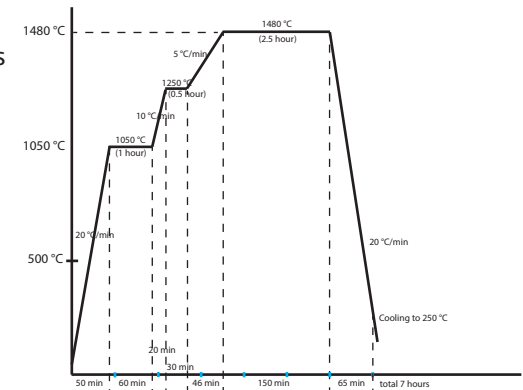


Program B. Single Crowns (exceeding 30) & 3 Unit Bridges

Stage	Rate / min	Ramp Time	Hold Time
1 Ramp to 1050 °C	20 °C / min	53 min	60 min
2 Ramp to 1250 °C	10 °C / min	20 min	30 min at 1250 °C
3 Ramp to 1480 °C	5 °C / min	46 min	150 min at 1480 °C
4 Cooling to 250 °C	20 °C / min	65 min	n/a
Total time		7 hours	

Optimal program for single crowns exceeding quantities of 30 as well as 3 unit bridges with thick pontics (since large mass pontics require increased amounts of heat).

(2.5 hours of holding time will produce a pontic area with much better aesthetics than a 2 hour holding time since the white L* value is decreased)



Program C. Bridges (over 3 units)

Stage	Rate / min	Ramp Time	Hold Time
1 Ramp to 1050 °C	20 °C / min	50 min	60 min
2 Ramp to 1250 °C	10 °C / min	20 min	30 min at 1250 °C
3 Ramp to 1480 °C	5 °C / min	46 min	150 min at 1480 °C
4 Cooling to 1000 °C	5 °C / min	100 min	n/a
5 Cooling to 250 °C	10 °C / min	75 min	n/a
Total time		9 hours	

This is the universal program for single crowns and bridge cases.

The extended cooling time will ensure minimal distortion and stress-free cooling of the bridge restorations.

(2.5 hours of holding time will produce a pontic area with much better aesthetics than a 2 hour holding time since the white L* value is decreased)

