

Procedures NobelRondo™ Zirconia

Colored Zirconia Copings

Firing instructions for NobelRondo™

Framework design instruction



New!

Colored Zirconia Copings



Zirconia copings in four different colors; standard, light, medium and intense

Procera® Zirconia components are available in four different colored shades for use with both NobelRondo™ Zirconia veneering material and NobelRondo™ Zirconia Press material in the following shades:

- Standard, which is the original shade from production of yttria stabilised zirconia
- Light, a light shading to be used in bright shades
- Medium, a medium shading to be used with the most common shades
- Intense, a strong shading to be used with chromatic, low values shades



Samples of colored and non-colored zirconia

New!

Colored Zirconia Copings

The technical idea with colored Procera® Zirconia is to create the possibility to alter the value of zirconia components with ease, Easy Esthetics™. The idea with coloured zirconia components is not at first hand to regulate chroma, since this demands a lot of variations of colorization, and might complicate veneering.

The colorization will affect the opacity slightly, so in cases with high esthetic demands and translucency, we recommend to use components for crowns and bridges from the Procera® Alumina assortment.

	A0, B0	A1, B1	A2, A3	A3.5, A4	B2	B3, B4	C1, C2	C3, C4	D2, D3, D4
Core colour	Standard	Light	Medium	Intense	Medium	Intense	Medium	Intense	Medium

Procera® Colored Zirconia copings follow ISO-standard on:

- Radioactivity according to ISO 6872 section 8.2
- Flexural strength according to ISO 6872 section 8.3.2 (Biaxial)
- Chemical solubility according to ISO 6872 section 8.4
- Cytotoxicity according to ISO 10993-5 section 8.4.1 (Agar diffusion)

Update on instructions

Indication

NobelRondo™ Zirconia is a veneering ceramic for use with all fully sintered zirconium oxide substructures with a CTE of approx. $10 \times 10^{-6} \text{K}^{-1}$ (25–500°C).

Contra-indication

- Veneering of substructures not within the CTE range
- Improper preparations
- Lack of veneering space

Firing recommendations

- **Note!** Never underfire the veneering-ceramic
- **Note!** Zirconium oxide is a poor heat conductor. Never use a heating rate of more than 45°C/min for veneering.
- **Note!** Avoid placing too many objects on the firing tray, since they absorb too much energy and might cause underfiring
- **Note!** With large bridge substructures, massive pontics or many small units raise the first and second dentine bake firing temperatures

Rule of thumb: The final temperature for each additional unit (crown, pontic, etc.) should be raised by 2°C each, however the maximum temperature increase should not exceed 15°C.

Example 1st dentine bake 6-unit bridge:

5 additional units – 910°C + (5×2°C) - firing temperature = 920°C.

- Pre-drying and oven closing time may also be extended with large bridge substructures, massive pontics or many small units
- **Note!** In order to reduce thermal tension, a slow opening phase of the oven may be advised
- **Note!** Using massive firing trays will cause excessive heat absorption and will influence the firing results negatively. Therefore **honeycomb-firing trays are strongly recommended**. If a massive firing tray is used, the firing temperature must be raised approximately 10°C.
- First apply and fire the shoulder material, afterwards follows the liner bake etc
- Please follow the firing recommendations below. **NB special general recommendations for large substructures below.**
- **Note!** Never place objects directly in the middle of the firing pins. We recommend thin wire pins.
- **Note!** Never place objects directly in the middle of the firing tray. Use area indicated in scheme below (closer to the heating elements).

- **Note!** After the opening of the oven, leave veneered zirconium oxide frameworks on firing tray to allow slow cooling-down to room temperature. This procedure will further reduce unwanted thermal tensions.

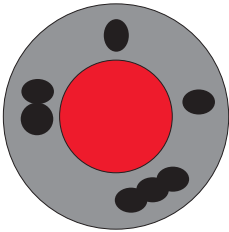


Fig. 1: Objects should never be placed in the inner circle of the firing tray (red area).

- **Note!** Frameworks of zirconium oxide should never be worked on with rotary instruments by using high pressures and high speed or without using water cooling. This is also true for adjustments made by the dentist.

A. General firing program

Small to medium sized substructures in zirconia

General firing program NobelRondo™ Zirconia	Preheat temp. [°C]	Drying time [min]	Heating rate [°C/min]	Firing temp. [°C]	Holding time [min]	Vacuum [hPa]	Slow cooling [min]
1 st shoulder bake	575	8:00	45	980	1:00	50	–
2 nd shoulder bake	575	8:00	45	960	1:00	50	–
Liner bake	575	8:00	45	930	1:00	50	–
1 st dentine bake	575	9:00	45	910	1:00	50	–
2 nd dentine bake	575	8:00	45	900	1:00	50	–
Glaze	575	5:00	45	880	1:00–2:00	–	–
Correction	575	5:00	45	850	1:00	50	–

B. Special firing program

Large substructures, e.g long/thick bridges in zirconia



Firing program NobelRondo™ Zirconia	Preheat temp. [°C]	Drying time [min]	Heating rate [°C/min]	Firing temp. [°C]	Holding time [min]	Vacuum [hPa]	Slow cooling [min]
1 st shoulder bake	575	8:00	45	980	1:00	50	6:00
2 nd shoulder bake	575	8:00	45	960	1:00	50	6:00
Liner bake	575	8:00	45	930	1:00	50	6:00
1 st dentine bake	575	9:00	45	910–925	1:00	50	6:00
2 nd dentine bake	575	8:00	45	900–915	1:00	50	6:00
Glaze	575	5:00	45	880	1:00–2:00	–	6:00
Correction	575	5:00	45	850	1:00	50	6:00

Austromat 3001	
1 st shoulder bake	C575 T120 T180 • L9 T180 V9 T045 • C980 V0 T60 C0 T120.L0 T240 T2 C575
2 nd shoulder bake	C575 T120 T180 • L9 T180 V9 T045 • C960 V0 T60 C0 T120.L0 T240 T2 C575
Liner bake	C575 T120 T180 • L9 T180 V9 T045 • C930 V0 T60 C0 T120.L0 T240 T2 C575
1 st dentine bake	C575 T180 T180 • L9 T180 V9 T045 • C910 V0 T60 C0 T120.L0 T240 T2 C575
2 nd dentine bake	C575 T120 T180 • L9 T180 V9 T045 • C900 V0 T60 C0 T120.L0 T240 T2 C575
Glaze	C575 T60 T120 • L9 T120 T045 • C880 T60 C0 T120.L0 T240 T2 C575
Correction	C575 T60 T120 • L9 T120 V9 T045 • C850 V0 T60 C0 T120.L0 T240 T2 C575

C. General firing programs for specific furnaces

Firing temperatures are given for guidance only. Variations may occur depending on the furnace used and the temperatures may need to be adjusted accordingly. For large cases the drying and final temperatures and cooling times should be extended in accordance with general firing program for these situation (see section B).

Austromat 3001 NobelRondo™ Zirconia	
1 st shoulder bake	C575 T120 T180 • L9 T180 V9 T045 • C980 V0 T60 C0 L0 T2 C575
2 nd shoulder bake	C575 T120 T180 • L9 T180 V9 T045 • C960 V0 T60 C0 L0 T2 C575
Liner bake	C575 T120 T180 • L9 T180 V9 T045 • C930 V0 T60 C0 L0 T2 C575
1 st dentine bake	C575 T180 T180 • L9 T180 V9 T045 • C910 V0 T60 C0 L0 T2 C575
2 nd dentine bake	C575 T120 T180 • L9 T180 V9 T045 • C900 V0 T60 C0 L0 T2 C575
Glaze	C575 T60 T120 • L9 T120 T045 • C880 T60 C0 L0 T2 C575
Correction	C575 T60 T120 • L9 T120 V9 T045 • C850 V0 T60 C0 L0 T2 C575

Austromat M NobelRondo™ Zirconia	START [°C]		↑	→	VAC LEVEL	°C min 	END [°C]	→	↘ ₁	↘ ₂
1 st shoulder bake	575	2	3	3	9	45	980	1:00	0	0
2 nd shoulder bake	575	2	3	3	9	45	960	1:00	0	0
Liner bake	575	2	3	3	9	45	930	1:00	0	0
1 st dentine bake	575	3	3	3	9	45	910	1:00	0	0
2 nd dentine bake	575	2	3	3	9	45	900	1:00	0	0
Glaze	575	2	3	2	0	45	880	1:00	0	0
Correction	575	1	2	2	9	45	850	1:00	0	0

Austromat D4 NobelRondo™ Zirconia	Drying time [min:sec]	Closing time [min:sec]	Preheat temp. [°C]	[min:sec]	Firing temp. [°C]	Heating rate [°C/min]	Holding time [min:sec]	Vac. (off/ level/ hold) [°C]	Vac. [%]
1 st shoulder bake	2:00	3:00	575	3:00	980	45	1:00	980	100%
2 nd shoulder bake	2:00	3:00	575	3:00	960	45	1:00	960	100%
Liner bake	2:00	3:00	575	3:00	930	45	1:00	930	100%
1 st dentine bake	3:00	3:00	575	3:00	910	45	1:00	910	100%
2 nd dentine bake	2:00	3:00	575	3:00	900	45	1:00	900	100%
Glaze	1:00	2:00	575	2:00	880	45	1:00	–	–
Correction	1:00	2:00	575	2:00	850	45	1:00	850	100%

Multimat MC MCII/Mach 2, NobelRondo™ Zirconia	Preheat temp. [°C]	Drying time [min]	Preheating time [min]	Vac. time [min]	Firing time [min]	Firing temp. [°C]	Heating rate [°C/min]	Vac.
1 st shoulder bake	575	4:00	3:00	1:00	2:00	980	45	50
2 nd shoulder bake	575	4:00	3:00	1:00	2:00	960	45	50
Liner bake	575	4:00	3:00	1:00	2:00	930	45	50
1 st dentine bake	575	6:00	3:00	1:00	2:00	910	45	50
2 nd dentine bake	575	5:00	3:00	1:00	2:00	900	45	50
Glaze	575	3:00	3:00	0:00	1:00–2:00	880	45	–
Correction	575	3:00	3:00	1:00	2:00	850	45	50

Programat P90/P95 NobelRondo™ Zirconia	Standby temp. [°C]	Heating rate [°C/min]	Firing temp. [°C]	Closing time [min]	Firing time [min]	Vac. ON [°C]	Vac. OFF [°C]
1 st shoulder bake	300	45	980	6:00	1:00	575	979
2 nd shoulder bake	300	45	960	6:00	1:00	575	959
Liner bake	300	45	930	4:00	1:00	575	929
1 st dentine bake	300	45	910	9:00	1:00	575	909
2 nd dentine bake	300	45	900	7:00	1:00	575	899
Glaze	300	45	880	5:00	1:00–2:00	–	–
Correction	300	45	850	5:00	1:00	575	849

Vacumat 100/200 – 2500 NobelRondo™ Zirconia	Standby temperature [°C]	Final temperature [°C]	Predrying time [min]	Heat-up time [min]	Holding time [min]	Vacuum time [min]
1 st shoulder bake	575	980	7:00	7:00	1:00	6:00
2 nd shoulder bake	575	960	7:00	7:00	1:00	6:00
Liner bake	575	930	6:00	7:00	1:00	6:00
1 st dentine bake	575	910	8:00	7:00	1:00	6:00
2 nd dentine bake	575	900	7:00	7:00	1:00	6:00
Glaze	575	880	5:00	7:00	1:00–2:00	–
Correction	575	850	5:00	7:00	1:00	6:00

Multimat Touch & Press, NobelRondo™ Zirconia	Preheating temp. [°C]	Drying time [min]	Preheating time [min]	Vacuum [hPa]	Heating rate [°C/min]	Firing temperature [°C]	Vacuum time [min]	Firing time [min]
1 st shoulder bake	575	4:00	3:00	50	45	980	1:00	1:00
2 nd shoulder bake	575	4:00	3:00	50	45	960	1:00	1:00
Liner bake	575	4:00	3:00	50	45	930	1:00	1:00
1 st dentine bake	575	6:00	3:00	50	45	910	1:00	2:00
2 nd dentine bake	575	5:00	3:00	50	45	900	1:00	1:00
Glaze	575	2:00	2:00	50	45	880	–	1:00
Correction	575	2:00	2:00	50	45	850	1:00	1:00

Troubleshooting

Problem	Cause	Solution
The colour is too bright and/or the ceramic is opaque and porous	The preheating temperature is too high	Reduce the preheating temperature
	Firing temperature is too low	Increase the firing temperature
	Vacuum pump starts too late	Reduce preheating and/or vacuum start temperature
	The vacuum level reached is too low	Check that the vacuum pump and furnace seals are intact
The ceramic surface is not smooth enough/is too rough	The end temperature is too low	Increase the end temperature and/or extend the holding time
The ceramic surface is not shiny enough	The end temperature is too low and/or the holding time is too short	Raise the end temperature and/or extend the holding time
The edges and contours are rounded	The end temperature is too high	Lower the end temperature
Chipping/Cracks	Sharp edges on the substructure	Avoid sharp edges and corners
	Poorly designed substructure	Pay attention to the substructure design instructions
	Underfiring	Raise the end temperature or increase the holding time
	Microcracks or perforated substructures	Only use substructures without defects. Check the framework thoroughly.
	Thermal tensions in object are too high	Never cool down restorations too quickly. When veneering massive pontics or large structures it is advised to slowly open the firing chamber
	Grinding on framework was performed with high pressure and/or high speed of rotating disc in the absence of watercooling	Zirconium oxide must never be worked on without water cooling at high pressures and/or high speed of the rotating instrument. Otherwise, damaging of the Zirconium oxide (creation of microcracks) might occur.
	Intensive grinding on veneering ceramic by dentist	After massive grinding on the veneering ceramic by the dentist (e.g. to adjust occlusion), the restoration must finally be glazed in a furnace by a dental technician to repair the defects created by this treatment.

Problem	Cause	Solution
Chipping/Cracks	Intensive grinding on (inner side of) zirconium oxide-framework by dentist to adjust final fit	Never grind on zirconium oxide without water cooling, or by using high pressures or high speed of the rotating instrument. Otherwise (micro-) cracks might be created in the zirconium oxide substructure.
Fractures at large constructions	Too short predrying and cooling phase	Change firing cycle in accordance with recommendations for large restorations
Pressure stress cracks: Horizontal cracks in the incisal or in pontics	Wrong substructure (CTE of substructure too high)	Only use zirconium oxide substructures with a CTE _{25–500°C} of approx. 10×10 ⁻⁶ K ⁻¹
Tensile stress cracks: Many non- directional cracks throughout the entire veneer	Wrong substructure (CTE of substructure too low)	Only use zirconium oxide substructures with a CTE _{25–500°C} of approx. 10×10 ⁻⁶ K ⁻¹

Preparation of the substructure

The fit of the sintered zirconium oxide framework is adjusted to the master model. In order to get the optimal fit, the margin is trimmed and if desired for the attachment of a ceramic shoulder the outer edge is reduced to the inner rim of the step or chamfer.

Pay attention to following recommendations:

- Always ensure that after grinding, the dimensions of the substructure are within the limits
- To avoid micro cracks, the substructures should be ground by using diamond impregnated finishing tools with fine grit size, under low pressure, with copious water irrigation
- Always ensure that the work piece is adequately cooled (e.g. water drops or water-cooled turbine)
- Never treat the sintered bridge framework with separating disks. Otherwise the strength of the restoration will be decreased.
- To clean the Zirconia substructure, sandblast using 2 bars of pressure utilizing 50 µm aluminium oxide, at an approximate distance of 10 mm. Then clean in ultrasonic bath.
- Before veneering the framework must be free of any contamination

Surface treatment before cementation

If contaminated, the inner surface of the framework could be sandblasted with 110 µm aluminium oxide at a pressure of approximately 2 to 3 bar at an approximate distance of 10 mm. Then clean in an ultrasonic bath for 5 minutes. Optimum retention will be achieved if the inner contour is untouched.

Update on instructions

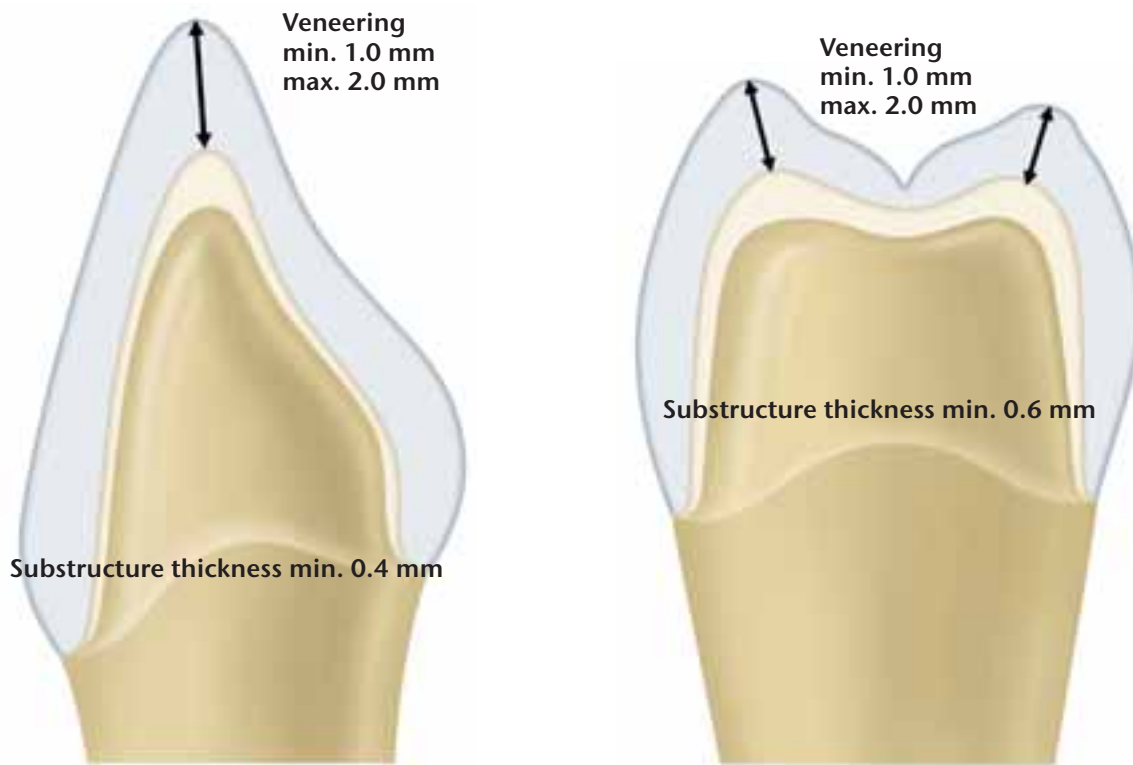


Fig. 1: Coping design of anterior and posterior restoration.

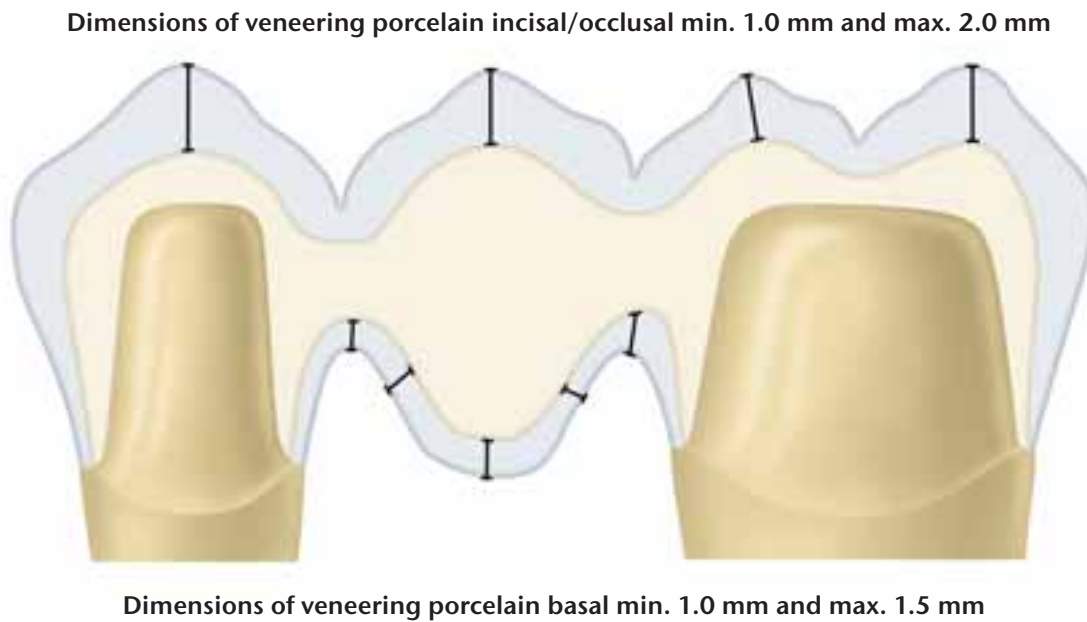


Fig. 2: Framework design of a three-unit bridge.

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