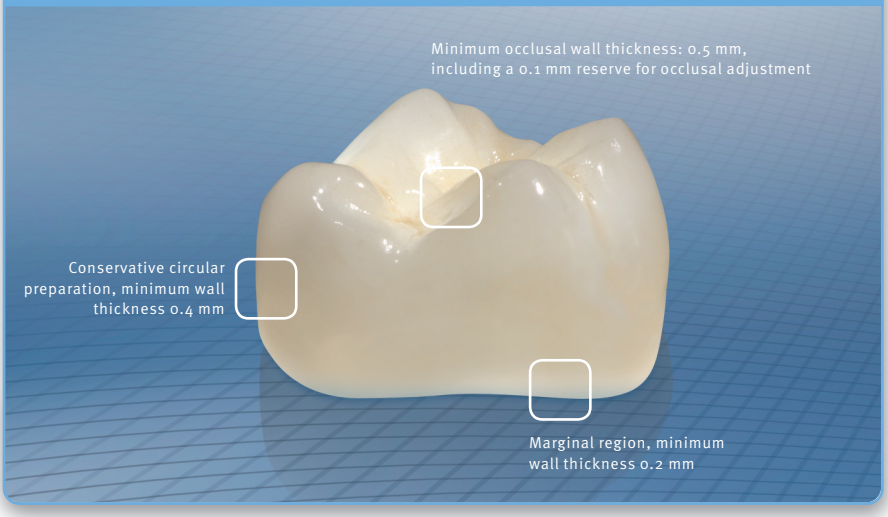
DENTSPLY | cercon® ht Zirconia



Cercon® ht and Cercon® ht Shaded Zirconia Directions For Use

℞ only

DENTSPLY | cercon® ht Zirconia

PRODUCT DESCRIPTION

Cercon® ht blanks are made of yttria-stabilized zirconia (Y-TZP). They are used in fabricating frameworks for fixed prosthetic restorations. They are made of a ceramic oxide material characterized by particularly high-strength.

Depending on the framework design, Cercon® ht frameworks can be veneered with ceramics or inserted as fully anatomical restorations. Which blank is selected will depend on the tooth shade to be reproduced and the space available for the veneer.

With fully anatomic restorations, no space is required for the ceramic veneer, which may allow the dentist to preserve more of the tooth structure.

Framework material	Zirconium oxide (Y-TZP)
Temporary cementation	Possible (for fully contoured restorations)
Definitive cementation	• Adhesive cementing • Conventional cementing

Objects are individually fabricated to your digital design specifications such as anatomic contour, framework and wall thickness, connector diameter and cementing gap.

TECHNICAL SPECIFICATIONS:

- Type II, class 6 (pursuant to DIN EN ISO 6872:2008)
- CTE; 10.5 µm/m · K (25–500°C)
- Modulus of elasticity: 210 GPa
- Flexural strength: approx. 1,200 MPa (three-point flexural testing)

COMPOSITION (IN % BY MASS)

- Zirconium oxide
- Yttrium oxide 5%
- Hafnium oxide < 3%
- Aluminium oxide
- Silicon oxide < 1%

INDICATIONS IN THE ANTERIOR AND POSTERIOR SEGMENTS:

- Conical and telescope crowns
- Crowns
- Multi-unit bridges (up to 16 units, with no more than two pontics between abutment crowns)*
- Bridges with cantilevered pontics, with min. 2 abutment teeth

*For Canada: Restricted to 6 units or less

Cercon® ht can be used as a substructure (framework) which is then veneered with a dental veneering ceramic or can be used for full-contour application (without veneering) as well. In the case of Telescopic primary crowns the substructure is not veneered.

CONTRAINDICATIONS

- This medical product may not be used in patient hypersensitivity to zirconia (Y-TZP) or one of the other ingredients
- Bruxism or recalcitrant parafunctional habits (for ceramically veneered frameworks)
- Insufficient available space
- Endodontic posts
- Endosseous implants
- Inlay bridges

WARNINGS

Known cross-reactions or interactions of this medical product with other medical products or material already present in the oral environment must be taken into consideration by the dentist in charge when selecting this medical product.

PRECAUTIONS

Please note:

- Keep product dust away from eyes
- Avoid any contact with mucosa
- After use, wash your hands and apply a hand cream
- When using, do not eat or drink, do not ingest, do not inhale dust particles
- Use local suction and suitable mouth/face protection during grinding

Processing the material will result in the release of dust that may cause irritation of the eyes, skin or respiratory passages. The safety and warning notes listed here describe how to use our system components in a safe and risk-free manner. Notify the dentist in charge of all factors described above if you use this medical product for a custom design and make sure to comply with the Instructions for Use and the pertinent Safety Data Sheet (SDS).

ADVERSE REACTIONS

We are not aware of any risks or adverse reactions related to Cercon® ht. If properly processed, adverse reactions of this medical product are highly unlikely. However, reactions of the immune system (such as allergies) or localized paraesthesia (such as an irritating taste or irritation of the oral mucosa) cannot be completely ruled out as a matter of principle. Should you hear or be informed of any adverse effects – even when doubtful – we would like to request notification.

SPECIAL NOTES ON FRAMEWORK DESIGN

Framework design for fully contoured restorations:

Indicated especially where limited occlusal space is available, for frameworks that are not to be veneered or for frameworks with body stains. The surface of fully contoured frameworks can carefully be optimized with rotary tools such as fine cutters prior to sintering.

Make sure that the occlusal surface is not changed by subsequent deepening of fissures, as notching action may compromise the strength of the material. Figure 3. Please note that flat occlusal reliefs can extend the life expectancy of fully contoured restorations. When making manual adjustments, make sure never to separate the interdental spaces of the frameworks with cutting discs or other rotary instruments, Doing so might damage the framework and compromise the strength of the material! Figure 4.

Important note:
Please ensure that the minimum wall thickness of the framework in the area of the occlusal surface is respected even after occlusal adjustments.

Framework design for veneered restorations:

Frameworks to be ceramically veneered are designed with reduced anatomical contour to provide maximum support for the veneer. The frameworks can be veneered using the build-up technique.

Framework dimensions for the anterior and posterior regions

Wall and border thickness:

Wall thickness, single crowns	0.4 mm
Margin thickness, single crowns	0.2 mm
Wall thickness, bridges	0.5 mm
Margin thickness, bridges	0.2 mm

Additional dimensional requirements for the anterior region:

Number of pontics	2
Connector cross-section	6 mm^2

Additional dimensional requirements for the posterior region:

Number of pontics	2
Connector cross-section	9 mm^2
Cantilever pontic at tooth position (only one pontic, up to one premolar width)	Up to the second premolar
Connector cross-section for this cantilever pontic	12 mm^2

NESTING

Special nesting notes for large-span bridges (9 units or more)

For distortion-free sintering of long-span bridges (9 units or more) when nesting the object in a Cercon ht 98mm disk, make sure to keep zirconia material in the lingual aspect of a long span arch, to reinforce the form during the sintering process and prevent distortion of the framework.

Always place objects (single copings, three-unit frameworks) within the sintering reinforcement lingual aspect in order to achieve a homogeneous shrinkage of large-span objects during sintering.

Entering the shrinkage factor for the milling unit:

In CAM software allowing the entry of 3 dimensions, enter X, Y and Z values.
In CAM software allowing the entry of 2 dimensions, enter X, Y or Z values.
In CAM software allowing the entry of 1 dimension, enter the X value.

MILLING

Special notes on milling:

Please read the respective Instructions for Use for your device regarding further processing. We recommend the following milling strategies for secure processing (Table 1).

TABLE 1. MILLING STRATEGY FOR CERCON HT UNITS:

Procedure	Tool, spherical mm	Feed rate Z mm/min	Feed rate F mm/min	Speed rpm	a_p mm	a_e mm	Strategy	Dimension mm
Contour rough-machining, occlusal side (OS)	HM Ø2	800	1,800	22,000	0.8	1	Contour-parallel rough-machining	0.3
Contour rough machining, cavity side (CS)	HM Ø2	800	1,800	22,000	0.8	1	Contour-parallel rough-machining	0.3
Pre-finishing (CS)	HM Ø2	400	1,200	22,000		0.2	Residue material rough-machining	0.1
Pre-finishing (OS)	HM Ø2	400	1,200	22,000		0.2	Residue material rough-machining	0.1
Finishing (OS)	HM Ø1	400	1,200	27,000		0.15	3D offset	0
Finishing without cavity (CS)	HM Ø1	400	1,200	27,000		0.15	3D offset from inside	0
Finishing cavities	HM Ø1	250	1,000	27,000		0.1	3D offset	0
Fissures	HM Ø 0,5-0,6	250	1,000	35,000		0.1	Partial finishing, 3D	0

The milling strategies are recommendations. If necessary, carry out trial millings and adapt the parameters as needed.

SEPARATING

Notes on separating the objects:

Separate the objects from the disk by sandblasting with aluminium oxide (50 µm, max. 1.5 bar) with a fine blasting tip (Figure 1). The sandblasting aid facilitates the removal of objects from the blank. It helps prevent framework fracture or other damage to the objects. For large-span bridges (9 units or more), separate only the labial and buccal sprues of the objects and keep the lingual connector intact, because the objects must be sintered together with that lingual portion to prevent from distorting (Figure 2). Any protruding ridges at the bottom of the lingual must be removed in order to assure that the objects will stay firmly put on the sintering tray. The smaller objects nested inside the lingual are detached completely and sintered separately.

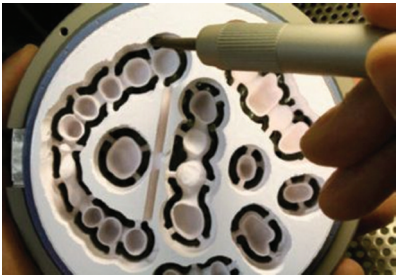


Figure 1 - Sandblasting the workpieces

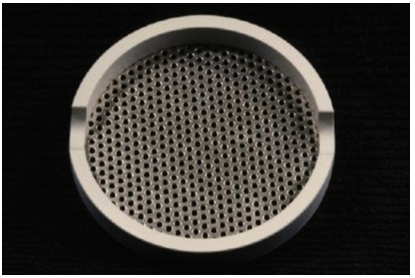


Figure 2 - Sandblasting aid

General notes on framework design:

Make sure the occlusal surfaces are not modified by severely deepening existing fissures, as this might compromise the stability of the material. (Figure 3) Note that a shallow occlusal relief will increase the life expectancy of fully anatomic restorations. When manually finishing the frameworks, never deepen the interproximals (connectors) with cutting wheels, disks, or other rotary instruments, as this may cause fracturing. (Figure 4)

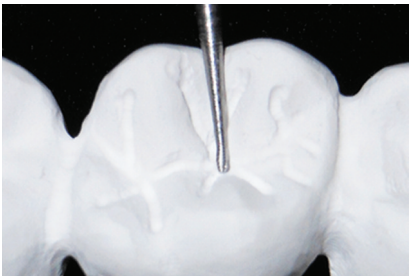


Figure 3

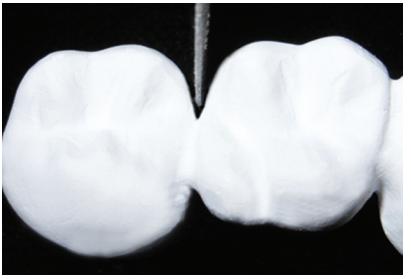


Figure 4

SINTERING

Sintering in the Cercon heat plus P8:

- 1,500°C in the Cercon heat plus
  - Program #4 for bridges up to 8 units, Tmax = 1,500°C
  - Program #5 for bridges of 9 units or more, Tmax = 1,500°C

Special sintering notes for large-span bridges (9 units or more)

Two wide-span bridges (9 or more units) can be sintered in the Cercon heat plus P8 at one time. Place the objects on the sintering block with due regard to the internal vertical clearance of the Cercon heat plus (130 mm) and the need to facilitate contraction without any mechanical constraints. The objects must not touch the sintering block during the sintering.

Sintering in the heat DUO/Multimat2 Sinter:

– Program #6: Speed program for bridges up to 6 units, Tmax = 1,540°C
– Program #7: Standard sintering for bridge frameworks up to 8 units, Tmax = 1,520°C
– Program #8: Sintering program for bridges of 9 units or more, Tmax = 1,520°C

Special sintering notes for large-span bridges (9 units or more)

Two wide-span bridges (9 or more units) can be sintered in the heat DUO or Multimat2 Sinter at one time. Place the objects on the special sintering bar for large-span bridges and keep in mind that the objects must not touch the sintering block during the sintering (Figure 5, 6, 7).
The maximum dimensions for milling:
Height: 65 mm
Width: 90 mm

Figure 5 Placement of bridges with sintering bar (more than 9 units).

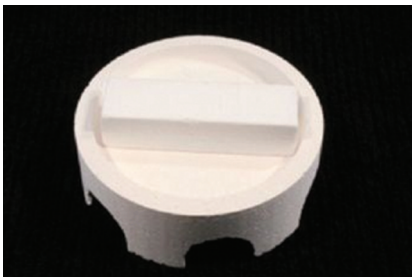


Figure 6 - Sintering tray with sintering block

Figure 7 - Correct position on the sintering tray

Sintering in third-party furnaces:

Sintering results may be adversely affected by e.g.:

- Incorrect sintering temperatures
- Insufficient heating power
- Incorrect temperature curves
- Incorrect object placement
- Insufficient heat-storing capacity of the furnace over the time of the sintering cycle
- Manufacturer-related or age-related variations in heating performance
- Object contamination by oxidation products emitted by non-enclosed heating elements

Any of these factors by itself or in combination may reduce the maximum strength of our above-mentioned zirconium dioxide materials and compromise the life expectancy of the frameworks.

For these reasons, we cannot grant general approval for the use of third-party furnaces for sintering two-piece abutments (mesostructures) and crown and bridge frameworks made of Cercon ht. We will, however, open the system technically for the use of furnaces of third-party furnaces only on condition that the following requirement are met:

IMPORTANT!
The sintering of Cercon ht in third-party sintering furnaces is done at the user's own responsibility and risk. Dentsply can accept no responsibility for any kind of damage caused by the sintering of zirconia materials in third-party furnaces, including but not limited to damage to or damage caused by the sintered objects such as abutments, crowns or bridge frameworks.

Additional notes:

The programming you use for your sintering furnace should be analogous to the Dentsply sintering programs.

GENERAL SINTERING PROGRAMS:

PROGRAMMING SUGGESTION #1 (STANDARD SINTERING OF BRIDGE FRAMEWORKS UP TO 8 UNITS)

Heat from room temperature to 900°C in 40 minutes, to 1,500°C in another 55 minutes, hold for 2:25 hours, then allow to cool slowly in the closed furnace; the total sintering cycle takes about 7:35 hours.

Examples of different representations of the same sintering curve:

- RT³ › in 40 min › 900°C in 55 min › 1,500°C/2:25 h › allow to cool to 200°C, firing chamber closed
- RT³ › 22°C/min › 900°C › 11°C/min › 1,500°C/2:25 h › allow to cool to 200°C, firing chamber closed
- RT³ › 1,320°C/h › 900°C › 660°C/h › 1,500°C/2:25 h › allow to cool to 200°C, firing chamber closed

PROGRAMMING SUGGESTION #2 (SINTERING OF BRIDGE FRAMEWORKS WITH 9 OR MORE UNITS)

Heat from room temperature to 860°C in 120 minutes, to 1,500°C in another 320 minutes, hold for 2 hours, then allow to cool slowly in the closed furnace; the total sintering cycle takes about 13 hours.

Examples of different representations of the same sintering curve:

- RT³ › in 120 min › to 860°C in 320 min › 1,500°C/2 h › allow to cool to 200°C, firing chamber closed
- RT³ › 7°C/min › 860°C › 2 °C/min › 1,500°C/2 h › allow to cool to 200°C, firing chamber closed
- RT³ › 420°C/h › 860°C › 120 °C/h › 1,500°C/2 h › allow to cool to 200°C, firing chamber closed

PROGRAMMING SUGGESTION #3 (SPEED SINTERING OF BRIDGE FRAMEWORKS UP TO 6 UNITS)

Heat from room temperature to 1,540°C in 90 min, hold for 35 min, then and then successively open up to 1,150°C, then successively open up to 750°C.
The objects can then be taken off the sintering tray at 200°C. (Total cooling time about 2 hours.) Total sintering time is about 4 hours.

Examples of different representations of the same sintering curve:

- RT³ › 17°C/min › 1,540°C/35 min › successively open up to 1,150°C › successively open up to 750°C › remove objects from the sintering tray at 200°C.
- RT³ › 90 min › 1,540°C/35 min › successively open up to 1,150°C › successively open up to 750°C › remove objects from the sintering tray at 200°C.

SINTERING PROGRAMS, SIRONA HTC-SPEED SINTERING FURNACE:

Cercon ht speed sintering of bridge frameworks with up to 6 units:

Step	Heating rate (°C/min)	Temperature (°C)	Holding time (min)
S4	70	750	0
S3	70	1,100	0
S2	70	1,540	35
S1	70	0	0

Cercon ht standard sintering:

Step	Heating rate (°C/min)	Temperature (°C)	Holding time (min)
S4	31	300	0
S3	30	750	0
S2	11	1,520	130
S1	22	880	0

Cercon ht sintering of bridge frameworks with 9 or more units:

Step	Heating rate (°C/min)	Temperature (°C)	Holding time (min)
S4	11	170	0
S3	11	1,100	0
S2	2	1,520	125
S1	7	820	0

Sintering temperatures are recommendations. If necessary, carry out a trial sintering cycle and adapt the sintering temperatures or times as needed.

Separating the sintering reinforcement in the case of large-span bridges:

Objects are separated from the "tongue" after sintering using irrigated rotary diamond cutters.

Manual finishing after sintering:

- Sandblast the inside and outside of the framework with aluminium oxide (110–125 µm, max. 2–3 bar, 45° angle).
- Eliminate premature contacts one by one until the framework has reached its final position on the die(s).
- During the try-on and fitting of the framework, keep the dies on the cast and try on the framework as a whole.
- Once the try-on and fitting has been completed, do not perform any additional adjustments such as finishing the entire framework.

Note: Zirconia crown or bridge abutments should fit passively, without friction. The rationale for requiring a passive fit if zirconia frameworks lies in the physical properties of the material itself: Ceramics will tolerate compressive stress but not tensile stress. In crowns that exhibit a friction fit, this friction is generated by certain "bearing" parts of the framework, as the crown itself never rests completely on the die due to processing-related surface roughness (the same actually holds for cast-metal frameworks). So it is only the peaks of the surface roughness (the named "bearing" parts) that are in contact with the die surface. This converts the compressive forces generated by masticatory pressure into tensile forces, which may damage the crown.

Adapt the framework margins exactly to the preparation margins.

Note: Sintered zirconia should be finished using diamond instruments under proper irrigation only. Keep the pressure on the framework material to a minimum and work only in one direction.

- Sandblast the finished areas once again with aluminium oxide (110–125 µm, max. 2-3 bar, 45° angle).
- Finally, clean the framework using a steam cleaner.

Veneering/staining:

Adjust your build-up technique to the respective Cercon ht shade.
Note that the light transmission of Cercon ht is very high due to its translucency.

General

The reproduction of the individual patient's tooth color can be significantly influenced by:

- Shade of the die
- Shade of the material used for temporary or definitive cementing
- Framework wall thickness
- Liner, if applied

Staining technique

For tooth-colored staining of fully contoured Cercon ht restorations we recommend Cercon® ceram body stains.

Build-up technique

We recommend Ceramco PFZ porcelain materials for veneering zirconia frameworks. Make sure to follow the applicable Directions for Use. (Figure 8, 9, 10)

Figure 8

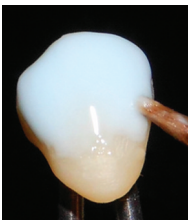


Figure 9

Figure 10

ANNEALING:

Based on the results of our scientific testing of zirconia frameworks, we consider a separate annealing ("healing") step both unnecessary and inappropriate.

POLISHING IN THE LABORATORY:

Unveneered Cercon ht frameworks should be highly polished or glazed with a high-gloss ceramic glaze. This also makes the restoration more amenable to proper oral hygiene procedures.

Polishing in the dental office:

Extensive studies have shown that the abrasive action of Cercon ht on antagonists is less than that of conventional ceramic veneers and not more than standard lithium disilicate ceramics even after finishing and polishing.

Important: After making minor final occlusal adjustments at chairside, we recommend prophylactic polishing of the adjusted sites to a high lustre or adding glaze with a smooth surface prior to temporary or definitive cementing to protect the antagonists from possible abrasion. This also makes the restoration more amenable to proper oral hygiene procedures.
Tooth surfaces whose shade was obtained by staining may present brighter spots where occlusal adjustments were made.

Transport and storage:

No particular requirements.

STAINING GUIDE FOR DIPPED CERCON HT UNITS:

For tooth-colored staining of fully anatomic Cercon® ht restorations, we recommend the Cercon® ht Zirconia Stain and Glaze kit (part number 67390113). However, other stains designed to be used with zirconia may also be used, including Ceramco PFZ and Cercon Ceram Kiss. Firing schedules may be found in Table 4.

Mix the Cercon glaze with the Ducera® Liquid STAIN, to a thin consistency. Apply a thin mixture to the crown. It is not necessary to do a separate firing. Use the following chart to complete the shade. (Figure 11, 12)

Figure 11

Figure 12

Fire according to Table 4.

- If the final crown has too high of a sheen, lower the High Temp in 5°C (41°F) increments to achieve the desired sheen.
- If the final crown has too low of a sheen, increase the High Temp in 5°C (41°F) increments to achieve the desired sheen.

TABLE 2. STAINING CHART FOR DIPPED CERCON HT UNITS:

Vita®* Shade	First Ceron ht Stain Application	Second Cercon ht Stain Application	Third Cercon ht Stain Application
A1	Mix the Body 1 and Body 2 in a 1:1 mixture		
A2	Mix the Body 1 and Body 2 in a 1:1 mixture	Apply a second coat of the body mixture and fire.	
A3	Mix the Body 1 and Body 2 in a 1:1 mixture		
A3.5	Mix the Body 1 and Body 2 in a 1:1 mixture		
A4	Mix the Body 1 and Body 2 in a 1:1 mixture		
B1	Mix the Body 1 and Body 4 in a 1:1 mixture	Apply a blue (Strato) stain wash and fire	
B2	Mix the Body 1 and Body 4 in a 1:1 mixture	Apply a blue (Strato) stain wash and fire	
B3	Mix the Body 1 and Body 4 in a 1:1 mixture	Apply a blue (Strato) stain wash and fire	
B4	Mix the Body 6 and Body 7 in a 1:1 mixture	Apply a blue (Strato) stain wash and fire	
C1	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix a 1:1 mixture of grey (Grau) and white (weiβ).
C2	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix a 1:1 mixture of grey (Grau) and white (weiβ).
C3	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix a 1:1 mixture of grey (Grau) and white (weiβ).
C4	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix the Body 6 and Body 7 in a 1:1 mixture	Mix a 1:1 mixture of grey (Grau) and white (weiβ).
D2	Mix the Body 7 and Body 9 in a 1:1 mixture	Mix the Body 7 and Body 9 in a 1:1 mixture	Apply an ivory stain wash and a blue (Strato) on the incisal and fire.
D3	Mix the Body 7 and Body 9 in a 1:1 mixture	Mix the Body 7 and Body 9 in a 1:1 mixture	Apply an ivory stain wash and a blue (Strato) on the incisal and fire.
D4	Mix the Body 7 and Body 9 in a 1:1 mixture	Mix the Body 7 and Body 9 in a 1:1 mixture	Apply an ivory stain wash and a blue (Strato) on the incisal and fire.

** Vita® is a registered trademark of Vita Zahnfabrik H. Rauter GmbH & Co.*

TABLE 3. 6 TO 16 STAINING TECHNIQUE FOR PRE-SHADED CERCON HT:

1. Sandblast the frameworks with 110 µm Al2O3 / 3 bar
2. Clean with steam cleaner
3. Apply a very thin layer with Celtra glaze
4. Start with Celtra stains according to the Celtra stain recipe mentioned below
5. The Celtra stains should be put on the framework in thin layers. For dark colors you need more firing cycles. If you put on thick layers the stain form puddles

Vita Shade	Disk Shade	Celtra Stain Body 1. Glaze firing	Celtra Stain Body 2. Glaze firing	Celtra Enamel
A1	A1	Body stain 3, a touch of olive		Enamel i1 + i2
A2	A1	Body stain 2+3, a touch of olive		Enamel i1 + i2
A3	A3	Body stain 1+3		Enamel i1 + i2
A3.5	A3	Olive	Body stain 3	Enamel i1 + i2
A4	A3	Body stain 1+3	Body stain 3	Enamel i1 + i2
B1	B1	Body stain 3		Enamel i1 + i2
B2	B1	Body stain 3+4		Enamel i1 + i2
B3	B3	Body stain 2+3		Enamel i1 + i2
B4	B3	Body stain 3+4, a touch of olive + sunset		Enamel i1 + i2
C1	C1	Body stain 3		Enamel i1 + i2
C2	C1	Body stain 3		Enamel i1 + i2
C3	C1	Body stain 3		Enamel i1 + i2
C4	C1	Body stain 3, a touch of olive		Enamel i1 + i2
D2	D2	Body stain 4		Enamel i1 + i2
D3	D2	Body stain 4		Enamel i1 + i2
D4	D2	Body stain 3, a touch of olive	Body stain 3, a touch of sunset	Enamel i1 + i2

TABLE 4. FIRING CHART

°C	Dry (min)	Preheat (min)	Low Temp	Heat Rate	High Temp	Vac Start Temp	Vac Stop Temp	Hold Time Vac	Hold Time Air (min)	Cool Time (min)
PFZ Stains/Glaze	3	3	450	55	820	0	0	0	1.5	6
Cercon ceram kiss Stains/Glaze	3	3	450	55	820	0	0	0	1.5	6
Cercon ht Stain & Glaze	3	3	450	55	820	0	0	0	1.5	6
Celtra Stain & Glaze	3	3	450	55	820	0	0	0	1.5	6

°F	Dry (min)	Preheat (min)	Low Temp	Heat Rate	High Temp	Vac Start Temp	Vac Stop Temp	Hold Time Vac	Hold Time Air (min)	Cool Time (min)
PFZ Stains/Glaze	3	3	842	99	1,508	0	0	0	1.5	6
Cercon ceram kiss Stains/Glaze	3	3	842	99	1,508	0	0	0	1.5	6
Cercon ht Stain & Glaze	3	3	842	99	1,508	0	0	0	1.5	6
Celtra Stain & Glaze	3	3	842	99	1,508	0	0	0	1.5	6

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