CrystalCeram®

Fine Grain Porcelain for Zirconia & Lithium Disilicate Frameworks

Manual of Instructions

MANUAL OF INSTRUCTIONS

1. Description

CrystalCeram® powders can be applied to Zirconia as well as to Lithium Disilicate ceramic materials without a liner or wash prior to build up. The properties of CrystalCeram® powders provide an optimal bond between materials. It can be applied as a full ceramic build up to give more vitality to opacious or low translucency structures or to characterize incisal and proximal areas on more translucent materials. Other characteristics include:

1.1 Great modeling ease, especially suitable for laboratories in which speed and accuracy are top priority.
1.2 Easy to use for the ceramist with little experience but with all the properties and porcelains necessary for the expert ceramist.
1.3 Immediate and accurate shade matching with the mere application of Dentine/Enamel layering; color stability even for varied thickness.
1.4 Extremely stable linear expansion coefficients during subsequent firing processes; safely withstands up to six firing cycles.
1.5 Minimum shrinkage.
1.6 Great translucency and color depth.
1.7 Internal Modifiers, Dentin Modifiers, Dentins, Enamels, Opal Enamels, Add-Ons and 3D Gum Shades
1.8 Porcelain shades and translucencies adapted to the new generation of translucent zirconia eliminating the need for excessive stock of porcelains.
1.9 “Live” and natural fluorescence in all light conditions.

The CrystalCeram® System is composed of

Internal Modifiers (5): Brown, Gray, Orange, Pink, Yellow

Dentine Modifiers (5): Brown, Orange, Yellow, Ocher, Pink

Dentines (12): BL1, BL4, A1, A2, A3, A3.5, B1, B2, B3, C1, C2, D2

Enamels (6): Clear, Translucent, Light, Extra light, Blue, Violet

Opal Enamels (4): Clear, Translucent, Blue, Gray

3D Gum Powder (2): Light, Dark

Add-Ons (2): Clear, Translucent

See Annex 2. for a shade tab color reference of all existing CrystalCeram® Powders.

2. The zirconia framework.

This manual does not include detailed instructions of any zirconia or Lithium Disilicate framework preparation. User should refer to the IFU of the specific zirconia or Lithium Disilicate material being used.

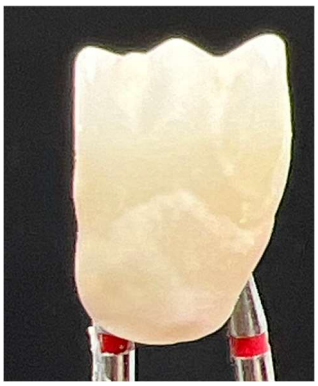
3. Liner

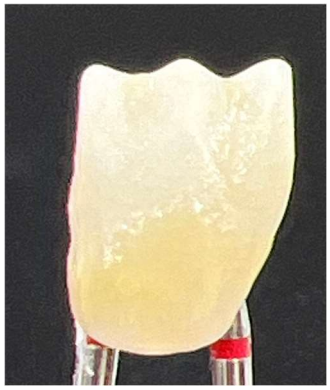
The special chemical formulation of CrystalCeram® powders creates an excellent bond to the surface of the Zirconia or Lithium Disilicate structure. Therefore, **no wash liner application or firing cycle is required**.

4. Powder application over single unit or bridge substructures.

4.1 CrystalCeram® Internal Modifiers

Internal Modifiers are to be used prior to the dentine layer. Internal Modifiers should be used to cover the area of the surface in need of additional chroma before the dentine layer is applied. These Internal Modifiers can be used to create a level of individualization to each restoration. See firing cycle on Annex 1.





4.2 CrystalCeram® Dentine Modifiers

CrystalCeram® Dentine Modifiers are to be used where an individualized modification of the Dentine or Enamel is needed. The Dentine Modifiers can be mixed with CrystalCeram® Dentine or Enamel powders to customized areas of the restoration as desired.

4.3 CrystalCeram® Dentine

Apply a layer of CrystalCeram® Dentine powder mixed with CGI Modeling Liquid to cover the substructure providing almost a full contour build up, leaving space to build the enamel layer. if you wish you can use dentin modifiers in this process. If modifiers are to be used, these can be added on the gingival third of the crown followed by the dentin and creating space for the addition of enamel.

4.4 CrystalCeram® Enamel

Several CrystalCeram® Enamel powders are available to characterize the restorations. Follow the CrystalCeram® Color System tabs diagrams to select the desired effect (Annex 3). The Enamel powders are applied over the Dentine powders to obtain the desired full contour shape and provide translucency and characterization to the incisal and proximal areas of the restoration and a visual depth effect to Dentine layered areas.

4.5 CrystalCeram® Opal Enamel

The Opal Enamels provide an extra level of characterization and vitality due to their natural opalescent effect. To achieve a higher level of characterization and vitality to the restorations, it can be applied on interproximal and incisal areas where light is transmitted though the ceramic material.



4.6 CrystalCeram® 3D Gum porcelain

The CrystalCeram® 3D Gum porcelain powders are intended to be applied over Zirconia materials to restore the tissue shape and create individual characterization of the gingival tissue area of the restoration. These powders, in combination with CGI Gum Stains, provide a more characterized appearance to the gingival area.

They can also be used to recreate gum wherever it is needed .

4.7 CGI Gum Stains

CGI Gum Stains are to be used over gingival areas that already have a full gingival contour as well as to better characterize the CrystalCeram® Gum Powders, if desired, to achieve a more individualized characterization of the gingival areas.

4.8 Finishing

Once the restoration has been fired, contours and contacts are adjusted with a handpiece using diamond burs or finishing wheels.

4.9 Stain and Glaze

CrystalCeram® can be stained and glazed using the CGI Paste Stains and CrystalCeram® Fluorescent Glaze Paste.

Top Left: Glaze application.

Top Center: Stains applied to Buccal-Distal only.

Top Right: Stains applied to Disto-Lingual

Bottom: Full stain and glaze applied using CGI Stain A to increase chroma on Gingival third and, CGI Azure (blue) to increase the translucency effect on incisal edges and proximal areas along with CGI Stain White to create natural effect

Final restoration after glaze showing excellent light transmission and vitality

CrystalCeram® Natural Fluorescence

4.10 Corrections

CrystalCeram® Add-On powder can be used to do small corrections or adjustments. The color of the Add-On powder easily absorbs the color of the area where it is added. Pictures show Add-On applied on the surface over glaze and after fired.




5. Firing.

Always follow the recommendations in firing chart of this manual. See Annex 1 and 2 for Firing cycles for Zirconia and Lithium Disilicate frameworks.

ANNEX 1. CrystalCeram® Firing Chart for Zirconia frameworks

These temperatures are a reference starting point that can be adjusted to your needs according to the furnace.

Firing chart ºC (no more than 10 single units)

	Intro Temp ºC	Dry out, min	Soak time, min	Heat rate, ºC/min	High Temperature, ºC	Hold time, min	Vacuum level	Vacuum on	Lower table	Vacuum off	Vacuum hold, min	Cooling, min
Internal Modifier	350	4	2	40	820	1	Full	350	820	820	1	2
1st Dentine/Enamel/Gum	350	4	2	40	815	1	Full	350	815	815	1	2
2nd Dentine/Enamel/Gum	350	4	2	40	810	1	Full	350	810	810	1	2
Glaze/Stains	300	5	2	40	790	1	None	None	790	none	1	2
Add On Powders	300	4	2	40	730	1	Full	300	730	730	1	2

Firing chart ºC (full arches)

	Intro Temp ºC	Dry out, min	Soak time, min	Heat rate, ºC/min	High Temperature, ºC	Hold time, min	Vacuum level	Vacuum on	Lower table	Vacuum off	Vacuum hold, min	Cooling, min
Internal Modifier	350	4	4	35	820	3	Full	350	650	820	3	6
1st Dentine/Enamel/Gum	350	4	4	35	815	3	Full	350	650	815	3	6
2ndDentine/Enamel/Gum	350	4	4	35	810	3	Full	350	650	810	3	6
Glaze/Stains	300	5	2	40	790	1	None	None	650	none	1	2
Add On Powders	300	4	2	40	730	1	Full	300	650	730	1	2

Note: Large span bridges absorbs more heat than single units and need longer holding times during the baking procedure. The information provide here is a starting guide and should be tested and adjusted accordingly with the support tray and furnace used.

Firing chart ºF (no more than 10 single units)

	Intro Temp, ºF	Dry out, min	Soak time, min	Heat rate, ºF/min	High Temperature, ºF	Hold time, min	Vacuum level	Vacuum on	Lower table	Vacuum off	Vacuum hold, min	Cooling, min
Internal Modifier	662	4	2	72	1508	1	Full	662	1508	1508	1	2
1st Dentine/Enamel/Gum	662	4	2	72	1499	1	Full	662	1499	1499	1	2
2nd Dentine/Enamel/Gum	662	4	2	72	1490	1	Full	662	1490	1490	1	2
Glaze/Stains	572	5	2	72	1454	1	None	None	1454	none	1	2
Add On Powders	572	4	2	72	1346	1	Full	572	1346	1346	1	2

Firing chart ºF (full arches)

	Intro Temp, ºF	Dry out, min	Soak time, min	Heat rate, ºF/min	High Temperature, ºF	Hold time, min	Vacuum level	Vacuum on	Lower table	Vacuum off	Vacuum hold, min	Cooling, min
Internal Modifier	662	4	4	63	1508	3	Full	662	1202	1508	3	6
1st Dentine/Enamel/Gum	662	4	4	63	1499	3	Full	662	1202	1499	3	6
2nd Dentine/Enamel/Gum	662	4	4	63	1490	3	Full	662	1202	1490	3	6
Glaze/Stains	572	5	2	72	1454	1	None	None	1202	none	1	2
Add On Powders	572	4	2	72	1346	1	Full	572	1202	1346	1	2

Note: Large span bridges absorb more heat than single units and need longer holding times during the baking procedure. The information provided here is a starting guide and should be tested and adjusted accordingly with the support tray and furnace used.

ANNEX 2. CrystalCeram® firing chart for Lithium Disilicate glass ceramic frameworks

CrystalCeram® Powders can also be used over Lithium Disilicate frameworks with the same excellent results by modifying the firing temperatures accordingly. These temperatures are a starting point and should be adjusted to your needs according to the furnace used.

Firing chart ºC (no more than 10 units)

	Intro Temp, ºC	Dry out, min	Soak time, min	Heat rate, ºC/min	High Temperature, ºC	Hold time, min	Vacuum level	Vacuum on	Lower table	Vacuum off	Vacuum hold, min	Cooling, min
Internal/Dentine Modifier	350	4	2	40	800	1	Full	350	800	800	1	2
1st Dentine/Enamel/Gum	350	4	2	40	790	1	Full	350	790	790	1	2
2nd Dentine/Enamel/Gum	350	4	2	40	785	1	Full	350	785	785	1	2
Glaze/Stains	300	5	2	40	770	1	None	None	760	none	1	2
Add On Powders	300	4	2	40	730	1	Full	300	730	730	1	2

Firing chart ºF (no more than 10 units)

	Intro Temp, ºF	Dry out, min	Soak time, min	Heat rate, ºF/min	High Temperature, ºF	Hold time, min	Vacuum level	Vacuum on	Lower table	Vacuum off	Vacuum hold, min	Cooling, min
Internal/Dentine Modifier	662	4	2	72	1472	1	Full	662	1472	1472	1	2
1st Dentine/Enamel/Gum	662	4	2	72	1454	1	Full	662	1454	1454	1	2
2nd Dentine/Enamel/Gum	662	4	2	72	1445	1	Full	662	1445	1445	1	2
Glaze/Stains	572	5	2	72	1418	1	None	None	1418	none	1	2
Add On Powders	572	4	2	72	1346	1	Full	572	1346	1346	1	2

ANNEX 3. SHADE SYSTEM

CrystalCeram® Dentine Modifiers

Orange	Gray	Brown	Pink	Yellow

CrystalCeram® Internal Modifiers

Orange	Brown	Ocher	Pink	Yellow

CrystalCeram® Enamels

Clear	Translucent	Extra-Light	Light	Blue	Violet

CrystalCeram® Opal Enamels (Opals are bluish under incident light, yellowish under transmission light)

Clear	Translucent	Blue	Gray

CrystalCeram® 3D Gum Shades

3D Gum Light	3D Gum Dark

CrystalCeram® Dentines

BL1	BL4	A1	A2	A3
A35	B1	B2	B3	C1
C2	D2			

CGI Paste Stains

STAIN A	STAIN B	STAIN C	STAIN D	BLUE	BROWN	BLACK	YELLOW
GRAY	GREEN	OCHER	ORANGE	PINK	VIOLET	WHITE	

CGI Gum Stains

Orchid	Pomegranate	Chestnut	Tangerine
Sunset	Coffee	Azure	Alabaster

Note: Actual color as true colors based on RGB readings using a spectrophotometer. These guides are for visual reference and final shade is obtained after firing according to the firing chart.

ANNEX 4. TECHNICAL DATA SHEET ACCORDING TO ISO 6872(2015)

Shade	CTE 2X	CTE 4X	Tg 2X	Tg 4X	Chemical Solubility, µg/cm²		Flexural Strength, MPa	
	$X10^{-6}$/ºC	$X10^{-6}$/ºC	ºC	ºC	ISO requirement	Value	ISO requirement	Value
Dentine/Enamel/Opal Enamel/Add On	9.8+/-0.5	9.4+/-0.5	535+/-10	548+/-10	<100	7	>50	65+/-9
Stain	9.5+/-0.5	9.5+/-0.5	532+-/10	N/A	<100	30	>50	N/A
Glaze	9.9+/-0.5	9.9+/-0.5	531+/-10	N/A	< 100	34	>50	N/A

Chemical Solubility. Namsa Report November 6,2020

Biocompatibility ISO 10993-5 and Radioactivity ISO 6872		
	Result	Standard
Cytotoxicity Test	No Cytotoxicity (Less than or equal to grade 2)	No Cytotoxicity
Radioactivity U^{238}	0.006105+/- 00038 Bq/g	Less than 1.0 Bq/g

Cytotoxicity study using the ISO Elution Method. Namsa GLP Report November 25,2020/ Radioactivity test by Pace Analytical January 08,2021

Composition range, w/w %				
Oxide	Dentine Modifiers Dentine/Enamel/Opal Enamel/Gum		Stain/Glaze	
	MIN	MAX	MIN	MAX
SiO_2	50%	75%	40%	50%
Al_2O_3	0%	20%	0%	4%
K_2O	0%	10%	0%	5%
CaO	0%	5%	0%	3%
Na_2O	5%	15%	5%	10%
B_2O_3	0%	5%	0%	5%
Fluorine	0%	1%	0%	1%
Li_2O	0%	5%	0%	1%
SrO	0%	5%	0%	5%
ZnO	0%	5%	0%	6%
ZrO_2	0%	5%	0%	1%
SnO	0%	1%	0%	0%
CeO_2	0%	1%	0%	0%
MgO	0%	1%	0%	0%
Coloring oxides	0%	5%	0%	20%

ANNEX 5. ITEM LIST

	CrystalCeram® PRODUCT CODE LIST	
CODE	**DESCRIPTION**	**CONTENT**
CCZDBL1	DENTINE BL1	20g
CCZDBL4	DENTINE BL4	20g
CCZDA1	DENTINE A1	20g
CCZDA2	DENTINE A2	20g
CCZDA3	DENTINE A3	20g
CCZD35	DENTINE A3.5	20g
CCZDB1	DENTINE B1	20g
CCZDB2	DENTINE B2	20g
CCZDB3	DENTINE B3	20g
CCZDC1	DENTINE C1	20g
CCZDC2	DENTINE C2	20g
CCZDD2	DENTINE D2	20g
CCZEBU	ENAMEL BLUE	20g
CCZECL	ENAMEL CLEAR	20g
CCZEXL	ENAMEL EXTRA LIGHT	20g
CCZELT	ENAMEL LIGHT	20g
CCZETL	ENAMEL TRANSLUCENT	20g
CCZEVT	ENAMEL VIOLET	20g
CCZOEBU	OPAL ENAMEL BLUE	20g
CCZOECL	OPAL ENAMEL CLEAR	20g
CCZOEGY	OPAL ENAMEL GRAY	20g
CCZOETL	OPAL ENAMEL TRANSLUCENT	20g
CCZIMBR	INTERNAL MODIFIER BROWN	20g
CCZIMOC	INTERNAL MODIFIER OCHER	20g
CCZIMOR	INTERNAL MODIFIER ORANGE	20g
CCZIMPK	INTERNAL MODIFIER PINK	20g
CCZIMYL	INTERNAL MODIFIER YELLOW	20g
CCZDMBR	DENTINE MODIFIER BROWN	20g
CCZDMGY	DENTINE MODIFIER GRAY	20g
CCZDMOR	DENTINE MODIFIER ORANGE	20g
CCZDMPK	DENTINE MODIFIER PINK	20g
CCZDMYL	DENTINE MODIFIER YELLOW	20g
CC3DGD	3D GUM DARK	20g
CC3DGL	3D GUM LIGHT	20g
CZAOECL	ADD ON CLEAR	20g
CZAOETL	ADD ON TRANSLUCENT	20g
CCZFG5	CrystalCeram® FLUORESCENT GLAZE PASTE	5gr

	CGI PASTE STAINS	
CODE	**DESCRIPTION**	**CONTENT**
TSTPA	STAIN A	3g
TSTPB	STAIN B	3g
TSTPC	STAIN C	3g
TSTPD	STAIN D	3g
TSTPBK	STAIN BLACK	3g
TSTPBU	STAIN BLUE	3g
TSTPBR	STAIN BROWN	3g
TSTPGN	STAIN GREEN	3g
TSTPGY	STAIN GRAY	3g
TSTPOC	STAIN OCHER	3g
TSTPOR	STAIN ORANGE	3g
TSTPPK	STAIN PINK	3g
TSTPVT	STAIN VIOLET	3g
TSTPWT	STAIN WHITE	3g
TSTPYL	STAIN YELLOW	3g

	CGI GUM STAINS	
CODE	**DESCRIPTION**	**CONTENT**
TSTPAL	STAIN GUM ALABASTER	3g
TSTPAZ	STAIN GUM AZURE	3g
TSTPCF	STAIN GUM COFFEE	3g
TSTPCH	STAIN GUM CHESTNUT	3g
TSTPOD	STAIN GUM ORCHID	3g
TSTPPG	STAIN GUM POMEGRANATE	3g
TSTPSU	STAIN GUM SUNSET	3g
TSTPTG	STAIN GUM TANGERINE	3g

	CrystalCeram® GLAZE PASTE	
CODE	**DESCRIPTION**	**CONTENT**
CCZFG5	CrystalCeram® FLUORESCENT GLAZE PASTE	5g

CODE	**DESCRIPTION**	**CONTENT**
TSGMDS	STAIN AND GLAZE LIQUID	15ml
TSGMDM	STAIN AND GLAZE LIQUID	120ml
TMODLS	MODELING LIQUID	15ml
TMODLM	MODELING LIQUID	120ml