



G-CERAM[®] *MF* Metal-Ceramic
instructions for use

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G-CERAM MF Metal-Ceramic is a natural feldspathic porcelain powder, which is used to make metal sub-structured porcelain crowns and bridges, porcelain veneer and dental inlays-onlays.

Thanks to its modelling ease of use, G-CERAM MF Metal-Ceramic powder is a reliable ceramic powder for veneering, especially recommended for laboratories whose priority is rapidity and accuracy. Easy to use for the ceramist with a little experience but becomes extremely fine for the experienced technicians that recognizes its physical properties and aesthetic performances.

G-CERAM MF Metal-Ceramic powder offers an immediate and accurate support in shade matching after each layering process with Opaque, Dentine and Incisal. In addition, high colour stability is ensured, even in the presence of varied thickness.

Further properties and performance characterize G-CERAM MF, as follows: minimum shrinkage, natural characterization for superior true-to-life aesthetic appearance in all light condition thanks to the higher degree of translucency and colour depth.

Offering a wide colour range, G-CERAM MF Metal-Ceramic powder will meet all specific shade requirements.

INDICATION

Metal-ceramic full veneers
Metal-ceramic partial veneers

CONTRAINDICTION

If patients are known to be allergic to any of the ingredients of G-CERAM MF, the material should not be used.

Material should not be used as mentioned in indications.



G-CERAM MF Metal-Ceramic powder is a fine grain feldspathic porcelain. Controlled production stages and optimum distribution of particle sizes provide the development basis to obtain a stable product and low shrinkage. Low shrinkage as well as simple and quick processing for the build-up of superior, esthetic restorations.

The major compositions of G-CERAM MF Metal-Ceramic are: potassium feldspar (orthoclase) KAlSi_3O_8 ($\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$) and sodium feldspar (albite) $\text{NaAlSi}_3\text{O}_8$ ($\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$).

The main reason of using potassium feldspar (KAlSi_3O_8) to manufacture porcelain powder, because chemical solubility is very limited.

Leucite an increase in strength is considered to be because the interface between the glass matrix and leucite particles occurred in continuous phases an effect due to fusion occurring during the transition from leucite particles to the glass phase. The leucite crystals cause increased strength of porcelain and reduce crack diffusion.

Another main component is quartz. Quartz (silicium dioxide SiO_2) increases the proportion of the glass phase and the translucency.

Metal oxides are used for colorization of porcelain powder. Metal oxides and pigments are added during the fritting processes to adjust opacity and translucency. G-CERAM MF porcelain shade stability meets (CIE) $L^*a^*b^*$ standards.

It has been proven by assessment that the G-CERAM MF Metal-Ceramic powder is a biocompatible product. Related tests are made according to the standard of "ISO 10993-1 Biocompatibility Medical Device". G-CERAM MF does not contain any hazardous and toxic elements such as radioactive elements, lead, uranium, antimony and cadmium.

Formation of leucite and glass phase during production period is very important for the coefficient of thermal expansion. Potassium feldspar provide this capability in a frit firing and cooling processes.

Figure 1, contains a ternary-phase equilibrium diagram of the $\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$ system, from which leucite may crystallise. The tetragonal leucite in veneering porcelains controlled their coefficient of thermal expansion.

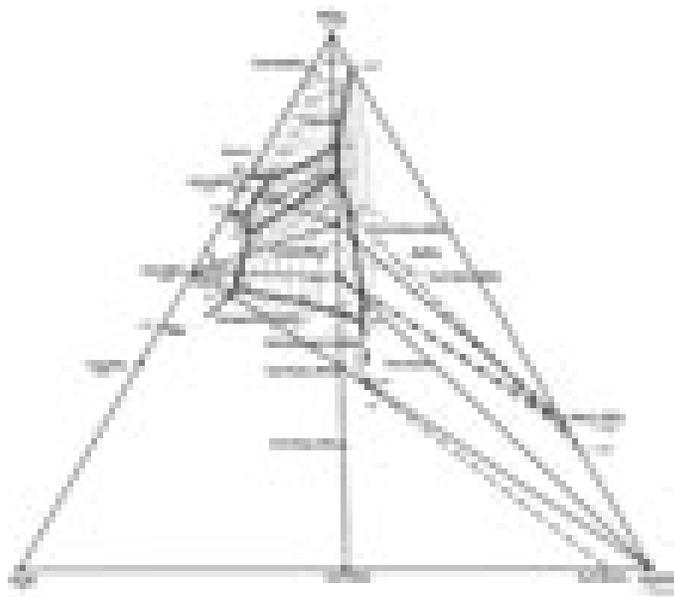


Figure 1

Physical and Chemical Properties			Value
Coefficient of Thermal Expansion (CTE)(25-500°C)	OPAQUE	(10 ⁻⁶ .K ⁻¹)	13,1-13,6
Temperature of Glass Transition (TG)	OPAQUE	°C	567 - 580
Softening Point (TS)	OPAQUE	°C	665 - 675
Particule Size Distrubition	OPAQUE	µm	<64
Coefficient of Thermal Expansion (CTE)(25-500°C)	DENTINE	(10 ⁻⁶ .K ⁻¹)	12,6 – 13,0
Temperature of Glass Transition (TG)	DENTINE	°C	557 - 570
Softening Point (TS)	DENTINE	°C	655 - 665
Chemical Solubility	DENTINE	µg/cm ²	<50
3-point Flexural Strength	DENTINE	Mpa	>90
Particule Size Distrubition	DENTINE	µm	<76
Bonding Strength		Mpa	>50

Physical and Chemical Properties		Value
Chemical Solubility		< 100 µg/cm ²
3-point Flexural Strength		>50 Mpa
Bonding Strength		>25 Mpa

Required physical and chemical properties EN ISO 6872 standard.

Opaque	Shoulder	Opaque -Dentine Chroma -Dentine	Dentine	Incisal
A0	Bleach	A0	A0	I6
A1	Light	A1	A1	I1
A2	Medium	A2	A2	I2
A3	Medium	A3	A3	I3
A3.5	Medium Dark	A3.5	A3.5	I4
A4	Dark	A4	A4	I5
B0	Bleach	B0	B0	I6
B1	Light	B1	B1	I1
B2	Medium Light	B2	B2	I2
B3	Medium Dark	B3	B3	I4
B4	Medium Dark	B4	B4	I4
C1	Light	C1	C1	I1
C2	Medium	C2	C2	I3
C3	Dark	C3	C3	I4
C4	Dark	C4	C4	I5
D2	Light	D2	D2	I1
D3	Medium Light	D3	D3	I2
D4	Medium	D4	D4	I3

G-CERAM [®]	FIRING CHART							
	Oxide	Base Paste	Opaque Powder	1 st and 2 st Shoulder	1 st Dentine	2 st Dentine	Glaze High & Stains	Add On
Dry Time	-	3-4 min	4-5 min	3-4 min	6 min	6 min	3-5 min	3-5 min
Start Temp	600°C	500°C	550°C	550°C	550°C	550°C	550°C	550°C
Heat Rate °C/min	100°C	100°C	55°C	55°C	55°C	55°C	55°C	55°C
Vacuum Start	600°C	500°C	600°C	600°C	600°C	600°C	None	Optional
Vacuum Stop	980°C	975°C	965°C	950°C	900°C	895°C	None	Optional
High Temp	980°C 990°C	975°C 980°C	965°C 970°C	950°C 955°C	905°C	900°C	895°C	850°C
Hold Time	1 min 10 min*	1 min	1 min	1 min	20-30 sec	20-30 sec	1 min	1 min
Cool Time	1 min	1 min	1 min	1 min 3 min**	1 min 3 min**	1 min 3 min**	1 min 3 min**	1 min 3 min*
Texture	Tin oxide surface	Eggshell Shiny	Eggshell Shiny	Eggshell	Grainy Shiny	Grainy Shiny	Glossy	Glossy
Thickness (approx.)	-	0.1-0.3mm	0.1-0.3mm	0.2mm	0.5-1.0mm	0.5-1.0mm	-	-

* During oxidation process, Hold Time will be 10 min in Nickel Free Chrome Cobalt Alloy.

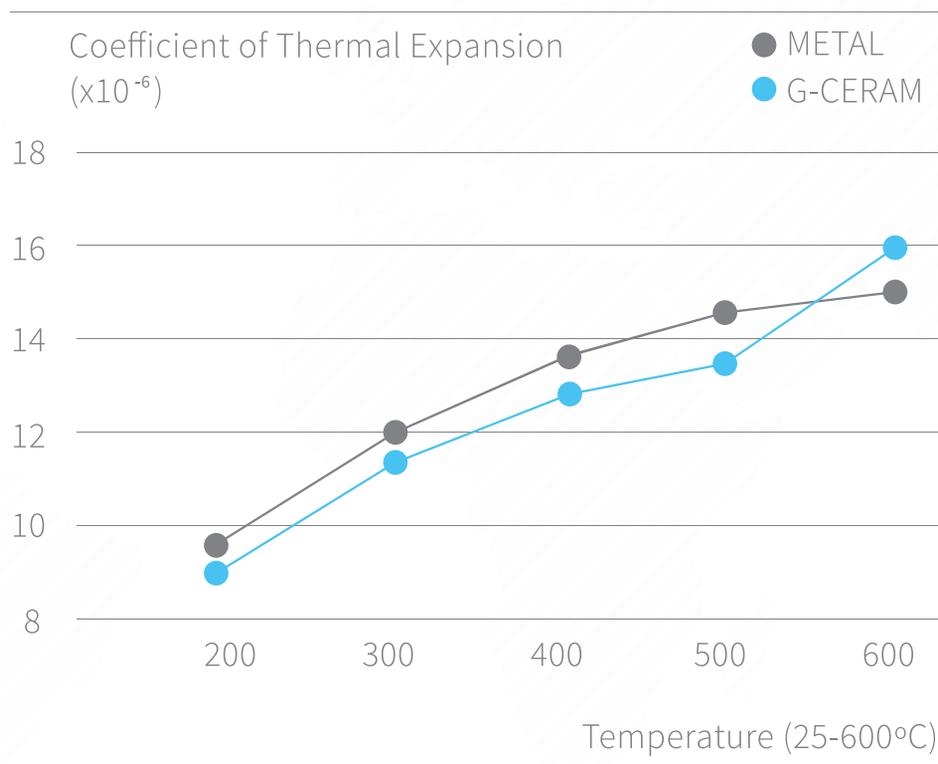
** Slow cooling must be performed when Nickel Free Chrome Cobalt Alloy is used.

Please note:

- The values listed here are intended for orientation only and should be regarded only as guidelines. Your firing results may differ.
- All firing results depend on the performance of the furnace used, which in turn depends on the brand, model, age of the furnace and calibration.
- Therefore, the guideline values will have to be adapted individually for each firing. We recommend running a test firing cycle to evaluate the performance of the furnace used.
- We have compiled and checked all values and other datas with great care. However, we cannot under any circumstances be liable for your results.
- Recommended alloy CTE range : $14.0-14.6 \times 10^{-6} \text{K}^{-1}$ 25°C - 600°C

In general, most of the alloys used for ceramic fused to metal restorations are compatible with G-CERAM MF Metal-Ceramic porcelains. However, since every alloy reacts differently with respect to the coefficient of thermal expansion and can sometimes be unpredictable beyond the officially published data, we suggest that you utilize the alloys recommended for the product with a CTE in the range of $14.0-14.6 \times 10^{-6} \text{K}^{-1}$, measured in 25-600°C.

CTE Assessments



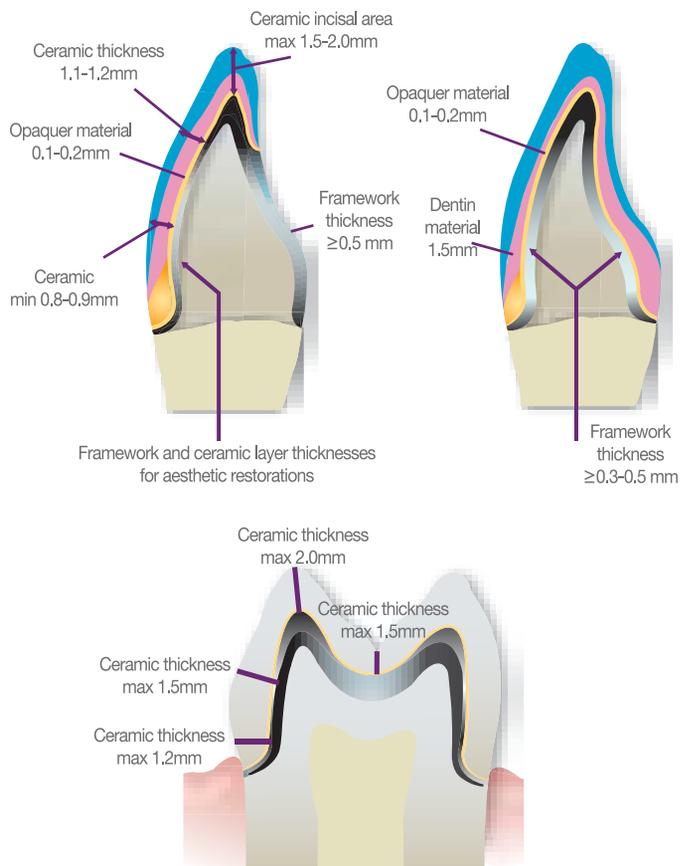
During model preparation, keep in mind that porcelain fused to metal restorations require a minimum thickness of 1,5 to 2,0 mm of which 0,3 to 0,5 mm is the metal portion. Remember that the use of shoulder porcelain requires a proper shoulder preparation.

The modeling of the metallic framework can be performed with the desired technique. The space reserved for the ceramic covering should not be less than 0,8 mm. The ceramic layer should not exceed 2,0 mm in thickness on the incisal borders to avoid the risk of fractures.

Avoid creating sharp corners, indentations, angles or curved edges on the metal surface that is to be covered. Every sharp corner is a potential point of origin for fractures, while every indentation could cause defects in the ceramic fusing process or fractures due to the contraction that occurs during firing.

The ceramic must be well supported by the metal, especially in the areas of contact with the opposing dentition. In order to avoid fractures or separations, the points of contact between ceramic and metal should not coincide with the points of contact between opposing surfaces. At the same time, metal structures that are extremely open must offer great flexural stability, keeping in mind the necessary aesthetic and hygienic considerations, because any possible bending that might occur will cause fractures or separations of the ceramic.

The surface of the metal structure that is to be covered must be perfectly clean, degreased and free of faults or porosity. It is recommended to use abrasives in aluminum oxide with a ceramic-bonded grinding instruments or carbides. Always grind or refinish in the same cutting direction of the instrument, without intersecting the cutting lines on the metallic structure. The finished and sanded structure must be washed with water using clean brushes.



OXIDATION

After grinding, carefully blast the framework with aluminium oxide (Al_2O_3) (particular size 100-110 microns). In generally alloy's required pressure is 1,5–2,0 bar.

Blasting improves the mechanical bond. It results in the object surface being roughened and considerably enlarged. In order to prevent inclusions of blasting medium residue in the ceramic, we recommend a blasting the alloys with the indicated pressure while keeping the nozzle at a flat angle to the object surface. A contaminated metal surface may result in the formation of bubbles during ceramic firing.

Before the oxidation firing, clean the metal framework using a brush under running water. Then, thoroughly clean it with steam or in the ultrasonic cleaner. Allow the framework to dry after cleaning. Oxidize the framework according to the instructions given by the alloy manufacturer. After oxidation, carefully check the framework for porosity or irregular oxide layer.



*Metallic Framework prepared
for ceramic applications*

G-Ceram porcelain can be mixed and modeled using the desired techniques, including condensed on to the model, pre-vibrated on to a mixing slab, pre-condensed on to a mixing slab and brush or spatula modeled.

During the preparation and working of the porcelain powder, remember that certain actions can lead to modifications of some of the material's characteristics:

- The porcelain should be mixed and moistened on a flat surface and not inside of deep wells. When mixed in the well, the liquid tends to deposit itself on the bottom, pulling with it finer particles and color pigments. This can modify the condensation characteristics of the porcelain as well as the resulting color.
- The drying of the liquid in excess after mixing should never be done from above, but always from the side of the moistened powder body. The liquid emerges due to capillary action, pulling with it finer particles and color pigments. Drying from above by way of absorption draws up the finest particles, which are principally responsible for the natural glaze, and modifies the porcelain's coefficient of thermal expansion.
- Drying of the restoration that is being modeled after condensation should always be done from the lower edge by simply dabbing it with the absorbent material. In this case, the ceramic powder itself acts as a filter, entrapping the fine particles and allowing only the liquid to flow out due to capillary action.
- The dried porcelain can always be remoistened with either distilled water and condensed for additional modeling. Remix the dried mixtures carefully.

The more pre-condensed the porcelain on the mixing lab, the greater the handling qualities are. There are substantial advantages in modeling drier and precondensed porcelain:

- It reduces condensation on the framework, which is always dangerous for the granulometric integrity, the coefficient of thermal expansion, the auto-glazing capacity and the chromatic qualities of the porcelain.
- It increases the compactness of the porcelain, which results in better translucency and greater hardness.
- It reduces contraction during firing, which avoids excessive over modeling of the restoration.

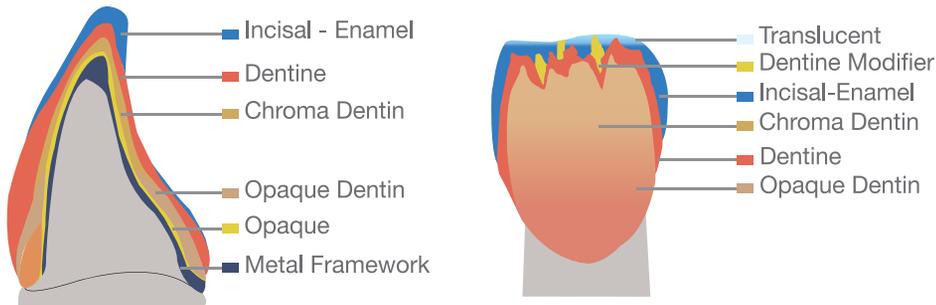
However, it is not always possible to keep a strong pre-condensation, especially when complex aesthetic treatment is foreseen, creating the need for chromatic layers and supports that are differentiated in depth as well as in extension. In all of these cases, there are no contraindications in adapting the fluidity of the mixture to the work being done.

Whenever possible, however, it is recommended to work in accordance with the instructions given above. At least partial pre-condensation of the powder, careful drying at the side or lower edge so as not to lose granulometric consistency and coloring pigmentation, and preparation on flat surfaces instead of bowls, will result in more consistent, higher quality restorations.

If you should prefer to model with a spatula, it is recommended to proceed with porcelain that has been condensed and brought to the proper level of compactness on the mixing surface.

The optimal state in which the porcelain should be mixed for modeling is well condensed and dried, plastic and pliable without being runny.

Recommended Layering:



Base Paste:

G-Ceram MF Base paste is a bond enhancer and color controller designed for optional use with alloys that produce excessive oxides. Base paste is compatible with all porcelains.

Either expels G-Ceram MF Base Paste a thin slurry and apply to the surface that will receive the porcelain. A thin even coat should be applied. Dry slowly in front of the muffle until a white chalky surface appears. Fire according to the recommendations in the G-Ceram MF firing chart.

Opaques:

There are 18 opaque porcelains, one for each dentine shade A0 – D4, available in both powders G-Ceram MF opaques are the foundation of the shade and therefore are in the same color range as the Dentines, Opaque Dentines and Chroma Dentines.

When using the opaque by spray, an extremely fine layer will produce excellent results. Spraying on this first layer is best accomplished with the restoration still on the die(s) to eliminate the need to remove opaque form the inside of any coping.



1st Opaquer Layering:

G-Ceram MF opaque powders are the finest grain. This allows complete coverage with a very thin layer.

Remove the desired amount from the jar and mix with G-CERAM MF Opaque Liquid on a glass slab.

Mix the opaque in a creamier or denser way and apply it as a first layer with the proper brush or glass instrument. With a well-coated brush or glass instrument, allow the material to slide onto the framework, vibrating very gently to obtain a uniform and homogeneous flow. Be certain that the distribution is homogeneous and that all of the metal is well coated. Fire according to the recommendations in the G-CERAM MF Metal-Ceramic firing chart.



*First opaque coat:
layering and firing*



Fired first opaque

2nd Opaquer Layering:

After firing, the metal structure should not be visible. The second opaque layer, a thicker powder, should be applied in the same fashion but applied as a thicker, creamier coat.

Fire according to the recommendations in the G-CERAM MF Metal-Ceramic firing chart.

In the case of non-precious alloys, you may model the opaque body about 1,0 mm beyond the metallic margin to avoid the formation of dark oxidation borders. Reduction should be performed only after the final firing. A thickness of about 0,2 mm is necessary to obtain a good opacifying and color effect.

The fired opaquer should have a silky-mat appearance (egg-shell gloss). The appearance of the fired opaquer can be compared with the corresponding material shade guide. If the gloss is too high, the firing temperature of the 2nd opaquer firing may be reduced to the firing temperature of the subsequent firing.



*Second opaque coat:
layering and firing*

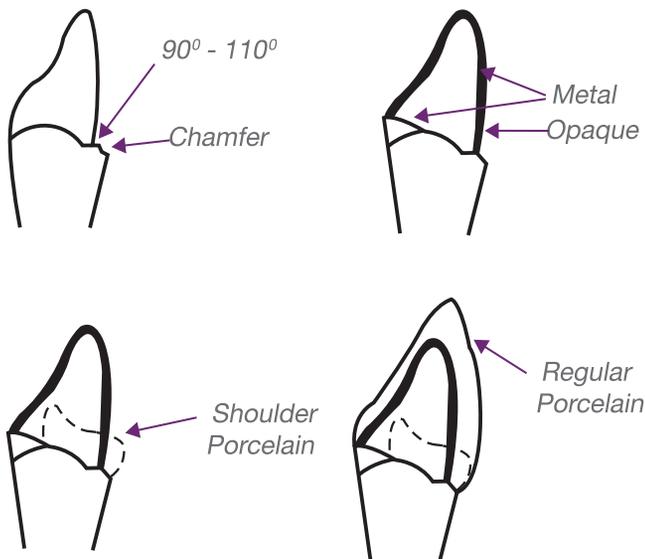


Fired second opaque

1st shoulder firing

There are six shoulder porcelains, and are recommended to be used according to the G-CERAM MF Metal-Ceramic Colour Combination Table.

In porcelain fused to metal crowns, the visibility of the metallic part on the cervical border can produce a crown margin that is dark or gray, detracting from the aesthetic appearance. To remedy this inconvenience, many experts recommend modeling the cosmetic shoulder without metal. However, dentine porcelain would not provide a perfect seal due to the sintering contraction and their rounding of the margins. For this reason, the modeling of these parts are done with shoulder porcelain.



The shoulder must be prepared in a clean step. The internal angle may be rounded but the external angle must be between 90 and 110 degrees.

The preparation must be 1 – 2 mm deep in order to guarantee a good appearance. The step must not be covered in metal (the metal must end before the floor of the step). The metal can be extended to the step only when there is sufficient space available. Mark the margin of the preparation with a pencil or felt tip pen.

Insulate the shoulder of the preparation with a thin layer of the separation liquid.

Position the crown carefully on the die. Mix the shoulder powder with Opaque Liquid, which will allow the powder to harden on the die allowing safe removal of the restoration without affecting the unsupported porcelain. Apply the shoulder porcelain with little or no vibration and adapt it accurately to the margin, carefully drying the porcelain.

Mark the margin of the shoulder with a pencil and allow the applied porcelain to dry for a few minutes. Remove the crown from the die and extract the excess porcelain from the inside of the crown. Fire the shoulder according to the recommended G-CERAM MF Metal-Ceramic firing chart.

2nd shoulder firing

Check to see if a second addition of shoulder porcelain is needed due to the sintering contraction. If so, apply the necessary porcelain vibrat slightly and repeat the firing procedure.

Continue with the restoration according to the previously recommended techniques.

Fire the shoulder according to the recommended G-CERAM MF Metal-Ceramic firing chart.

Opaque Dentine:

Before layering the Dentin and Incisal materials, sealing the model is a very important step. In this way, the ceramic material is prevented from drying out or sticking to the model. Use the Ceramic Separating Liquid to seal and lubricate the gypsum die and the adjoining areas of the model.

G-Ceram MF Opaque-Dentines are used to avoid differences in the shade of abutment crowns and pontics. Opaque-Dentine is applied to the basal surface and to the cervical area of the pontic.

Opaque-Dentine is in the same color range as the corresponding Dentine porcelains but higher in chroma and therefore, even less translucent. They possess such a good opaquing capacity that can be used when the base opaque appears too evident or in those modeling areas that are chromatically critical.

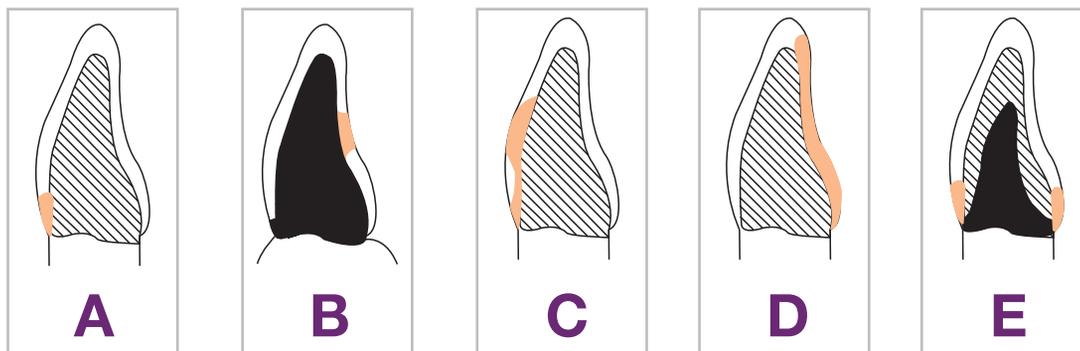
A Thin dentine areas especially which are close to the margin: In these areas, a layer of opacous-dentine can be modeled in order to avoid chromatic variations in relation to the other areas of the tooth.

B Sub gingival areas of the restorations: In these areas, a layer of opacous dentine can be modeled in order to reproduce the exact color and reduce the shadow effect due to the presence of the gingiva and to the scarce quantity of light present.

C Central labial areas: In these areas, a good layering of opacous dentine allows for interesting chromatic effects permitting the reproduction of secondary pigmentation without affecting the overall chromatic character of the restoration.

D Interdental spaces: The use of a layering of opacous dentine in these zones lends a more natural appearance to the restoration through better light reflection and a reduction of the shadow effect.

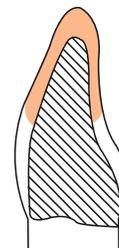
E Posterior zones (lingual and palatinal): A layering of opacous dentine helps to camouflage the presence of visible metal collars.



Chroma Dentine:

There are 18 Chroma Dentines, one for each shade A0 – D4.

G-Ceram MF Chroma Dentines are in the same color range as the corresponding Dentine porcelains but higher in chroma and therefore less translucent. Apply small quantity of G-CERAM MF Chroma Dentine to complete the crown. Apply the chroma dentine only to incisal area at one third of the crown.



1st DENTINE:

Starting to built up dentine from the mesial and distal area. The complete tooth shape is built up with dentine. The way of a useful basis with regard to the size, shape and position of the teeth can be obtained. A thin layer of dentine is applied on the layer of opaque-dentine that has already been applied to the cuspid and the shape is completed.

The mamelon shape is, once again, only outlined. Make sure to provide adequate space for the subsequent application of the Incisal and incisal modifier materials.

To achieve a uniform level of moisture, the material should be carefully wetted with a brush in the interproximal areas from the palatal side before the enamel material is applied.



Dentine Modifier:

The Dentine Modifier material is used for modification of shade within a mamelon structure created in the incisal area. Dentine Modifier will increase the intensity of shade within specific areas. The Dentine Modifier materials can be used with unmixed state or mixed with Dentine.



Incisal:

The incisal porcelains are highly translucent as compared to dentine porcelains. During the layering process, remember that the chromatic effect of the incisal porcelain is that of reducing the color saturation of the dentine while increasing luminosity. It is critical to remember that a general incisal layering of the surface of the restoration leads to an overall grayish appearance. Apply incisal porcelains in thin layers. Apply small quantity of G-CERAM MF Incisal to complete the crown. Apply the incisal only to incisal area at one third of the crown.

Condensing the ceramic surface (after restoration) using a large, dry brush, makes it more homogeneous, which prevents the ceramic from pulling away from the margin.

Before firing, the entire bridge units must be separated using a thin blade and cutting through the ceramic down to the opaquer. Moreover, a visual check must be made to make sure that all areas are properly covered with ceramic prior to firing.

Remove the bridge from the model, then contact points must be completed using dentine and incisal porcelains. Put the restoration on a firing tray for the firing process.

Fire the 1th Dentine according to the recommended G-CERAM MF Metal-Ceramic firing chart.



2nd DENTINE:

After the first dentin firing, the restoration is placed on the model and contact areas are controlled and adjusted.

The interproximal areas must be separated by using diamond disc.

The correction and shaping must be done by using diamond burs.

After correction it is recommended to clean the restoration with steam or under running water by using tooth brush.

After that, any deficient areas are supplemented with the dentine and incisal. The interdental areas and proximal contact points must be given special attention. First, the interproximal areas are filled with dentine. Once the interproximal areas have been slightly condensed, the basal surface of the pontic is filled with opaque dentine.

Final corrections of shape is carried out starting from the cervical part using dentine and incisal porcelains for recommended areas.

Fire the 2nd Dentine according to the recommended G-CERAM MF Metal-Ceramic firing chart.



After second Dentine firing, prepare the restoration for glaze. Following the example of the natural tooth, the surface structure is contoured.

Shape with diamond burs to create anatomy as desired.

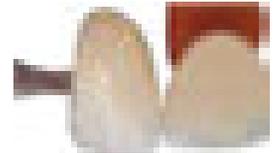
Use a diamond disc to create angles as desired.

Marked anatomy

It is recommended to clean the restoration with steam or under running water by using tooth brush and dry it.

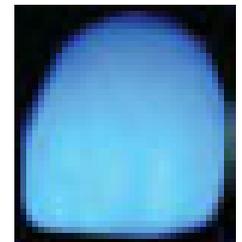
Mix the G-CERAM Glaze powder with G-CERAM Glaze liquid to get a creamy mixture.

Apply a very fine layer with a brush. During this procedure, stains can be layered alone or mixed with the glaze. Slowly place the restoration into the oven and fire without engaging vacuum according to the G-CERAM MF Metal-Ceramic firing chart.



Fluorescence:

Ceramics are colored with special fluorescent material during the production process. Thanks with this action, natural fluorescence effect emanate from deep inside of the crown. The natural fluorescence effect can be clearly observed in black light, diffuse light and daylight. G-CERAM Porcelain has an excellent fluorescence effect.



Comprehensive Shade-matching

- **Opaque** – 18 shades
- **Opaque Dentine** – 18 shades
- **Chroma Dentine** – 18 shades
- **Dentine** – 18 shades
- **Incisal** - 10 shades
- **Opaque Modifier** – 7 shades
- **Shoulder** – 6 shades
- **Dentine Modifier** – 9 shades
- **Incisal Modifier** – 9 shades
- **Gum Porcelain** – 3 shades
- **Stain** – 11 shades
- **Glaze** – Low and High Glaze
- **Add-on correction** – 3 shades



G-CERAM Shade Guide A1-D4 (including A0 and B0) matches with Vita[®] Classical Shade A1-D4.

Vita[®] is a registered trademark of VITA Zahnfabrik H. Rauter GmbH & Co. KG, - Bad Säckingen, Germany

G-Ceram MF Base Paste												▶ For masking metal framework and increase the bonding effects						
G-Ceram MF Opaque										A0 - D4		▶ For masking the metal framework and give a base shade						
A0	A1	A2	A3	A3,5	A4	B0	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4	
G-Ceram MF Opaque - Dentine										A0 - D4		▶ To be used in the cervical areas to avoid loss in color of pontics						
A0	A1	A2	A3	A3,5	A4	B0	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4	
G-Ceram MF Chroma - Dentine										A0 - D4		▶ Increase the chroma effect of dentine in the upper half of crown						
A0	A1	A2	A3	A3,5	A4	B0	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4	
G-Ceram MF Dentine										A0 - D4		▶ Mainshade material to build up the ceramic restoration according to natural teeth						
A0	A1	A2	A3	A3,5	A4	B0	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4	
G-Ceram MF Incisal												▶ Last layer of build up the ceramic restoration according to natural teeth						
I1	I2	I3	I4	I5	I6	Opal incisal clear		Opal incisal light		Opal incisal medium		Transparent						

<p>G-Ceram MF Opaque Modifier</p>		White	<p>▶ For coloring the inside to obtain effects of depth</p> <p>▶ Creating special characterization</p>
		Yellow	
		Ocher	
		Brown	
		Gray	
		Pink	
		Orange	

<p>G-Ceram MF Shoulder</p>		Bleach	<p>▶ Used on esthetic transition zone of labially decreased metal copings</p>
		Light	
		Medium-Light	
		Medium	
		Medium-Dark	
		Dark	

<p>G-Ceram MF Dentine Modifier</p>		White	<p>▶ For preparing mamelons and creating special characterization</p> <p>▶ For coloring the inside to obtain effects of depth</p> <p>▶ Used for intensify the dentin shade</p>
		Yellow	
		Ocher	
		Brown	
		Gray	
		Pink	
		Orange	
		Blue	
		Violet	

<p>G-Ceram MF Gum Shade</p>		Light	<p>▶ Gum materials for aesthetic appearance</p>
		Medium	
		Dark	

<p>G-Ceram MF Incisal Modifier</p>		White	<p>▶ For different characterization and individualization</p> <p>▶ Provide different colors of translucency effects</p>
		Yellow	
		Ocher	
		Brown	
		Gray	
		Pink	
		Orange	
		Blue	
		Violet	

<p>G-Ceram MF Liquids</p>		Opaque	▶ Used to mix all opaque materials
		Modelling	▶ Used to mix all dentine, incisal and additional materials
		Glaze & Stain	▶ Used to mix all glaze & stain powders

<p>G-Ceram MF High Glaze</p>		▶ For polish surface of restoration
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<p>G-Ceram MF Stain</p>		White	<p>▶ Used to provide the same characteristic image as natural teeth</p> <p>▶ Used for restoration make up alone on mixed with one another</p>
		Yellow	
		Ocher	
		Brown	
		Gray	
		Pink	
		Orange	
		Blue	
		Violet	
		Green	
		Black	

<p>G-Ceram MF Add On</p>		Light	<p>▶ Used for corrections and adjustment of shape after glaze firing</p>
		Medium	
		Dark	

	Problems	Possible Causes	Solutions
01	Horizontal cracks on the porcelain	1) CTE of the alloy is not compatible 2) Excessive vibration during application of Dentine and Incisal 3) Over or under firing of Opaque 4) Sharp edges on alloy surface	1) Use alloy with CTE range with in 14.0×10^{-6} - 14.4×10^{-6} 2) Avoid vibration during porcelain buildup 3) Check Opaque firing parameters in accordance to the firing chart 4) Eliminate sharp edges when finishing alloy surface
02	Porcelain is not bonding well to the metal framework	1) Excessive or insufficient oxidation 2) Contaminated metal surface 3) Improper finishing / blasting	1) Follow the instructions of alloy's manufacturer 2) Check for contaminated metal surface 3) Sandblast the metal surface with clean aluminium oxide (Al_2O_3) and wash with steam cleaner or boiled water
03	Cracks during firing in the thick areas of Opaque	1) Opaque layer is not uniform and/or too thick 2) Dry time is too short	1) Apply uniformly by decreasing thick areas 2) Increase dry time
04	Splits during firing in the Dentine and Incisal areas	1) Dry time is too short	1) Increase dry time

	Problems	Possible Causes	Solutions
05	Porcelain appears milky without translucency	1) Vacuum starts in low temperature 2) Liquid does not match properly	1) Vacuum must start at 600°C 2) Change liquid by using other branded liquids
06	Over glasses surface and /or greyish appearance	1) Firing temperature is too high	1) Decrease high-temperature
07	Hard porcelain	1) Firing temperature is too high 2) Hold time is too high 3) Excessive vibration during application of Dentine	1) Decrease high-temperature 2) Decrease hold time 3) Avoid vibration during porcelain buildup
08	High shrinkage	1) Liquid density is too high	1) Reduce density of the liquid by adding distilled water
09	Surface appears milky without translucency after Glaze firing	1) Glaze layer is too thick 2) Grinding particles are not completely removed 3) Heat rate is too high	1) Apply thicker layer of Glaze 2) Wash with steam cleaner or running water with brush 3) Adjust heat rate to 55°C/min
10	Cracks after Glaze firing	1) Glaze high temperature is higher than Dentine high temperature	1) Double-check the firing parameters for Glaze and Dentine in accordance to the firing chart Note: in case of less shinning, increase hold time

Please note: G-Ceram products should be used according to the working instructions. We cannot be held liable for damages resulting from incorrect handling or usage. The user is furthermore obliged to check the product before use with regard to its suitability for the intended area of applications. We cannot accept any liability if the product is used in conjunction with materials and equipment from other manufacturers which are not compatible or not authorized for use with our product. Furthermore, our liability for the correctness of this information is independent of the legal ground and, in as far as legally permissible, is limited to the invoiced value of the goods supplied excluding turnover tax. In particular, as far as legally permissible, we do not assume any liability for profit loss, for indirect damages, for consequential damages or for claims of third parties against the purchaser.

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