SPECTRA

DENTAL CERAMICS

INSTRUCTIONS FOR USE

PFM

Leucite layering ceramic

METAL-CERAMIC RESTORATIONS



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ABOUT THIS DOCUMENT

This Instruction for Use describes the indication, handling and firing of the SPECTRA PFM layering ceramic system for metal-ceramic restorations. Read it completely before first use. Firing parameters are guide values determined on a Zubler Vario 300 furnace and must be verified on your own equipment.

SYSTEM OVERVIEW

SMF-Bonder · Opaque (paste/powder) · Margin · Opaque dentine · Dentine · Chroma modifier · Incisal · Opal incisal · Monolayer M1–M3 · Gingiva · LFC 710 / PFM 790 correction · Shades & Stains LFU · Glaze LFU · Modeling, opaque & glaze liquids

Indication & Contraindication

The SPECTRA PFM layering ceramic is a leucite glass ceramic, coloured according to the Vita®* classical shade guide A1–D4. SPECTRA PFM is intended exclusively for dental applications and for use by trained professionals.

01 INDICATION

Veneering of suitable dental alloys for metal-ceramic technology with a thermal expansion (CTE) of 14–15 × 10-6 K-1 (RT–500 °C):

Precious metal alloys, cast or milled.

CoCr or NiCr alloys, cast, milled or laser-sintered.

Frameworks must have an anatomically reduced shape, sufficient stability and allow uniform ceramic layer thicknesses with a maximum layer thickness of 1.5–2 mm. Edges and tips are to be rounded off. Missing substance must be replaced with alloy.

02 CONTRAINDICATION

Combinations with ceramic materials outside the described range of product systems and/or material from another manufacturer.

Use of non-approved framework materials.

Sharp edges and corners on the framework, or non-anatomically reduced framework shapes.

Dental ceramic and all-ceramic restorations made of glass ceramics are not recommended for patients with bruxism or parafunction.

* VITA® is a registered trademark of VITA Zahnfabrik, Bad Säckingen, Germany.



SPECTRA PFM POWDERS AND COCR ALLOY

Framework Fabrication

Metal framework

The fabrication of the metal framework (casting, processing, cleaning/oxidation) must be performed according to the alloy manufacturer's instructions. The framework must have a reduced anatomical shape and provide enough space for an even coating of layering ceramic of < 2 mm. Sharp edges and corners must be rounded off.

IMPORTANT NOTE — CLEANING BEFORE ANY PORCELAIN APPLICATION

Base metal alloys (cobalt-chromium and nickel-chromium) create water-soluble chromium oxides during every heat treatment process. The oxide must be removed before porcelain application. Clean the framework and the layering with steam or water and brush thoroughly before another porcelain application.



PREPARED COCR METAL FRAMEWORK



SPECTRA CERAMIC WET PALETTE

SMF-Bonder

Intermediate layer for non-precious alloys

SPECTRA SMF-Bonder can be used with non-precious metal alloys and reduces the problems of strong oxide formation (green discolouration and flaking of the ceramic). It serves as an intermediate layer between cobalt-chromium based dental alloys and dental ceramics for metal-ceramic crowns and bridges with a CTE of 14–15 × 10-6 K-1 (25–500 °C).

SMF-Bonder is offered as paste or as powder. The paste has a ready-to-use consistency and can be applied as a covering layer that does not run off; the powder is mixed with SPECTRA opaque liquid to a paste-like consistency.

With all pastes: water acts as an extreme diluent. Dry the brush after washing, then moisten it with opaque liquid before applying. Apply SMF-Bonder with a brush or glass instrument to the well-cleaned, dry framework in a thin, even layer.

BONDER BAKE

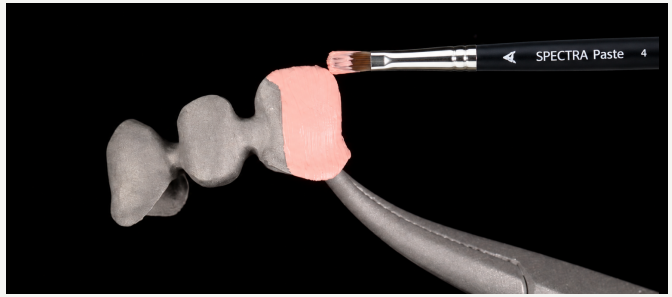
After the bonder has been applied, the restoration is dried in front of the open furnace at a starting temperature of 450 °C for 1–2 minutes. The furnace is then closed with a 6-minute closing time and heated at 80 K/min with vacuum (vacuum on at 450 °C) to 980 °C.

Hold time 6 min, without vacuum Final temp. 980 °C

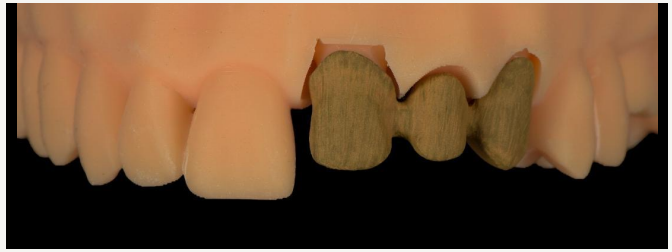
RESULT

After the bonder firing, SMF-Bonder shows a yellowish colour and an eggshell lustre. The opaque is then applied as usual.

Separate SMF-Bonder Instruction for Use available.



SPECTRA PASTE / BONDER APPLICATION



COCR FRAMEWORK AFTER BONDER BAKE



SPECTRA PFM / EMF, BONDER POWDER / 20g

Opaque Bake

Application

The opaques are made in a modern paste form or as powders. The paste has a ready-to-use consistency and can be applied as a covering layer that does not flow. The canned material allows the original consistency to be recreated simply by mixing, in case the opaque separates after prolonged storage.

With all pastes: water reacts with the paste like an extreme thinning agent — after washing the brush with water, dry it before applying opaque paste. Wet the brush before use with opaque liquid only. Apply the first opaque layer onto the clean, dry framework with a flat brush so that optimum coverage of the metal is reached (do not suction).

1ST OPAQUE BAKE

After the opaque application, the crown or bridge is dried in front of the open furnace at a starting temperature of 400 °C for 1–2 minutes. The furnace is then closed with a 6-minute closing time and heated at 80 K/min with vacuum (vacuum starting at 450 °C) to 950 °C.

Hold time 2 min, without vacuum Final temp. 950 °C

2ND OPAQUE BAKE

Clean the framework and the layering with steam or water and brush thoroughly before another porcelain application. With the application of the second opaque layer the metal framework is completely covered. Continue with the same procedure as in the first opaque bake (950 °C).



COCR FRAMEWORK AFTER OPAQUE BAKE



SPECTRA PASTE / OPAQUE APPLICATION

Margin Bake



1ST MARGIN BAKE

Apply a thin layer of isolation liquid to the shoulder of the die. Mix the margin powder with modeling liquid L2 (margin) to a creamy consistency. Apply the margin shoulder ceramic mix in small portions and condense by tapping; suck off excess liquid and dry well. After the margin application, place the crown or bridge on a firing tray at a starting temperature of 400 °C, close the furnace with a 4-minute closing time and heat at 80 K/min with vacuum (vacuum starting at 450 °C) to 930 °C.

Hold time 1 min, without vacuum Final temp. 930 °C

After the first bake, place the crown on the die and remove excess material.

2ND MARGIN BAKE

A second margin application follows where necessary to optimise the fit. Second bake as first bake (930 °C).

Important note: clean the framework and the layering with steam or water and brush thoroughly before any further porcelain application. For SMF-Bonder firing, see page 5.

Dentine / Incisal Bake

Application

Mix ceramic powder (dentine and correlated incisal) with modeling liquid to a creamy consistency. Apply opaque dentine, dentine and incisal ceramic in small portions to the cervical and interdental area and compact by light vibration. Then more opaque dentine, dentine or incisal is applied according to the tooth layering.

Important note: clean the framework and the layering with steam or water and brush thoroughly before any further porcelain application.

1ST DENTINE / INCISAL BAKE

After the dentine application the crown is placed on a firing tray at a starting temperature of 400 °C. The furnace is closed with a 4-minute closing time and heated at 60 K/min with vacuum (vacuum starting at 450 °C) to 920 °C.

Hold time 1 min, without vacuum Final temp. 920 °C

After the first firing, trim and clean the crown or bridge, then apply a second layer of dentine and incisal.

2ND DENTINE / INCISAL BAKE

Same procedure as the first dentine firing, except with a firing temperature of 910 °C. Any further dentine firings should be carried out at 900 °C.

Dentine and incisal firing is also possible in one go and is common practice.



01 / DENTINE BUILD-UP - BEFORE FIRING



02 / INCISAL LAYERING - BEFORE FIRING



AFTER DENTINE BAKE



BEFORE INCISAL BAKE



AFTER INCISAL BAKE

Glaze Finish / Glaze Firing

Application

After completely finishing the surface with a diamond instrument, thoroughly clean the crown or bridge. Apply the glaze LFU paste or the glaze LFU powder mixed with glaze liquid in a thin layer.

For colour characterisation, SPECTRA glaze, shades & stains LFU can be applied and fired. For the firing, refer to the firing table (page 23).

A GLAZE FIRING

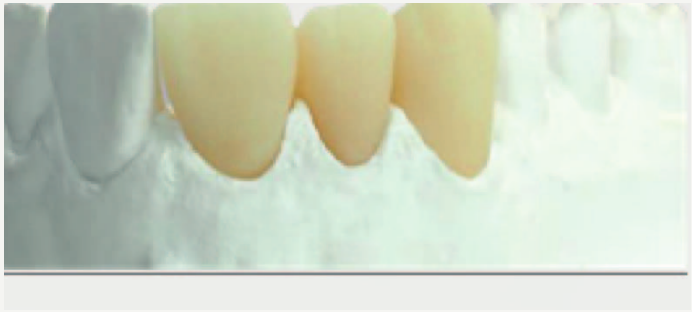
After the stains/glaze application the crown or bridge is placed on a firing tray at a starting temperature of 400 °C. The furnace is closed with a 4-minute closing time and heated at 45 K/min without vacuum to 710 °C.

Hold time 1 min, without vacuum Final temp. 710 °C

B NATURAL GLAZE

Place the crown on a firing tray at a starting temperature of 400 °C. Close the furnace with a 4-minute closing time and heat at 60 K/min with vacuum to 900 °C.

Hold time 1 min, without vacuum Final temp. 900 °C



ELABORATED FOR STAINS / GLAZE FIRING



AFTER STAINS / GLAZE FIRING



Modeling «nature»



Simplified layering

For the simpler «nature» modeling, a thin layer of opaque dentine is applied after the bonder and opaque firing to create a depth effect. The tooth body is built up with dentine materials, slightly contoured and covered with incisal material.

Characterisation

After the dentine/incisal firing is complete, shades & stains LFU can be used to highlight the colour aspects of the finished crown that match the tooth shade. The gloss finish is then made with glaze LFU.

Firing chart on page 23 .

Modeling «individual»



Internal structure

For the «individual» modeling, a thin layer of opaque dentine is applied after the bonder, opaque and margin firing for the optical depth effect. Dentine, modifiers, mamelons and various transpa materials are then applied analogously to the internal structure of natural teeth.

Completion

After the dentine firing, the crown is completed with various incisal and opal materials and fired. Special colour aspects of the finished crown can be highlighted with shades & stains LFU. With glaze LFU the crown receives its gloss finish.

Firing chart on page 23 .

Coloured Modeling Liquids

Visual control while layering

If desired, our ceramic powders can be coloured with coloured modeling liquid. This makes it easier for the dental technician to distinguish between the powders when layering.

The colour burns out completely during firing and has no influence on the final shade of the restoration.



LAYERING WITH COLOURED MODELING LIQUIDS



SPECTRA CERAMIC WET PALETTE





COLOURED MODELING LIQUIDS

Monolayer Modeling



Worked example — shade A3

In order to obtain the tooth shade A3, the complete tooth shape was built up with SPECTRA PFM monolayer M3 and applied to the coping that was opaqued with opaque A3. After firing and finishing the crown, the tooth shade (A3) can be optimally matched to the Vita® shade guide with SPECTRA shades & stains LFU (see the matching colour assignment of the shades LFU in the Combination Table on page 22). The gloss finish was done with SPECTRA glaze LFU.

Gingiva

SPECTRA gingiva classifies gingival shades based on the analysis of natural gingiva, identifying three primary colour types: pink, orange and brown.

Gum reconstruction

In addition, a range of special effects is available to further modify and enhance each shade, allowing for highly accurate simulation of the natural gingival appearance: Essence Red, Essence Orange and Neutral.

The SPECTRA PFM gingiva powders are used for reconstruction in the gum area. The gingiva powders can be individually combined with each other depending on the colour you want, in order to achieve a natural appearance of the gum restoration.





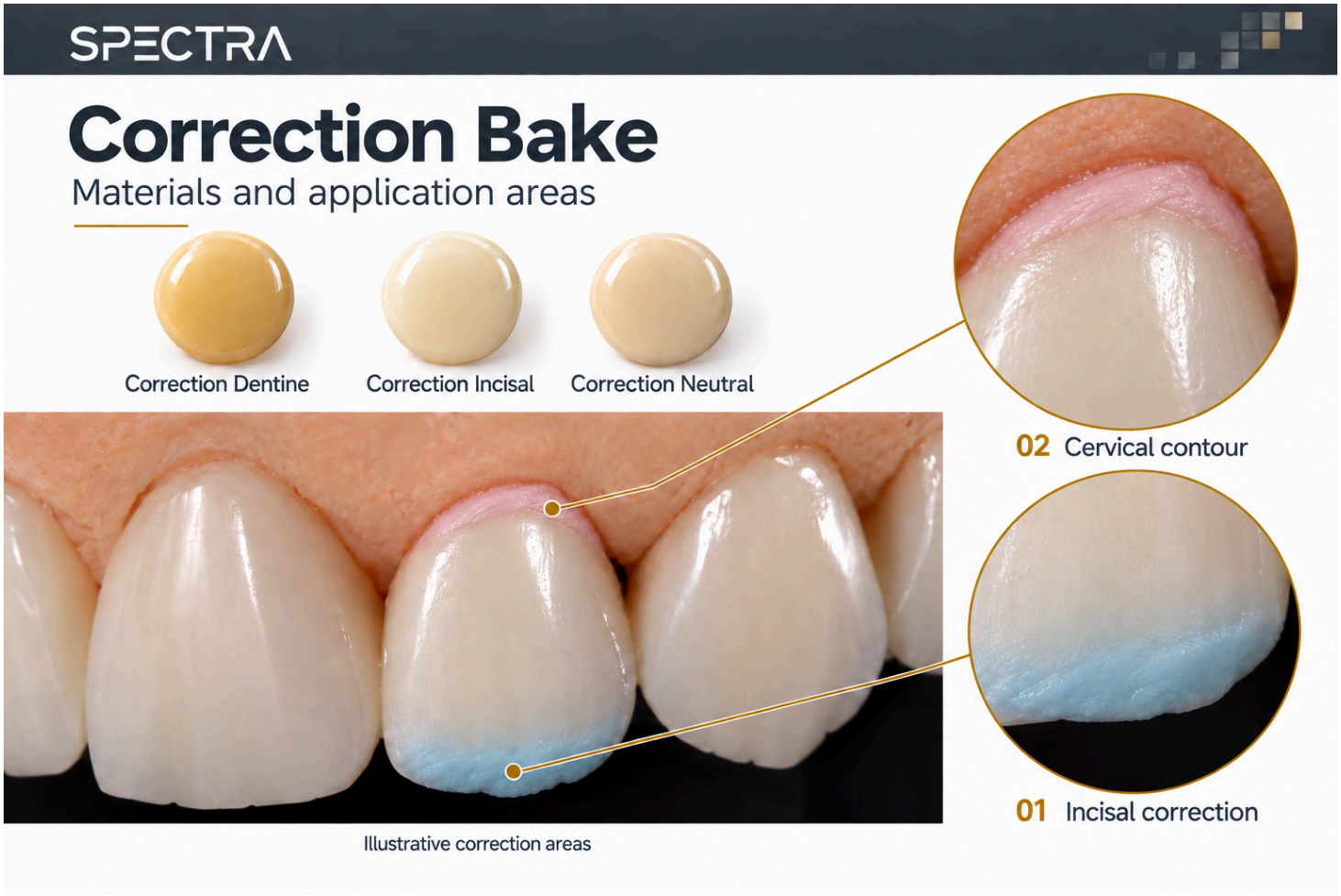
BROWN PINK ORANGE

Gingiva Colour Overview on the Model



Gingiva materials are fired with the dentine/incisal programme (page 23).

Correction Bake



LFC 710 / PFM 790 correction powders

Small corrections to the approximal contacts or to the pontic of the completed restoration can be applied with dentine- or incisal-coloured powders from the SPECTRA LFC 710 or PFM 790 correction lines without affecting the layering.

Mix the LFC 710 or PFM 790 correction powder with modeling liquid to a creamy consistency and apply in small portions to the desired areas and model. After application, place the work on a firing tray and fire according to the firing table with the respective programme: LFC 710: 710 °C, PFM 790: 790 °C (page 23).

Shades & Stains LFU

Low-fusing fluorescent stains and body shades for characterisation of the finished restoration — available as powder or pre-mixed paste, fired at 710 °C together with the glaze.



COLOUR SELECTION / 5g

Shade A light fluor.
STP04434P5

Shade B light fluor.
STP04435P5

Shade C light fluor.
STP04436P5

Shade D light fluor.
STP04437P5

White fluor.
STP04405P5

Yellow fluor.
STP04407P5

Orange fluor.
STP04409P5

Olive fluor.
STP04424P5

Purple fluor.
STP04411P5

Blue fluor.
STP04415P5

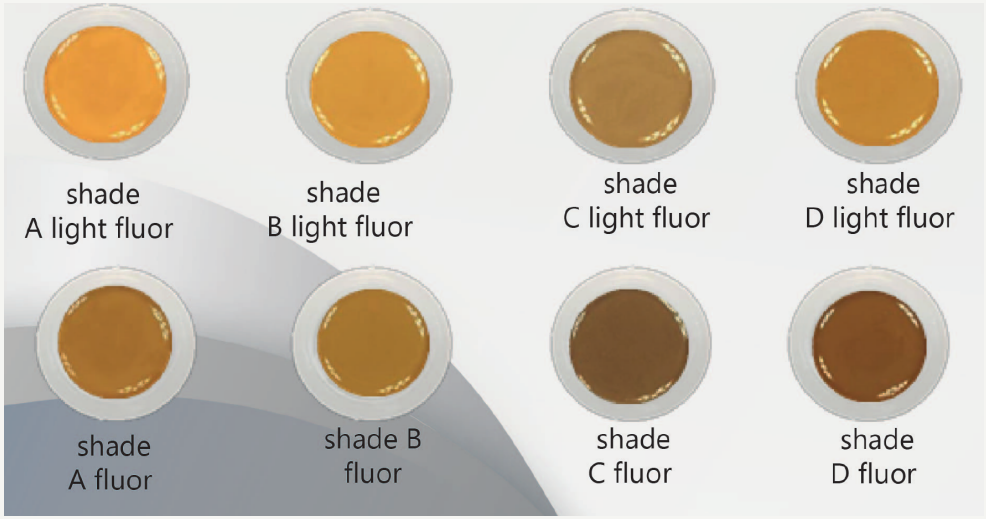
Brown fluor.
STP04417P5

Grey fluor.
STP04420P5

Glaze paste fluor.
STP04474P5

Black fluor.
STP04419P5

Body Colours



SHADE A / B / C / D – LIGHT FLUOR AND FLUOR



SPECTRA PALETTE / COLOUR PREPARATION

AREA OF APPLICATION

Body colours for the characteristic colouring of the A–D shade groups. light fluor variants are assigned to the lighter shades, fluor variants to the deeper shades – see Combination Table.

Stains LFU

Effect colours for extensive characteristic colouring – from white, vanilla and beige through the orange, safari and olive group to blue, purple, brown and black.



COLOUR SELECTION / 5g

Vanilla fluor. STP04406P5	Snow white fluor. STP04443P5	Beige fluor. STP04422P5	Champagne fluor. STP04428P5
Smoke STP04451P5	Green fluor. STP04425P5	Copper fluor. STP04455P5	Coral STP04457P5
Transpa-blue STP04460P5	Transpa-pigeon STP04461P5	Transpa-orange STP04463P5	Transpa-halo STP04464P5
Structure stain yellow 2 STP04469P5	Glaze paste fluor. STP04474P5	Glaze paste strong fluor. STP04475P5	

Effect Colours

Area of application: effect colours for extensive characteristic colouring. The colours shown are a selection of our wider range only.



White fluor.
STP04405P5 / 5g



Snow white fluor.
STP04443P5 / 5g



Vanilla fluor.
STP04406P5 / 5g



Beige fluor.
STP04422P5 / 5g



Yellow fluor.
STP04407P5 / 5g



Yellow 2 fluor.
STP04408P5 / 5g



Orange fluor.
STP04409P5 / 5g



Medium orange fluor.
STP04441P5 / 5g



Orange 2 fluor.
STP04410P5 / 5g



Champagne fluor.
STP04428P5 / 5g



Safari fluor.
STP04440P5 / 5g



Safari + fluor.
STP04421P5 / 5g



Olive fluor.
STP04424P5 / 5g



Khaki fluor.
STP04427P5 / 5g



Rose fluor.
STP04429P5 / 5g



Rose pink
STP04412P5 / 5g



Red purple
STP04439P5 / 5g



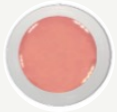
Blue rose
STP04423P5 / 5g



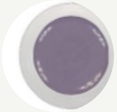
Purple fluor.
STP04411P5 / 5g



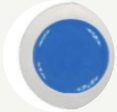
Red
STP04416P5 / 5g



Red bright
STP04456P5 / 5g



Smoke fluor.
STP04413P5 / 5g



Blue fluor.
STP04415P5 / 5g



Pigeon blue fluor.
STP04414P5 / 5g



Green fluor.
STP04425P5 / 5g



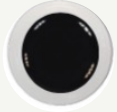
Brown fluor.
STP04417P5 / 5g



Dark brown fluor.
STP04418P5 / 5g



Red brown intensive
STP04438P5 / 5g



Black fluor.
STP04419P5 / 5g



Grey fluor.
STP04420P5 / 5g

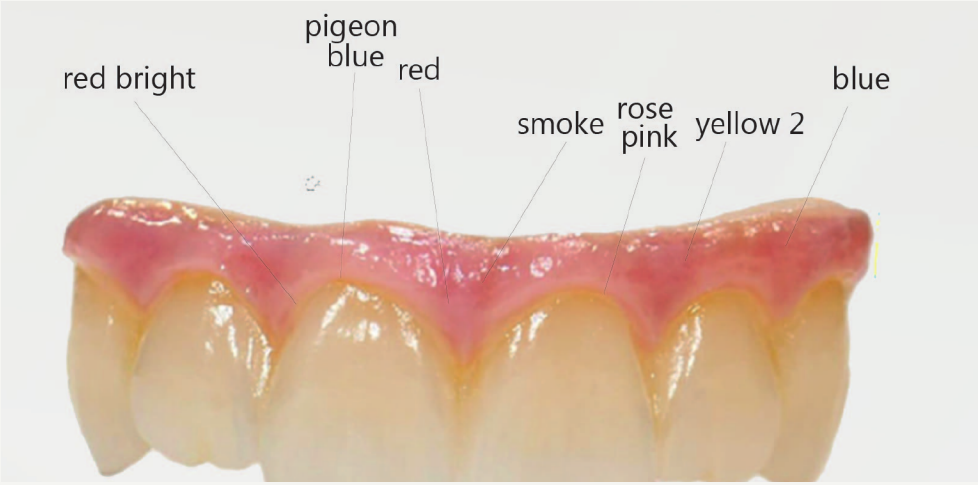
FIRING LFU glaze/stains: 400 °C start · 4 min closing · 45 K/min · 710 °C · 1 min hold, without vacuum.

Recommendation for the Gingival Area

Individual gingival shading

The illustration shows a restoration which was individually painted in the gum area with stains LFU for a natural look before the gingival materials were applied.

The listed stains LFU without fluorescence are ideal for an individual shade design in the gingival area.



GINGIVAL AREA PAINTED WITH STAINS LFU



ROSE · ROSE PINK · RED PURPLE · RED BRIGHT · BLUE ROSE · PURPLE · RED · SMOKE · BLUE · PIGEON BLUE · YELLOW 2

Combination Table

Tooth shade	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
Shade group			**A**				**B**				**C**				**D**	
SPECTRA PFM opaque	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
SPECTRA PFM margin	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
SPECTRA PFM margin (SM)*	1+2	2	2	3+4	4+5	1+2	1+3	3	3+5	1+5	1+5	5	5	2+5	2+5	3+5
SPECTRA PFM opaque dentine	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
SPECTRA PFM dentine	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
SPECTRA PFM chroma modifier	A	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D
SPECTRA PFM incisal	1	2	2	4	4	1	2	3	4	2	2	3	4	1	2	3
SPECTRA PFM opal incisal	1	2	2	4	4	1	2	3	4	2	2	3	4	1	2	3
SPECTRA PFM monolayer	M1	M2	M3	M3	M3	M1	M2	M3	M3	M1	M3	M3	M3	M1	M2	M2
SPECTRA PFM shade LFU	A	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D
SPECTRA PFM shades LFU (monolayer)**	A light	A light	A light	A light	A	B light	B light	B	B	C light	C light	C	C	D light	D light	D light

* Margin (SM) mixing ratio 1 : 1.

** The shade LFU colour combinations were specially designed for the colour scheme of the SPECTRA PFM monolayer.

Firing Chart

Note: The given firing temperatures were determined in a **Zubler Vario 300** dental furnace and are approximate values. For other furnace types, corrections to the firing temperatures may be necessary.

Firing parameters	Start temp. [°C]	Closing time [min]	Vacuum start [°C]	Heating rate [K/min]	1st bake (vacuum end) [°C]	2nd bake (vacuum end) [°C]	Holding time without vacuum [min]
Oxidation (acc. alloy manufacturer)	450	1	500	80	**980**	–	7
SMF-Bonder	450	6	450	80	**980**	–	6
SPECTRA PFM opaque	400	6	450	80	**950**	950	2
SPECTRA PFM margin	400	4	450	80	**930**	930	1
SPECTRA PFM dentine / incisal	400	4	450	60	**920**	910	1
SPECTRA PFM monolayer	400	4	450	60	**920**	910	1
SPECTRA PFM natural glaze	400	4	450	60	**900**	–	1
LFU glaze / stains	400	4	–	45	**710**	–	1
LFC 710 correction	400	4	450	45	**710**	–	1
PFM 790 correction	400	4	450	45	**790**	–	1

PLEASE NOTE

Delayed furnace opening (min. 2 minutes) is recommended after each main firing, especially with voluminous layers, starting with the margin firings.



SPECTRA CF-100

Ceramic furnace shown for the SPECTRA workflow.
Use the source calibration note above when setting firing programmes.

Technical Data

SPECTRA PFM complies with all applicable standards for dental ceramics (DIN EN ISO 6872 / DIN EN ISO 10993-5). All limits are undercut and thresholds are outperformed.

Materials classification	
Material	Silicate glass ceramic
Chemical composition	Major glass ceramic constituents: SiO_2, Al_2O_3, K_2O, Na_2O, CaO, B_2O_3
DIN EN ISO 6872:2019	Type 1 · Class 1 · Sub-class b

Property (acc. DIN EN ISO 6872)	opaque	margin, dentine, incisal	opal	PFM 790 correction
Coefficient of thermal expansion 25–500 °C [10^{-6} K^{-1} ± 0.5]	2× 13.0 4× 13.0	2× 13.0 4× 13.0	2× 13.0 4× 13.0	2× 13.0 4× 13.0 (25–475 °C)
Transformation temperature Tg [°C ± 20]	2× 550 4× 550	2× 580 4× 580	2× 570 4× 570	2× 500 4× 500
Bending strength [MPa]	≥ 50	≥ 50	≥ 50	≥ 50
Solubility [µg/cm²]	< 100	< 100	< 100	< 100

2× / 4× = values after two and four firings respectively.

MATERIAL SCIENCE. NATURAL EXPRESSION.

LEUCITE LAYERING CERAMIC / METAL-CERAMIC RESTORATIONS

Regulatory Information

Conformity

SPECTRA PFM meets all requirements of the applicable directives and regulations for medical devices. Manufacturing complies with a certified Quality Management System according to **ISO 13485**, Annex II of Medical Device Directive 93/42/EEC, Annex IX Chapter I of Regulation (EU) 2017/745 and further international requirements.

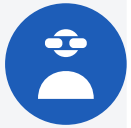
Classification	Class
Medical device classification acc. Annex IX, Rule 8 of MDD 93/42/EEC	**IIa**
Medical device classification acc. Annex VIII, Rule 8 of MDR (EU) 2017/745	**IIa**

UMDNS Code	**16-187 Dental ceramics**
MDR Code acc. MDCG 2019-14	**MDT 2003, MDN 1103**
Classification acc. DIN EN ISO 6872	**Type 1, Class 1**
Notified body	**CE 0483**

CE 0483

Warnings · Label Symbols

WARNINGS





Use only by trained specialists. Wear protective goggles or suitable face protection when finishing the ceramic restorations. Remove splinters and dust with a suction device or wear a suitable dust mask.

Be careful with the high temperatures when firing — there is a risk of burns! Use furnace tongs / tweezers and gloves. Use only in a clean work environment. Contamination of the aids (waxes) and devices (mixing plate, preheating furnace) through residues from alloy processing, especially CoCr or NiCr alloys, can lead to discolouration of the ceramic. The framework, or a framework that has already been veneered, must be cleaned thoroughly with steam or under running water with a brush before each ceramic application.

There are different firing conditions due to the different ceramic furnaces on the market. This must be taken into account and clarified by the customer on his own responsibility. The specified firing temperatures are guide values only.

Recommended storage conditions: 12–38 °C and normal humidity 40–60 %.

Warning about the investment: investment materials contain quartz powder — avoid inhaling dust, use a protective mask. Pay attention to the hazard warnings on the packaging of the investment material.

LABEL SYMBOLS



Manufacturer



Date of manufacture (YYYY-MM)



Medical device



Batch code / LOT number



Reference number



Unique Device Identification



Caution



Consult instructions for use

SPECTRA

Precision in every layer.

SPECTRA CERAM TRADING L.L.C.

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PRODUCT RANGE & SUPPORT

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