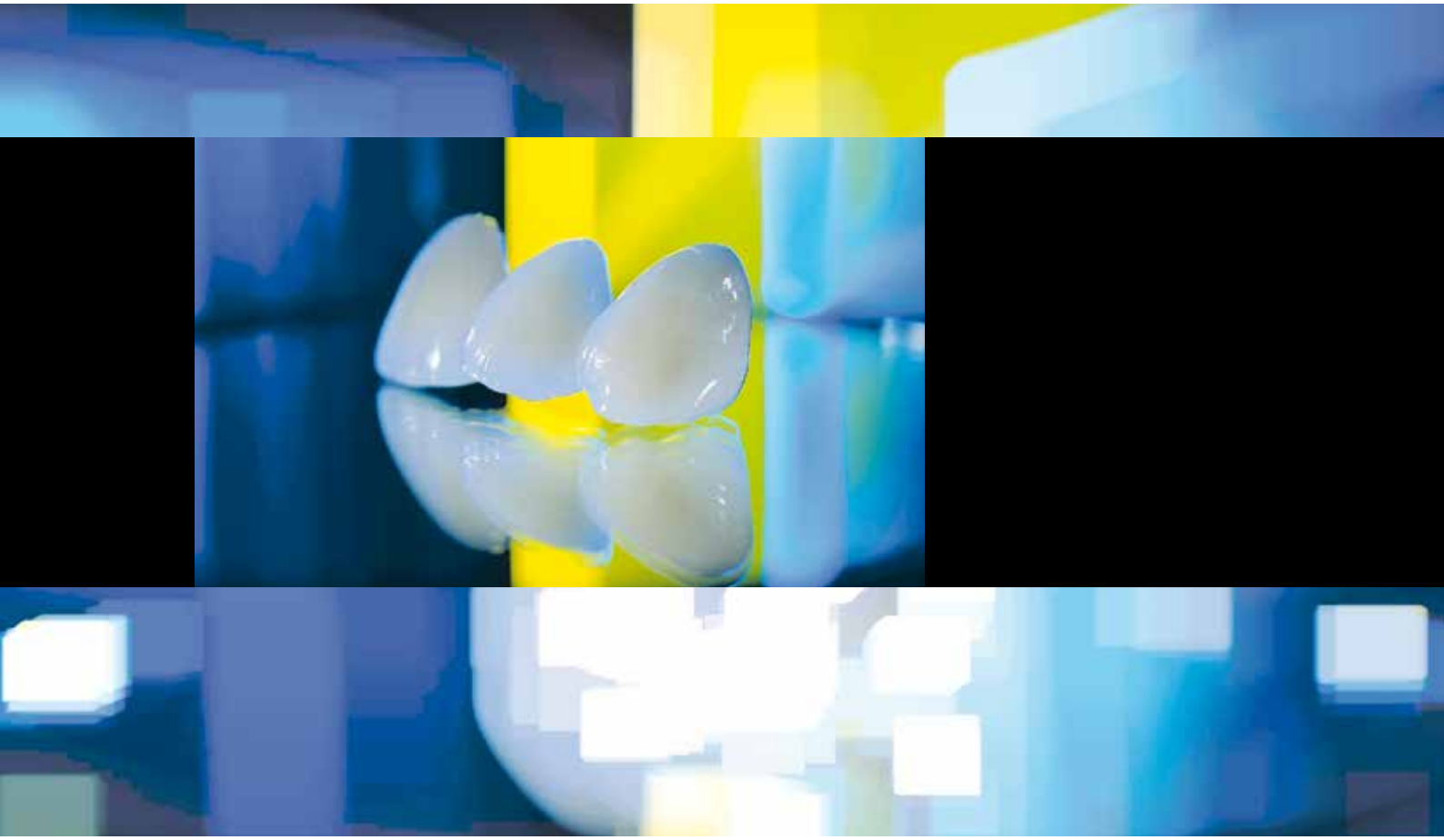
IPS Classic®

Instructions for Use



CE 0123

ivoclar vivadent®

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IPS – Ivoclar Porcelain System

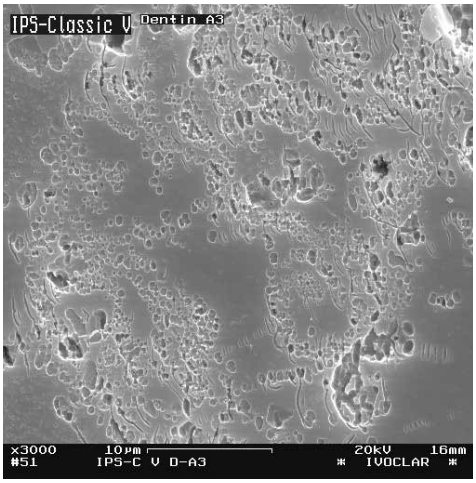
Today, the requirements placed on ceramic restorations are becoming increasingly higher. That is the reason why ceramists need a program with which they can design ceramic restorations with high esthetics and individuality.
The IPS Classic ceramic is based on the Chromascop shade guide, while IPS Classic V is based on A-D shades.

Material

New technologies in production and the willingness to innovate were the cornerstones for the development of the IPS Classic line of ceramic materials.

Thorough quality control of the materials and a special grain size distribution system provide IPS Classic with its extraordinary advantages. For example, the feldspar raw material is selected after chemical analyses and is then checked for contamination.

The exact composition of the components controls the properties, such as thermal expansion, transformation range as well as crystal growth. That is why it is possible to mix all IPS Classic and IPS Classic V materials with each other and process them together.



IPS Opaque Dentin, IPS Classic Dentin, IPS Classic Incisal:

CTE (25–500°C) [10^{-6} /K][1]	12.9 ± 0.5
Flexural strength (biaxial) [MPa][1] [2]	≥50
Chem. solubility [µg/cm²][1]	≥100
Firing temperature [°C]	910 – 920

[1] according to ISO 6872:2008
[2] typical mean values for the flexural strength are 80 MPa

Classification: Dental ceramics Type II / Class I

Advantages of the IPS Classic line of ceramic materials

- Long-term clinical experience
- Efficient and economical processing
- Highly esthetic restorations
- Easy handling
- Excellent shade match with Chromascop and A-D shades
- Special materials for individual characterization options
- Opalescent Incisal and Effect materials
- Coordinated components as far as equipment is concerned: Ivoclar Vivadent ceramic furnaces
- Compatible alloys
- Coordinated cements: Multilink® Automix, Multilink® Speed, Multilink® N, Vivaglass® CEM

CTE – coefficient of thermal expansion

More than two thousand alloys are offered on the dental market throughout the world. It is therefore impossible to test all alloys regarding their compatibility with IPS Classic and IPS Classic V. We therefore limit ourselves to a recommendation regarding a suitable cooling phase for the respective alloy types.

Basically, the instructions of the alloy manufacturer must be observed. The relevant factor is the coefficient of thermal expansion (CTE) after dental casting, which should measure in the same range as that of the ceramic. For the CTE of IPS Classic and IPS Classic V, ISO 6872 requires a temperature range of 25–500°C.

Basically, IPS Classic and IPS Classic V are suitable for alloys with a CTE of approximately 13.8 to 15.2 x 10^{-6}/K at 25–500 °C. However, the composition of the alloy and the firing temperature, particularly the cooling phase, must be taken into consideration depending on the alloy type.

Alloys in the lower CTE range (e.g. approximately 13.8–14.5 at 25–500 °C) can be processed using standard cooling. In this way, the fired object may be removed from the ceramic furnace after the completion of the firing program with a cooling phase. Ivoclar Vivadent furnaces emit an acoustic signal at the end of a firing program.

Long-term cooling depends on the alloy type and the respective CTE. With a longer cooling phase in case of long-term cooling of IPS Classic and IPS Classic V, the CTE value of the material is increased. Several firing cycles for an object have a similar effect as long-term cooling.

The basic rule is as follows: the higher the CTE of the alloy, the longer is the long-term cooling. If long-term cooling is necessary, it should be conducted after each firing cycle for an object, except for opaquer firings and soldering procedures after ceramic firing.

Indication
Conventional multi-layer veneering ceramic for the most popular dental alloys in the CTE range of 13.8–15.2 x 10^{-6}/K (25–500°C)

Contraindications
- If patients are known to be allergic to any of the ingredients, IPS Classic should not be used.
- Bruxism
- Veneering of titanium and zirconium oxide frameworks
- Any other uses not listed in the indications.

Important processing restrictions
- Exceeding or falling short of the stipulated veneering layer thicknesses
- Failure to observe the layer thickness ratio between the framework and layering ceramic
- Mixing with and processing in conjunction with other dental ceramics
- Veneering of dental alloys not within the stipulated CTE range
- Failure to observe the necessary minimum connector and framework thicknesses
- Application of IPS Shade, IPS Shade V and Stains P during layering (e.g. between Dentin and Incisal materials)
- Mixing of paste materials with powder materials

Side effects
If patients are known to be allergic to any of the material's ingredients IPS Classic restorations should not be used.

Warning
Avoid inhaling grinding dust when working on ceramic restorations. Use suction equipment or protective masks!

Composition

The IPS Classic and IPS Classic V ceramic materials and liquids consist of the following main components:

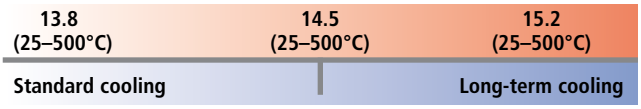
- **Ceramic materials**
  40– 65% by weight SiO_2
  Additional components: Al_2O_3, B_2O_3, BaO, CaO, CeO_2, K_2O, MgO, Na_2O, P_2O_5, SnO_2, TiO_2, ZrO_2 and pigments
- **Paste Opaquers, Shades, Stains and Glazing Materials**
  contain ceramic materials and 25– 40% glycol.s
- **IPS Classic Powder Opaquer Liquid**
  Components: Water, glycol, acetic acid, additive
- **IPS Classic Modelling Liquids N, S and L**
  Components: Water, butandiol and chloride
- **IPS Model Sealer**
  Components: Ethyl acetate, softener and nitrocellulose
- **IPS Ceramic Separating Liquid**
  Component: Paraffin oil
- **IPS Classic Glazing and Staining Liquid**
  Component: Ethylene glycol
- **IPS Margin Build-Up Liquid**
  Components: Water and cellulose derivative
- **IPS Margin Sealer**
  Components: Wax dissolved in hexane

Storage
- Protect powder materials from humidity
- Store paste materials and liquids at 2–28°C/36-81°F

Warnings
- Hexane is highly flammable and detrimental to health. Avoid contact of the material with the skin and eyes. Do not breathe in vapours. Keep away from sources of ignition.

Note
Protect liquids from exposure to sunlight and heat!

Alloys



The following Ivoclar Vivadent alloys were tested for compatibility with IPS Classic and IPS Classic V. Moreover, they are listed on the Ivoclar Vivadent Alloy Card (Dental Alloys - Compositions and physical properties).

Alloy	IPS Classic	Colour	CTE 25–500°C
High-gold			
Brite Gold	✓*	rich yellow	14.8
Brite Gold XH	✓*	rich yellow	14.4
Golden Ceramic	✓*	rich yellow	14.6
Callisto 86	✓	rich yellow	14.4
Aquarius Hard	✓*	rich yellow	14.5
Aquarius	✓*	rich yellow	14.6
d.SIGN 98	✓*	rich yellow	14.3
Callisto 84	✓	rich yellow	14.3
Y	✓	yellow	14.6
Aquarius XH	✓	yellow	14.1
Y-2	✓*	yellow	15.0
Y-Lite	✓	yellow	13.9
Sagittarius	✓	white	14.0
Y-1	✓*	yellow	14.8
d.SIGN 96	✓	yellow	14.3
Reduced gold			
d.SIGN 91	✓	white	14.2
W	✓	white	14.2
W-5	✓	white	14.0
Lodestar	✓	white	14.1
W-3	✓	white	13.9
Leo	✓	white	13.9
W-2	✓	white	14.2
Palladium containing			
Spartan Plus	✓	white	14.3
Spartan	✓	white	14.2
Capricorn	✓	white	14.1
d.SIGN 84	✓	white	13.8
Protocol	✓	white	13.8
Callisto 75 Pd	✓	white	13.9
Aries	✓	white	14.7
d.SIGN 67	✓	white	13.9
d.SIGN 59	✓*	white	14.5
d.SIGN 53	✓**	white	14.8
W-1	✓*	white	15.2
Capricorn 15	✓	white	14.3
Callisto CPG	✓	white	14.2
Implant alloys			
Callisto Implant 78	✓	white	13.9
Callisto Implant 33	✓	white	14.0
IS-64	✓**	white	14.8
Callisto Implant 60	✓**	white	14.5
Base metal			
Colado NC	✓	white	14.0
4all	✓	white	13.8
d.SIGN 30	✓**	white	14.5
Colado CC	✓**	white	14.2

* Cooling to 800°C / 1472°F
** Cooling to 700°C / 1292°F

The range of available alloys may vary from country to country.

Important

IPS Classic

– If the minimum requirements cannot be observed, cooling to *800 °C (1472 °F), or **700 °C (1292 °F), depending on the type of alloy, is required in conjunction with all main firings and glaze firings.
– With ceramic layer thicknesses of over 1.5 mm up to max. 2.5 mm, as well as with voluminous restorations (e.g. implant-retained reconstructions) in combination with high gold and base metal alloys, cooling to *800 °C, or **700 °C is mandatory. This also applies to soldered restorations.

Important

IPS Classic V Powder Opaquer

– Alloys (CTE of approximately 13.8 to 15.2 x 10^{-6}/K at 25–500 °C) with a solidus point of over 1080 °C (1976 °F) are suitable for opaquerization with the powder opaquer at a firing temperature of 960 °C (1760 °F).

Ceramic furnaces of other manufacturers often feature opening mechanisms different from that of Ivoclar furnaces. Therefore, the firing conditions may also differ. Make sure to observe these varying firing conditions.

IPS Classic® and IPS Classic® V
Description of products and assortments

IPS Classic Opaquer / IPS Classic V Opaquer
Paste opaquers which feature a high masking capability even in thin layers due to their consistency and excellent stability. The paste opaquers are characterized by their easy and economic processing.

Shades:
- *IPS Classic Opaquer*: 110, 120, 130, 140, 210, 220, 230, 240, 310, 320, 330, 340, 410, 420, 430, 440, 510, 520, 530, 540
- *IPS Classic V Opaquer*: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4

IPS Classic Intensive Opaquer / IPS Classic V Intensive Opaquer
Specially shaded intensive paste opaquers for the individualized characterization in the opaquer area.

Shades:
- *IPS Classic Intensive Opaquer*: white, orange, brown, purple, grey
- *IPS Classic V Intensive Opaquer*: A, B, C, purple, white

IPS Lowpaque / IPS Lowpaque V
IPS Lowpaque was especially developed for what is known as bioalloys, most of which have a low solidus point. Given the thermal stability, bioalloys require a lower-fusing opaquer. It goes without saying that IPS Lowpaque is not only suitable for bioalloys, but also for other ceramic alloys.

Shades:
- *IPS Lowpaque*: 110, 120, 130, 140, 210, 220, 230, 240, 310, 320, 330, 340, 410, 420, 430, 440, 510, 520, 530, 540
- *IPS Lowpaque V*: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4

IPS Lowpaque Intensive / IPS Lowpaque V Intensive
Specially shaded intensive paste opaquers for the individualized characterization in the opaquer area.

Shades:
- *IPS Lowpaque Intensive*: white, orange, brown purple, grey
- *IPS Lowpaque V Intensive*: A, B, C, purple, white

IPS Classic V Powder Opaquer
Powder opaquer with optimized properties and high stability during application as well as high firing stability. The powder opaquer can be applied in the conventional way using a brush or instrument. It is also excellently suitable for the spray-on technique.

Shades:
- *IPS Classic V Powder Opaquer*: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4

IPS Classic V Intensive Powder Opaquer
Specially shaded powder opaquers for the individualized characterization in the opaquer area.

Shades:
- *IPS Classic V Intensive Powder Opaquer*: A, B, C, purple, white

IPS Margin / IPS Margin V

The IPS Margin shoulder materials are characterized by their high stability of shape and low shrinkage. They enable technicians to fabricate esthetic, accurately fitting crown margins. Additionally, the range includes Intensive Margin materials to achieve special effects in the cervical area. As the ceramic shoulder is located supragingivally in periodontal cases in particular, the highest possible shade match is required. These materials are intended for characterization and can be added to the ceramic shoulder materials to reproduce the typical, bony effect of the root. To achieve all cervical shades, the shoulder materials can be mixed both with each other and with the Intensive materials (M10-M14).

Shades

- *IPS Margin*: M1 (110), M2 (120, 130), M3 (140, 210, 220), M4 (230, 240), M5 (330, 340) M6 (310, 320), M7 (520, 530), M8 (540), M9 (410, 420, 430, 440, 510)
- *IPS Margin Intensive*: M10 (neutral), M11 (yellow), M12 (orange), M13 (brown), M14 (pink)
- *IPS Margin V*: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4,
- *IPS Margin V Intensive*: brown, yellow, orange

IPS Opaque Dentin / IPS Opaque Dentin V

Considering the multitude of different layer thicknesses used for the fabrication of a crown or bridge and the often difficult space conditions, a dentin material with a higher degree of opacity and a more intensive shade effect is a big help. These materials can be used alone when the space conditions are difficult. However, they can also be mixed with the standard Dentin materials. They can be used as dentin replacement in difficult space conditions, as secondary dentin in the incisal area, in the cervical, interdental and lingual areas, in the vicinity of bridge pontics and to mix with the IPS Classic Dentin materials.

Shades

- *IPS Opaque Dentin*: 120, 130, 140, 210, 220, 230, 240, 310, 320, 410, 420, 430, 440, 510
- *IPS Opaque Dentin V*: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4, brown, yellow, orange

IPS Classic Dentin / IPS Classic V Dentin

The coordinated grain size distribution provides these dentin materials with their vitality and shade brilliance.

Shades

- *IPS Classic Dentin*: 110, 120, 130, 140, 210, 220, 230, 240, 310, 320, 330, 340, 410, 420, 430, 440, 510, 520, 530, 540
- *IPS Classic V Dentin*: A1, A2, A3, A3.5, A4, B1, B2, B3, B4, C1, C2, C3, C4, D2, D3, D4

IPS Classic and IPS Classic V Incisal and Transpa materials

The shade gradation of the Incisal materials is adjusted to the Chromascop and A-D shade guides. The coordinated grain size distribution and opal effect provide the materials with their vitality and shade brilliance.
The shades of the Transpa materials (T1 - T4) are graded to allow for the different effects of a true-to-nature incisal area. The range of materials is completed with Transpa clear and neutral

Shades

– *IPS Classic Incisal*: S1, S2, S3, S4, S5
– *IPS Classic V Incisal*: S1, S2, S3, S4
– *IPS Classic Opal Incisal*: OS1, OS2, OS3, OS4, OS5
– *IPS Classic Transparent*: T1 (neutral), T2 (reddish), T3 (greyish), T4 (transparent)
– *IPS Classic V Transparent*: T (neutral), T (clear)

IPS Effect

Lifelike opal effects in the incisal area can be quickly and easily imitated with these ready-mixed Effect materials. Users may choose between five shade gradations of the Effect materials. Starting with Effect 1, which demonstrates true-to-nature opalescence in conjunction with high translucency, the brightness value gradually increases from Effect 2 to Effect 4.

Shades

E1 super opal, E2 opal, E3 whitish opal, E4 white opal, E5 red-brown opal

Application options of the IPS Effect materials

IPS Effect 1

IPS Effect 2

IPS Effect 3

IPS Impulse

The ready-mixed ceramic characterization materials facilitate the application of natural effects.

– **Mamelon materials**
  These materials are available in five different shade gradations. They demonstrate a high opacity and optimum masking capabilities even when applied in very thin layers. Depending on the working habits of the user, the materials are applied in thin stripes on reduced dentin. In this way, an individualized appearance of the incisal third can be achieved.

– **Incisal edge materials**
  This material is used to achieve what is known as the 'halo' effect, which occurs in natural teeth by the refraction of light at the incisal edge.

– **Incisal materials**
  These two shaded incisal materials may either be mixed with Incisal materials to modify and intensify the shade or they can be applied directly.

– **Transparent materials**
  The Transparent materials are available in three shades. They are suitable to reproduce shaded, transparent areas, particularly in the incisal third.

– **Occlusal Dentin materials**
  These materials are available in three different shades. They are used to provide the basic shade for occlusal surfaces and to intensify the chroma.

– **Molar Incisal material**
  This material is used particularly in the posterior region to imitate whitish incisal areas. Additionally, it can be used to mix with every Incisal material to imitate whitish incisal areas in anterior teeth.

Shades
– *IPS Impulse Mamelon materials*: MM1, MM2, MM3, MM4, MM orange
– *IPS Impulse Incisal Edge materials*: yellow, light yellow
– *IPS Impulse Incisal materials*: yellow-grey, grey
– *IPS Impulse Transparent materials*: blue, yellow-grey, grey
– *IPS Impulse Occlusal Dentin materials*: brown, yellow, orange
– *IPS Impulse Molar Incisal material*: MS

IPS Gingiva

The IPS Gingiva materials are suitable to create esthetic gingiva replacements in metal-ceramic restorations and implant superstructures which feature true-to-nature gingiva shades and characteristics.

- Imitation of the natural gingiva
- Masking long tooth necks in bridge reconstructions
- Closing of large interdental spaces
- Designing areas adjacent to the gingiva in implant superstructures

The pink-coloured paste opaquer and powder opaquer are used to mask marginal areas in metal frameworks or implant superstructures. Depending on the patient situation, the 4 Gingiva Modifiers may be used alone or mixed with the 5 IPS Gingiva materials. The shade gradations range from orange and reddish to bluish.

Shades

- *IPS Gingiva Opaquer*: pink
- *IPS Lowpaque Gingiva*: pink
- *IPS Gingiva Powder Opaquer*: pink
- *IPS Gingiva*: G1, G2, G3, G4, G5
- *IPS Gingiva Modifier*: GM1, GM2, GM3, GM4

IPS Shade / IPS Shade V

These ready-mixed dentin stains in paste form enable subsequent shade adjustments on the ceramic surface.

Shades

– *IPS Shade*: 110/120, 130, 140/210, 220/230, 240, 310, 320, 330, 340, 410/420, 430/440, 510, 520, 530, 540
– *IPS Shade V*: A1, A2/A3/A3.5, A4, B1, B2/B3/B4, C1/C2, C3/C4, D2/D3, D4

IPS Stains-P

These intensive stains in paste form permit an easy and individualized design of the restorations. The creative freedom has virtually no limit due to the innumerable shade mixing possibilities.

Shades

White, bamboo-beige, caramel-crown, copper-brown, cork-brown, mahogany-brown, azure-blue, black, orange, basic yellow, basic red, basic blue

IPS Classic Glazing paste

Glazing materials in paste form with easy handling for a lifelike gloss of the ceramic restorations.

IPS Classic Add-On material

The low-fusing add-on material for the IPS Classic and IPS Class V metal-ceramic material is indicated especially for small adjustments and shape modifications on completely fired restorations.

Shade: neutral

Liquids

IPS Classic Powder Opaquer Liquid

Powder opaquer liquid to mix with the powder opaquer for various application techniques, such as conventional application with a brush or instrument or the spray-on technique.

IPS Classic Glazing and Staining Fluid

Used for consistency adjustment of IPS Shade, IPS Shade V, IPS Stains-P and IPS Classic Glazing Paste.

IPS Classic Glazing and Staining Fluid contains ethylene glycol and is detrimental to health. Do not breathe in vapours. Avoid contact with the skin and eyes.

IPS Margin Build-Up Liquid

This special build-up liquid facilitates modelling of the ceramic shoulder materials. Thanks to subsequent curing, the contoured crown can be easily lifted off the working die.

IPS Classic Build-Up Liquid N (Normal)

This build-up liquid is particularly suitable for technicians who apply small portions of ceramic material using a brush. Build-Up Liquid 'N' produces a very high stability and demonstrates outstanding modelling properties. Build-Up Liquid 'N' is particularly suitable for technicians who like a moist working environment, i.e. who use suction sparely. As the designation 'N' (=normal liquid) indicates, this build-up liquid is suitable for everyday use and for most layering techniques.

IPS Classic Build-Up Liquid L (Long)

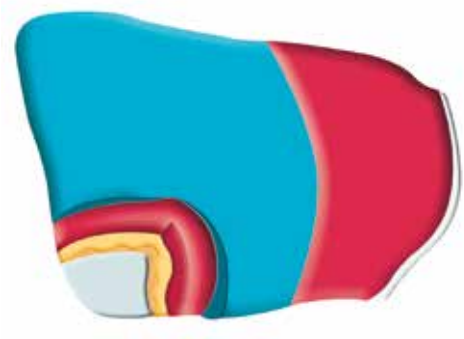
Build-Up Liquid 'L' was developed for technicians who like a longer working time as well as for markets in warmer climates. Build-Up Liquid 'L' contains an additive that increases the boiling point and thus enables slower evaporation of the liquid. This results in a prolonged working time with unchanged, excellent modelling properties.

IPS Classic Build-Up Liquid S (Spatula)

This liquid is particularly suitable for technicians who pack the materials very densely and use suction, followed by the subsequent cut-back with an instrument. The liquid can be easily suctioned off the contoured crown. This results in a relatively firm material, which can be individually sculpted with an instrument.

The IPS Classic Build-Up Liquids N, L and S may be diluted with distilled water.

IPS Classic®
Layering diagram



Chromascoop

A–D

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IPS Classic®
Framework design

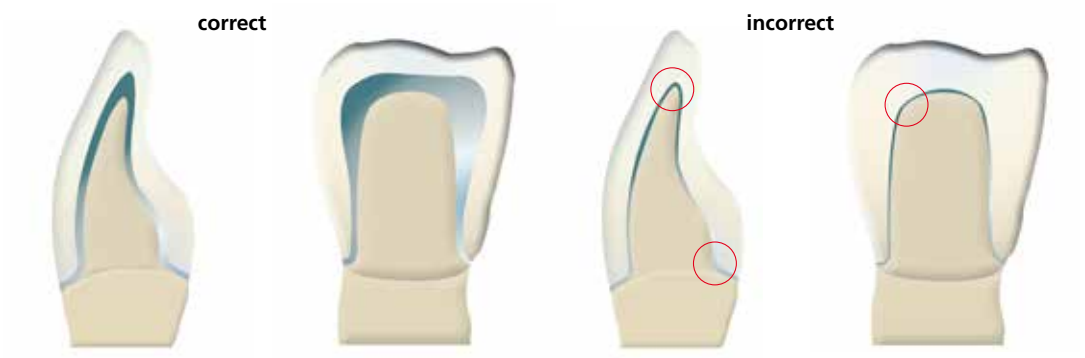
The following points must be observed for designing ceramic-veneered frameworks:

1. Functional support of the veneering ceramic
2. Framework design for fused ceramic shoulders
3. Framework stability
4. Framework design for bridges
5. Design of bridge pontics
6. Interface between metal and ceramic

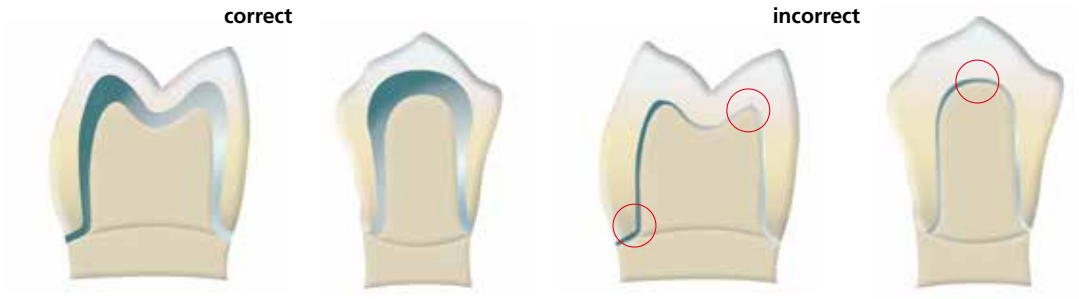
1. Functional support of the veneering ceramic

The framework reflects the shape of the tooth in a reduced form. It should be designed in such a way that the cusps are supported thus resulting in a virtually even layer thickness of the veneering ceramic in the cusp-fissure area. In this way, the masticatory forces occurring during functional chewing are exerted on the framework rather than on the veneering ceramic. Therefore, the framework must not show any angles and edges (see diagram) so that the masticatory forces do not result in tension peaks, which may cause delamination and cracks. These angles and edges should be rounded out already in the wax-up and not in the metal in order to avoid falling short of the minimum framework thickness. The wall thickness of the metal framework for single crowns must not be less than 0.3 mm and for bridge abutments 0.5 mm after finishing (see diagram). For further information, please refer to the Instructions for Use of the alloy being used.

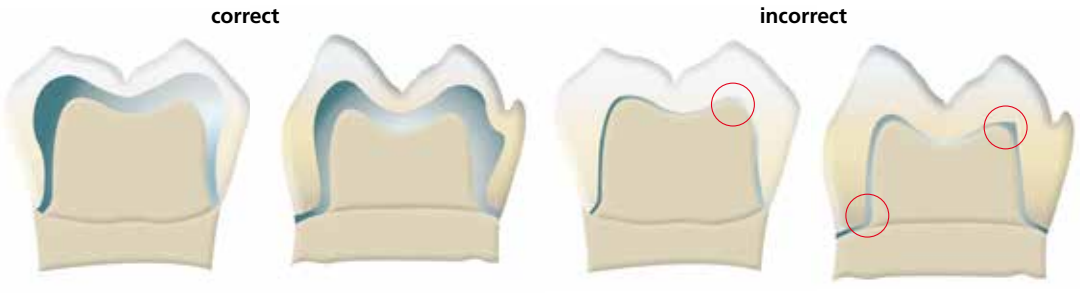
Anterior crowns



Premolar crowns

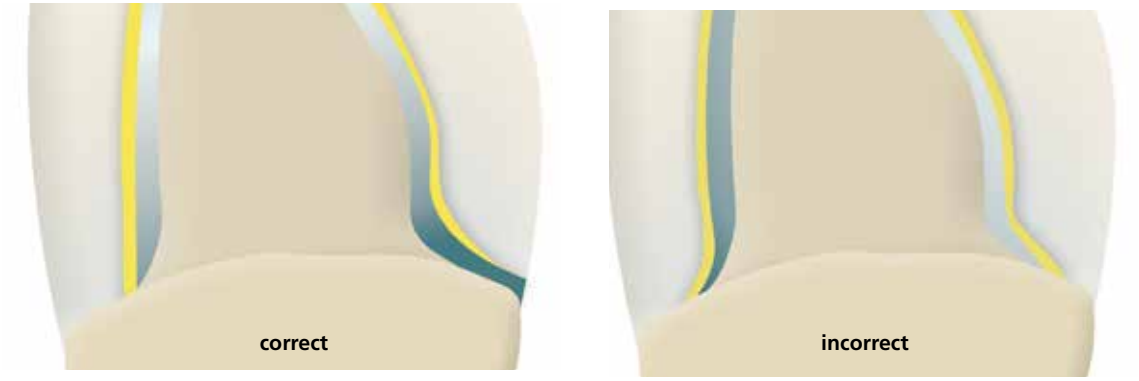


Molar crowns



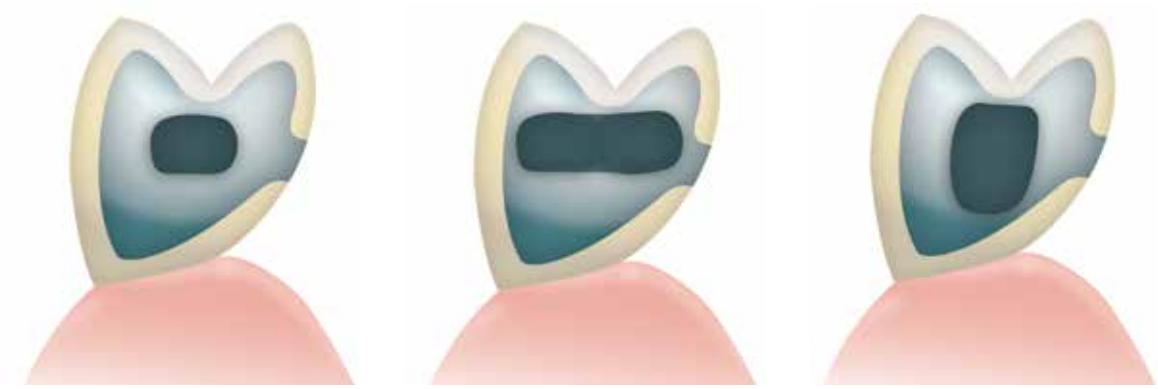
2. Framework design for fused ceramic shoulders

With fused ceramic shoulders, make sure that the framework rather than the veneer is supported by the prepared tooth. The framework is thus reduced exactly to the inner edge of the chamfer or shoulder preparation. In this way, functional support of the framework on the preparation is achieved. Excellent accuracy of fit on the preparation is essential to ensure that the shoulder material does not reach the inner aspects of the framework during subsequent application.



3. Framework stability

The dimensions of the interproximal connector surface greatly influences the stability of the restoration during the laboratory procedure, as well as the clinical long-term success after cementation. Therefore, the connectors must be adequately dimensioned in accordance with the alloy being used (particularly if bioalloys or high-gold alloys are used). The thermal behaviour of the selected alloy during processing has to be considered when designing the framework.



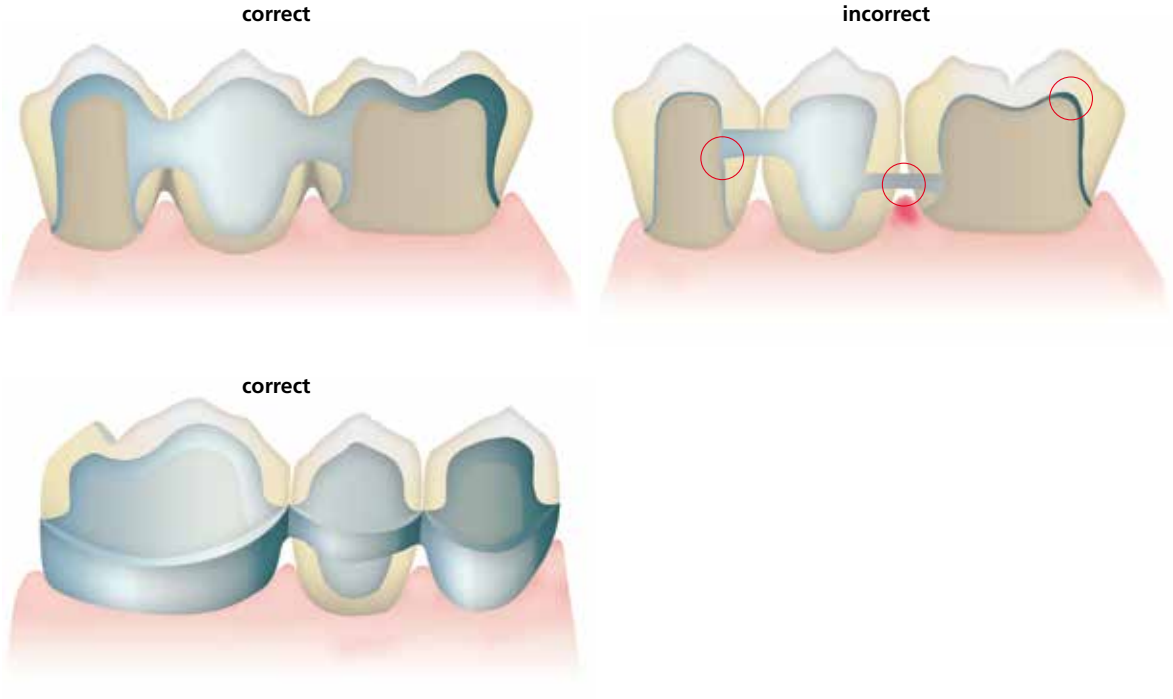
Single connector width
= single stability

Double the width of the connector
= double the stability

Double the height of the connector with single width
= eightfold stability

4. Framework design for bridges

Thermal stress during firing and masticatory forces after cementation affect ceramic-veneered frameworks. Therefore, these forces must be transferred to the framework rather than the veneer. Particularly in the connector areas between bridge abutments and bridge pontics in bridge reconstructions, the stability must be ensured with the help of the framework design and adequate framework material thickness. The framework design and framework thickness must therefore meet all the optical and functional requirements, as well as the aspects of periodontal hygiene. A full wax-up with the corresponding reduction of the ceramic provides the best prerequisites. During the laboratory procedures, the framework is repeatedly exposed to high temperatures. These firing temperatures may cause the framework to distort and compromise the accuracy of fit if it has not been properly designed and the required framework thickness has not been observed.
A scallop-type design with e.g. interproximal reinforcements counteracts this development. Additionally, this framework design (e.g. with cooling grooves) ensures more even cooling of the restoration during the cooling phase. This is particularly important if bioalloys or high-gold alloys are used. The corresponding failures can be prevented as described under point 1. In order to enable optimum oral hygiene with bridge restorations, the design of the interdental spaces should be given special attention. Adequate opening of the interdental area without creating black triangles should be factored in when designing the framework in order to ensure proper periodontal hygiene with interdental brushes and dental floss.

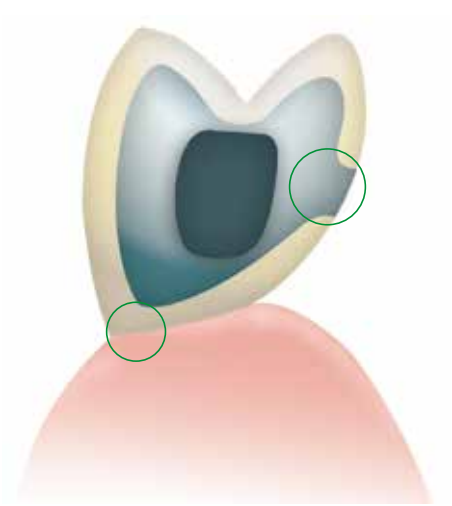


5. Design of bridge pontics

Bridge pontics are designed taking esthetic and functional aspects as well as oral hygiene into account. The area of the pontic that contacts the alveolar ridge should be made of ceramic. In order to ensure adequate stability between the bridge pontic and the bridge abutments, a palatal and/or lingual scallop is recommended. Furthermore, to ensure more even cooling of the bridge pontic, which absorbs the most heat, additional cooling grooves are advantageous.

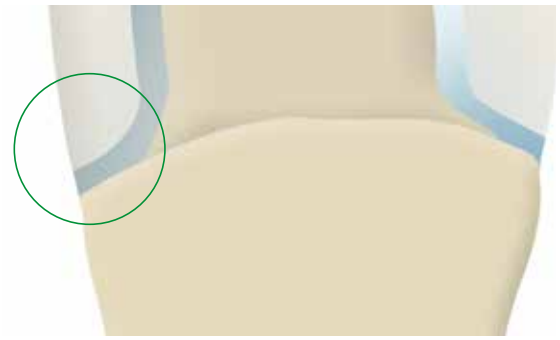
Bridge pontic design - ovate pontic

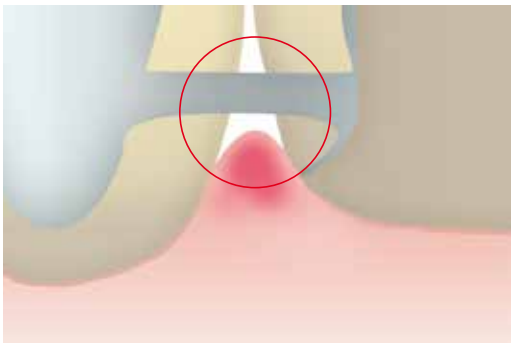
Bridge pontic design - saddle-type pontic



6. Interface between metal and ceramic

The interface between the metal framework and the veneering ceramic must be clearly defined. If possible, incorporate a right angle finish line. The junctures between the metal framework and the veneering ceramic must neither be located in the contact area nor on surfaces involved in masticatory functions. Furthermore, make sure that the interface between metal and ceramic in the cervical area does not come into contact with the gingiva, particularly if a tapered crown margin is designed (i.e. no metal margin and no ceramic shoulder). In this way, irritation of the gingiva can be prevented. The interface in the interdental area should be designed in such a way that cleaning of these difficult-to-access areas is possible.





Starting situation

Fabricate a master model or a model with detachable segments according to the impression in the usual manner. Generally, the application of a sealer is recommended to harden the surface and to protect the stone die. The application of a sealer must not cause any changes in the dimensions of the die. Next, a spacer may be applied depending on the respective working habit.

Framework fabrication

Framework design

When fabricating frameworks, make sure that the wall thickness after finishing is at least 0.3 mm for single crowns and 0.5 mm for bridge abutments. These dimensions are the prerequisite for the stability of the metal framework and a durable metal-ceramic bond. If the stipulated framework and connector dimensions are not observed, tensions, delamination and distortion of the framework may occur.

Recommended procedure

1. Full contouring of the anatomical tooth shape
2. Reduction for the application of the veneering material
3. Modelling the contact points and connector areas
4. Checking the occlusal and proximal points

Contouring

The framework reflects the reduced anatomical tooth shape (tooth shape-supporting contouring). As a result, the dental ceramic material can be applied in an even layer and will consequently be appropriately supported. The requirements of the different alloys (e.g. firing stability) have to be taken into account.

– Insufficiently dimensioned metal frameworks result in increased shrinkage behaviour of the veneering ceramics and require additional corrective firing cycles.
– If the metal framework is too small, the veneering ceramic is not adequately supported, which may lead to cracks and delamination, particularly in very thick ceramic layers.

Finishing the metal framework

The cast metal framework is finished using tungsten carbide metal burs or ceramic-bonded grinding instruments. To make room for the ceramic shoulder (labial or circular), the marginal area of the framework is reduced up to the inner edge of the chamfer or shoulder preparation.

– If softer alloys are used, it is recommended to work with limited pressure.
– Work in one direction only to avoid overlapping and inclusions in the metal surface.
– Do not use diamond grinding instruments. Diamond particles may be trapped in the alloy and cause bubbles in the ceramic material during firing.

Please refer to the "Framework design guidelines for metal-ceramic restorations" for additional information on framework design. They can be ordered from your Ivoclar contact.

Oxide firing

Carefully blast the framework with aluminium oxide Al_2O_3 50–100 µm after finishing. The pressure to be used is 1.5-2 psi.

– Use only pure Al_2O_3 disposable jet medium to blast the alloy surface.
– Please also observe the instructions for use of the corresponding alloy manufacturer.

Sandblasting improves the mechanical bond. It roughens and thus substantially increases the surface of the object. In order to prevent inclusions of jet medium particles, we recommend blasting the alloy 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 in the ceramic material during firing. When conditioning the frameworks, the instructions of the alloy manufacturer must be observed at all times. Oxidation is carried out according to the instructions of the alloy manufacturer.

Schematic diagram of the blasting direction
Correct angle to blast the alloy surface

Before further processing (oxidation firing), clean the metal framework using a brush under running water. Then, thoroughly clean it with the steam jet or in the ultrasonic cleaner. After cleaning, carefully allow the framework to dry. Oxidize the framework according to the parameters provided by the alloy manufacturer. Provide adequate support on the firing tray, particularly for long-span bridges.
After oxidation, check the framework for porosities or uneven oxide. Make adjustments, if necessary.

Opaquer firing

Paste opaquer

1st Opaquer firing (Wash firing) (paste opaquer)
Remove the desired quantity of the ready-to-use paste opaquer from the syringe and mix thoroughly.

To adjust the ductile consistency and for minimal thinning of dried opaquer that has been used several times before, the IPS Classic Glazing and Staining Liquid is used. The material must not be thinned with water.

Apply the first opaquer layer (wash layer) thinly using a brush. Make sure to thoroughly smooth out any roughness on the metal surface, since the wash layer represents the most important bond between the metal and the ceramic.

Apply the first opaquer layer (wash layer) thinly using a brush.

Firing parameters for the 1st Opaquer firing (Wash firing) (paste opaquer) – IPS Classic Opaquer

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
980	403	6	80	1	550	979

Firing parameters for the 1st Opaquer firing (Wash firing) (paste opaquer) – IPS Lowpaque

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
920	403	6	80	1	450	919

2nd Opaquer firing (paste opaquer)

Apply the second opaquer layer in such a way that the metal framework is entirely covered with opaquer, i.e. as much as required and as little as possible.

Apply the second opaquer layer...

.. so that it thoroughly covers the entire framework.

Ready-mixed, intensive paste opaquers are available for individual situations and demanding esthetic requirements. The intensive opaquers are applied before the second Opaquer firing in the desired areas (e.g. in the cervical, incisal, occlusal or palatal areas).

Apply intensive opaquer in the desired area...

...and subsequently fire using the firing parameters for the 2nd Opaquer firing.

The fired opaquer should have a silky-mat gloss (eggshell gloss).

Firing parameters for the 2nd Opaquer firing (paste opaquer) – IPS Classic Opaquer

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
970	403	6	80	1	550	969

Firing parameters for the 2nd Opaquer firing (paste opaquer) – IPS Lowpaque

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
910	403	6	80	1	450	909

Powder opaquers

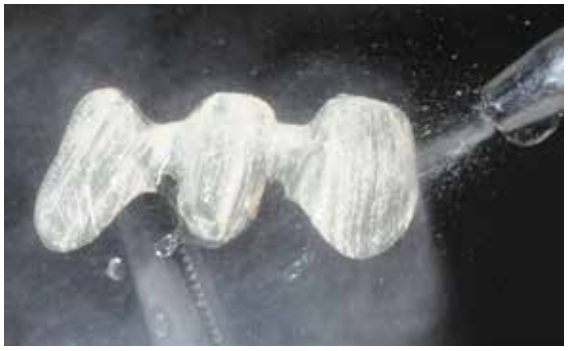
1st Opaquer firing (Wash firing) (powder opaquer)

The IPS Classic V Powder Opaquer is selected according to the tooth shade. Remove the quantity of Powder Opaquer required for the wash firing from the jar and mix with the Powder Opaquer Liquid to the desired consistency on the mixing pad. Apply the first opaquer layer thinly on the metal framework and agitate it into the surface. After firing and cooling, clean the opaquerized metal framework with the steam jet and subsequently dry with oil-free air.

Mixing to the desired consistency

Apply the first opaquer layer (wash layer) thinly using a brush

After the 1st Opaquer firing



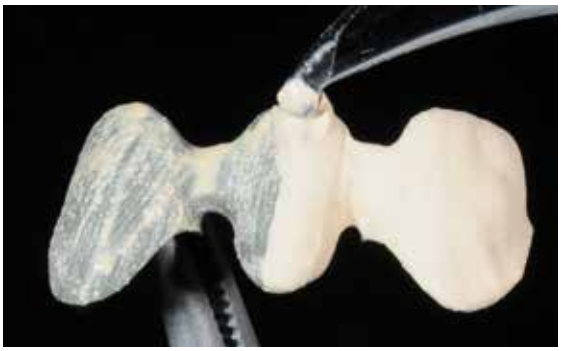
Thoroughly clean with the steam jet

Important

Mix IPS Classic V Powder Opaquer only with the Powder Opaquer Liquid.

2nd Opaquer firing (powder opaquer)
Remove the quantity of powder opaquer required for the covering layer from the jar and add it to the dried "wash opaquer residue" on the mixing pad. Again, mix the Powder Opaquer with the Powder Opaquer Liquid to the desired consistency.

Apply the second opaquer layer in an even, covering layer. After firing using the stipulated firing parameters, the IPS Classic V Powder Opaquer should show a covering, silky-mat shiny surface. After the opaquer firing, the alloy framework should be entirely covered with opaquer.


Apply the second opaquer layer so that it thoroughly covers the entire framework.


After the 2nd Opaquer firing

Tip:
The IPS Classic V Powder Opaquer can be very well applied using a glass or ceramic instrument. It goes without saying that brushes are also suitable for the application of IPS Classic V Powder Opaquer.

The IPS Classic V Powder Opaquer and Powder Opaquer Liquid are also ideally suitable for the application with conventional spray-on techniques. Mix the powder opaquer to a thin consistency, depending on the spray-on system.
Observe the instructions of the manufacturer of the respective spray-on system.

Important
- **Distilled water can be used to rewet mixed or already applied powder opaquer.**
- **The firing tray with the restoration should only be placed in the firing chamber once the furnace head is completely open and the beeper has sounded.**

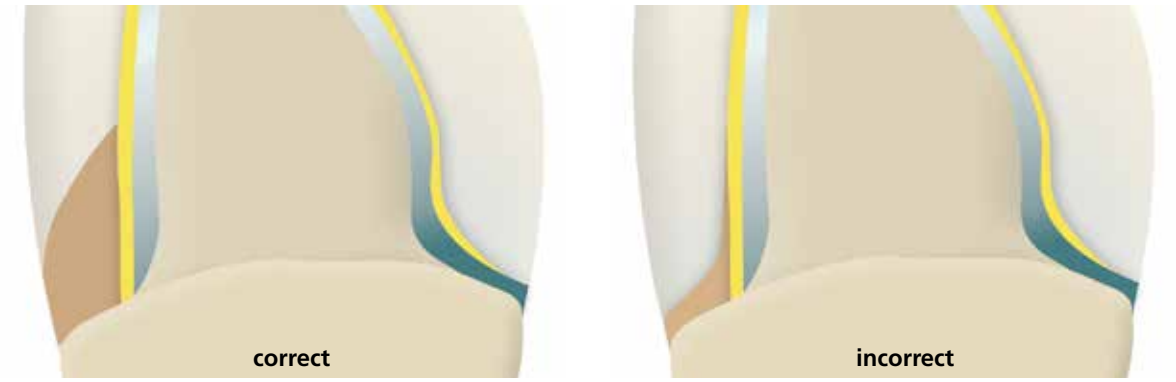
Firing parameters for the 1st and 2nd Opaquer firing (powder opaquer) – IPS Classic V Powder Opaquer

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
960	403	4	100	2	450	959

Important
IPS Classic V Powder Opaquer
– Alloys (CTE of approximately 13.8 to 15.2 x 10^{-6}/K at 25 – 500 °C) with a solidus point of over 1080 °C (1976 °F) are suitable for opaquerizing with the powder opaquer at a firing temperature of 960 °C (1760 °F).

1st Shoulder firing

A ceramic shoulder can be fabricated on the metal framework after the opaquer firing, if the necessary space has been provided during finishing. Before creating the ceramic shoulder, seal the stone die with IPS Margin Sealer and then, after drying, with IPS Ceramic Separating Liquid. After that, apply the IPS Margin material in the respective shade generously in drop-shaped increments in the cervical area (i.e. the outer aspect of the ceramic is given a convex design) and dry.



For esthetically demanding restorations, Intensive Margin materials are available. They can be either added to other materials or applied alone. Then, carefully remove the framework with the dried Margin material from the die.

IMPORTANT:
Depending on whether IPS Classic Opaquer, IPS Lowpaque or IPS Classic V Powder Opaquer was used, different firing parameters apply for the Shoulder firings.

Firing parameters for the 1st Shoulder firing – IPS Classic Opaquer

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
950	403	4	80	1	550	949

Firing parameters for the 1st Shoulder firing – IPS Lowpaque / IPS Classic V Powder Opaquer

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
930	403	4	80	1	550	929

Tip:
When designing a ceramic shoulder (particularly for bridges), the Margin material can be pulled slightly up in the interproximal area, which counteracts interdental shrinkage during the subsequent Dentin and Incisal firing cycles.

2nd Shoulder firing

After firing, the shoulder may have to be slightly adjusted by grinding. Then, the accuracy of fit (sinter shrinkage) of the shoulder has to be optimized with a second shoulder firing. Use the same Margin materials as for the 1st Shoulder firing.

First, however, isolate the die again using IPS Ceramic Separating Liquid. Subsequently, supplement the missing areas by carefully inserting the shoulder material into the gap created during the 1st Shoulder firing so that the ceramic shoulder is given optimum accuracy of fit. Complete the shoulder, dry, and carefully remove the framework with the completed and dried shoulder material from the die and place it on the firing tray.

Firing parameters for the 2nd Shoulder firing – IPS Classic Opaquer

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
940	403	4	80	1	550	939

Firing parameters for the 2nd Shoulder firing – IPS Lowpaque / IPS Classic V Powder Opaquer

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
930	403	4	80	1	550	929

1st Dentin and Incisal firing

Before layering the Dentin and Incisal materials, isolating the model represents the first working step. In this way, the ceramic material is prevented from drying out or sticking to the model. To isolate the stone die and the adjacent model areas, use the IPS Model Sealer followed by the IPS Ceramic Separating Liquid.

Isolate the stone model with IPS Model Sealer and IPS Ceramic Separating Liquid

To achieve an optimum bond between the ceramic material and the opaquer surface, apply IPS Opaque Dentin or Dentin material in small increments, particularly in the cervical and interdental areas (in bridges) and slightly roughen it. In this way, you will achieve better adaptation of the ceramic material on the opaquer surface.

Apply a smaller amount of IPS Opaque Dentin in the cervical and interdental area ...

...and slightly roughen it to achieve better adaptation of the ceramic material on the opaquer surface.

With an intermediate firing cycle using only IPS Opaque Dentin and/or a little Dentin material, the number of subsequent firing cycles can be reduced, particularly in large restorations, e.g. multi-unit bridges and implant superstructures.

Firing parameters for IPS Opaque Dentin (intermediate firing)

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
920	403	4	60	1	580	919

In order to achieve true-to-nature shade effects even if space is limited, IPS Opaque Dentin materials are used. They are directly applied on the opaquer layer. For pontics and crown margins tapering in metal, IPS Opaque Dentin material in the appropriate tooth shade is applied in the cervical or basal area to stabilize the shade in the cervical area

IPS Opaque Dentin layering for stabilizing the shade in the cervical area.

After that, layer IPS Classic Dentin materials individually, while ensuring that the outline of the mamelon shape remains traceable in the dentin. Another possibility is the build-up of the full anatomical shape in the dentin. Subsequently, the contoured crown is reduced on the labial, incisal-mesial and distal areas. In this method as well, the mamelon shape in the dentin in maintained. With both methods, make sure to provide adequate space for the subsequent application of the Incisal and Transpa materials.

Depending on the patient case, an individualized and simple build-up with Mamelon, Effect and Transpa materials can be applied in the now reduced incisal third. In this way, utmost esthetics can be achieved.
Cover the palatal fossa of the restoration with IPS Opaque Dentin orange and underlay the marginal ridges with Dentin materials. Finally, layer Incisal and Transpa materials over the tuberculum and the marginal ridges.
Make sure that the restoration is slightly overcontoured so that the actual tooth shape is achieved after firing.

Layered IPS Classic Dentin materials with the mamelon shape indicated in the dentin ...

.. then apply Incisal and Transpa materials in small increments and complete the anatomical shape with slight overcontours

Condensing the ceramic surface (after contouring) using a large, dry brush makes it more homogeneous, which prevents the ceramic from pulling away from the cervical margin. Lift the bridge off the model to supplement the contact points with Dentin and Incisal materials. Before firing, it is absolutely necessary to separate the entire bridge pontic (in the interdental area) down to the opaquer. A visual inspection before firing to ensure that there are no ceramic deficiencies, especially in the cervical area, is indispensable.

Once the contact points have been added, separate the interdental areas down to the opaquer with a sharp instrument (e.g. thin scalpel, razor blade).

– Provide adequate support for bridges on the firing tray.
– Position the firing tray in the furnace only after the furnace head is completely open (beeper sounds).

The completely layered restoration is now placed on the firing tray. Make sure to provide adequate support. The firing tray with the restoration should only be placed in the firing chamber once the furnace head is completely open and the beeper has sounded. The restoration is then fired using the following firing parameters.

Firing parameters for the 1st Dentin and Incisal firing

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
920	403	4	60	1	580	919

2nd Dentin and Incisal firing

After the first Dentin firing, the restoration is contoured and cleaned. Now, the missing areas are supplemented with the same materials used for the first Dentin and Incisal firing. Pay particular attention to the interdental areas and the proximal contact points. Subsequently, the restoration is fired using the firing parameters for the 2nd Dentin and Incisal firing.

The proximal areas are supplemented with the same materials that were used for the 1st Dentin and Incisal firing. The restoration is then adjusted using Incisal and Transpa materials.

Before the 2nd Dentin and Incisal firing, the restoration must be thoroughly cleaned.
Do not blast with polishing beads under any circumstances.

Firing parameters for the 2nd Dentin and Incisal firing

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
910	403	4	60	1	580	909

Tip:
Before the restoration is completed, conduct a try-in in the raw-fire state to ensure that shade, shape and function of the layered restoration correspond with the patient situation.

Preparing the restoration for the Glaze firing

Subsequently, the restoration is finished.
Create a lifelike surface structure, such as incremental lines and convex/concave areas.
Depending on the working habits, raised areas can be prepolished with silicone polishers.

Create a lifelike surface structure, such as incremental lines and convex/concave areas.

Tip:
True-to-nature surface textures can be made visible with the help of gold or silver powder. After that, clean the restoration using the steam jet so that the surface is free of dirt and grease. Make sure to remove all the gold or silver powder.

IMPORTANT:
Avoid inhaling grinding dust when working on ceramic restorations. Use suction equipment or protective masks!

Stain and Characterization firing

To apply shade adjustments and individual characterizations, a wide shade range is available.

Shade adjustments with IPS Shade, IPS Shade V and IPS Stains-P
These stains may be fired in a separate Stain firing. Minor shade adjustments and individual characterizations may also be fired in the Glaze firing.

IPS Shade and IPS Shade V
These dentin stains are used for subsequent shade adjustments of IPS Classic restorations. They can be used for surface staining and to tint the layering materials.

Note
– Adding too much IPS Shade material changes the material structure (e.g. grain size distribution), which negatively affects the ceramic construction.
– Before the Stain and Characterization firing, the restoration must be thoroughly cleaned. Do not blast with polishing beads under any circumstances.

Dispense the desired quantity of IPS Shade / IPS Shade V, dilute and mix with IPS Classic Glazing and Staining Fluid to the desired consistency. Apply IPS Shade/ IPS Shade V in the cervical and dentin area and verify the shade adjustment with the help of the shade guide.

Pooling should be avoided and the material must not be applied too thickly. More intensive shades are achieved by several staining procedures, not by applying thicker layers. If the desired shade has not been achieved yet, another Stain firing cycle should be conducted using the same firing parameters. Minor shade adjustments may also be performed together with the Glaze firing cycle.

Firing parameters for the Stain firing – IPS Shade / IPS Shade V 2. Dentin and Incisal firing

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
900	403	4	60	1	0	0

IPS Stains-P

Dispense the desired quantity of IPS Stains-P, dilute and mix with IPS Classic Glazing and Staining Fluid to the desired consistency. Then apply individualized characterizations, e.g. discolouration, enamel stains, on the ceramic surface, using IPS Stains-P.

Note:
– Adding too much IPS Stains P material changes the material structure (e.g. grain size distribution), which negatively affects the ceramic construction.

Firing parameters for the Stain firing – IPS Stains-P

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
900	403	4	60	1	0	0

Glaze firing

For the Glaze firing, you can choose a manner of processing:
– Glaze firing without IPS Classic Glazing material for restorations with a true-to-nature, silky-mat gloss
– Glaze firing with IPS Classic Glazing material for restorations with a high gloss

The following rule applies: the longer the holding time, the more pronounced the lustre will be.

Method 1

Glaze firing without glazing material

Minimally wet the restoration with IPS Classic Glazing and Staining Fluid and perform shade adjustments and/or individualized characterizations. Place the restoration on the honey-comb firing tray and fire it. If the Glaze firing is conducted without glazing material, the stains should not be extensively applied. After firing, the degree of gloss of the restoration may be adjusted to meet the patient's individual requirements by polishing with rubber polishers, felt wheels and pumice.

Firing parameters for the Glaze firing without Glazing material

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
920	403	4	60	1	0	0

Method 2

Glaze firing with Glazing material

Remove IPS Classic Glazing Paste from its container and mix thoroughly. Adjust the consistency by diluting the material with IPS Classic Glazing and Staining Fluid, if required. Next, apply the glaze in the usual manner using a brush. Make sure not to apply the glazing material either in too thick or too thin a layer.

Apply the glaze in the usual manner using a brush.

Finally, the shade of the completed restoration is checked.

Apply minor shade adjustments with IPS Shade, IPS Shade V and IPS Stains-P on the already applied glaze.

Firing parameters for the Glaze firing with Glazing material

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
900	403	4	60	1–2	0	0

Add-on material firings

After the completion of a restoration, small adjustments, such as contact points, pontic rests, shoulder adjustments, may be necessary. For these different requirements, the range offers a low-fusing add-on material with medium incisal opacity.

Depending on the working habit, you may process the IPS Classic Add-on material in different manners.

Method 1 (dentin / incisal adjustments)
Mix the IPS Classic Add-on material with any Dentin and Incisal material in a 1:1 ratio and mix with the desired build-up liquid. Then apply and fire.

Firing parameters for the Add-on firing – IPS Classic Add-on material (1:1)

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
810	403	4	60	1	420	809

Method 2 (contact areas)
Mix IPS Classic Add-on material with the desired build-up liquid, apply on the missing areas and fire.

Firing parameters for the Add-on firing – IPS Classic Add-on material (pure)

T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
690	403	4	60	0.5	420	689

Result

Fired IPS Classic bridge on the model.

IPS Classic®
Firing Parameters

Method a – IPS Classic Opaquer

IPS Classic Opaquer	T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
1st Opaquer firing (Wash firing) (paste opaquer) – IPS Classic Opaquer	980	403	6	80	1	550	979
2nd Opaquer firing (paste opaquer) – IPS Classic Opaquer	970	403	6	80	1	550	969
1st Shoulder firing – IPS Classic Opaquer	950	403	4	80	1	550	949
2nd Shoulder firing – IPS Classic Opaquer	940	403	4	80	1	550	939

Method b – IPS Lowpaque

IPS Lowpaque	T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
1st Opaquer firing (Wash firing) (paste opaquer) – IPS Lowpaque	920	403	6	80	1	450	919
2nd Opaquer firing (paste opaquer) – IPS Lowpaque	910	403	6	80	1	450	909
1st + 2nd Shoulder firing – IPS Lowpaque / IPS Classic V Powder Opaquer	930	403	4	80	1	550	929

Method c – IPS Classic V Powder Opaquer

IPS Classic V Powder Opaquer	T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
1st + 2nd Opaquer firing (powder opaquer) – IPS Classic V Powder Opaquer	960	403	4	100	2	450	959
1st + 2nd Shoulder firing – IPS Classic V Powder Opaquer	930	403	4	80	1	550	929

IPS Classic	T °C	B °C	S min.	t ↗ °C/min	H min.	V_1 °C	V_2 °C
IPS Opaque Dentin (intermediate firing)	920	403	4	60	1	580	919
1st Dentin and Incisal firing	920	403	4	60	1	580	919
2nd Dentin and Incisal firing	910	403	4	60	1	580	909
Stain firing – IPS Shade / IPS Shade V	900	403	4	60	1	0	0
Stain firing – IPS Stains-P	900	403	4	60	1	0	0
Glaze firing without Glazing material	920	403	4	60	1	0	0
Glaze firing with Glazing material	900	403	4	60	1–2	0	0
Add-on firing – IPS Classic Add-on material (1:1)	810	403	4	60	1	420	809
Add-on firing – IPS Classic Add-on material (pure)	690	403	4	60	0.5	420	689

– The indicated firing parameters are guidance values. They are valid for the Ivoclar ceramic furnaces P310, P510, P300, P500, P700, PX1 and EP 3010, EP 5010, EP 3000, EP 5000, EP 600 Combi.
For Ivoclar furnaces of an older generation, e.g. P20, P80, P90, P95, P100, these temperatures are also guidance values. However, depending on the age of the heating muffle, the values may deviate by approximately ± 10°C.
– When working with a furnace from another manufacturer, these parameters have to be adjusted accordingly.
– Regional differences in the power supply or the operation of several electrical devices by means of the same circuit may render adjustments of the firing and press temperatures necessary.
– Ceramic furnaces from other manufacturers often feature opening mechanisms different from that of Ivoclar furnaces. Therefore, the firing conditions may also differ. Make sure to take these varying firing conditions into account.
– Conduct regular furnace calibrations

Chromascop shades

Assortment	Materials/ Shade Group	white	yellow	light-brown	grey	dark-brown	Special Material
IPS Classic	Paste Opaquer	110 120 130 140	210 220 230 240	310 320 330 340	410 420 430 440	510 520 530 540	GO-Gingiva
	Intensive Paste Opaquer (IO)	white, orange, brown, purple, grey					
	Dentin (D)	110 120 130 140	210 220 230 240	310 320 330 340	410 420 430 440	510 520 530 540	
	Incisal (S)	S3 S1 S1 S1	S1 S2 S2 S2	S5 S5 S5 S2	S4 S4 S1 S4	S4 S2 S5 S3	
	Opal Incisal (OS)	OS3 OS1 OS1 OS1	OS1 OS2 OS2 OS2	OS5 OS5 OS5 OS2	OS4 OS4 OS1 OS4	OS4 OS2 OS5 OS3	
	Transparent (T)	neutral, reddish, greyish, transparent					
IPS Opaque Dentin	Opaque Dentin (Op.D.)	– 120 130 140	210 220 230 240	310 320 – –	410 420 430 440	510 – – –	
IPS Margin	Margin (M)	M1 M2 M2 M3	M3 M3 M4 M4	M6 M6 M5 M5	M9 M9 M9 M9	M9 M7 M7 M8	
	Intensive Margin (M)	M10, M11, M12, M13, M14					
IPS Impulse	Occlusal Dentin (Oc.D.)	brown, yellow, orange					
	Mamelon Materials (MM)	MM1, MM2, MM3, MM4,MM orange					
	Incisal (S)	yellow-grey, grey					
	Transparent (T)	yellow-grey, grey, blue					
	Molar Incisal (MS)	MS					
	Incisal Edge Materials (IS)	light-yellow, yellow					
IPS Effect	Effect Materials	E1 super opal, E2 opal, E3 whitish opal, E4 white opal, E5 red-brown opal					
IPS Gingiva	Gingiva Materials	G1, G2, G3, G4, G5 Modifier GM1, GM2, GM3, GM4					
IPS Shade	Dentin Stains	110 120 130 140	210 220 230 240	310 320 330 340	410 420 430 440	510 520 530 540	
IPS Stains P	Characterization Stains	white, orange, bamboo-beige, caramel-brown, copper-brown, cork-brown, mahogany-brown, azure-blue, black					basic yellow, basic red, basic blue

A – D shades

Assortment	Materials / Shade Group	A	B	C	D	Special Materials
IPS Classic V	Paste and Powder Opaquers (O)	A1 A2 A3 A3.5 A4	B1 B2 B3 B4	C1 C2 C3 C4	D2 D3 D4	GO-Gingiva
	Intensive Paste and Powder Opaquers (IO)	IO-A	IO-B	IO-C	IO-A/IO-B	IO-white, IO-purple
	Dentin (D)	A1 A2 A3 A3.5 A4	B1 B2 B3 B4	C1 C2 C3 C4	D2 D3 D4	
	Incisal (S)	S1 S2 S2 S4 S4	S1 S2 S3 S4	S2 S2 S3 S4	S1 S2 S3	
	Transparent (T)	clear, neutral				
IPS Opaque Dentin V	Opaque Dentin (Op.D.)	A1 A2 A3 A3.5 A4	B1 B2 B3 B4	C1 C2 C3 C4	D2 D3 D4	
	Opaque Dentin (Op.D.)	yellow, orange, brown				
IPS Margin V	Shoulder Materials (M)	A1 A2 A3 A3.5 A4	B1 B2 B3 B4	C1 C2 C3 C4	D2 D3 D4	
	Intensive (M)	yellow, orange, brown				
IPS Impulse	Occlusal Dentin (Oc.D.)	orange	yellow	brown	orange, yellow	
	Mamelon Materials (MM)	MM1, MM2, MM3, MM4, MM orange				
	Incisal (S)	yellow-grey, grey				
	Transparent (T)	yellow-grey, grey, blue				
	Molar Incisal (MS)	MS				
	Incisal Edge Materials (IS)	light-yellow, yellow				
IPS Effect	Effect Materials	E1 super opal, E2 opal, E3 whitish opal, E4 white opal, E5 red-brown opal				
IPS Gingiva	Gingiva Materials	G1, G2, G3, G4, G5 Modifier GM1, GM2, GM3, GM4				
IPS Shade V	Dentin Stains	A1 A2 A3 A3.5 A4	B1 B2 B3 B4	C1 C2 C3 C4	D2 D3 D4	
IPS Stains P	Characterization Stains	white, orange, bamboo-beige, caramel-brown, copper-brown, cork-brown, mahogany-brown, azure-blue, black				basic yellow, basic red, basic blue

IPS Classic®

A good concept always results in success!

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