

Noritake

Super Porcelain

Ti-22

**TECHNICAL
INSTRUCTIONS**

Super Porcelain *Ti-22*

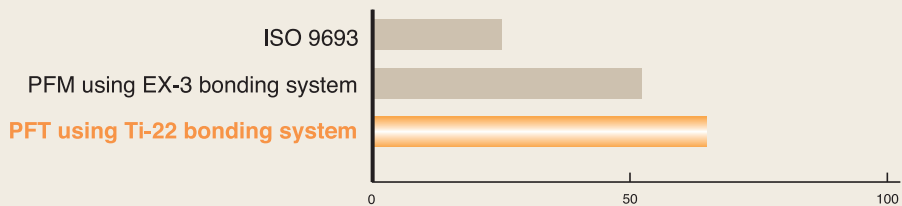
Created for Fusing with Pure Titanium

Ti-22 is specifically developed for pure titanium frameworks without worrying about metal allergy. The combination of Ti-22 and pure titanium achieves excellent bonding strength.

Features

- ① Specially developed for use with pure titanium, Noritake Bonding Porcelain (BP) achieves excellent bonding strength.

■ Bonding Strength (MPa)



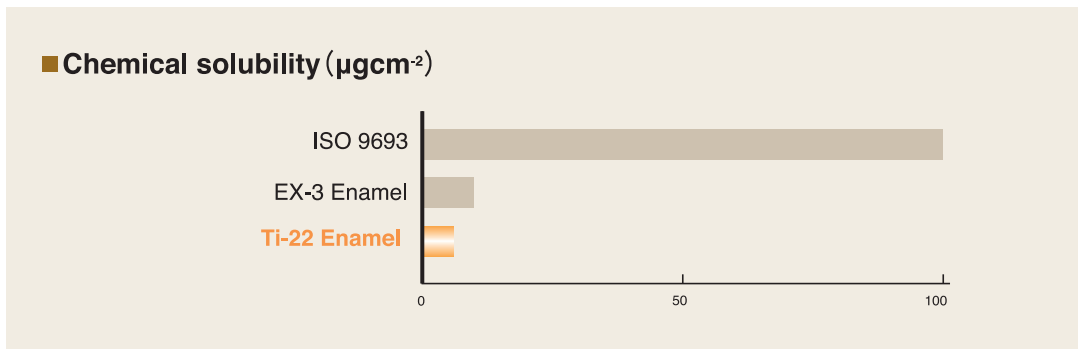
Excellent Bonding Strength

The photo on the Left shows artificial fracture of porcelain on the oxide layer. On the titanium metal layer the porcelain remains intact, due to the excellent bonding strength of Noritake Super Porcelain Ti-22. Chance of fractures in oral cavity is minimized.

- ② Since Noritake BP possesses masking power like opaque porcelain, color of natural teeth can be simply reproduced with thin layer of opaque after baking BP.



③ Intra-oral chemical stability is achieved by high acid resistance.



④ Since Ti-22 has high covering power like opaque porcelain, black oxidized layer peculiar to titanium can be completely masked.



Ti-22

Company A

⑤ Whereas low-fusing porcelain tends to be grayish, Ti-22 can produce bright colors.

⑥ At the glaze baking stage, distortion peculiar to low-fusing porcelain is minimal.

⑦ Cracking is of little concern, since Ti-22 is designed to make a perfect match in thermal expansion with pure titanium.

⑧ Greening is minimal on Ti-22 during presoldering or even when baked in a furnace contaminated with silver.

⑨ Conventional techniques can be taken to produce aesthetic PFT.

⑩ Achieve a fluorescent color similar to that of natural teeth.

Better Solutions for using Ti-22 porcelain on Nobel Biocare Pure titanium PIB frameworks.

Ti-22 porcelain has been exclusively developed for pure titanium frameworks. Other non-titanium alloys such as Co-Cr and Ni-Cr alloys and F136 Titanium alloys (Ti6Al4V: Titanium-6Aluminium-4Vanadium) cannot be used with Ti-22 porcelain, because cracking might occur after baking.

Pure titanium frameworks need to be designed with a minimum framework thickness of 0.5mm, to ensure marginal integrity and framework stability during firing under the high temperature in a porcelain furnace.

During baking Ti-22 porcelain, oxidized film is generated onto the inside of the framework. This oxidization ensures precision of fit especially at the area where the screw is inserted (do not remove the oxidized film).

Firing of titanium frameworks should not be higher than 885 degrees Celsius, this ensures that the characteristics of titanium material remain stable, guaranteeing strong frameworks for best clinical results.

Please respect a baking temperature for Ti-22 porcelain, it is a low fusing porcelain, and should be used correctly, according to the instruction manual. Especially, the bonding porcelain is important to be applied when bonding the porcelain to the titanium framework. Please pay special attention to the thickness of bonding porcelain and to the condition of baking.

Please respect clinical indications and contraindications for Ti-22. Ti-22 is a low-fusing porcelain with crystal. Low-fusing porcelain has about 70% fracture toughness of the conventional porcelain that is baked at around 950 degree Celsius. Application in the occlusal areas therefore is limited.

Generally, the fracture toughness of porcelain decreases as the porcelain thickness increases. For example, it is reported that the strength of 2.5mm-thick porcelain is half of that of 1.5mm-thick porcelain. Please design a titanium framework so that the porcelain thickness will not be larger than required.



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Types and Shades



Full Kit composition:

65 shades × 10g

Bonding Porcelain	1shade	Cervical	4shades
Opaque	16shades	Modifier	12shades
Body	16shades	Opaque Modifier	8shades
Enamel	3shades	Add-on	2shades
Translucent	3shades		

- 1 × 10ml BP Liquid
- 1 × 10ml Forming Liquid
- 1 × 10ml Opaque Liquid
- 1 × Color Table



Margin Kit composition:

18 shades × 10g、1 × Color Table

MA ₁	MA ₂	MA ₃
MA _{3.5}	MA ₄	MB ₁
MB ₂	MB ₃	MB ₄
MC ₂	MC ₄	MD ₃
MD ₄	MDL	MRP
M Orange	M Cervical	M Brown



Luster Kit composition:

Shades

7 shades × 10g

1 × Color Table、1 × Technical Instructions

1. T Blue	2. Luster T ₀
3. Luster T ₁	4. Creamy Enamel
5. Sun Bright	6. Incisal Aureola
7. Creamy White	

Ti-22 Bonding Liquid

10ml

Ti-22 Forming Liquid

10ml 100ml

Ti-22 Opaque Liquid

10ml 30ml



CZR Press LF External Stain Kit

※CZR Press LF ES (External Stain) can be used with Ti-22 for characterization as Internal and External Stain.

Bonding Porcelain (1 shade) 10g,50g

BP

Opaque Shades (16 shades) 10g,50g

A ₁ O	A ₂ O	A ₃ O	A _{3.5} O	A ₄ O
B ₁ O	B ₂ O	B ₃ O	—	B ₄ O
C ₁ O	C ₂ O	C ₃ O	—	C ₄ O
—	D ₂ O	D ₃ O	—	D ₄ O

Body Shades (16 shades) 10g,50g

A ₁ B	A ₂ B	A ₃ B	A _{3.5} B	A ₄ B
B ₁ B	B ₂ B	B ₃ B	—	B ₄ B
C ₁ B	C ₂ B	C ₃ B	—	C ₄ B
—	D ₂ B	D ₃ B	—	D ₄ B

Enamel Shades (3 shades) 10g,50g

E ₁	E ₂	E ₃
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Translucent Shades (3 shades) 10g,50g

T ₀	T ₁	T ₂
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The degree of translucency is: T₀>T₁>T₂

Luster Porcelain Shades (7 shades) 10g,50g

T Blue	Luster T ₀	Luster T ₁	Creamy Enamel	Sun Bright	Incisal Aureola	Creamy White
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Cervical Shades (4 shades) 10g,50g

CV-1	CV-2	CV-3	CV-4
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Modifiers (12 shades) 10g,50g

WHITE	GRAY	BLUE	GREEN	YELLOW	LIGHT ORANGE
ORANGE	BROWN	PINK	CORAL PINK	LIGHT TISSUE	DARK TISSUE

Opaque Modifiers (8 shades) 10g,50g

OM WHITE	OM GRAY	OM YELLOW	OM ORANGE
OM BROWN	OM DARK BROWN	OM PINK	OM VIOLET

Add-On porcelain (2 shades) 10g,50g

ADT	ADB
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Baking Schedule

	Dry-out time	Low Temperature		Start Vacuum		Heat Rate		Vacuum Level		Release Vacuum		Hold Time	High Temperature	
	min.	°C	°F	°C	°F	°C/min.	°F/min.	kPa *1	°C	°F	min.	°C	°F	
Bonding Porcelain—1-6 units	5	500	930	500	930	50	90	96	790	1455	-	800	1470	
Bonding Porcelain—more than 7 units	5	500	930	500	930	50	90	96	790	1455	0.25~0.5	800	1470	
Opaque Porcelain	5	500	930	500	930	50	90	96	770	1420	-	780	1435	
Margin Porcelain	5	500	930	500	930	50	90	96	760	1400	-	770	1420	
Margin Retouching Power (MRP)	3	500	930	500	930	50	90	87	720	1330	-	730	1345	
Body/Enamel—single crown (1 st & 2 nd Bake)	7	500	930	500	930	40	70	96	750	1380	-	760	1400	
Body/Enamel—2-6 units (1 st & 2 nd Bake)	10	500	930	500	930	40	70	96	760	1400	-	770	1420	
Body/Enamel—over 6 units (1 st & 2 nd Bake)	15	500	930	500	930	40	70	96	770	1420	0.5	770	1420	
Glaze—single-3 units	5	500	930	-	-	50	90	-	-	-	-	760	1400	
Glaze—over 3 units	10	500	930	-	-	50	90	-	-	-	-	770	1420	
Glaze—glazing powder	7	500	930	-	-	50	90	-	-	-	-	750	1380	
Oxidation Treatment of pure titanium	3	500	930	500	930	50	90	99	790	1455	3	800	1470	

Note The above schedule is only a guideline. Different temperature may be varied with the peculiarities of different furnace.

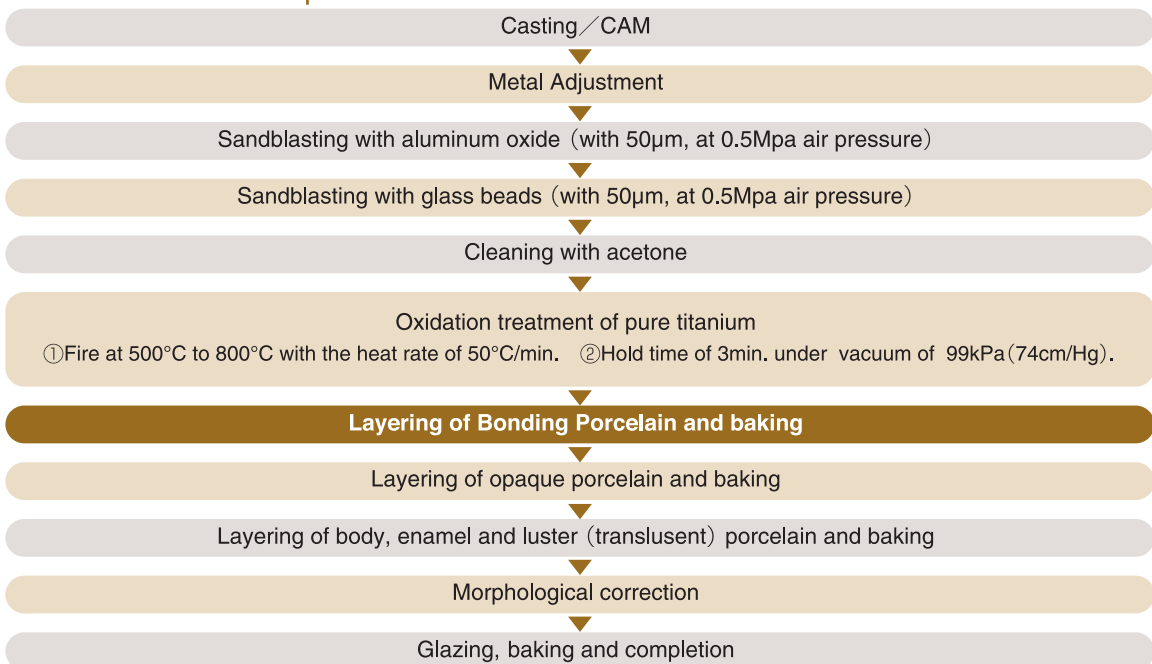
*1 96kPa = 72cmHg (29 inchesHg)

Color Combination Table

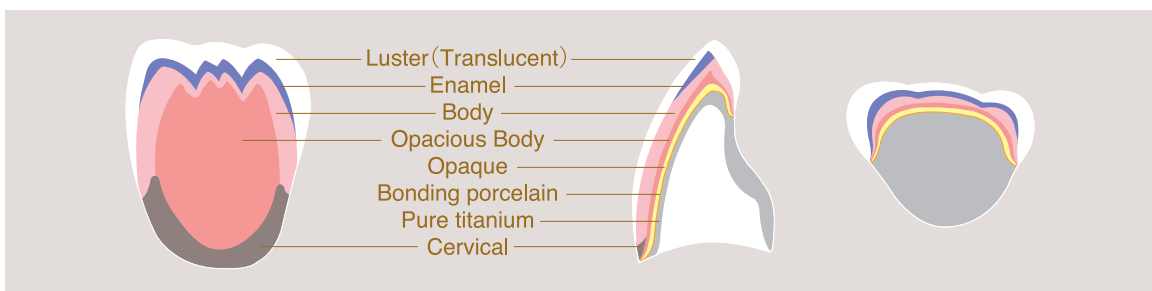
Shade	A ₁	A ₂	A ₃	A _{3.5}	A ₄	B ₁	B ₂	B ₃	B ₄	C ₁	C ₂	C ₃	C ₄	D ₂	D ₃	D ₄
Opaque	A ₁ O	A ₂ O	A ₃ O	A _{3.5} O	A ₄ O	B ₁ O	B ₂ O	B ₃ O	B ₄ O	C ₁ O	C ₂ O	C ₃ O	C ₄ O	D ₂ O	D ₃ O	D ₄ O
Body	A ₁ B	A ₂ B	A ₃ B	A _{3.5} B	A ₄ B	B ₁ B	B ₂ B	B ₃ B	B ₄ B	C ₁ B	C ₂ B	C ₃ B	C ₄ B	D ₂ B	D ₃ B	D ₄ B
Cervical	-	CV-1 *1	CV-1 *2	CV-1 *2	CV-1	-	CV-2 *1	CV-2 *2	CV-2	-	CV-3 *1	CV-3 *2	CV-3	CV-4 *1	CV-4 *2	CV-4
Enamel	E ₂	E ₂	E ₃	E ₃	E ₃	E ₁	E ₂	E ₃	E ₃	E ₂	E ₃	E ₃	E ₃	E ₂	E ₃	E ₃
Luster (Translucent)	LT ₁ (T ₁)															

*1 Mix two parts body porcelain with one part cervical porcelain. *2 Mix one part body porcelain with one part cervical porcelain.

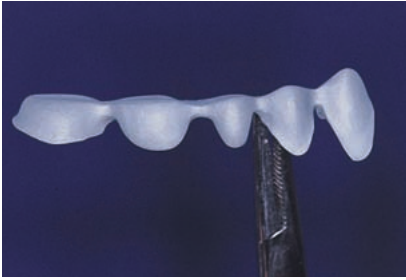
Fabrication Process of PFT using Noritake Super Porcelain Ti-22



Layering of Noritake Super Porcelain Ti-22



Working Procedures



Metal Frameworks Preparation

After the metal adjustment with carbide bar, sandblast with 50 to 70 micron aluminum oxide. Then clean ultrasonically in acetone solution for 10 minutes. After cleaning, bake at 500°C (930°F) to 800°C (1470°F) with a heat rate of 50°C (90°F) /min., and a holding time of 3 minutes under a vacuum of 99kPa for oxidation treatment of pure titanium.



Bonding Porcelain Application

Mix BP with BP liquid. Apply the mixture on porcelain bonding surface of metal frameworks.

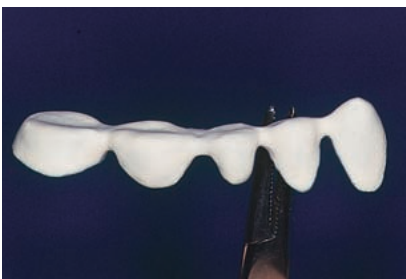


After 1st. application of BP on entire metal surface, continue to make 2nd application in 0.2mm thickness to mask completely. Then codensation follows.



Bonding Porcelain Baking

After BP has been dried at the muffle entrance for 5 minutes, bake at 500°C (930°F) to 800°C (1470°F) under a vacuum of 96kPa. After taking it out of the furnace, check if the BP surface should be shiny and glossy. For more than 7 units restorations, hold under vacuum for 15 to 30 seconds to obtain desired shiny and glossy surface.



After BP baking, sandblast lightly with alumina sand on 3MPa so that opaque porcelain can be easily applied. Then clean ultrasonically in acetone solution for 5 minutes.



Opaque Porcelain Application

Mix opaque porcelain with opaque liquid, and apply it in approx. 0.15mm thickness to obtain desired shade.



Opaque Porcelain Baking

Dry at muffle entrance for 5 to 7 minutes, then bake at 500°C(930°F) to 780°C(1435°F) in accordance with baking schedule under a vacuum of 96kPa.



Body Porcelain Application

Mix body porcelain with forming liquid and apply. For accurate applying of body porcelain and enamel porcelain, match the same dimensions and shape as tooth on opposite arch.



Cut Back

Cut back the two-thirds of labial & proximal surface in the conventional way.



Forming Mamelon Structure

Form mamelon structure at incisal area. Body porcelain should be at least 0.8mm thickness.



Enamel Porcelain Application

Apply enamel porcelain 10 to 12% larger than the target tooth to allow for shrinkage caused by baking. If necessary, Translucent Porcelain and Luster Porcelain can be overlaid Enamel Porcelain.



Baking

Body and enamel porcelain should be baked at 500°C (930°F) to 760°C (1400°F) under a vacuum of in accordance with baking schedule. In the case of a long span bridge, temperature should be increased by 10°C (20°F) higher. (Refer to baking schedule on Page 5) **Surface texture should appear slightly glossy after baking.**



Morphological Correction

Since PFT porcelain is easily affected by thermal shock, do not grind forcefully with an instrument such as a disc. After morphological correction, clean ultrasonically in acetone solution, then glaze.

CZR Press LF ES (External Stain) can be used with Ti-22 for characterization.



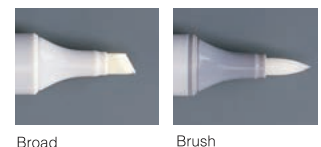
Glazing and Completion

A PFT bridge with a bright, natural color is completed.



MAGIC SEPARATOR

MAGIC SEPARATOR is a pen-type porcelain separator. It is used to separate porcelain from the model material in margin porcelain area, on the gingival surface of pontics and in adjacent contact area.



Precautionary Measures






- ① **Use only with pure titanium** ; alloys such as 6A1-4V should not be used.
- ② Ti-22 should not be mixed with other porcelain materials.
- ③ At metal adjustment stage, finish surface with carbide bar, then sandblast with 50 to 70 micron aluminum oxide.
(**To avoid bubbling, do not use carborundum point.**)
- ④ After morphological correction, clean metal frameworks and PFT with **isopropyl alcohol or acetone**. To avoid bubbling, do not use methyl alcohol, or chemicals containing chlorine, such as trichloro-ethylene.
- ⑤ Use only Ti-22 Forming Liquid for mixing with Ti-22.
- ⑥ To obtain desired bonding strength, layer BP (about 0.2mm in thickness) until **metal color is no longer visible**. Fire until surface turns glossy.
- ⑦ Use only Noritake's Magic separator, when using Ti-22 margin porcelain. Other porcelain separators may cause black discoloration on porcelain.
- ⑧ After glazing and polishing, remove oxide film from PFT's inner surface by light sandblasting with aluminum oxide.
- ⑨ Because dust particles inside the furnace greatly affect the shade of low-fusing porcelains, such as Ti-22, be sure to clean the inside of your furnace at least once a month.
- ⑩ Since PFT porcelain is easily affected by thermal shock, do not grind forcefully with an instrument such as a disc.
- ⑪ During morphological correction use a carborundum point with free on titanium. Titanium powder will adhere to the porcelain.

Notes on Safety

- ① When grinding porcelain use an approved dust mask and a vacuum air filter to protect the lungs from breathing dust.
- ② When grinding porcelain, wear safety glasses.
- ③ It is non-edible. Keep it out of the reach of children.
- ④ Avoid eye contact with all Ti-22 liquids. In the event of eye contact, immediately rinse with a copious amount of water and consult a physician.
- ⑤ Do not touch items heated by the furnace with your bare hands.
- ⑥ This porcelain is for dental use only. Do not use for other purposes.
- ⑦ For use only by dentists and dental technicians.

All products mentioned in this manual except Noritake Magic Set, Ti-22 FORMING LIQUID are part of the Ti-22 system and are covered by its registered trademark.

■ SYMBOLS USED IN A LABEL

SYMBOL	MEANING
	MANUFACTURER
	USE BY
	BATCH CODE
	CAUTION, CONSULT ACCOMPANYING DOCUMENTS. ATTENTION, SEE INSTRUCTIONS FOR USE.
	AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY

· Contraindications

If the patient is hypersensitive to Dental Porcelain or any of the other components, this medical product should not be used. Or it should be only used under the strict supervision of the patient's doctor/dentist.

· EU Authorized Representative

Name : EMERGO EUROPE
Address : Molenstraat 15, 2513 BH,
The Hague, The Netherlands



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