

ADHESIVE RESIN CEMENT SYSTEM

PANAVIATM **V5**

TECHNICAL INFORMATION

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Introduction

It has been thirty years since the launch of the first generation of PANAVIA™. Now, with the advent of “PANAVIA™ V5”, a new catalyst technology is born.

The PANAVIA™ series has undergone continuous improvement since its launch in 1983. It was our first adhesive resin cement to contain the original adhesive monomer “MDP” which made it possible to use the cement not only for general cementation, but also for difficult prosthetic restoration situations, including adhesive bridges. In 1993, we developed PANAVIA™ 21, a resin cement system consisting of a self-etching primer and resin paste, with a window dispenser to make it easier to use. More importantly, PANAVIA™ 21 offered a reduction in postoperative sensitivity. In 1998, PANAVIA™ evolved further with the development of PANAVIA™ F. This was a dual-cure cement that embodied two important concepts: assuring a secure seal at the adhesion interface plus improving marginal adaptability by use of surface-treated sodium fluoride and a photo-initiator. Subsequently, in 2003 we brought out PANAVIA™ F2.0, which could be polymerized with an LED light-curing unit. As we indicated above, the PANAVIA™ series has been widely accepted in the worldwide dental materials market for many years, due to the delivery of excellent bond strength and marginal sealing.

In recent years, the growing demand for aesthetic restorations has substantially increased the variety of prostheses being used, promoting the widespread application of a variety of aesthetic materials to replace metal. These include zirconia, lithium silicate glass, and hybrid ceramics. A successful prosthetic treatment relies on a strong bond to the tooth structure of the prostheses made from these new materials. In addition, the cement needs to remain discoloration-free for a long period of time. Cements should also be available in a wide range of color variations, for better shade matching.

With the intention of attaining a higher level of prosthetic treatment, Kuraray Noritake Dental Inc. has embarked on the development of a novel dental cement using a new catalyst technology. In 2015, we successfully developed PANAVIA™ V5, a new type of versatile dental cement that features superior color stability, as well as dramatically improved bond strength to tooth (especially to dentin), compared with that of our conventional products. Its simple cementation procedure makes it suitable for many types of applications. These range from those requiring a very strong bond – such as for adhesive bridges, posts, or cores, to those where esthetics are of utmost importance – such as ceramic inlays or laminate veneers. PANAVIA™ V5 is a versatile adhesive resin cement that is indicated for almost all types of prostheses and clinical cases.

1983



PANAVIA™ EX

1993



PANAVIA™ 21

1998



PANAVIA™ F

2003



PANAVIA™ F 2.0

2015



PANAVIA™ V5

PANAVIA™ V5 Kit Components

A simplified cement system that provides a strong bond and outstanding esthetics.

All you need
to pretreat
prostheses!

PROSTHESIS



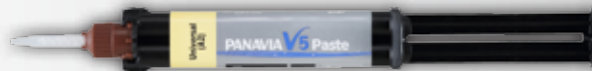
CLEARFIL™ CERAMIC PRIMER PLUS : Prosthesis Primer

This is used to condition prosthetic surfaces.

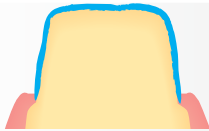
The silane-coupling agent and phosphate monomer (MDP) it contains make it suitable for the pretreatment of porcelain, silica-based ceramic, composite resin, hybrid ceramics, zirconia/alumina, and metal. It can also be used for the pretreatment of titanium implant abutments.



PANAVIA™ V5 Paste : automix type



The paste is available in five shades: Universal, Clear, Brown and White (all of which are dual-cured) and Opaque (chemically-cured).



TOOTH STRUCTURE AND ABUTMENTS



PANAVIA™ V5 Tooth Primer : self-etching primer

This is used to condition prepared tooth. The MDP in the primer makes it suitable for the pretreatment of resin cores and non-precious metal cores, as well as tooth structure.

* Precious metal core surfaces need to be conditioned with Alloy Primer.

All you need
to pretreat
abutments (tooth
structure and
resin cores)!



PANAVIA™ V5 Try-in Paste : shade matching material

Try-in Paste is used to evaluate the shade of the cement before cementation. It is available in five shades that correspond to those of PANAVIA™ V5. After trying-in the restoration, the Try-in Paste can be rinsed off easily with water.



K-ETCHANT Syringe : etching gel (35% phosphoric acid)

This etching gel is used to acid-etch enamel or the prosthesis. It has a proper consistency which makes it suitable for selectively etching enamel.

Overview

1. Simple cementation procedure

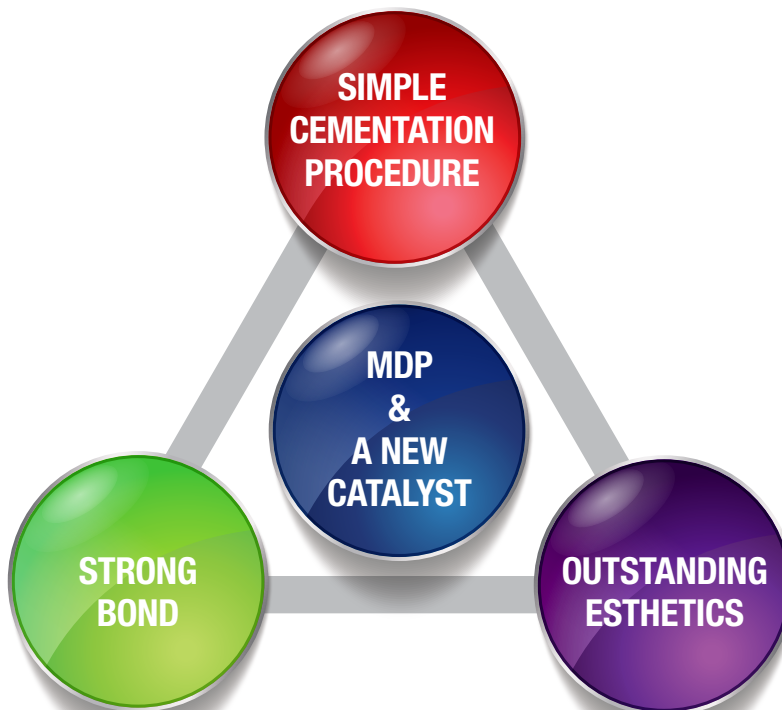
- The cementation procedure is very simple: first, you apply a single-liquid self-etching primer; next, a single-liquid prosthesis primer, and finally the automix paste.

2. Strong bond to tooth structure

- The bond strength to dentin has been substantially improved (1.5 times greater in human tooth shear strength and 3 times in bovine tooth tensile strength, as compared with our conventional product)
- The bond strength to enamel is also high, like our previous product.

3. Outstanding esthetics

- Excellent color stability because of a new amine-free* catalyst.
- Users can evaluate the cement shade in situ using the Try-in Paste provided.



* Amine in self-cure mode.

Two important technologies combined in PANAVIA™ V5

An adhesive monomer and a new catalyst system

PANAVIA™ V5 is an excellent adhesive resin cement system that Kuraray Noritake Dental has created using new technologies.

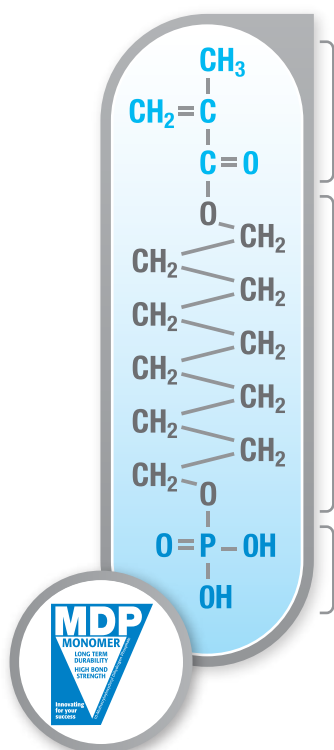


We began the research of adhesion technology in the early 1970s; in 1981, we succeeded in developing the phosphate monomer MDP. It is reported that MDP provides a strong bond not only to tooth structure, but also to metals and zirconia. MDP chemically bonds to hydroxyapatite to form a calcium salt that is hardly soluble in water.¹

In addition, it is also reported that as level of MDP purity changes, the durability of the adhesion and the strength of the reaction to calcium also vary², so that MDP, which was developed through our proprietary synthesis and purification technology, provides a highly durable adhesion.³

PANAVIA™ V5 Tooth Primer and CLEARFIL™ CERAMIC PRIMER PLUS contain a very pure MDP phosphate monomer. PANAVIA™ V5, therefore, forms a strong bond between the prosthesis and tooth structure.

The chemical structure of phosphate monomer MDP



THE POLYMERIZABLE GROUP:

Polymerizes with other monomers.

THE HYDROPHOBIC GROUP:

Gives the desired level of hydrophobicity (and therefore durability) to the monomer.

THE HYDROPHILIC GROUP:

Bonds chemically to hydroxyapatite, calcium, zirconia, or metals.

¹ Y. Yoshida, K. Nagaoka, R. Fukuda, Y. Nakayama, M. Okazaki, H. Shintani, S. Inoue, Y. Tagawa, K. Suzuki, J. De Munch, B. Van Meerbeek: J Dent Res, 83 (6) : 454-458, 2004

² K. Yoshihara, N. Nagaoka, M. Inokoshi, T. Okihara, Y. Yoshida, B. Van Meerbeek: J Dent Res, 93 (Spec Iss C) : 29, 2014

³ K. Yoshihara, N. Nagaoka, Y. Yoshida : Adhes Dent, 32 (3) : 159, 2014



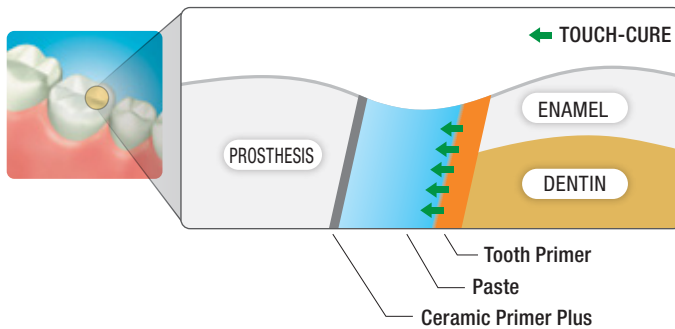
For resin cements to be able to deliver a strong bond, it is not enough for them simply to contain an adhesive monomer. It is necessary for that monomer to be polymerized effectively.

PANAVIA™ V5 uses an innovative “ternary catalytic system” consisting of a highly-stable peroxide, a non-amine reducing agent* and a highly-active polymerization accelerator. Since this novel catalytic system does not contain amine, which causes cement discoloration, the hardened cement has unsurpassed color stability. In addition, the highly-active polymerization accelerator, which is also contained in Tooth Primer, is not only an excellent reducer that promotes polymerization effectively, but it is also capable of coexisting with the acidic MDP. We capitalized on this feature to develop a single-liquid Tooth Primer.

* Amine in self-cure mode.

The adhesive interface can be effectively sealed with “touch-cure”

Tooth Primer has a novel highly-active polymerization accelerator. Polymerization is promoted at the adhesive interface where the tooth structure surface that has had Tooth Primer applied comes in contact with the Paste. This kind of polymerization is called “touch-cure”. This seals the interface securely while it unites the tooth structure and prosthesis with a very strong bond.



NOTE

Tooth Primer promotes the polymerization of the cement at the adhesive interface.

PASTE WORKING TIMES

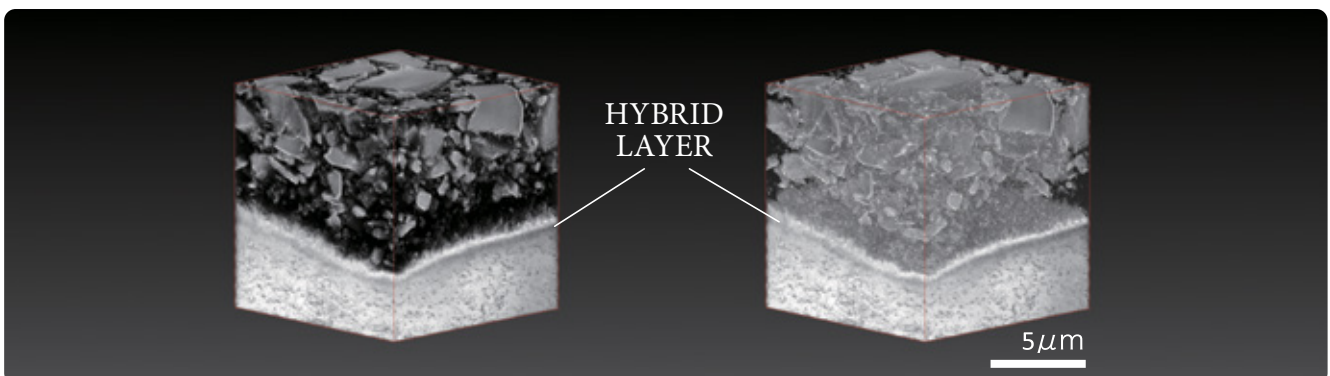
When it comes in contact with Tooth Primer at 37°C / 99°F	60 seconds
In a normal environment at 23°C / 73°F	2 minutes

Paste final curing times

When it comes in contact with Tooth Primer at 37°C / 99°F	3 minutes
In a normal environment at 37°C / 99°F	5 minutes
In a normal environment at 23°C / 73°F	10 minutes

3D SEM pictures of the adhesive interface with dentin

The adhesive interface between PANAVIA™ V5 and human dentin was observed in 3D using a focused ion beam scanning electron microscope (FIB-SEM), which is a combination of a focused ion beam system and a scanning electron microscope. The results show the cement joined in close contact with the dentin.



Left: An unmodified 3D image

Right: The image after the resin matrix has been rendered transparent.

Photo courtesy of Dr. N. Nagaoka and Dr. K. Yoshihara, Okayama Univ. Japan

SIMPLE CEMENTATION PROCEDURE

Use PANAVIA™ V5 Tooth Primer for the pretreatment of tooth structure and abutments

We have succeeded in changing the self-etching primer from a 2-bottle liquid to a single-bottle liquid formulation. The use of a new polymerization accelerator, which coexists well with MDP, makes it possible to attain a self-etching primer as a single-bottle.



Now just one bottle where there used to be two!

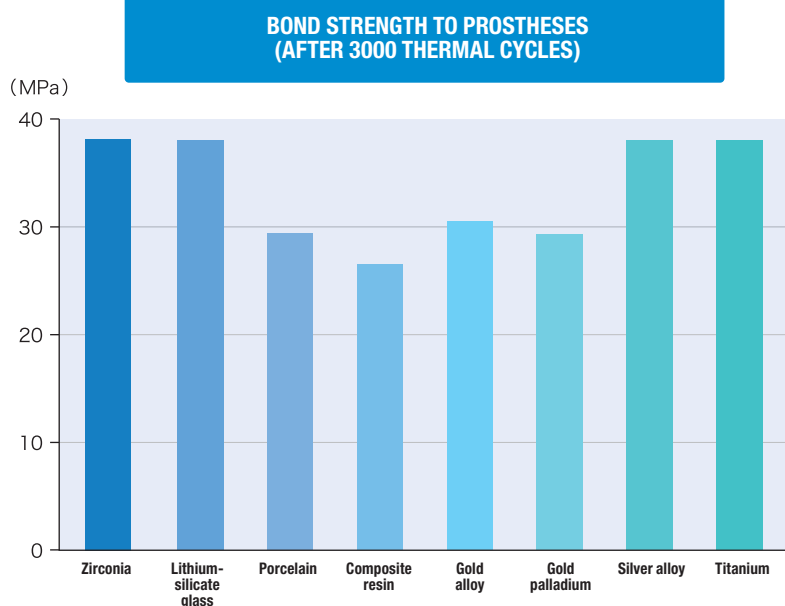


All you need to pretreat abutments (tooth structure, resin cores)!

Use CLEARFIL™ CERAMIC PRIMER PLUS for the pretreatment of prostheses

CLEARFIL™ CERAMIC PRIMER PLUS, containing the phosphate monomer MDP, as well as a silane-coupling agent, can be used all by itself to pretreat the following prostheses:

- Porcelain
- Composite resin
- Zirconia/alumina
- Silica-based ceramics
- Hybrid ceramics
- Metal



All you need to pretreat prostheses!

Measurement conditions:

Sandblasting (zirconia, metals other than titanium, composite resin)
Polishing with #1000 grit (porcelain, glass, titanium)
Adherent surface: 5 mm ϕ
After CERAMIC PRIMER PLUS was applied to the adherent surface, PANAVIA™ V5 was applied over it and the prosthesis was held under pressure. The margins of the prosthesis were light-cured from two directions for 10 seconds each, using Pen Cure 2000. The assembly was immersed in water (37°C) for one day, subjected to thermal cycling (4-60°C, 3000 times), and then evaluated for bond strength.

Measuring instrument:

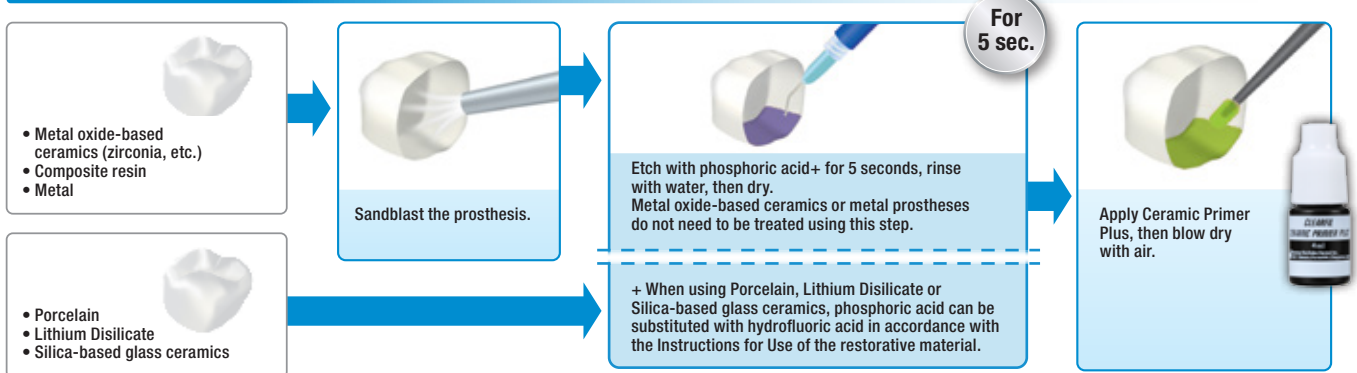
Autograph AG-100kN (Shimadzu) at a crosshead speed of 1 mm/min.

Measured by Kuraray Noritake Dental Inc.: The values may vary according to the measurement conditions.

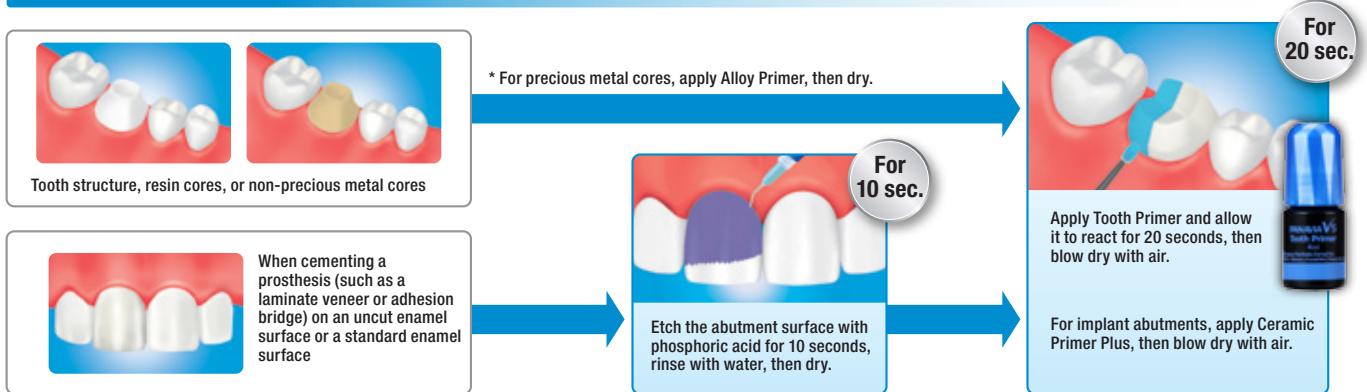
Application 1) Cementation of crowns, bridges, inlays, onlays and veneers

Clean and dry the tooth surface in the usual manner. As necessary, trial fit the prosthetic using the Try-in paste, wash and remove.

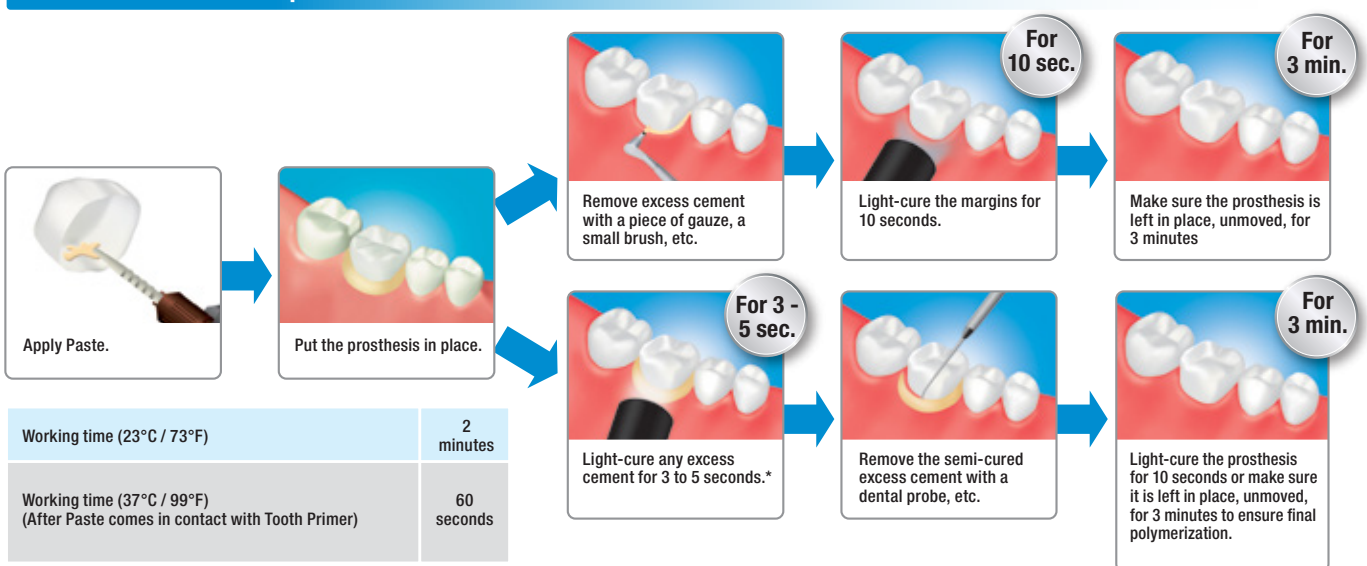
Conditioning the Prosthetic Restoration Surface



Pretreatment of abutments



Placement of the prosthesis



NOTE

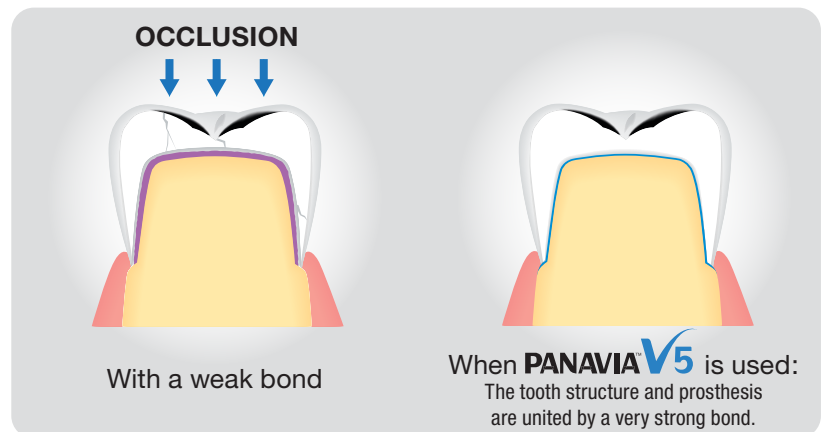
Remove any excess cement as soon as possible after putting the prosthesis in place. (Otherwise, the excess cement might be difficult to remove because of the very strong bond made with the Paste.)



In our pursuit of a stronger bond to tooth structure, we have substantially improved the bond strength to dentin, as compared with our previous product.

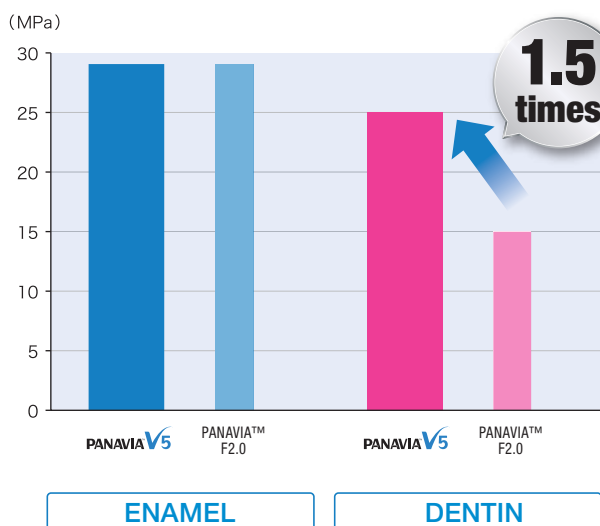
PANAVIA™ V5 is suitable for applications where an especially strong bond is required, such as the cementation of adhesive bridges; posts; and cores.

PANAVIA™ V5 bonds to tooth structure, especially to dentin, much more strongly than our previous product. Its high tensile and shear bond strengths make it suitable for the cementation of fragile prostheses or those that tend to bend easily due to occlusion, or for applications where it is difficult to fashion a form that provides stable retention.



Stable tensile and shear bond strengths

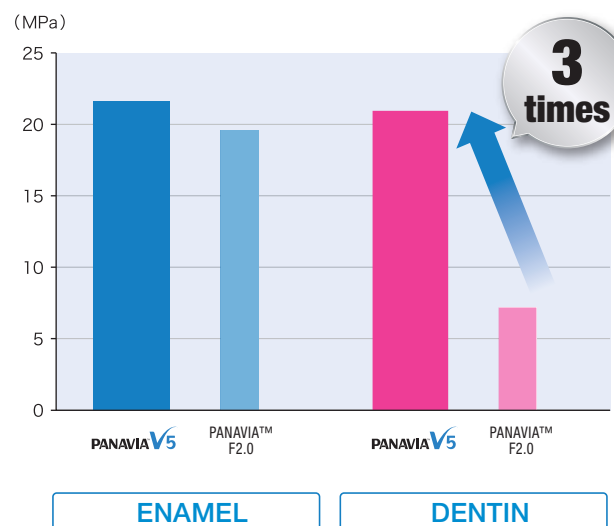
**BOND STRENGTH TO TOOTH STRUCTURE
(HUMAN TOOTH SHEAR STRENGTH: AFTER 3000 THERMAL CYCLES)**



Measurement conditions:

The specimens were human teeth polished with #1000 grit (for the shear bond strength test) and bovine teeth polished with #1000 grit (for the tensile bond strength test), over a 3 mm adherent surface area. Their margins were light cured from two directions using Pen Cure 2000 for 10 seconds each (for the shear bond strength test), or chemically cured (for the tensile bond strength test). After curing, they were immersed in 37°C water for one day, subjected to thermal cycling (4-60°C, 3000 times (TC3000) or 4000 times (TC4000)), and evaluated according to type for either shear bond strength or tensile bond strength.

**BOND STRENGTH TO TOOTH STRUCTURE
(BOVINE TOOTH TENSILE STRENGTH: AFTER 4000 THERMAL CYCLES)**



Measuring instrument:

Autograph AG-100kN (Shimadzu), crosshead speed of 1 mm/min (for shear bond strength test) or 2 mm/min (for tensile bond strength test)

Measured by Kuraray Noritake Dental Inc.: The values may vary according to the measurement conditions.

Case 1

Application with anterior adhesive bridges

Photo courtesy of Dr. Yasuhiro Kondo of Kondo Dental Clinic, Japan

INDICATION 3)

Cementation of adhesive bridges and splints.
For more detailed information, refer to the Instructions for Use.



Before preparing the abutments
The mandibular right lateral incisor is missing. The abutments are the right mandibular canine and the right central incisor.



After preparing the abutments



Prosthesis
An anterior adhesive bridge made of 12% Au-Ag-Pd alloy with an anterior pontic made of crown and bridge resin.



Pretreatment of the prosthesis
Sandblast the adherent surface of the prosthesis, apply metal adhesive primer, and blow dry with air.



Pretreatment of the abutments (A)
Condition the enamel of each abutment for 10 seconds using the K-ETCHANT syringe, rinse with water and dry.



Pretreatment of the abutments (B)
Apply Tooth Primer, allow it to react for 20 seconds, then blow dry with air.



Application of Paste
Use Opaque in order to mask the metal that is visible from the labial side.



Placement of the prosthesis
After placement, remove excess cement using a piece of gauze, a small brush, etc.



Light-curing
Light-cure the margins of the prosthesis for 10 seconds.



Final polymerization
Make sure the prosthesis is left in place, unmoved, for 3 minutes.



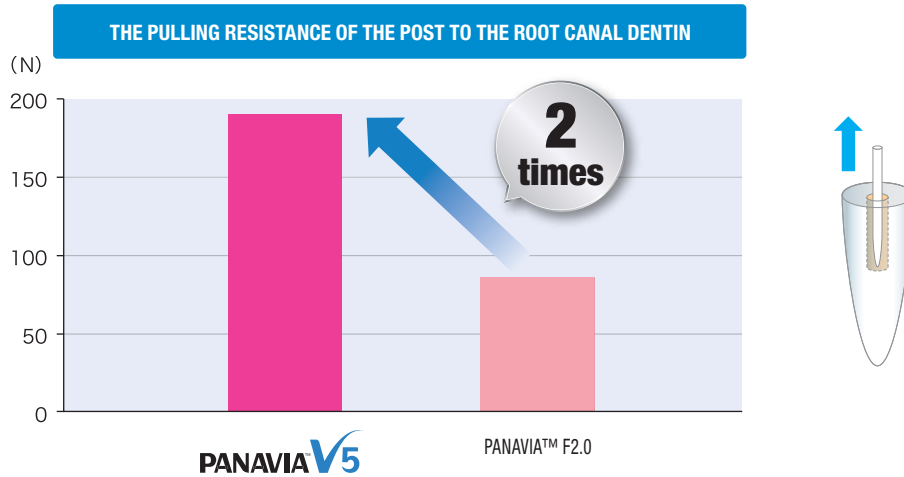
After final polymerization
The lingual surface of the prosthesis after final polymerization.

NOTE

Opaque is chemically cured, but the outermost surface of the cement paste at the margins and other areas can be light-cured.

A strong bond to root canal dentin

Root canal dentin is more fragile than crown dentin. In addition, root canal dentin has to be cleaned and disinfected with an irrigant, which interferes with the development of a stable bond. This is why root canals have a reputation of being difficult clinical sites in terms of obtaining a strong bond to tooth structure. PANAVIA™ V5 provides a far stronger bond to root canal dentin than our previous product does, making it suitable for the cementation of posts and cores.



Paste can be inserted directly into the root canal using the endo tip supplied with the product.

Measurement conditions:

Bovine root dentin: cavity size 1.2 mm diameter and 5 mm in depth
Post: AD Post II

The margins of the hole in each tooth specimen were light-cured using Pen Cure 2000 from two directions for 10 seconds each to form a pseudo-root canal into which the post was implanted. The tooth and post assembly was immersed in 37°C water for one day and measured for pulling resistance.

Measuring instrument:

Autograph AG-100kN (Shimadzu) at a crosshead speed of 0.75 mm/min.

Measured by Kuraray Noritake Dental Inc.: The values may vary according to the measurement conditions.



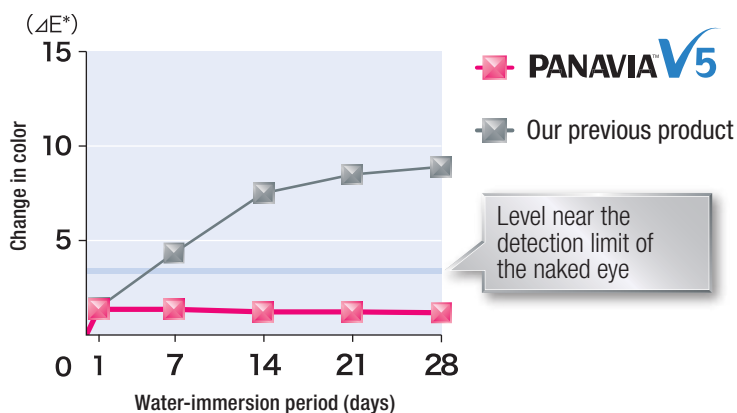
Suitable for applications where esthetics are of the utmost importance, such as:
Laminate veneers; ceramic inlays; etc

PANAVIA™ V5 employs the novel technology of an amine-free catalyst*. The use of this technology means that hardened PANAVIA™ V5 cement retains better color stability than our previous cement product that used a BPO-amine catalyst.

* Amine in self-cure mode.

Better color stability and Fluorescence, similar to that of natural teeth

COLOR STABILITY OF HARDENED CEMENT



Measurement conditions:

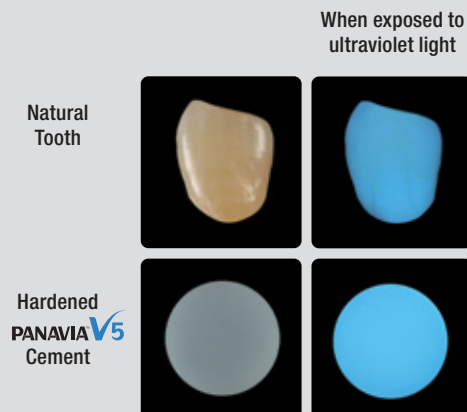
The specimen, 0.25 mm thick, was immersed in water (at 70°C) and then subjected to measurement against a white background.

Measuring instrument:

Spectrophotometer SE6000 (Nippon Denshoku), light source: D65/2

Measured by Kuraray Noritake Dental Inc.: The values may vary according to the measurement conditions.

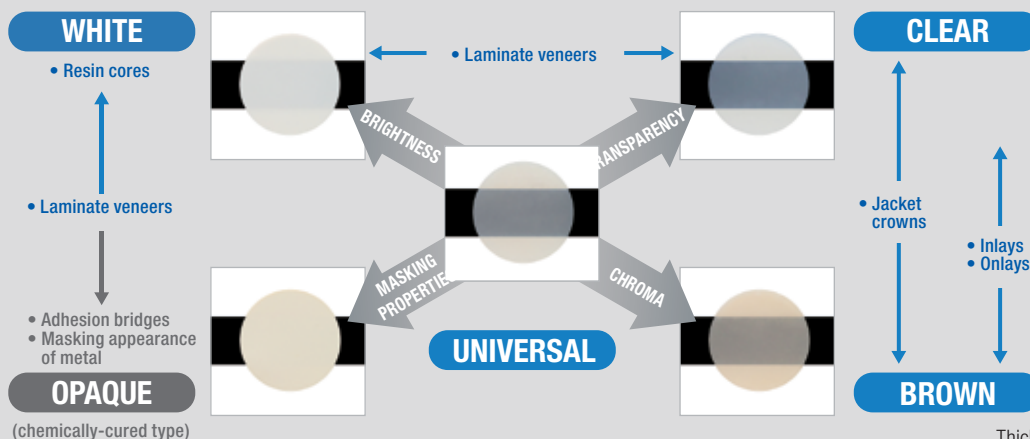
FLUORESCENCE SIMILAR TO THAT OF NATURAL TEETH



Photographed by Kuraray Noritake Dental Inc.:

The results may vary according to the photographic conditions.

Five shade variations including Universal



Case 2

Application with anterior prostheses made of highly translucent zirconia

Photo courtesy of Dr. Shoji Kato of Takanawa Dental Office, Japan

INDICATION 1)

Cementation of crowns, bridges, inlays and onlays.
For more detailed information, refer to the Instructions for Use.



After preparing the abutments
An anterior bridge made of crown and bridge resin has become dislodged. The abutments are vital teeth.



Prosthesis
A PFZ bridge with a frame fabricated using KATANA™ Zirconia HT12.



Application of Try-in Paste
Evaluate the shade of the cement before cementation.



Try-in
After checking the cement's shade, rinse the prosthesis and tooth surface with water to remove Try-in Paste.



Pretreatment of the prosthesis (A)
Sandblast the prosthesis (at 0.3 to 0.4 MPa), clean with an ultrasonic cleaner for 2 minutes, then dry.



Pretreatment of the prosthesis (B)
Apply CERAMIC PRIMER PLUS and blow dry with air.



Pretreatment of the abutments (C)
Apply Tooth Primer, allow it to react for 20 seconds, then blow dry with air.



Application of Paste
Use Universal.



Placement of the prosthesis
After placement, remove excess cement using a piece of gauze, a small brush, etc.



Light-curing
Light-cure the entire surface of the prosthesis, including the margins.



Final polymerization
Make sure the prosthesis is left in place, unmoved, for 3 minutes

RELATED PRODUCTS



Noritake KATANA™ Zirconia



CERABIEN™ ZR

PANAVIA™ V5



Standard Kit

PANAVIA V5 Standard Kit

#3601KA Universal (A2)

#3602KA Clear

Standard Kit contains:

- Paste 8.1g (4.6ml) x 1
- Tooth Primer 4ml x 1
- CLEARFIL CERAMIC PRIMER PLUS 4ml x 1
- K-ETCHANT Syringe 3ml x 1
- Try-in Paste 1.8ml x 1

Accessories

- Mixing tip: 15 pcs
- Endo tip (S): 5 pcs
- Applicator brushes (fine(silver)): 50 pcs
- Needle tip (E): 20 pcs
- Mixing dish (PN): 1 pc



PANAVIA V5 Paste

8.1g (4.6ml) x 1
Mixing tip x 20

Universal (A2)	Clear	Brown (A4)	White	Opaque
#3611KA	#3612KA	#3613KA	#3614KA	#3615KA



PANAVIA V5 Try-in Paste

1.8ml x 1

Universal (A2)	Clear	Brown (A4)	White	Opaque
#3621KA	#3622KA	#3623KA	#3624KA	#3625KA



Introductory Kit

PANAVIA V5 Introductory Kit

#3604KA Universal (A2)

#3605KA Clear

Introductory Kit contains:

- Paste; 4.2g (2.4ml) x 1
- Tooth Primer 2ml x 1
- CLEARFIL CERAMIC PRIMER PLUS 2ml x 1

Accessories

- Mixing tip: 10 pcs
- Applicator brushes (fine(silver)): 50 pcs
- Mixing dish (PN): 1 pc



**PANAVIA V5
Tooth Primer**

4ml x 1
#3635KA



**CLEARFIL CERAMIC
PRIMER PLUS**

4ml x 1
#3637KA



Mixing Tip

20pcs
#3626KA



Endo tip (S)

20pcs
#3629KA

- The following products are referred to as follows in this brochure:
PANAVIA™ V5 Paste: Paste
PANAVIA™ V5 Try-in Paste: Try-in Paste
PANAVIA™ V5 Tooth Primer: Tooth Primer
CLEARFIL™ CERAMIC PRIMER PLUS: CERAMIC PRIMER PLUS
- Measurement data cited in this brochure were obtained by Kuraray Noritake Dental Inc.
The values may vary according to the measuring conditions.
- The colors shown in this brochure may be different from those of the actual product.
- The specifications and appearance are subject to change without notice.
- Before using this product, read the Instructions for Use.

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