

# Imprint™ 3

## VPS Impression Material



## Technical Data Sheet

### Indications

All dual-phase impressions, e.g. crown, bridge, inlay and onlay preparations, implant abutments, orthodontic impressions and related impressions such as a matrix for provisional restorations, tooth reduction guides, study models and bleaching trays.

The quick-setting products are especially suited for single-unit and two-unit impressions.



### Introduction

3M ESPE is the worldwide leader in impression materials, and is renowned for its ongoing innovations in this market segment. Since the introduction of its first impression material more than 40 years ago, 3M ESPE has continuously improved and expanded its portfolio of VPS and polyether impression materials to serve virtually all customer needs and impression indications, techniques and delivery choices.

With Imprint™ 3 VPS Impression Material, the next generation of innovative VPS impression materials is now available to dental professionals. The products set the stage for uncompromising impression accuracy and quality, the prerequisites for excellent fitting restorations.

Imprint 3 impression materials offer all of the features a state-of-the-art precision impression material needs to precisely capture the preparation margins. Imprint 3 impression material is very hydrophilic, and offers excellent flowability to the tooth and gingiva while retaining the drop resistance dentists expect from the Imprint brand. While developing this state-of-the-art impression material, 3M ESPE put special focus on minimizing the risk of distortion upon mouth removal — a potential source of poor fitting restorations. Imprint 3 impression materials withstand the stretching and compressive forces an impression is exposed to upon removal from the mouth better than other leading VPS impression materials. Imprint 3 impression material has a high stretching potential and a high tensile strength for greater toughness to resist tearing. And it recovers nearly 100% after stretching and compression.

These features result in Imprint 3 impression material offering the best balance of clinically relevant properties among leading brands — providing the ideal foundation for obtaining precise impressions and less potential for distortion upon mouth removal along with the best potential for accurate fitting restorations — the first time.

**3M** ESPE

## Clinically-Relevant Properties of Imprint™ 3 VPS Wash Materials

The overall goal of an impression is to create an exact copy of the dentition, especially the detailed reproduction of the preparation margins — a prerequisite for excellent fitting restorations. To capture the margin, an impression material needs to have excellent properties in the unset stage, especially hydrophilicity and flowability. To avoid any kind of permanent deformation when the impression is removed from the mouth, an impression material needs extraordinary properties in the set stage. The Imprint™ 3 VPS impression materials meet these requirements — even under challenging clinical conditions. When developing the new Imprint 3 wash materials, special focus was paid to design a material that can withstand all forces the set material is exposed to upon mouth removal. This strongly reduces the risk of distortions and results in the potential for more accurate fitting restorations.

### 1. Capture the Margin Through Strong Hydrophilicity and Very Good Flowability:

**a.) Hydrophilicity:** The hydrophilicity of an impression material can contribute to the successful reproduction of detail in a moist environment. The method most often used to determine the hydrophilicity of an impression material is the contact angle measurement. In this test a drop of water is placed on the surface of the impression material and the spreading of the drop across the surface is observed. The spreading of a drop of water on Imprint 3 VPS materials is extremely rapid. Fig. 1 shows that Imprint 3 VPS impression materials show a much lower contact angle than all of the other leading VPS materials tested. Clinically, this reflects the potential for better wettability of the preparation surfaces and better performance in the oral environment. Impressions made with Imprint 3 VPS products show very good detail reproduction, even under challenging clinical conditions.

**b.) Flow Properties:** In addition to hydrophilicity, impression materials also require special rheological properties in order to ensure optimal wetting of the preparation surface areas after syringing around the preparation. Fig. 2 shows the flow around the tooth preparation of Imprint™ 3 Quick Step Light Body Wash Material (Imprint 3 VPS washes are also available in a slightly thicker, regular body, viscosity as well as an even thicker viscosity, ultra-regular body).

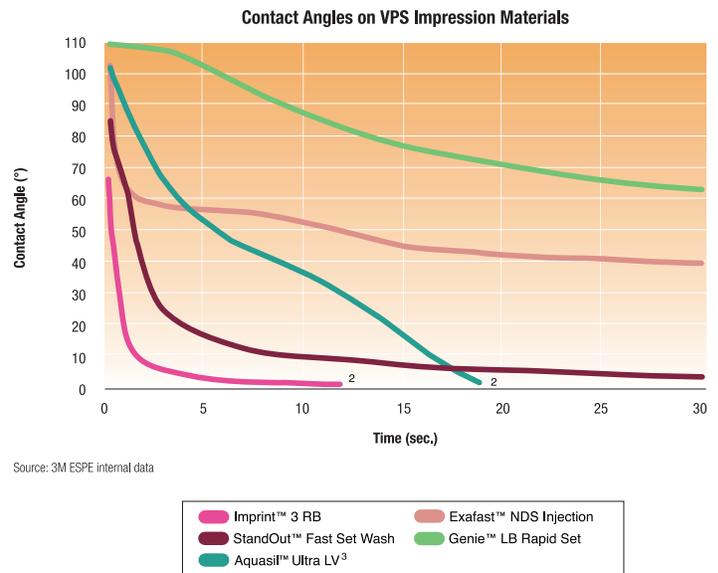


Fig. 1: More hydrophilic: Imprint™ 3 Regular Body VPS Impression Material has one of the lowest contact angles tested on set VPS impression materials.<sup>1</sup>



Fig. 2: Flow to tooth and gingiva of Imprint™ 3 VPS Quick Step Light Body Wash Material.

<sup>1</sup> Source: 3M ESPE internal data. For test procedure details, call 3M ESPE at 1-800-634-2249

<sup>2</sup> Test detection limit

<sup>3</sup> Based on mathematical model representing the measured data

## 2. Reproduce the Margin Accurately through Distortion-Free Mouth Removal:

When an impression is removed from the mouth, it is exposed to two principal forces, elongation and compression. Imprint 3 impression material has a unique ability to withstand these forces.

Impression material characteristics that are necessary to withstand mouth removal are:

Ability to Elongate and Compress	→	Elongation and Compression Potential
Ability to Avoid Tearing	→	High Tensile Strength
Ability to Recover from Elongation and Compression	→	Recovery from Deformation

**a.) Toughness:** In order to avoid tearing, an impression material not only has to have a high tensile strength, but also a high elongation potential that allows the material to stretch upon removal. The combination of these two parameters is described as toughness (Fig. 3). It is defined as the total amount of energy an impression material can absorb until it tears. Toughness is the best measure of an impression material's ability to withstand the forces it is exposed to during mouth removal without tearing.

Fig. 3 also shows that Imprint 3 wash materials display a toughness value higher than most leading VPS materials tested. Clinically, this means that Imprint 3 VPS impressions are less likely to tear upon mouth removal.

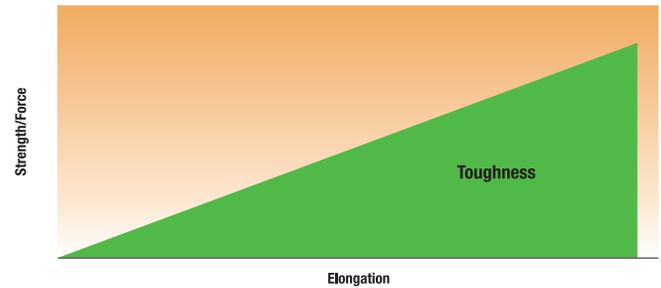
**b.) Recovery from Deformation and Elongation (Memory):** While Imprint 3 impression materials have high potential to resist tearing, this alone is not enough to reproduce an impression free of distortion. To achieve this, an impression material must show excellent recovery from the compressive and elongation forces it experiences upon mouth removal.

Although all modern VPS impression materials fulfill sufficient recovery from compression (ISO test), **they may lack in an adequate recovery from elongation.** High recovery from elongation is important for the areas around the preparation margin, especially a deep sulcus, undercuts, and interproximal spaces. In these places, the impression material is exposed to strong elongation forces upon mouth removal.

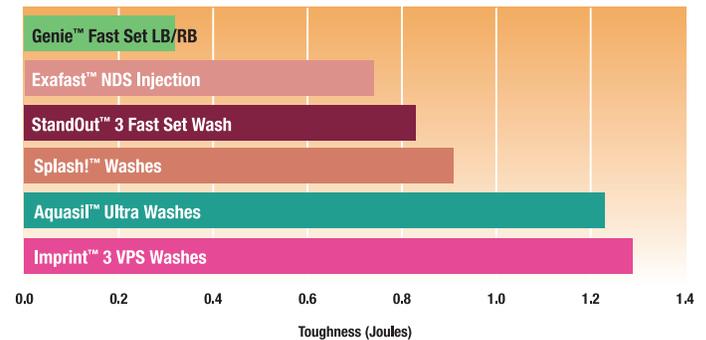
Imprint 3 wash materials show — by far — the best elastic recovery from stretching. This can be demonstrated using a sophisticated method for analyzing the recovery from elongation — the Memory Test.

In this test, paddle-shaped specimens of different VPS materials were cured at mouth temperature for the manufacturer's

recommended setting time, stretched by 150%, and then allowed to recover. After two hours, the samples were measured for recovery from elongation.

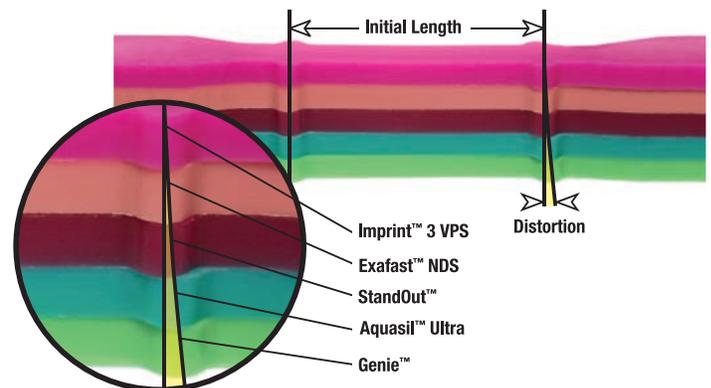


Source: 3M ESPE internal data



Source: 3M ESPE internal data

Fig. 3: Laboratory tests prove that Imprint™ 3 VPS Wash Material shows higher toughness values than other leading VPS products tested, making it less likely to tear upon removal.



Source: 3M ESPE internal data

Fig. 4: **MEMORY TEST:** Lab tests prove Imprint™ 3 VPS Quick Step Light Body Impression Material is less likely to distort upon removal.

Fig. 4 shows that Imprint 3 VPS impression materials have the best memory (99.8%) among all leading impression materials tested.

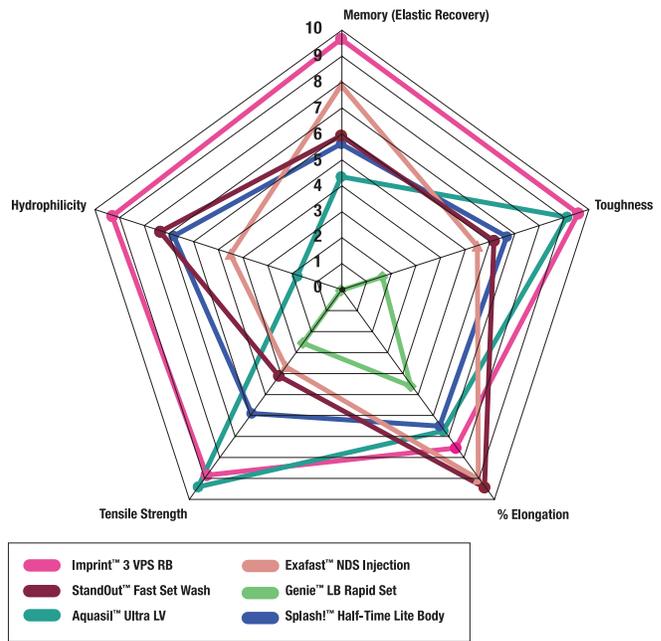
Clinically this means that even under strong elongation forces, Imprint™ 3 VPS Impression Materials can maintain their original dimensions. In this test, the other leading VPS impression materials exhibit a permanent deformation of up to >5%,

increasing the chance of distorted and potentially poor fitting restorations. The nearly 100% memory for the Imprint 3 VPS products is also a benefit for the dental technician when removing the cast from the impression.

### 3. Get the Best Balance of Clinically Relevant Properties:

The combination of all clinically relevant properties: Tensile Strength, Elongation Potential, Toughness, Memory and Hydrophilicity are summarized in a star chart (Fig. 5). Imprint™ 3 VPS Impression Materials (pink) demonstrate outstanding overall performance in each of these areas; show a much larger total performance area than all other measured VPS materials; and have the **best** overall balance of clinically relevant properties of the VPS brands tested.

From a clinical perspective Imprint 3 impression material offers extraordinary potential for more accurate impressions and better-fitting restorations — a benefit for dentist, patient and the dental technician.



Source: 3M ESPE internal data

Fig. 5: Compilation of 5 clinically important impression material parameters: Tensile Strength, % Elongation, Toughness, Memory (Elastic Recovery), Hydrophilicity (2 second values on set material). Shown are Imprint™ 3 VPS and other leading VPS impression materials. Values for each parameter are given in a scale from 1 to 10 in which 1 = poor and 10 = excellent. Overall, Imprint™ 3 VPS Impression Materials show the best balance of properties — the biggest area in the diagram, and no value below 7.

## Imprint™ 3 VPS Impression Materials Working and Setting Times

Product	Color	Viscosity low high	Working Time at 23°C/74°F min:sec	Intraoral Syringe Time min:sec	Intraoral Setting Time min:sec
<b>Quick Setting</b>					
Imprint™ 3 Penta™ Quick Step Heavy Body	●		1:15		2:30
Imprint 3 Quick Step Heavy Body	●		1:15		2:30
Imprint 3 Quick Step Ultra-Regular Body	●		1:30	0:40	2:30
Imprint 3 Quick Step Regular Body	●		1:30	0:40	2:30
Imprint 3 Quick Step Light Body	●		1:30	0:40	2:30
<b>Regular Setting</b>					
Imprint 3 Penta Putty	●		1:30		3:00
Imprint 3 Penta Heavy Body	●		2:00		3:30
Imprint 3 Heavy Body	●		2:00		4:00
Imprint 3 Monophase (Medium Body)	●		1:00		4:00
Imprint 3 Ultra-Regular Body	●		2:00	1:00	3:30*
Imprint 3 Regular Body	●		2:00	1:00	3:30*
Imprint 3 Light Body	●		2:00	1:00	3:30*

\*Intraoral setting time is 3:00 min. when used in combination with Imprint 3 Penta Putty.

## Imprint™ 3 Penta™ Putty— Product Characteristics

Hand-mixed putty remains a popular choice of tray impression material among many dentists because of the seating resistance and high compressive forces. Due to their high viscosity levels, these materials are typically dosed and mixed by hand, with the associated disadvantages such as non-homogeneity and presence of voids in the mix. This together with inhibition problems associated with latex gloves and infection control concerns associated with de-gloving have led many dentists to abandon hand-mixed putties. The mixing of an impression material with real putty consistency in the Pentamix™ Mixing Unit<sup>1</sup> and superior mixing qualities compared to hand-mixed putties (Fig. 6a and 6b) was achieved with a unique combination of reactive polysiloxanes and fillers. This innovative approach enabled the use of high-viscosity pastes in the Pentamix mixing unit without having to forfeit any of the customary putty characteristics.

**Thermally Active Properties:** In contrast to other tray impression materials, Imprint™ 3 Penta™ Putty offers a unique benefit: it accelerates the intraoral setting time of any VPS wash material combined with it.<sup>2</sup> This thermally-active behavior results from the fact that Imprint 3 Penta putty exits the Pentamix™ Mixing Unit at about mouth temperature. Because the putty is already warm when the tray is seated in the mouth, the wash material warms up faster than with other impression materials. Polymerization of the VPS wash material — which is strongly temperature-dependent — is accelerated. As a result, the intraoral wash setting time is shortened while the working time remains unchanged. This is demonstrated in Fig. 7 in which the intraoral setting time of Imprint™ 3 Light Body Wash Material is compared when combined with Imprint 3 Penta putty (thermally active) and Imprint™ 3 Penta Heavy Body (not thermally active). With Imprint 3 Penta putty as tray material, the intraoral setting time for Imprint 3 light body wash material is reduced by 30 seconds.

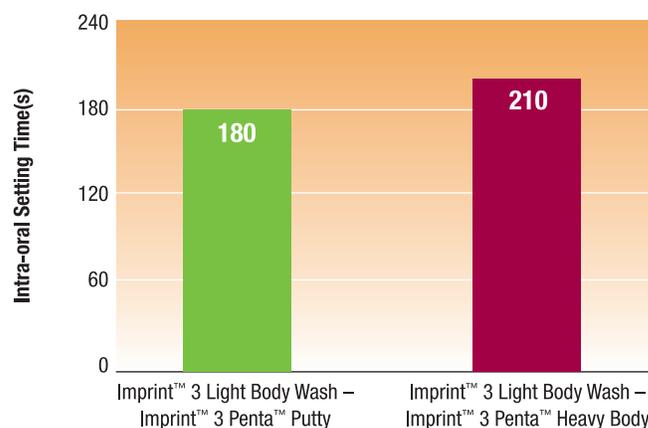
Imprint 3 Penta putty is designed to be used with regular-setting wash materials and combines the clinical benefit of having a long wash syringing time (1 minute intraoral) with the increased productivity and patient comfort from faster mouth removal of the impression.



Fig. 6a: Superior mixing quality of Imprint™ 3 Penta™ Putty with the Pentamix™ Automatic Mixing Unit.



Fig. 6b: Superior mixing quality of Imprint™ 3 Penta™ Putty with the Pentamix™ Mixing Unit (left) compared with a putty mixed by hand (right, Express™ STD Putty).



Source: 3M ESPE internal data

Fig. 7: Comparison intraoral setting time of Imprint™ 3 Light Body Wash Material when combined with Imprint™ 3 Penta™ Putty and Imprint™ 3 Penta™ Heavy Body. When combined with the thermally-active Imprint 3 Penta putty, the intraoral setting time for the wash material is reduced by 30 seconds.

## Benefits of Imprint™ 3 Penta™ Putty Impression Material

Material Properties	Pentamix™ Mixing Unit Delivery
Customary putty-like consistency and insertion force when seating tray	Standardized, consistently homogeneous mixing quality as well as absence of streaks and voids (Fig. 6a, 6b)
High final rigidity	Hygiene and cleanliness of mixing process
Easy carving of initial impression for 2-step technique	Precise dosing
Thermally active properties	Long-term storage of pastes due to hermetic air seal in extremely airtight foil bags

<sup>1</sup> Imprint 3 Penta putty should only be mixed in the Pentamix™ Automatic Mixing Unit with a metal cartridge

<sup>2</sup> Simultaneous (1-step) impression technique only

# Physical/Technical Data

Property	Unit	Tray Materials					Monophase Materials	Wash Materials					
		Imprint™ 3 Penta™ Putty	Imprint™ 3 Penta™ Heavy Body	Imprint™ 3 Penta™ Quick Step Heavy Body	Imprint™ 3 Heavy Body	Imprint™ 3 Quick Step Heavy Body	Imprint™ 3 Medium Body	Imprint™ 3 Light Body	Imprint™ 3 Quick Step Light Body	Imprint™ 3 Regular Body	Imprint™ 3 Quick Step Regular Body	Imprint™ 3 Quick Step Ultra Regular Body	Imprint™ 3 Ultra Regular Body
Consistency A+B (ISO 4823:2000)	mm	34	31	31	31	33	37	43	41	39	39	39	38
Linear dimensional change (ISO 4823:2000)	%	-0.3	-0.3	-0.2	-0.3	-.03	-0.3	-0.4	-0.1	-0.3	-0.3	-0.4	-0.4
Recovery from deformation (ISO 4823:2000)	%	99.4	99.6	99.6	99.6	99.6	99.8	99.8	99.8	99.7	99.7	99.7	99.7
Strain in compression (ISO 4823:2000)	%	2.0	1.7	1.6	2.0	1.9	2.7	4.5	4.4	4.0	3.8	4.3	4.1
Tensile strength at mouth removal (3M ESPE AG internal)	MPa						2.4	4.5	4.5	4.2	4.6	4.1	5.0
Toughness at mouth removal (3M ESPE AG internal)	J							1.25	1.29	1.18	1.44	0.77	1.21
Recovery from elongation at mouth removal (3M ESPE AG internal)	%							-0.10	-0.07	-0.03	-0.02	0.20	0.29
Shore hardness after 15 min. (DIN 53505)	—	76	70	69	70	64	53	50	50	51	52	50	51
Shore hardness after 24 hrs. (DIN 53505)	—	78	74	71	75	75	59	54	55	55	56	55	56
Contact angle after 2 sec., cured (3M ESPE AG internal)	°							13	12	12	24	16	25

Compatibility with gypsum (ISO 4823:2000) and reproduction of detail (ISO 4823:2000) are fulfilled for all tray and wash materials.

NOTE: The data do not represent ranges of values but are individual values, each relating to a specific production batch.

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