

# — PROSTHETICS MANUAL

---

Grand Morse



*THE GRAND MORSE  
IMPLANT SYSTEM*





# CONTENTS

<b>1.0 INTRODUCTION TO THE GRAND MORSE INTERFACE</b>	<b>7</b>
<b>2.0 CLASSIFYING DENTAL IMPLANT PROSTHESIS</b>	<b>11</b>
2.1 Level of work for dental implant prostheses: implant or abutment	11
2.2 Type of retention: cement-retained or screw-retained prosthesis	13
2.3 Number of elements: single (crown) or multiple	13
<b>3.0 GENERAL CARE IN THE SELECTION OF ABUTMENTS AND PROSTHETIC COMPONENTS</b>	<b>14</b>
<b>4.0 GENERAL POINTS TO BE NOTED IN THE PLACEMENT OF ABUTMENTS AND PROSTHETIC COMPONENTS</b>	<b>15</b>
4.1 Overview of Grand Morse healing abutments	15
4.2 Biological care when placing Grand Morse abutments and prosthetic components	17
<b>5.0 TRANSFER OF THE IMPLANT OR ABUTMENT AND MODEL PRODUCTION</b>	<b>18</b>
5.1 Transfer of implants/abutments (open or closed tray impressions)	18
5.2 Model Production	19
<b>6.0 SCANNING AND DIGITAL SOLUTIONS</b>	<b>20</b>
6.1. Scan Transfer	20
6.2 Digital workflow for prostheses (CAD/CAM)	21
<b>7.0 ABUTMENT OPTIONS</b>	<b>22</b>
7.1 The implant level (screw-retained or cement-retained)	22
7.2 Abutment level	26

<b>8.0 CONVENTIONAL WORKFLOW FOR PROSTHESES (LOST-WAX TECHNIQUE, TEMPORARY CROWNS, ETC.)</b>	<b>30</b>
<b>BIBLIOGRAPHY</b>	<b>31</b>

## 1.0 INTRODUCTION TO THE GRAND MORSE INTERFACE

Over the last few years, internal connections have developed an excellent reputation in implant dentistry. Implants with internal connections have begun to produce excellent clinical results and have become widely accepted by dental surgeons, thanks to their practicality. Internal connections rapidly became popular soon after their introduction. They were seen to give improved biological and mechanical results<sup>1</sup>. Originally described by Stephen A. Morse in 1864, the Morse taper connection is intended to provide a more stable and reliable connection between two parts. Tapering interface adjustments then began to be commonly used in engineering practices as Morse tapers, used to connect parts of lathes<sup>2</sup>. In the dental field, the internal connections were adapted for use with dental implants, where the characteristics of this fitting, such as the forces for removal, insertion and stress distribution of the parts depend on<sup>2,3,4,5,6</sup>:

1. the angle of the taper;
2. the length of the contact area;
3. the internal and external diameter of the parts;
4. the depth of insertion;
5. material properties;
6. the coefficient of friction;
7. the size and mass of the male connector.

As implant connections have become increasingly important in achieving satisfactory treatment results, Neodent has developed a new implant system. The company, which has over 20 years experience in dental implants, has built a team of specialists, focused on creating a complete package of innovations based on real clinical needs. The team has worked closely with the company's implant group to improve the current range of connections, creating the Grand Morse connection (Figure 1).



FIGURE 1. The Neodent Grand Morse Implant has a deep tapering connection on the inside of the implant, which is designed to increase the contact area between the implant and the abutment. In addition, this connection has a larger diameter, resulting in a simpler, more efficient clinical procedure.

This innovative approach has led to a major evolution in implant design. As everything has been designed from the connection to the body of the implant, new implants have been designed to be suitable for different surgical techniques and bone density. This has led to major advantages, including the fact that all Grand Morse implants (GM Helix, GM Drive and GM Titamax) have the same sized prosthetic connection, regardless of the diameter of the implant (Figure 2), with an internal angle of 16°. The thicker inner walls result in greater mechanical resistance and improved results in comparison to implants with different internal connections. They have been strategically designed for the Grand Morse portfolio.

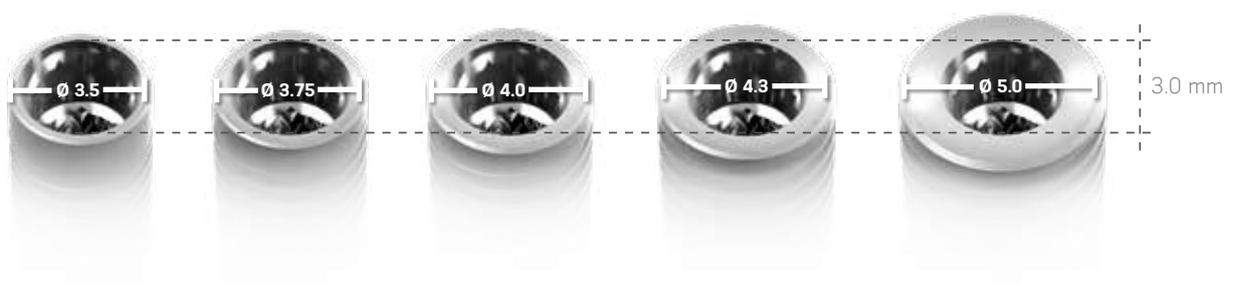


FIGURE 2. All Neodent Grand Morse implant connections have the same dimensions, regardless of the diameter of the implant, which results in a simpler prosthetic process.

In addition, the Grand Morse tapering connection has an indexed internal hexagonal socket called Grand Morse Exact, as shown in Figure 3. Grand Morse Exact is used for the surgical positioning of the implant, giving a precise fit and orientation of the prosthetic abutments when working at the implant level.



FIGURE 3. An internal hex index developed to surgically guide the placement of the implant and shape the implant during the prosthetic phase.

A unique feature which was developed to provide clinical solutions was the auto-removal function. This simple and important detail enables the removal of abutments after their placement on the implant. As the fundamental principal of tapering connections is the friction between the parts, this feature results in easier manipulation. More details can be found in Figure 4.



FIGURE 4. The auto-removal function for Grand Morse abutments results in easier clinical tests, in particular when using titanium bases and their crowns.

Most of the Grand Morse products require just one screwdriver, called the Neo Screwdriver. All the prosthetic screws have been redesigned and, when used with the Neo Screwdriver, provide the parts with high mechanical strength.



FIGURE 5. The Neo Screwdriver is used for most of the screws in the system.

The angled mini conical abutments in the Grand Morse line have also been carefully designed to be more anatomically correct and less aggressive to the peri-implant soft tissue. Figure 6 illustrates this format.



FIGURE 6. New angled abutments with anatomical profiles.

## 2.0 CLASSIFYING DENTAL IMPLANT PROSTHESIS

There are several ways to rehabilitate patients using dental implants. To make this procedure easier, dental implant prostheses can be classified according to:

- The level of the work: implant or abutment.
- The retention type: cement-retained or screw-retained.
- The number of elements: single (crown) or multiple.

### 2.1 Level of work for dental implant prostheses: implant or abutment

Bone implants are first restored with the help of prosthetic abutments. These parts are screwed onto the implants, acting as an abutment that elevates the position of the implant (next to the bone) to the soft tissue level, facilitating restoration. Prosthetic abutments support the soft tissue during the procedure. Figure 7 is a schematic for restoration at the implant and abutment levels.

In cases where there is little soft tissue due to anatomical limitations, poor implant positioning, or for any another reason, implants should be restored at their platform level. In such cases, abutments are no longer needed. Figures 8 and 9 show the clinical step of an impression at the implant level and impressions at the abutment level (restoration at implant level/restoration at abutment level).

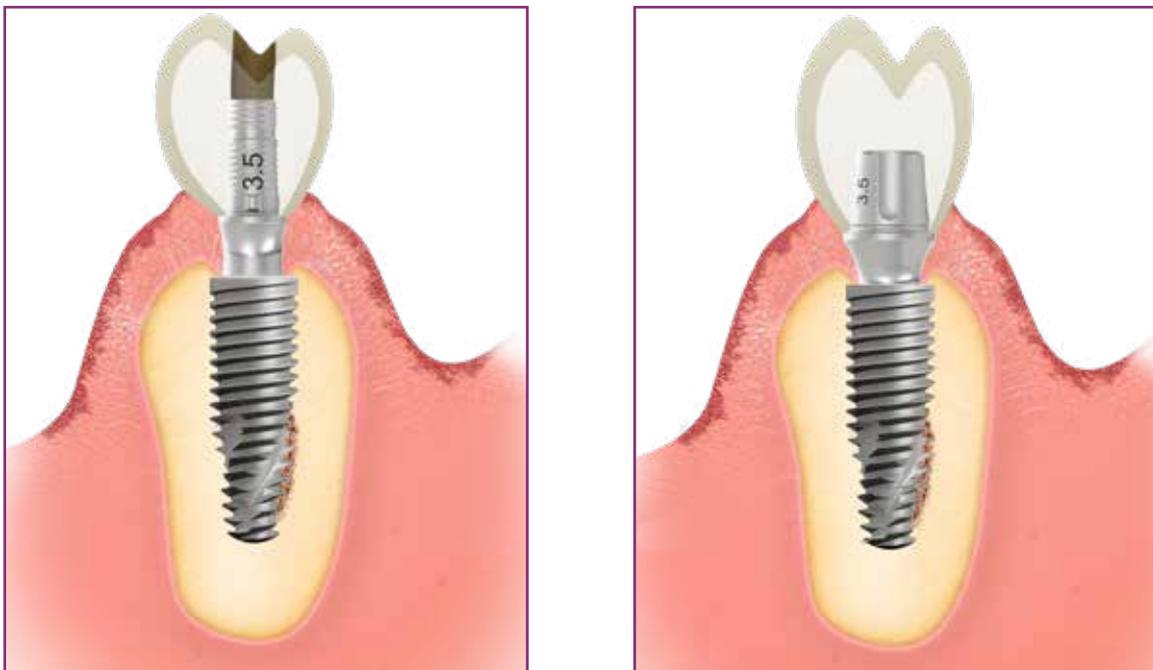


FIGURE 7. Restorations at implant level and at abutment level.

There are many reasons to opt for a restoration at either the implant or abutment level, especially now that digital solutions are available. However, abutment level restorations are strongly recommended when there is a minimum amount of mucosa, as they stabilize the soft tissue, provide a biological seal and mechanically protect the system.



Abutment level prosthetics require abutment level procedures, i.e. impressions, clinical tests, temporary restorations, etc., which should always be carried out on the abutments. In this way, this item is not removed regularly, keeping the homeostasis of the peri-implant tissues intact (Figure 8).

FIGURE 8. A closed tray impression being taken at the abutment level.

Implant level restorations are carried out when there are procedures that result in customized infrastructure. This customization process can be carried out using either casting or milling (when there are digital solutions). The implant level work results in clinical procedures carried out directly on the implant, as illustrated in Figure 9. As with abutment level restorations, the implant level restorations may be screw-retained or cement-retained. Implant-level cement-retained prosthetics require a customized abutment for each specific clinical case.



FIGURE 9. A closed tray impression being taken at the implant level.

## 2.2 Type of retention: cement-retained or screw-retained prosthesis

Dental implant prosthesis can either be cement-retained or screw-retained, depending on the clinical situation and the preference of the dental surgeon. Screw-retained restorations are reversible and do not present a risk of inflammation of the mucosa resulting from too much cement during placement. On the other hand, screw-retained prostheses require excellent passive connection and seating. They also require an opening on the occlusal side for the fixation screw to exit. The location of this opening must therefore be planned in order to avoid esthetic impairment. Angled abutments are strongly recommended to avoid problems when this exit point faces the oral cavity.

Cement-retained restorations are more easily finished with good esthetics, because there is no concern with the outlet of the fixation screw securing the cylinder, but they are not reversible. At the same time, excess cement should be avoided during the process of cementation of the crown. Figure 10 illustrates the difference between screw-retained and cement-retained dental prostheses. Titanium bases are recommended for cement-retained or screw-retained prostheses, though cementation of the titanium base is carried out outside the mouth, in the laboratory, eliminating the risk of excess cement on peri-implant tissues. Subsequently, the structure is screwed onto the implant. More details are given in Chapter 7.

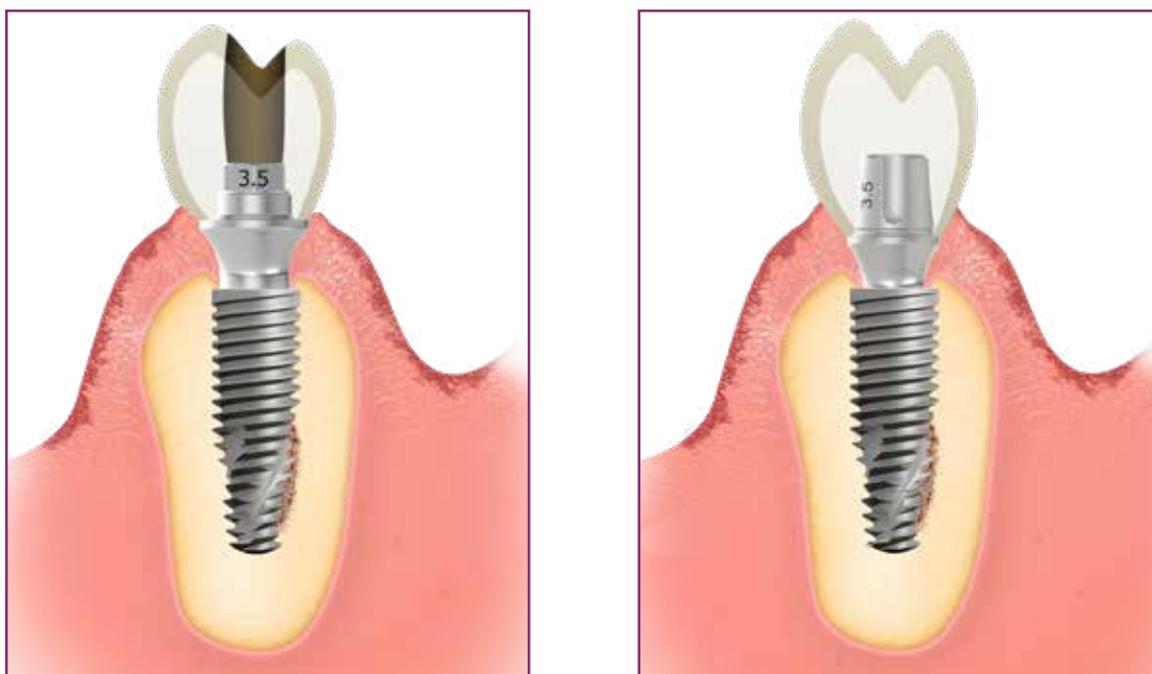


FIGURE 10. Examples of screw-retained and cement-retained restorations.

## 2.3 Number of elements: single (crown) or multiple

Dental implants may be used to restore gaps left by single or multiple missing teeth. Depending on the dentist's treatment plan, they may be joined or placed separately as individual crowns. The design of prosthetic abutments and cylinders is determined by these formats, which may be anti-rotational (for crowns) or rotational (for multiple prostheses).

The selection of anti-rotational or rotational formats of the Grand Morse system also depends on whether the lower part of the abutments has the Grand Morse Exact, as well as whether there is an adjustment fitting in the cylinders for laboratory use. The presence or absence of an anti-rotational element on the cylinder establishes whether it is indicated for crowns or for multiple prostheses (Figure 11).



FIGURE 11. Rotational and anti-rotational formats are used for multiple or single prostheses. Each abutment or prosthetic component has its own characteristics and options (rotational or anti-rotational, Exact or non-Exact). Further details will be given when all the abutments are described in the manual. In any case, the relationship between the cylinder and the abutment determines whether they are indicated for use in single or multiple prostheses.

### 3.0 GENERAL CARE IN THE SELECTION OF ABUTMENTS AND PROSTHETIC COMPONENTS

The type of retention used, the extent of the work, and the number of units define the selection of the abutment, as can be seen in the table below:

Retention Type	Screw-retained		Cement-retained
Extent of Work			
Implant	Single		Single
	- GM Exact Titanium Base		- GM Exact Titanium Base
Abutment	Multiple	Single	Single
	- GM Micro Abutment - GM Mini Conical Abutment	- GM Exact Abutment - GM Micro Abutment	- GM Exact Universal Click Abutment

Once the abutment is selected, other characteristics also need to be determined, as each abutment has a different transmucosal height, shape and angle (shown on pages 24 to 31). The main characteristics of an abutment are:

- A. Diameter;
- B. Interocclusal height (from the abutment);
- C. Transmucosal height;
- D. Angle (the Grand Morse line includes straight, 17° and 30° options).

## 4.0 GENERAL POINTS TO BE NOTED IN THE PLACEMENT OF ABUTMENTS AND PROSTHETIC COMPONENTS

Abutments are placed during the following stages: (1) in the healed mucosa (after removal of healing abutments or temporary crowns); or (2) during surgery with or without flaps, soon after the positioning of the implant (in the case of immediate loading); or (3) after the removal of the cover screws (when abutments are placed instead of healing abutments).

After the abutment type is selected, the following characteristics should be considered for the determination of your design:

- A. Interocclusal space, height, and diameter;
- B. Transmucosal height (gingival);
- C. Biological space (distance between the abutment and the bone crest);
- D. If there is a need for angular correction of the implant with the abutment or if it is parallel to adjacent abutments.

In addition to the relationship between healing abutments and abutments, other important biological aspects are described to facilitate this step.

### 4.1 Overview of Grand Morse healing abutments

The Grand Morse implant range includes a variety of healing abutments, with different diameters and transmucosal heights, designed to adapt to the final abutments. The correct choice of this element determines adequate healing of soft tissues, controlling pressure while maintaining the biological distance.

There are a number of standard Grand Morse healing abutment formats, which can be selected according to the needs of the dental surgeon:



GM Healing Abutments

	Ø3.3	Ø4.5
Transmucosal height	0.8 mm	0.8 mm
	1.5 mm	1.5 mm
	2.5 mm	2.5 mm
	3.5 mm	3.5 mm
	4.5 mm	4.5 mm
	5.5 mm	5.5 mm

Grand Morse healing abutments were designed to ensure the correct emergence profile, adapted to all abutment types, as described in the figure below.

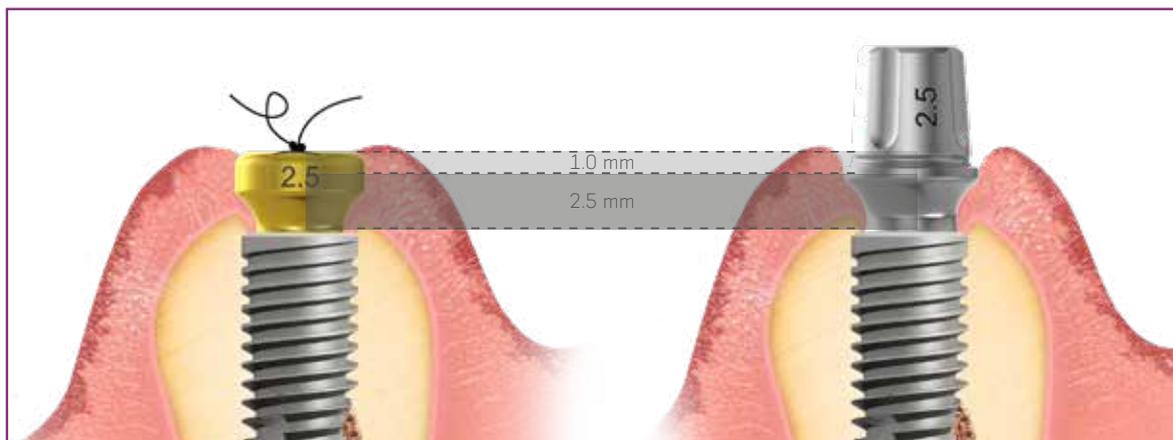


FIGURE 12. Relationship between the design of healing abutments and the dimensions of all Grand Morse abutments.

#### 4.1.1 Overview of Grand Morse abutments and their corresponding healing abutments

Grand Morse Screw-retained Options

Type		GM Mini Conical Abutment	GM Exact Angled Mini Conical Abutment	GM Micro Abutment	GM Exact Abutment
Abutment	Ø Available	4.8 mm	4.8 mm	3.5 mm	4.8 mm
	Transmucosal height	0.8 mm		0.8 mm	0.8 mm
		1.5 mm	1.5 mm	1.5 mm	1.5 mm
		2.5 mm	2.5 mm	2.5 mm	2.5 mm
		3.5 mm	3.5 mm	3.5 mm	3.5 mm
		4.5 mm		4.5 mm	4.5 mm
5.5 mm			5.5 mm	5.5 mm	
Corresponding healing abutment	Ø Available	4.5 mm	4.5 mm	3.3 mm	4.5 mm
	Transmucosal height	0.8 mm		0.8 mm	0.8 mm
		1.5 mm	1.5 mm	1.5 mm	1.5 mm
		2.5 mm	2.5 mm	2.5 mm	2.5 mm
		3.5 mm	3.5 mm	3.5 mm	3.5 mm
		4.5 mm		4.5 mm	4.5 mm
5.5 mm			5.5 mm	5.5 mm	

Grand Morse Cement-retained Options

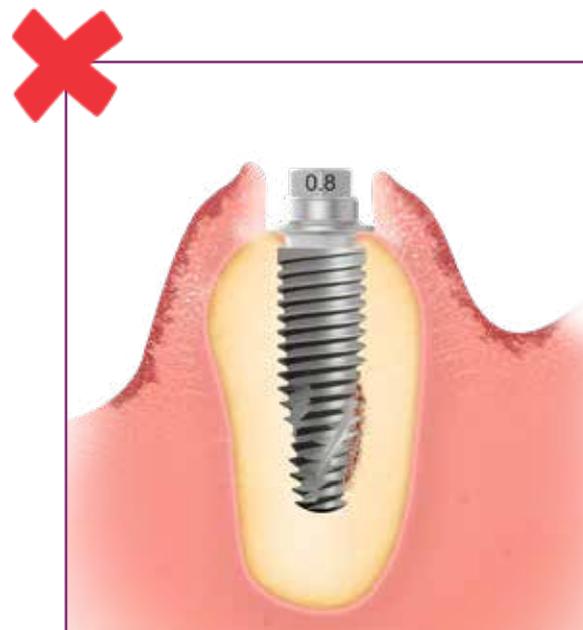
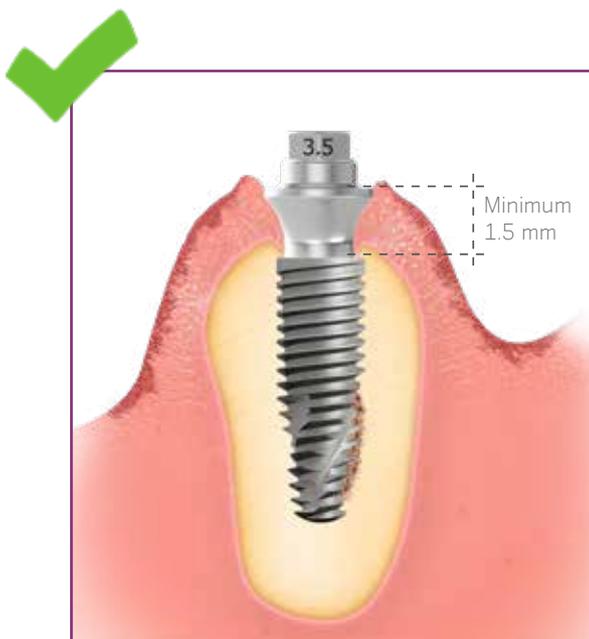
Type		Abutment GM Exact Universal Click		Abutment GM Exact Universal Click		Type		Abutment GM Exact Universal Click		Abutment GM Exact Universal Click			
Abutment	Ø Available	3.3 mm		4.5 mm		Corresponding healing abutment	Ø Available	3.3 mm		4.5 mm			
	Transmucosal height	Straight Angled		Straight Angled			Transmucosal height	Straight Angled		Straight Angled		Straight Angled	
		0.8 mm		0.8 mm				0.8 mm		0.8 mm		0.8 mm	
		1.5 mm 1.5 mm		1.5 mm 1.5 mm				1.5 mm 1.5 mm		1.5 mm 1.5 mm		1.5 mm 1.5 mm	
		2.5 mm 2.5 mm		2.5 mm 2.5 mm				2.5 mm 2.5 mm		2.5 mm 2.5 mm		2.5 mm 2.5 mm	
		3.5 mm 3.5 mm		3.5 mm 3.5 mm				3.5 mm 3.5 mm		3.5 mm 3.5 mm		3.5 mm 3.5 mm	
4.5 mm		4.5 mm		4.5 mm		4.5 mm		4.5 mm					
5.5 mm		5.5 mm		5.5 mm		5.5 mm		5.5 mm		5.5 mm			

## 4.2 Biological care when placing Grand Morse abutments and prosthetic components

Grand Morse abutments are normally placed in the intraosseal position. This results in a certain amount of bone tissue on the cervical portion of the implant, which may impact the abutments placed on the implants. For such situations, Neodent provides the GM Bone Profile drill. The GM Height Measurer is used to check and select the correct transmucosal height of the abutment.



The margin of the abutment should not be closer than 1.5 mm to the bone crest and no more than 2 mm under the mucosa. The images below illustrate different situations and the correct final positioning of the abutment.



## 5.0 TRANSFER OF THE IMPLANT OR ABUTMENT AND MODEL PRODUCTION

The implant can be transferred for laboratory work and production of the prosthesis in different ways, as modern prostheses can be fabricated by conventional casting procedures (conventional flow) or through the use of milling and CAD/CAM technology. This chapter covers conventional impression techniques and scanning methods (of the model and intraoral).

### 5.1 Transfer of implants/abutments (open or closed tray impressions)

The procedure for transferring implants or abutments is combined with that of taking conventional dental impressions. It can be carried out using open or closed trays. Individual items, known as impression copings, are screwed or adapted to the abutments or directly onto the implants.

With the closed tray technique, a negative impression of the piece is made on the impression material. The impression coping is then removed from the oral cavity and adapted to the impression material in the tray. Some special closed tray impression copings are made in plastic and captured directly by the impression material. Each abutment has its own impression system and each option should be reviewed in the catalog or working protocol.

In the case of impression copings for Grand Morse implants, there are two options available for the transfer of the impression: open or closed tray. There are also two length options available, depending on the transmucosal height and the final position of the implant. These options are described below.

	Open Tray	Closed Tray
Conventional	 <p>19.1 2.0</p>	 <p>13.0 2.0</p>
Long	 <p>23.0 4.0</p>	 <p>16.9 4.0</p>

Generally, the transfer sequence for abutments follows the same workflow as that set out for the transfer of implants (open or closed), but with the impression copings adapted to each abutment. The characteristics of each abutment should be noted, as only some allow for either an open or closed transfer process to be used.

## 5.2 Model Production

### 5.2.1 Producing a Plaster Model

First, the impression should be checked, mainly to ensure that the impression coping is correctly adjusted and positioned. The following steps should be carried out in the prosthesis laboratory:

A. Analog (implant or abutment, depending on the technique) is positioned. It should fit exactly as shown in the figure below:



B. Use the preferred artificial gingival material to make a removable, accurate and faithful gum 3 to 4 mm in depth (follow the manufacturer's instructions for the material used for making the artificial gum indicated in the respective IFU);

C. Prepare the mixture using Type IV plaster. Mix the powder and the water correctly, following the manufacturer's instructions;

D. Pour the plaster mixture into the impression. Make sure that the plaster coats all anatomical details and, in particular, that it covers the analog completely;

E. Wait the recommended time for the plaster to set and then carefully remove the template from the impression tray;

F. Check that there are no bubbles and that all the details have been completely copied;

G. Finish the model;

H. It is also important to model the opposing dentition and mount both in an articulator.

## 6.0 SCANNING AND DIGITAL SOLUTIONS

Modern dentistry is becoming increasingly digital. Scanning solutions range from digitalization of the impression in the impression tray to direct scanning of the patient's oral cavity (intraoral scanning). When the digital model is ready, specialized technicians begin to design the future prosthesis, which will be milled in a CAM machine. Some different procedures and devices must be described to make this technique clearer.

### 6.1. Scanbody

The scanbody is used on an implant and/or abutment in order to transfer their positions following scanning for use in the CAD/CAM procedure. This is used to realign the library of implants/abutments with the correct position, according to the reference implant/abutment. There are two types of scanbodies: one is used for plaster model scanning (for analogs) and one for intraoral scanning (for implants and abutments). The Neodent scanbodies are made in Peek, an opaque polymer that eliminates the need for any type of opaquing spray.



FIGURE 13. Scanbodies are essential for the digitization of models or for intraoral scans.

## 6.2 Digital workflow for prostheses (CAD/CAM)

### 6.2.1 Scanning a plaster model

Once the plaster model is made (Item 5.2 - impressions of implants/abutments), it can be scanned. This technique requires a plaster model scanner or a bench scanner. Neodent Digital Solutions recommends the following scanners: Ceramill® Map400, Straumann® CARES® and Dental Wings™ 7Series.

- For this step, the appropriate library must be installed in the software. (Libraries are available for the following software: exocad GmbH, Amann Girschbach AG Inc, Dental Wings Inc and 3Shape A/S at <http://en.neodent.com.br/libraries-cadcam> or from your local representative). Make sure that your CAD library is up to date.

The order of the following steps may vary depending on the software and scanner used, but will be basically the same for all:

- A. Start the software database/chosen scanner;
- B. Select the correct option and material for the case and make sure that the selected library matches the scanbodies that are to be used;
- C. The steps set out by the scanner's manufacturer must be followed, though what is important is to scan the plaster model with and without the removable gum (usually carried out at different steps) and, of course, to scan with the analog of the implant or abutment in position.

Notes:

- The flat surface of the scanbody should be positioned towards the oral cavity;
- Make sure that the scanbody is properly seated;
- Scanbodies where the implant platform is damaged may lead to digitalization problems.

After digitalization, design the prosthesis with the CAD software. The same care should be taken when using an intraoral scanner.

## 6.2.2 Intraoral scanning

Dentists need an Intraoral (IO) scanner available at their practice. The dental laboratory receives an e-mail with the file instead of a pack with the physical impression. The intraoral scanning process must follow all the clinical cares and safety instructions that dentists are used to and also follow the step-by-step of the IO scanner manufacturer. Scanners indicated to Neodent Scanbodies are: TRIOS® by 3Shape A/S and DW IO by Dental Wings Inc. In general, scanning procedures are similar for every scanning system.

- A. Fill all order from the software properly;
- B. Use the correct intraoral scanbody, according to the chosen abutment or Grand Morse implant;
- C. Select correctly the indication, material and specify which is the element implant related;
- D. Follow the step by step indicated by the scanner manufacturer;
- E. The digitalization of a scanbody has to copy as most details as possible;
- F. Finalize the scan process following the software instructions;
- G. The final scanning files should be sent to the CAD software (Chairside or send to a dental laboratory with CAD/CAM system).

### Notes:

- The flat surface of the scanbody should be positioned towards the oral cavity;
- Make sure that the scanbody is properly seated;
- Scanbodies where the implant platform is damaged may lead to digitalization problems.

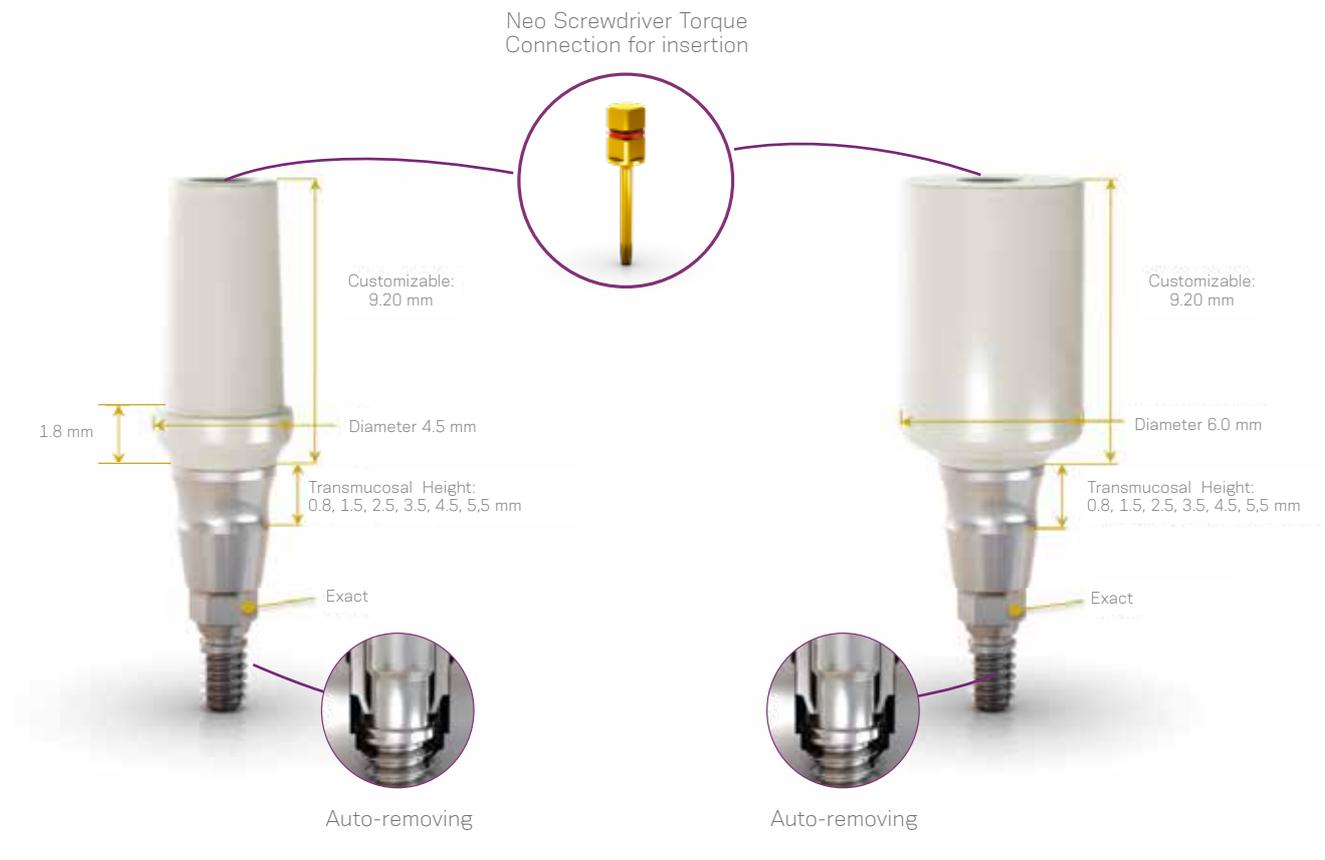
## 7.0 ABUTMENT OPTIONS

### 7.1 The implant level (screw-retained or cement-retained)

#### 7.1.1 GM Pro Peek Abutment (temporary abutment)

The GM Pro Peek Abutment is a temporary abutment composed of two parts: the first is the body made of Peek (a high-performance polymer) in cylindrical shape - which can be customized - and the second is manufactured from titanium, to be seated in the implant using the GM Exact indexer. The GM Pro Peek Abutment should be customized to determine and establish the emergence profile during the period of healing of peri-implant tissues prior to final selection of an abutment. Peek is an easily prepared dental material when compared to other materials, and is biocompatible.

The GM Pro Peek Abutment is available in different diameters and different transmucosal heights, as shown below:



Note: The Pro Peek Abutment is a device indicated only for provisional crowns (maximum time in the mouth: 6 months) and so the unlocking device is an important characteristic.

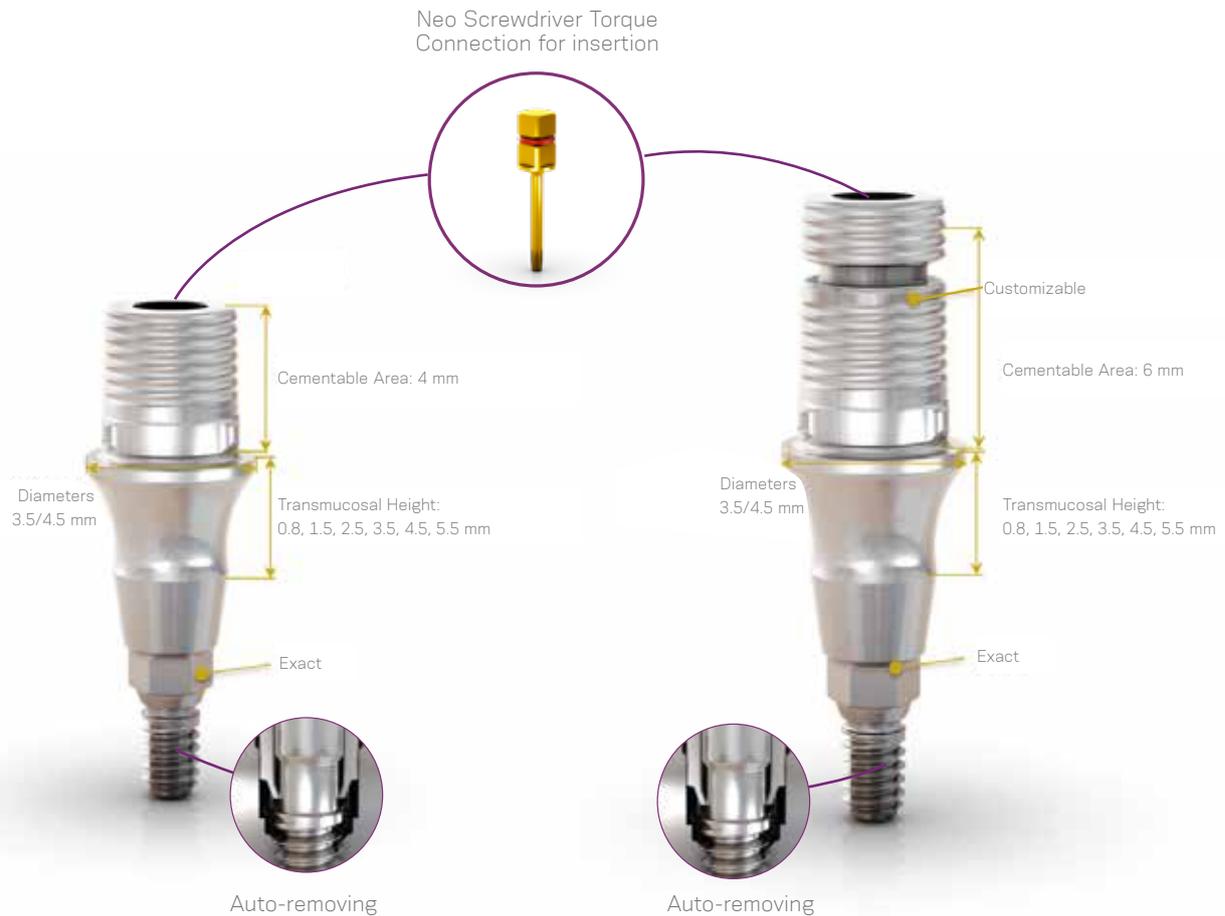
To use the GM Pro Peek Abutment, some steps should be followed:

- A. Select the GM Pro Peek Abutment according to the treatment planning, respecting the biological tissues as previously described and install it (20 N.cm);
- B. Make sure that the abutment is aligned with the insertion axis of the implant;
- C. Ensure that it is perfectly seated on the Implant (using periapical X-ray);
- D. Prepare the GM Pro Peek abutment with a high-speed in the patient's mouth or at the dental lab. Make sure there is a minimum remaining of 5 mm of Peek;
- E. Create and adapt a temporary restoration to condition the emergence profile and soft tissue;
- F. Test the adaptation of the prosthetic structure;
- G. Cement the restoration using the manufacturer's instructions:
  - Important to protect the access of the screw;
  - Be aware to keep the mucosa free of cement excess.

### 7.1.2 GM Exact Titanium Base

The GM Exact Titanium Base allows in-house milling (in the laboratory or labside) with the Neodent Originals Program. It is recommended for single prosthesis: copings and crowns cemented in the laboratory and screwed onto the implant in the mouth.

The GM Exact Titanium Base is available with cementable areas of 4 mm or 6 mm. The 4 mm titanium base does not permit customization, while the 6 mm base may be reduced to 4 mm. GM Exact Titanium Bases share the following characteristics:



Note: the Analog of the Grand Morse Implant should be scanned when using the GM Exact Titanium Base. Both intraoral scanning and conventional impressions may be used. When conventional impression is used, once the model is made, the analog of the Grand Morse implant should be scanned when using the GM Exact Titanium Base.

After scanning, the following steps should be followed:

- A. Launch the CAD software;
- B. Carefully select the GM Exact Titanium Base in the CAD software library;
- C. Proceed with the normal CAD design;
- D. Complete the design and start the milling process (CAM);
- E. Mill the cylinder/crown in-house;
- F. As the restoration is in the final phase, test its fit to the titanium base, preferably in the mouth of the patient;
- G. The GM Exact Titanium Base should be cemented in the laboratory;
- H. Screw the GM Exact Titanium Base onto the analog of the model;
- I. Protect the access to the screw;

- J. Follow the cement manufacturer's instructions for use. The GM Exact Titanium Base has been tested with chemically-activated resinous cements (e.g.: Panavia™ – Kuraray America, Inc.);
- K. Apply the cement to the GM Exact Titanium Base and apply pressure to the restoration, following the three indexes;
- L. The restoration should be pressed onto the GM Exact Titanium Base and any excess cement removed immediately;
- M. Remove the analog infrastructure after the cement sets and remove any remaining cement surrounding the GM Exact Titanium Base;
- N. Before placing the prosthesis in the mouth, give it a final clean:
- Immerse the piece completely in a solution of enzymatic detergent (diluted according to the manufacturer's instructions);
  - Leave in the ultra-sonic cleaning equipment for approximately 10 to 15 minutes;
  - Rinse thoroughly with distilled water to completely remove any remaining solution;
  - The use of nylon brushes is recommended;
  - Dry with a clean, dry cloth or with compressed air;
  - Perform a visual inspection, noting possible failures in the cleaning process. If there is any remaining dirt, the part must be immersed again in the enzyme solution and, if necessary, cleaned with the aid of a nylon brush. Repeat the process of rinsing and drying.
- O. Proceed with the placement in the mouth (using the Neo Screwdriver Torque Connection with a torque of 20 N.cm);
- P. Make sure that the prosthesis is aligned with the axis of insertion of the implant;
- Q. Make sure that the prosthesis is perfectly positioned over the implant and that the restoration is not pressing the peri-implant tissues (with the aid of a periapical X-ray).

Note: Check in the IFU the indication of minimum thickness, maximum angulation and other important information on the GM Exact Titanium Bases.



## 7.2 Abutment level

### 7.2.1 GM Exact Abutment (screw-retained single fitting)

The GM Exact Abutment is made of titanium alloy in accordance with ASTM Standard F136, recommended for screw-retained single prostheses (crowns). The fixation screw that came with the cylinders of this abutment is larger in diameter than the fixation screws of conventional prosthetics (the fixation screws for the GM Exact Abutment has 2.0 vs. 1.4 mm of conventional screws), resulting in improvements in mechanical performance.



Follow these steps to use the GM Exact Abutment:

- Check that the soft tissue and emergence profile are ready;
- Select the appropriate GM Exact Abutment according to the treatment plan, respecting the biological tissues, as previously described;
- Place the GM Exact Abutment (use the Neo Screwdriver Torque Connection with a torque of 20 N.cm);
- Make sure it fits well and follow the transfer sequence already described in chapter 5.1 (transfer);
- The laboratory technician then produces the piece using conventional techniques (lost-wax) or milling (CAD/CAM);
- Place the GM Exact Abutment (using the Neo Screwdriver Torque Connection with a torque of 10 N.cm).
- Make sure that the GM Exact Abutment is aligned with the axis of insertion of the implant;
- Make sure that the GM Exact Abutment is perfectly positioned over the implant and that the restoration is not pressing the peri-implant tissues (with the aid of a periapical X-ray).



7.2.2 GM Mini Conical Abutment (multiple screw-retained) and GM Micro Abutment (single or multiple screw-retained)

The GM Mini Conical Abutment and the GM Micro Abutment are recommended for use with multiple prostheses and prosthesis bars. However, the GM Micro Abutment has an anti-rotational cylinder, making it suitable for use with single screw-retained prostheses (crowns). The main difference between the abutments is the diameter, as shown in the following image.



GM Mini Conical Abutment



GM Micro Abutment

Note: The GM Micro Abutment can be used for crowns or multiple prostheses. It is not available with different angles.

The GM Mini Conical Abutment is available with different angles (straight, 17° and 30°). Angled abutments permit different transmucosal heights, as shown below:



GM Exact Mini Angled Conical Abutment 17°



GM Exact Mini Angled Conical Abutment 30°



Follow these steps to use the GM Mini Conical Abutment and the GM Micro Abutment:

- A. Check that the soft tissue and emergence profile are ready;
- B. Select the appropriate abutment in accordance with the treatment plan, respecting the biological tissues, as previously described;
- C. Place the abutment:
  - the GM Exact Mini Angled Conical Abutment and GM Micro Abutment, applying a torque of 32 N.cm, using the Hexagonal Prosthetic Driver;
  - the GM Exact Mini Angled Conical Abutment, applying a torque of 20 N.cm, using the Neo Screwdriver Torque Connection;
- D. Ensure that the abutment is perfectly positioned over the implant and that the restoration is not pressing the peri-implant tissues (with the aid of a periapical X-ray);
- E. Check that the transfer fits well and follow the sequence already described in chapter 5.1 (transfer);
- F. The laboratory technician then produces the piece using conventional techniques (lost-wax) or milling (CAD/CAM);
- G. Place the definitive prosthesis (using the Neo Torque Wrench with a torque of 10 N.cm);
- H. Ensure that the abutment is aligned with the long insertion axis of the implant.



Note: The GM Micro Abutment can be used for both single and multiple prostheses.



## 8.0 CONVENTIONAL WORKFLOW FOR PROSTHESES (LOST-WAX TECHNIQUE, TEMPORARY CROWNS, ETC.)

Select the preferred abutment as appropriate for the case, and follow the workflow described in the table below:

Cylinder	Indication	Technique
 <p>Titanium or Polymer</p>	Provisional/ Temporary	<ul style="list-style-type: none"> <li>- Select a Neo Titanium Cylinder or Temporary Click Cylinder;</li> <li>- Fix the cylinder on the analog and customize to match the interocclusal space available;</li> <li>- Prepare the temporary prosthesis;</li> <li>- Test the passivity and the fit of the prosthesis structure to the cylinder;</li> <li>- Secure the cylinder on the abutment and check the occlusion;</li> <li>- Temporary crowns can be made in the laboratory or in the dental office (chairside).</li> </ul>
 <p>CoCr</p>	Definitive Prosthesis	<ul style="list-style-type: none"> <li>- Place the cylinder onto the analog on the plaster cast;</li> <li>- Apply wax to the restoration;</li> <li>- The thickness of the wax must be at least 0.5 mm, and can be reduced to 0.3 mm after overcasting;</li> <li>- Prepare the base of the cylinder for casting and add the covering;</li> <li>- The alloy must be compatible with the esthetic material and the CoCr base;</li> <li>- Do not apply porcelain directly onto the CoCr base;</li> <li>- Apply the porcelain (specific to this type of alloy) directly over the area not covered by the metallic alloy used for overcasting, as this can cause cracks;</li> <li>- Ensure that the original format of the screw access opening is preserved;</li> <li>- Polishing protectors are recommended during finishing and polishing procedures;</li> <li>- Do not use corrosive materials during the finishing of the alloy, as they may contain iron particles.</li> </ul>
 <p>Burnout-capable</p>	Definitive Prosthesis	<ul style="list-style-type: none"> <li>- Place the cylinder onto the analog on the plaster cast;</li> <li>- Apply wax to the restoration;</li> <li>- Prepare the base of the cylinder for casting and add the covering;</li> <li>- Continue with the casting and finishing processes;</li> <li>- Ensure that the original format of the screw access opening is preserved, when using a screw-fixed prosthesis.</li> </ul>

## 9.0 OVERVIEW OF TORQUES AND CONNECTIONS



Neo Screwdriver      Hexagonal Torque Connection Prosthetic Driver

	GM Exact Abutment	20 N.cm	
	GM Mini Conical Abutment		32 N.cm
	GM Exact Angled Mini Conical Abutment	20 N.cm	
	GM Micro Abutment		32 N.cm
	GM Exact Click Universal Abutment	20 N.cm	
	GM Exact Titanium Base	20 N.cm	
	GM Pro Peek Abutment	20 N.cm	
	Neo Prosthetic Screws	10 N.cm	

## BIBLIOGRAPHY

1. Macedo JP, Pereira J, Vahey BR, et al. Morse taper dental implants and platform switching: The new paradigm in oral implantology. *Eur J Dent.* 2016 Jan-Mar;10(1):148-54.
2. Hernigou P, Queinnec S, Flouzat Lachaniette CH. One hundred and fifty years of history of the Morse taper: from Stephen A. Morse in 1864 to complications related to modularity in hip arthroplasty. *Int Orthop.* 2013 Oct;37(10):2081-8.
3. Bozkaya D, Müftü S. Mechanics of the tapered interference fit in dental implants. *J Biomech.* 2003 Nov;36(11):1649-58.
4. Bozkaya D, Müftü S. Efficiency considerations for the purely tapered interference fit (TIF) abutments used in dental implants. *J Biomech Eng.* 2004 Aug;126(4):393-401.
5. Bozkaya D, Müftü S. Mechanics of the taper integrated screwed-in (TIS) abutments used in dental implants. *J Biomech.* 2005 Jan;38(1):87-97.
6. Shigley's, Budynas R and Nisbett J, *Mechanical Engineering Design*, Eighth Edition, McGraw-Hill Primis, ISBN: 0-390-76487-6. USA. 1059 p., 2006).
7. Bernardes SR, da Gloria Chiarello de Mattos M, Hobkirk J, Ribeiro RF. Loss of preload in screwed implant joints as a function of time and tightening/untightening sequences. *Int J Oral Maxillofac Implants.* 2014 Jan-Feb;29(1):89-96.
8. Coppedê AR et al. Fracture resistance of the implant-abutment connection in implants with internal hex and internal conical connections under oblique compressive loading: an in vitro study. *Int J Prosthodont.* 2009 May-Jun;22(3):283-6.

© 2017 - JJGC Indústria e Comércio de Materiais Dentários S.A. All rights reserved.  
Ceramill® and Amann Girrbach® are registered marks of Amann Girrbach AG.  
exocad® is a registered mark of exocad GmbH.  
3Shape® is a registered mark of 3Shape A/S.  
Straumann® CARES® are registered marks of Straumann Holding AG.  
Some items may not be available for sale yet. For further informations, please contact your local distributor.  
(PM\_GM\_ING\_V1)