

— PROSTHETICS MANUAL

GRAND MORSE

*THE GRAND MORSE
IMPLANT SYSTEM*





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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 results¹. 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 lathes². 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^{2,3,4,5,6}:

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).

These guidelines do not substitute each product's instructions for use (IFU). These can be found at our website: www.ifu.neodent.com.br. It is the surgeon's sole responsibility to analyze the most appropriate products for each clinical situation.



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 (Helix GM, Drive GM and Titamax GM) 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 unlocking feature (self-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 (unlocking feature) 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.

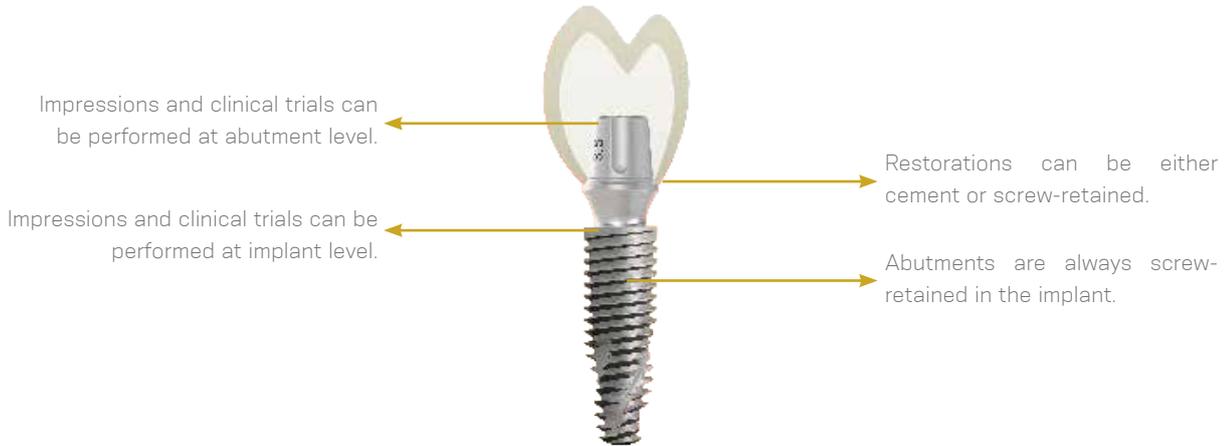


FIGURE 6. New angled abutments with anatomical profiles.

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



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).

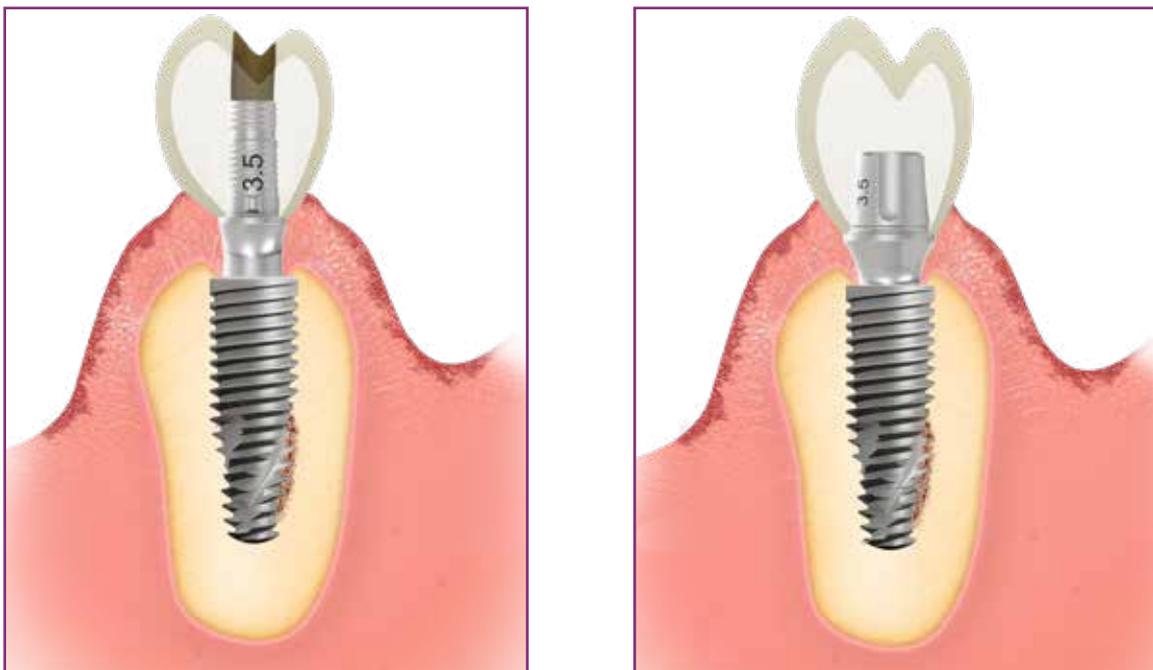


FIGURE 7. Restorations at implant level and at abutment level.

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, provisional 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 performed 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 enhanced 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.

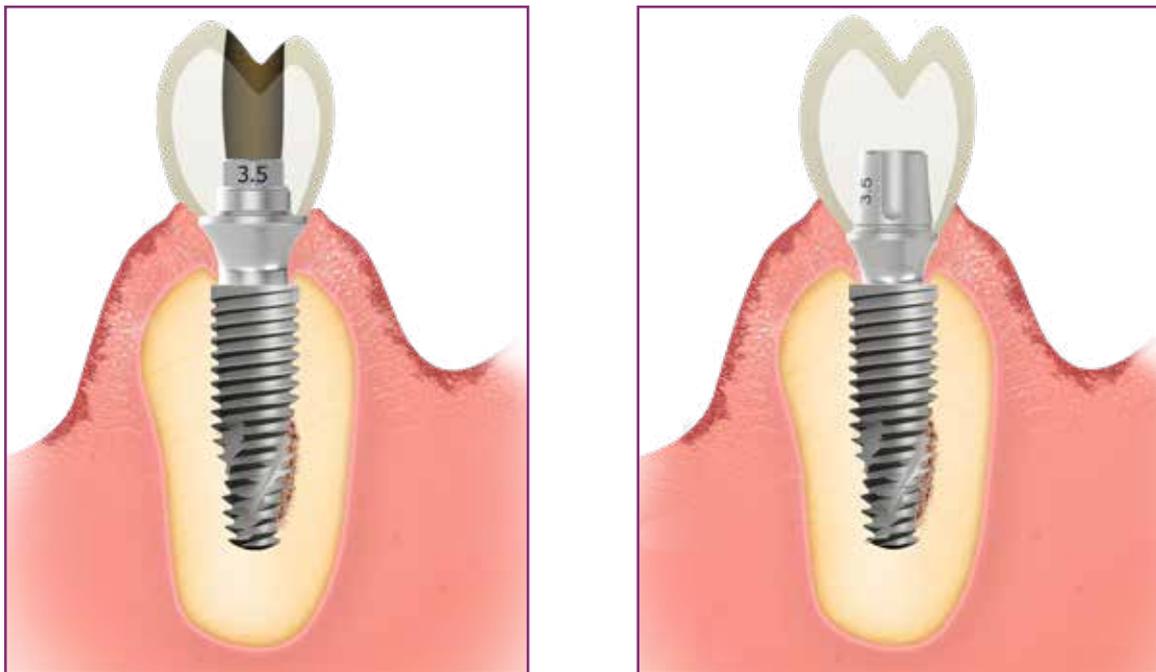


FIGURE 10. Examples of screw-retained and cement-retained restorations.

2.3 Number of elements: single (crown) or multiple (bar or bridge)

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).

| Multiple | Single (Crown) | Multiple | Multiple | Single (Crown) |
|---|--|--|---|---|
| Rotational  | Anti-rotational  | Rotational  | Rotational  | Anti-rotational  |
| Rotational  GM Mini Conical Abutment | Rotational  GM Micro Abutment | Rotational  GM Micro Abutment | Anti-rotational  GM Exact Angled Mini Conical Abutment | Anti-rotational  GM Exact Abutment |

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 this 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:

| Extent of Work | Retention Type | | Cement-retained | | Overdenture |
|----------------|--|--|--|--|---|
| | Screw-retained | | Multiple | Single | |
| Implant | Single | | Multiple | Single | GM Equator Attachment |
| | <ul style="list-style-type: none"> GM Exact Titanium Base GM Exact Titanium Base C GM Titanium Blocks GM CoCr Base | | <ul style="list-style-type: none"> GM Exact Titanium Base GM Exact Titanium Base C GM Titanium Blocks GM CoCr Base | <ul style="list-style-type: none"> GM Titanium Blocks | |
| Abutment | Multiple | Single | Single | | <ul style="list-style-type: none"> GM Exact Universal Click Abutment |
| | <ul style="list-style-type: none"> GM Micro Abutment GM Mini Conical Abutment | <ul style="list-style-type: none"> GM Exact Abutment GM Micro Abutment | | | |

Once the abutment is selected, other characteristics also need to be determined, as each abutment has a different transmucosal height, shape and angle. 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.

Note: For the step A, all screw head's designs should be considered in the case of screw-retained restorations. The head of the screws has a direct relation with the remaining interocclusal space planned for the restoration. So it should be considered:



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 shapes, which can be selected according to the needs of the dental surgeon:



| | 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.

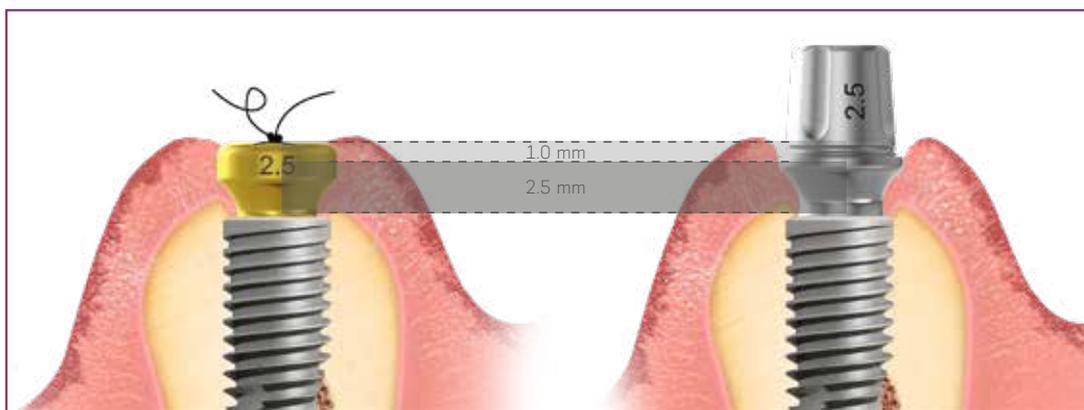


FIGURE 12. Relationship between the design of healing abutments and the dimensions of all Grand Morse abutments.

The Grand Morse line also features customizable healing abutments. They are produced in titanium, with a customizable portion made of Peek. The available diameters and transmucosal heights are presented below. It is also important to notice the height of the parallel portion, which is of 1.5 mm for all options, with the exception of the 7.0X5.5 mm (with a 2.5 mm high parallel portion) and the 7.0X6.5 mm (with a 3.5 mm high parallel portion) customizable healing abutments. In all cases, there is the possibility of customizing the upper and lateral portions of the product. A minimum thickness of 0.5 mm is recommended to be maintained between the screw and the lateral and upper portions.



| | Ø 5.5 | Ø 7.0 |
|---------------------|--------|----------|
| Transmucosal height | 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 | 6.5 mm** |

*parallel portion of 2.5 mm

**parallel portion of 3.5 mm

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 | ∅ 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 | ∅ 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

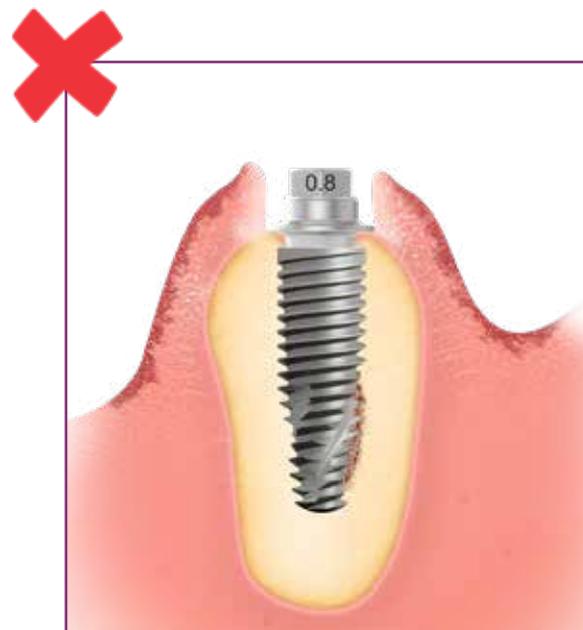
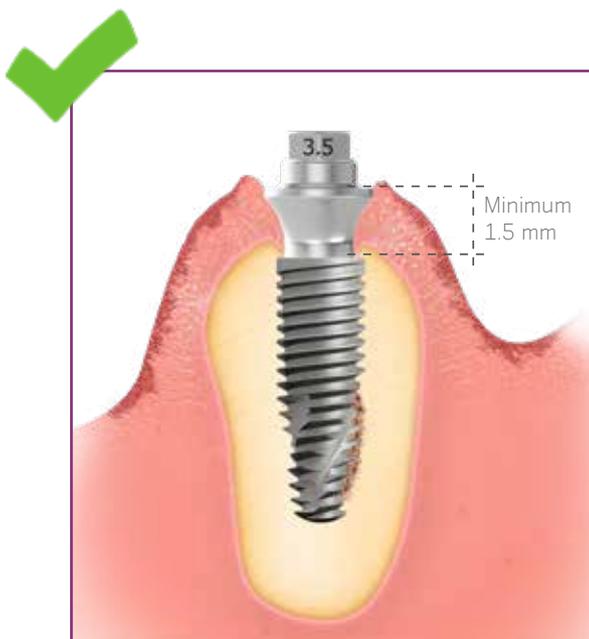
| Type | | Abutment GM Exact Universal Click | | Abutment GM Exact Universal Click | | Type | | Abutment GM Exact Universal Click | | Abutment GM Exact Universal Click | |
|----------|---------------------|-----------------------------------|--------|-----------------------------------|--------|--------------------------------|---------------------|-----------------------------------|--------|-----------------------------------|--------|
| Abutment | ∅ Available | 3.3 mm | | 4.5 mm | | Corresponding healing abutment | ∅ Available | 3.3 mm | | 4.5 mm | |
| | Transmucosal height | Straight | Angled | Straight | Angled | | Transmucosal height | Straight | Angled | Straight | Angled |
| | | 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 |
| | | 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 |
| | | 4.5 mm | | 4.5 mm | | | | 4.5 mm | | 4.5 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 |  |  |
| Long |  |  |

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.

Neodent has developed a new generation of analogs, which can be used either in the conventional (plaster model) or the digital workflows (printed model), for prototyped models. They are called Hybrid Repositionable Analogs and are available for implant or abutment level impressions or scanings.



FIGURE 13. GM Implant and Abutments (GM Exact, Micro, Universal and Mini Conical) Hybrid Repositionable Analogs.

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 14. 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 softwares: 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.

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.

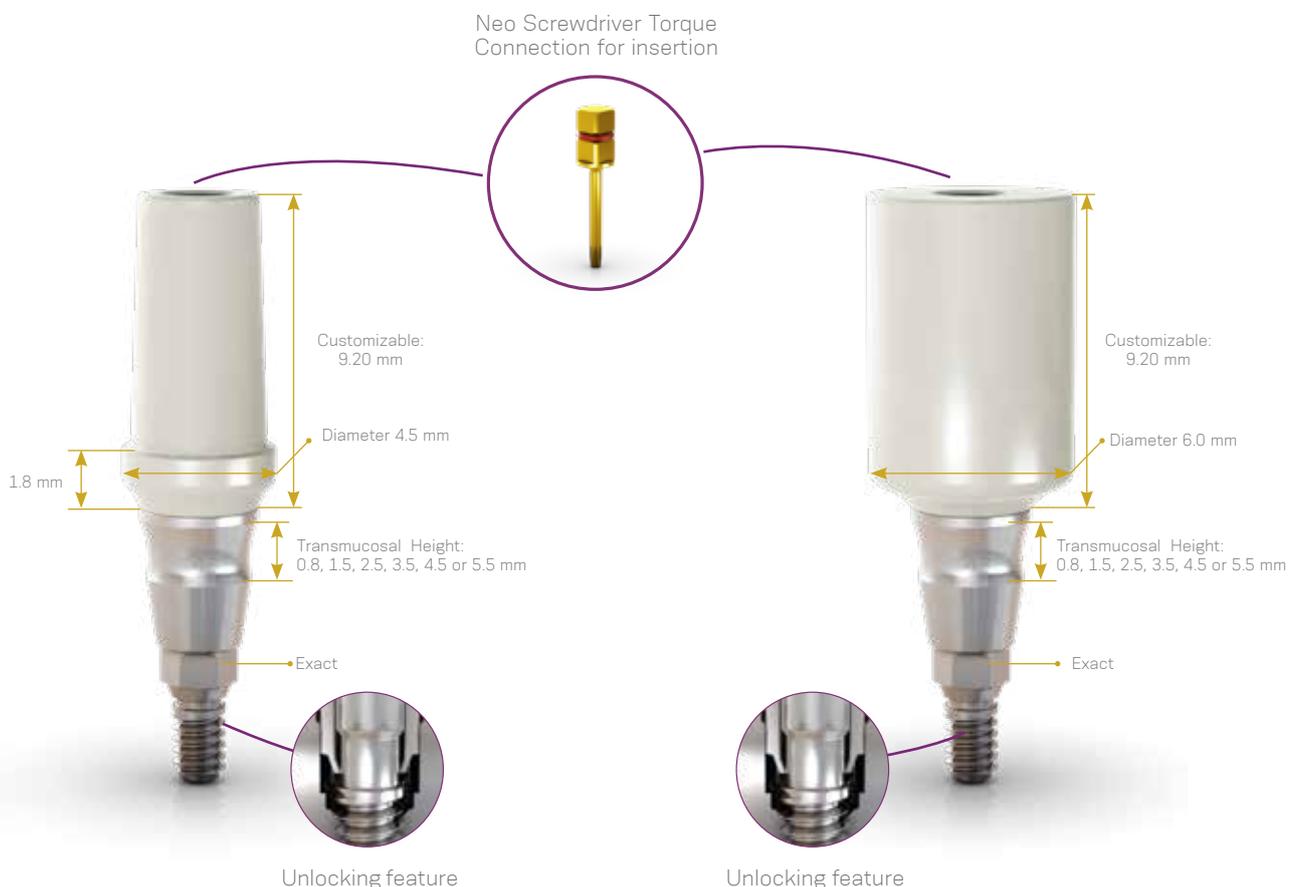
7.0 ABUTMENT OPTIONS

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:

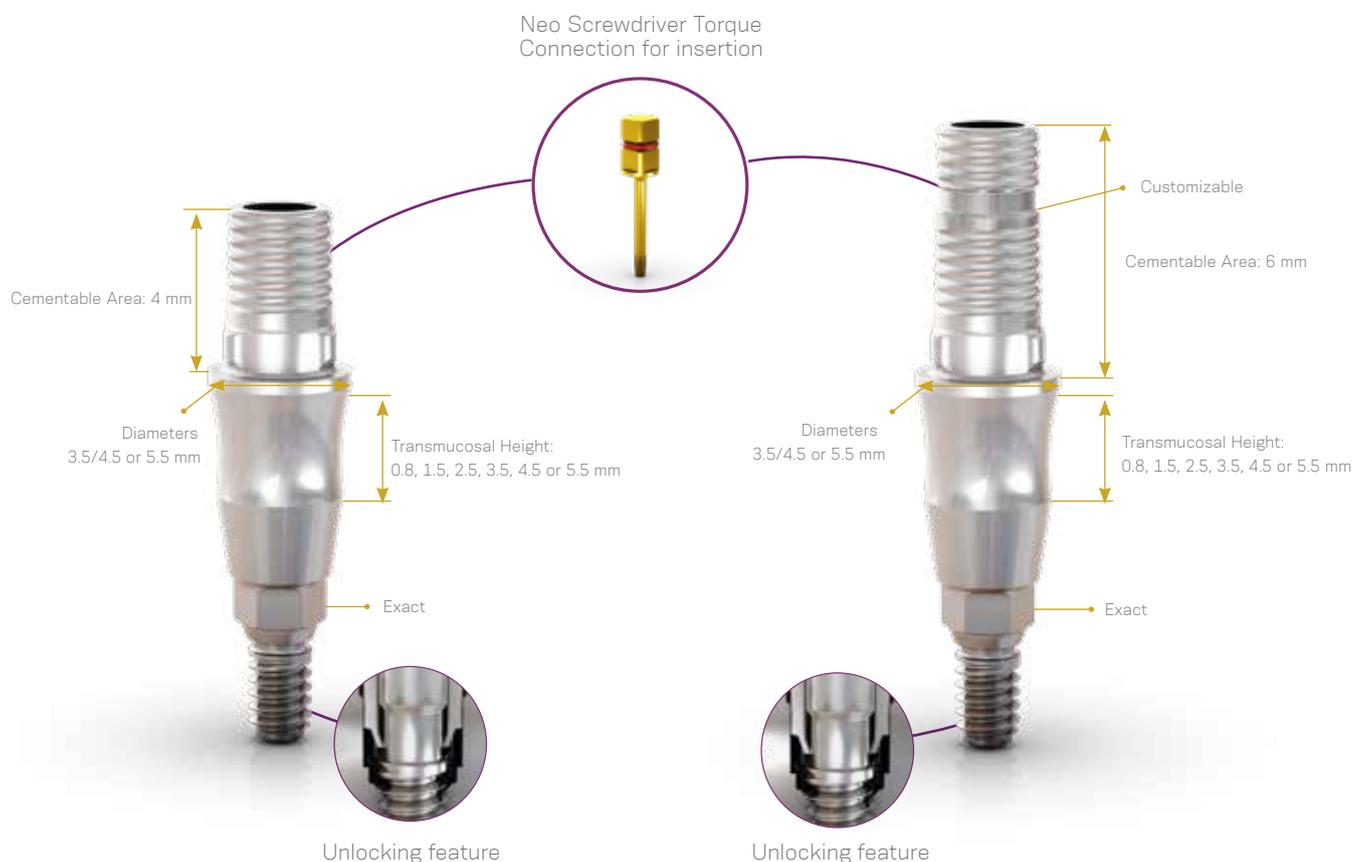
- Select the GM Pro Peek Abutment according to the treatment planning, respecting the biological tissues as previously described and install it (20 N.cm with Neo Screwdriver Torque Connection);
- Make sure that the abutment is aligned with the insertion axis of the implant;
- Ensure that it is perfectly seated on the implant (using periapical X-ray);
- Prepare the GM Pro Peek Abutment with a high-speed in the patient's mouth. 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 chairside) of customized parts and is covered by 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 and check occlusion;
- 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.





Note 2: Titanium Bases can also be used according a conventional workflow for ceramic injection molding. For this, steps A-E are substituted to conventional procedures with plaster models, a burn-out coping is waxed and taken to the furnance.

7.1.3 GM Exact Titanium Base C

The GM Exact Titanium Base C allows in-house milling (in the laboratory or chairside) with the Neodent Originals Program, using the CEREC® System, provided by Dentsply Sirona®. 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 C has the following characteristics:

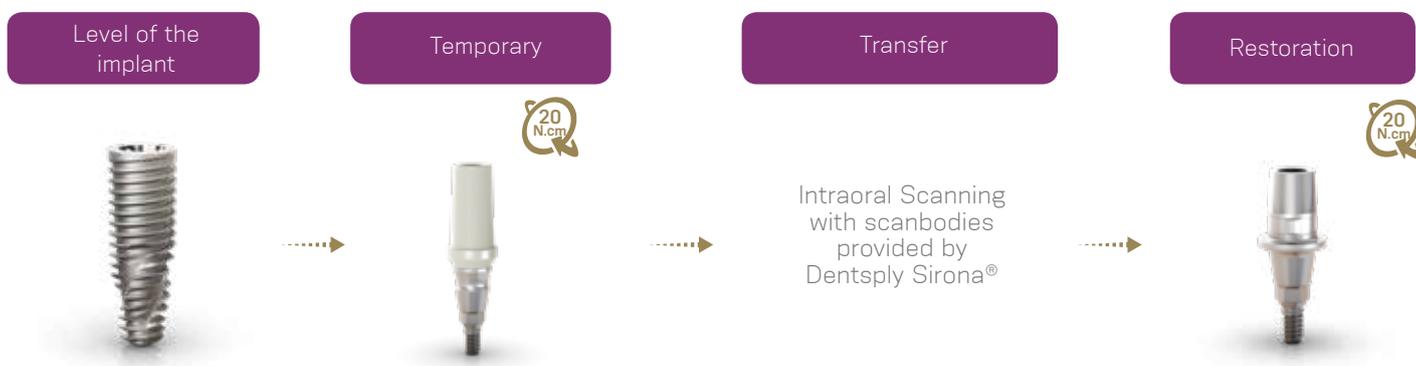


Follow these steps to use the GM Exact Titanium Base C:

- A. Select the GM Exact Titanium Base C according to the transmucosal height;
- B. Insert the GM Exact Titanium Base C (using the Neo Screwdriver Torque Connection);
- C. Insert the scanbody, provided by Dentsply Sirona®, on the GM Exact Titanium Base C and perform the intraoral scanning;
- D. Select in the CAD software the comparable third-party Ti-base and perform the digital design;
- E. Mill the digital design and cement the restoration onto the the GM Exact Titanium Base C in the laboratory. Be sure to remove all the cement excess;
- F. Before placing the prosthesis in the mouth, give it a final clean, as previously described;
- G. Proceed with the placement in the mouth (using the Neo Screwdriver Torque Connection with a torque of 20 N.cm);
- H. Make sure that the prosthesis is aligned with the axis of insertion of the implant;
- I. 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).

Cerec® digital library compatibility

| Library | Sirona's Products | | | | Compatible with implant System | | | | | |
|-------------------|-------------------|-----------|----------------------|------------------------------|--------------------------------|----------------------|----------------|------------------|-------|----------------|
| | Ti-base | Scan Body | REF scanbody Omnicam | REF scanbody Bluecam / Ineos | Grinding block | Implant manufacturer | Implant system | Implant diameter | | Abutment screw |
| NBB 3.4 L | | | | | | | | | | |
| NB A 4.5 L | | | | | | | | | | |
| SSO 3.5 L | L | 9431329 | 6431303 | InDent Zi meso L | Neodent | GM HE iPlus | CM | Ø1: 3.3-4.1/4.3 | iPlus | Included |
| S BL 3.3 L | | | | | | | | | | |
| S BL 4.1 L | | | | | | | | | | |
| BO 3.4 L | | | | | | | | | | |



7.1.4 GM CoCr Base

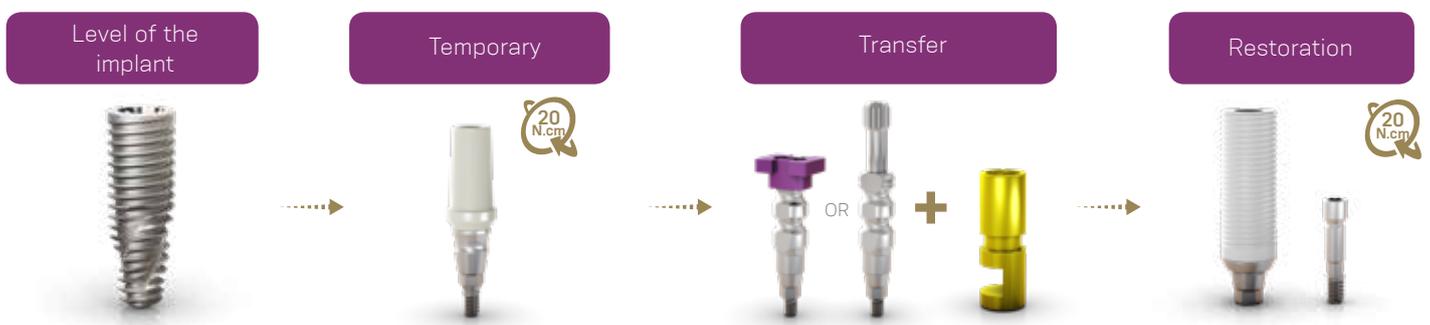
The GM CoCr Base can be used for single-unit prostheses, screw or cement-retained. It is offered in three different diameters and is available as a set, which includes a GM CoCr Base, one titanium screw and one GM Implant Analog. The 3.5/3.75 GM CoCr Base is indicated for Ø 3.5 or Ø 3.75 Grand Morse Implants; the 4.0/4.3 GM CoCr Base is indicated for Ø 4.0 or Ø 4.3 Grand Morse Implants; and the 5.0/6.0 GM CoCr Base is indicated for Ø 5.0 or Ø 6.0 Grand Morse Implants.

The GM CoCr Base is available with a customizable height of 12 mm, which can be reduced up to a minimal remaining of 5 mm. GM CoCr Bases have the following characteristics:



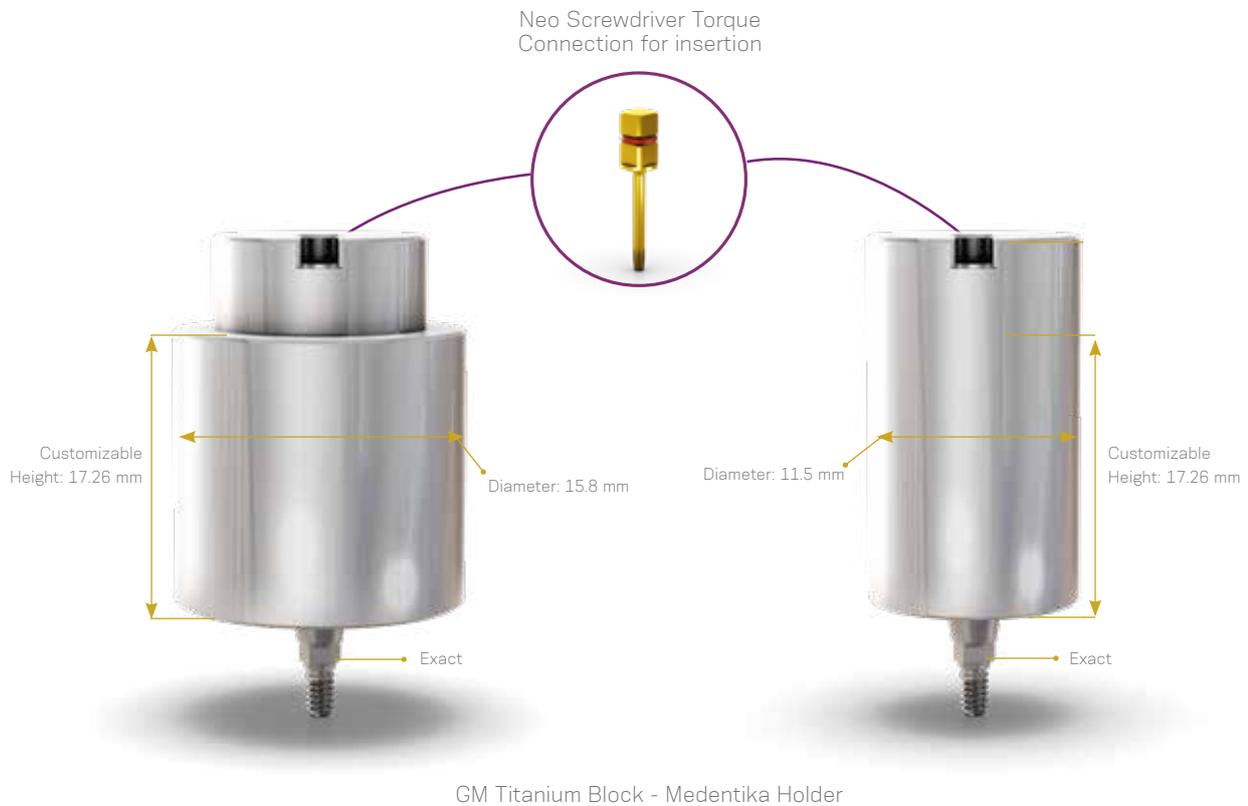
Follow these steps to use the GM CoCr Base:

- A. Identify the Grand Morse implant diameter (3.5, 3.75, 4.0, 4.3, 5.0 or 6.0) in order to define the set of GM CoCr Base to be used, if: (a) 3.5/3.75; (b) 4.0/4.3; (c) 5.0/6.0;
- B. Carefully adapt one of the GM Implant Impression Copings over the implant and take the impression;
- C. Place the selected GM Implant Analog (3.5/3.75; 4.0/4.3 or 5.0/6.0) in the Impression Coping, produce the plaster model and send it to the laboratory, along with the GM CoCr Base (3.5/3.75; 4.0/4.3 or 5.0/6.0);
- D. Insert and prepare a GM Pro Peek Abutment for temporalization (using the Neo Screwdriver Torque Connection with a torque of 20 N.cm);
- E. The laboratory technician then produces the piece using conventional techniques. The restoration can be either cemented or screw-retained, crown cementation is performed at the patient mouth if a cemented restoration is chosen.
- F. After temporalization, make sure that the soft tissues and emergence profile are ready;
- G. Insert the set of the defined GM CoCr Base, using the Neo Screwdriver Torque Connection with a torque of 20 N.cm and the screw that comes in the GM CoCr Base set (if the restoration is cement-retained, this procedure should be performed after GM CoCr Base adaption, avoiding cement excess);
- H. Ensure that it fits perfectly on the implant and that the prosthesis is not pressing on the peri-implant tissue.



7.1.5 GM Titanium Block

GM Titanium Blocks are blank titanium blocks created to be adapted in milling machines and posteriorly customized in-house (in the laboratory or chairside). The pre-made implant abutment connection allows it to be applicable to the Original Neodent program. They are available in two different diameters: 11.5 mm and 15.8 mm, for Medentika holder. GM Titanium Blocks share the following characteristics:



Follow these steps to use the GM Titanium Block:

- Select the GM Titanium Block according to the necessity for diameter and angulation of the customized abutment;
- Insert the GM Implant Intraoral Scanbody on the Grand Morse Implant (using the Neo Screwdriver Torque Connection) and perform the scanning;
- Select in the CAD software the compatible abutment related to the previously chosen and perform the digital design;
- Mill the designed part;
- Before placement, perform a final clean as indicated by the manufacturer;
- Place the customized abutment on the Grand Morse Implant (using the Neo Screwdriver Torque Connection with a torque of 20 N.cm);



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.



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.



7.2.3 GM Exact Click Universal Abutment (cement-retained single)

The GM Exact Click Universal Abutment is intended to be used for cement-retained single prostheses. It has a click system that helps in the impression and the cementation/production of temporary prostheses. The GM Exact Click Universal Abutment is available in different sizes, as listed below.

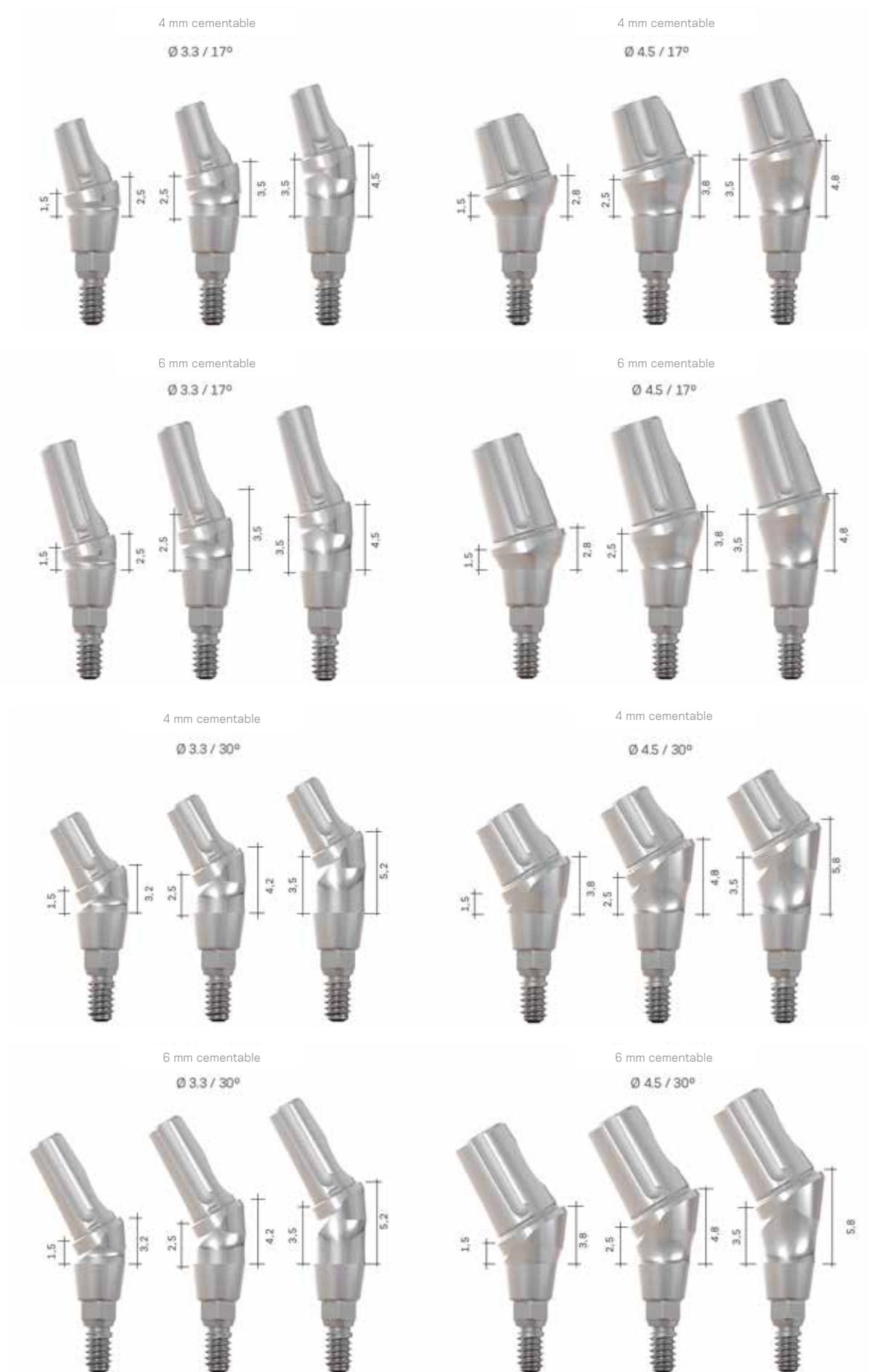


The click system is reproduced in all the analogs and acrylic cylinders for temporary crowns. In addition, all analogs and impression transfers are identified by colors according to the height of the cementable area (violet for 4 mm and green for 6 mm), Figure 14. The Hybrid Repositionable Analogs may also be used in this workflow.



Figure 14. Analogs with slots for the click system and the difference in the colors of the analogs and transfers identify the height of the cementable area.

The GM Exact Click Universal Abutment is available in different angles (straight, 17° and 30°) for all the formats offered. Angled abutments permit different transmucosal heights, as shown below.



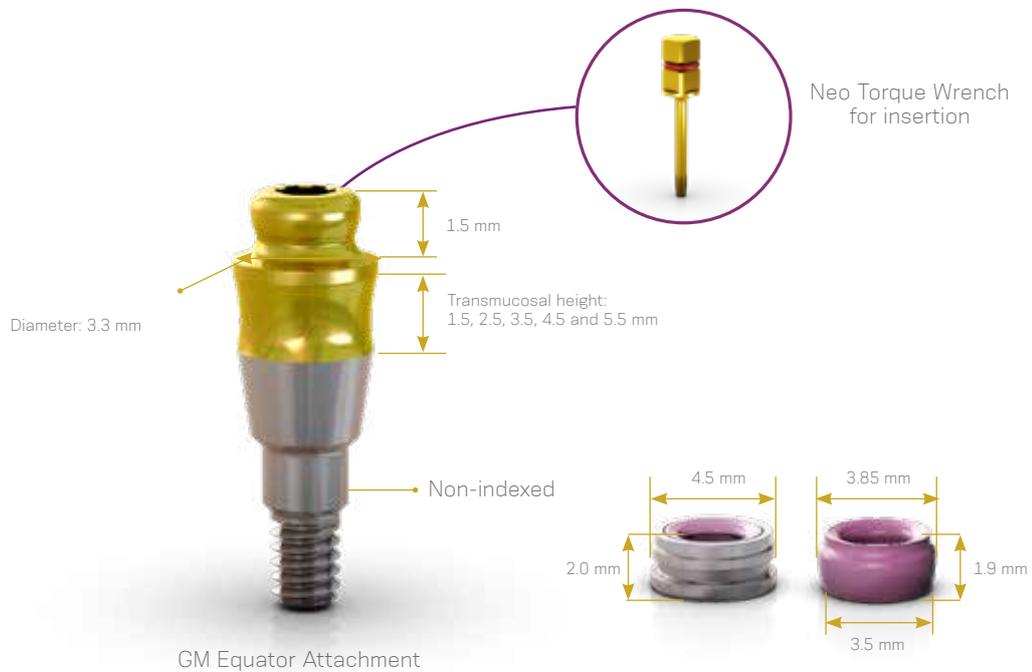
The following steps should be used when placing the GM Exact Click Universal Abutment:

- A. When the healing abutments are removed, the GM Exact Click Universal Abutment can be used immediately, given that there is the option to use acrylic cylinders for temporary crowns, and the emergence profile can be defined from them;
- B. Place the GM Exact Click Universal Abutment (use the Neo Screwdriver Torque Connection with a torque of 20 N.cm);
- C. Following the temporary fitting, check that the soft tissue and emergence profile are ready;
- D. Select the appropriate GM Exact Click Universal Abutment according to the treatment plan, respecting the biological tissues, as previously described;
- E. Ensure that it fits well and use a transfer for closed tray impressions with the click function to transfer the GM Exact Click Universal Abutment;
- F. Send the impression to the laboratory and produce a model, inserting the chosen analog in the impression coping with click;
- G. The laboratory technician then produces the piece using conventional techniques (lost-wax) or milling (CAD/CAM);
- H. Cement the prosthesis and avoid excess cement on the peri-implant tissue;
- I. Ensure that it fits perfectly on the abutment and that the prosthesis is not pressing on the peri-implant tissue. Also check for a possible excess of cement (with the aid of periapical X-ray).



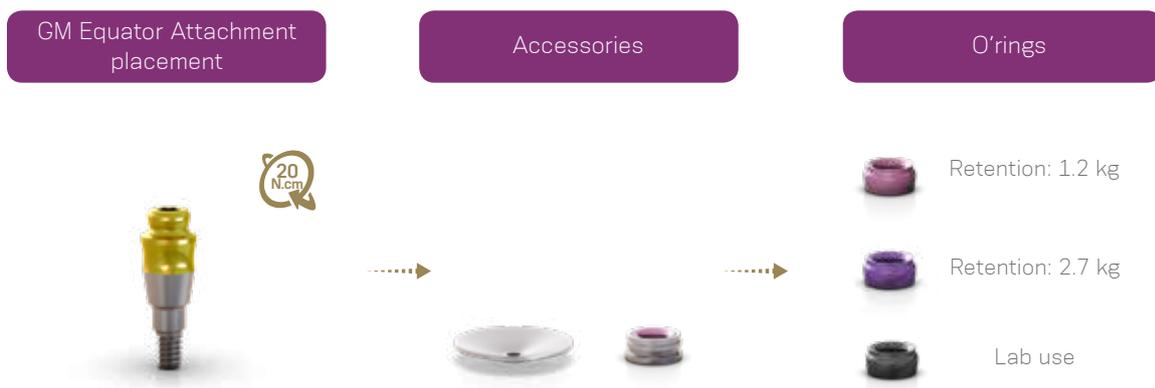
7.2.4 GM Equator Attachment (overdenture)

The GM Equator Attachment is recommended for removable prostheses retained by attachments, known as overdentures. Equator accepts a angulation of 30° between two implants. Its small dimensions require a minimal amount of abrasion to adapt it in the prostheses. GM Equator Attachments offer 2 options of retention, with a stronger retention force being provided by the purple o'ring (2.7 Kg) and a lighth one, rose (1.2 kg). To this technique, it is indicated the placement of minimum two Grand Morse implants and abutments.



Follow these steps to use the GM Equator Attachment with overdenture:

- A. Make a new total prosthesis/denture for the patient;
- B. Install the GM Equator Attachment, with the Neo Screwdriver Torque Connection and 20 N.cm torque;
- C. Position the protection disk over the GM Equator Attachment and, over them, the O’ring with Cylinder;
- D. Make a relief on the intaglio surface of the new prosthesis, in the region where the O’ring with Cylinder will be placed and check for correct fit and lack of interferences;
- E. Capture one cylinder at a time, with the aid of self curing acrylic resin in centric relation;
- F. After capturing the two cylinders, remove the protection disk from the GM Equator Attachment;
- G. Polish the prosthesis and install it.



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

9.0 OVERVIEW OF TORQUES AND CONNECTIONS



Neo Screwdriver
Torque Connection



Hexagonal
Prosthetic Driver

| | | | |
|---|---------------------------------------|---------|---------|
|  <p>GM Grand Morse</p> | 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 Exact Titanium Base C | 20 N.cm | |
| | GM Titanium Block | 20 N.cm | |
| | GM CoCr Base | 20 N.cm | |
| | GM Pro Peek Abutment | 20 N.cm | |
| | GM Equator Attachment | 20 N.cm | |
| | Neo Prosthetic Screws | 20 N.cm | |

10.0 GRAND MORSE ABUTMENT TRY-IN KIT

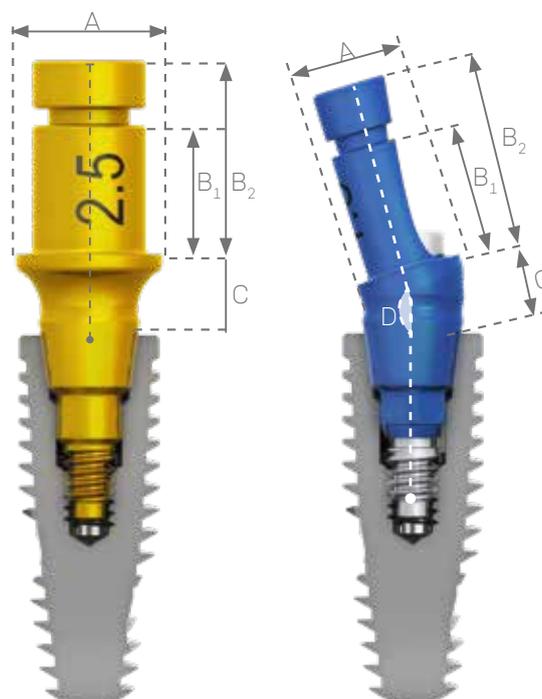
To help choosing healing abutments and prosthetic abutments, Neodent has developed the Grand Morse Prosthetic Try-in Kit, with all of the possible combinations of width, transmucosal height, angulation and interocclusal height of the Grand Morse abutment line. It is a cassette composed with titanium pieces similar to abutments. Every abutment has individual dimensions replicating important references for diagnosing the spaces.



Grand Morse Abutment Try-In Kit, composed by titanium pieces similar to the abutments.

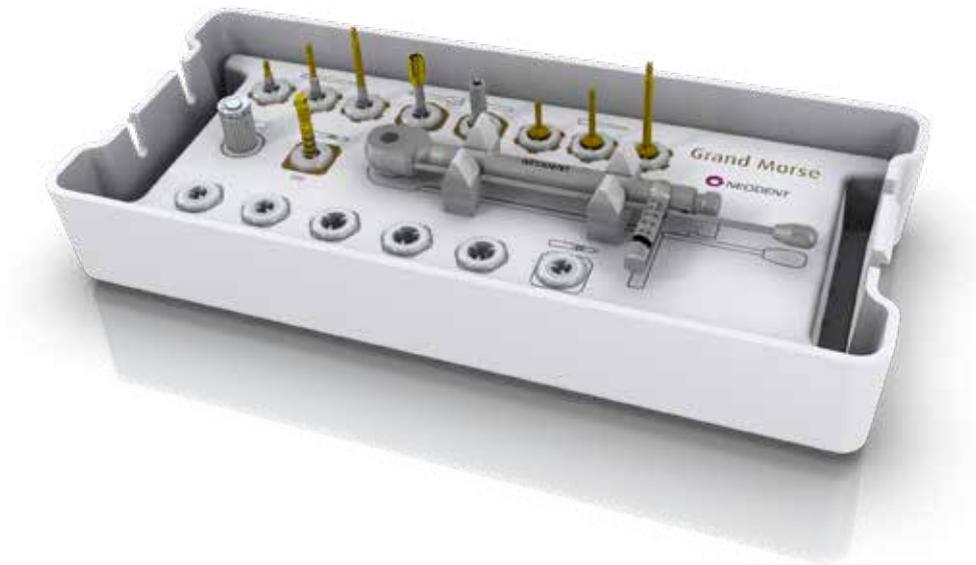
The main references are:

- A. Diameter;
- B. Occlusal height of the prosthetic component ($B_1 = 4 \text{ mm}$; $B_2 = 6 \text{ mm}$);
- C. Transmucosal height;
- D. Angle (in Neodent it can be straight, 17° and 30°).



11.0 GRAND MORSE PROSTHETIC KIT

The Grand Morse Prosthetic Kit features all instruments necessary to insert the Grand Morse abutments: Neo Screwdrivers Torque Connections for Contra-angle and for Torque Wrench, Hexagonal Prosthetic Drivers for Contra-angle and Torque Wrench, a Manual Screwdriver Torque, a GM Height Measurer and a Torque Wrench.



Grand Morse Prosthetic Kit

12.0 NEODENT TECHNIQUES

12.1 One Step Hybrid

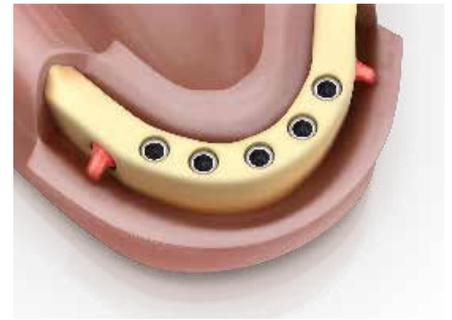
The One Step Hybrid technique allows the passive fitting of prostheses, without the need for welding, by cementing the Titanium Coping onto the metal structure. It is indicated for multiple-unit screw-retained prostheses and results in reduced laboratory work times. It can be performed over GM Mini Conical Abutments or GM Micro Abutments. The sequence to perform the One Step Hybrid technique is described in the following images:



1) Normalization of alveolar ridge.



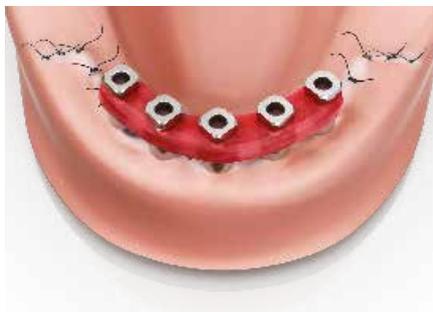
2) Surgical drilling completed, obtaining adequate distance from distal implant in relation to the mental foramen with 7 mm Space Planning Instrument.



3) Placement of 5 Neodent implants, according to their indication.



4) Placement of corresponding Neodent Abutments.



5) Placement of Impression Copings, splinted with acrylic resin.



6) Positioning of Multifunctional Guide to obtain intermaxillary ratios. After splinting impression copings, soft silicone is injected to take the soft tissue impression.



7) Removal of Multi-Funcional Guide and placement of Analogs to the impression copings.



8) Working model with artificial gum.



9) Castable One Step Hybrid Coping, Brass One Step Hybrid Coping, grooved Titanium One Step Hybrid Coping, with lower dimensions than the brass one, which compensates using the mill.



10) Brass Copings are placed over analogs, then Castable Copings are fixed by working screws.



11) Castable ring with waxed framework.



12) Cast framework.



13) Adapting the framework over the stone model.



14) Please note cementing area.



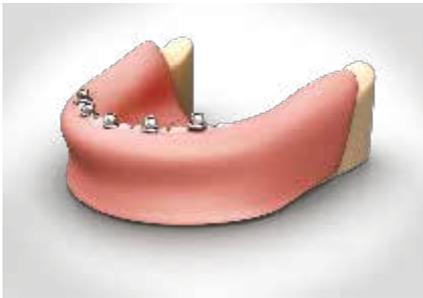
15) Cementing with Panavia™ (Kuraray America, Inc) the structure over the Titanium copings.



16) Final inside-mouth view.

12.2 Distal Bar

This technique is used to ease mandible rehabilitations, by a provisional total prosthesis supported by implants. The prosthesis is then more resistant to fractures, due to the resulting cantilever. The Distal Bar technique can be performed over GM Mini Conical or Micro Abutments. The technique is described by the following images:



1) Neodent Abutments placed.



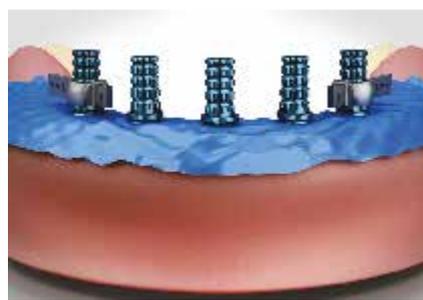
2) Prosthesis wearing, keeping posterior region integrity.



3) Placing of copings to central Implants and Distal Bar to distal Implants.



4) Proof of inferior prosthesis wearing (centered occlusion position, no interference on copings).



5) Placement of rubber dam over copings to protect soft tissues.



6) Applying selfpolymerizing acrylic resin on copings.



7) Applying acrylic resin between copings.



8) Applying to worn area in lower prosthesis, repositioning inside mouth, patient in occlusion until total polymerization.



9) Removal of inferior prosthesis after resin is polymerized, copings already captured.



10) Wearing, finishing and polishing of inferior prosthesis with polishing protectors.



11) Provisional implant supported prosthesis completed.



12) Final posterior inside-mouth view.

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(GM_PM_EN_V2)