Volume

1

VELOCITY LABS INC.

Vacuum Hip Disarticulation Fitting Manual

PROSTHETIC CENTRAL FABRICATION AND SUPPLIES

Vacuum Hip Disarticulation Manual

---

40 West Illiana Street
Orlando, FL 32806
Phone 407.841.6335 • Fax 407.841.6336
Version 101306

Table of Contents

Section

1

Vacuum Background

This section will discuss the history and techniques of high vacuum systems

High vacuum systems have been around since the late 90's and utilized vacuum in excess of 15 in/mg to achieve superior suspension and proprioception for the amputee. Initially developed for transtibial amputees recent developments in transfemoral socket design has made it possible to apply high vacuum to a transfemoral amputation by utilizing an inner socket and retainer.

High vacuum is achieved in TT and TF amputations by the use of a silicone liner and a suspension sleeve. The liner is held to the amputees' skin by way of compression and a lack of air between the liner and the skin. A sheath or sock is placed over the liner as a vacuum wick. The amputee steps into the socket and seals the socket to the liner with a suspension sleeve. The vacuum pulls the liner (with the skin) to the wall of the socket thus creating superior linkage.

This differs from a regular expulsion valve. Expulsion valves can never expel all the air since air is required to crack open the duckbill valve. When a small amount of air is left in the socket pistoning occurs.

The Vacuum Hip Liner developed at Velocity Labs combines the sleeve and liner in one. The liner is worn like a pair of shorts which utilizes the compression and tackiness of the liner to hold onto the amputees' skin. A carbon fiber plate is inserted into the vacuum circle in the liner. Vacuum is applied between the liner and the carbon plate, locking the plate and liner together. The plate is then connected to the socket by way of an anterior and posterior lanyard. The only additional suspension is a contra-lateral belt that controls the lateral moment at mid-stance.

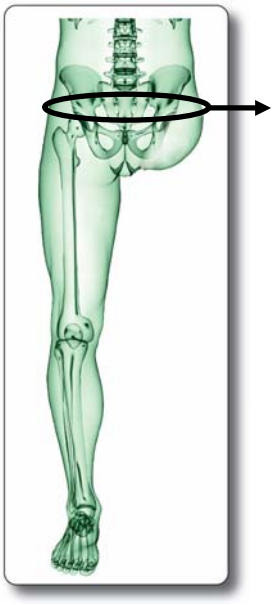
Section

2

Selecting a liner

This section will discuss how to select the proper size for your liner

Liners are sized based on the largest circumference measured. With the amputee standing record several measurements with the tape measure parallel to the floor. Use the largest measurement to select the appropriate size off-the-shelf hip liner. If the amputee has any invaginations or an irregular shape you may need a custom fabricated hip liner. Custom hip liners are fabricated from a skin cast of the amputee.



Vacuum Hip Liner (VHL) sizing chart

Circumference	Liner
12-18	X-small
18-26	Small
26-32	Medium
32-42	Large
42-52	X-large

Casting for a CUSTOM VHL:

1. Wrap one plaster bandage around the waist like a belt while the amputee is standing.

2. Tuck one end of a plaster bandage segment into the belt created in step one and bring it under and tuck it into the anterior portion of the belt. This will support the medial tissue and be the most medial segment.

3. Fill in-between the waist belt and medial segment with additional plaster bandage until the effected side is covered.

4. Cut off the contra-lateral plaster bandage belt.

5. Write the amputee name, facility and waist measurement on the cast and send to Velocity.

Section

3

Casting over a VHL

This section will discuss how to cast over the liner for a first stage check socket

It is necessary to cast over the VHL in order for the check socket to have space for the liner. This manual demonstrates our method of casting, however, many techniques may be used including the MAS and blocking method. Use the casting method that you are most comfortable with.

Casting over a HVL:

1. Start with a section of bandage from the posterior waist to the anterior waist. This section will be the most medial strip and support the distal tissue

Figure 1

Figure 2

2. Add a section of plaster bandage circumferentially at waist height. This section will be the most proximal and serve to support the rest of the cast.

3. Continue to fill in the exposed portion of the cast

Figure 3

4. Once the cast has been filled in with plaster bandage, support the tissue until the cast fully sets.

Figure 4

5. Cut the waist section from the cast

Figure 5

6. Once the cast has been cut, fill the cast and modify as usual. We recommend reducing the cast by 2% circumferentially.

Figure 6

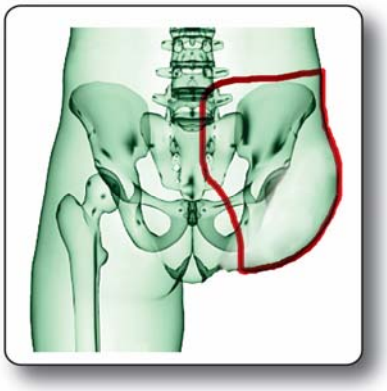
Section

4

Fitting the initial check socket

This section will discuss how to fit the first stage check socket for a VHL

Once you have modified the cast, pull a ½" check socket over the cast. Keep in mind that a check socket for a VHL does not extend to the contra-lateral side as in traditional sockets. A VHL socket should encompass the amputated side but not extend past the midline of the body. Try to keep the trim lines high for initial fitting and trim down as needed.



7. Once the check socket is ready, cover the inside of the socket with vegetable shortening. This will help visualize high and low pressure areas.

Figure 7

8. Have the amputee sit on the edge of a casting table or other suitable surface.

Figure8

9. Adjust the check socket according to the pressures indicated by the vegetable shortening. Based on the fit of the socket you may need to make a second check socket.

Figure 9

Figure 10

10. After you are satisfied with the fit of the socket, outline the large and small circle of the VHL on the socket. Send the cast into Velocity Labs for the final check socket manufacture.

Section 5

Fitting the final check socket

This section will discuss how to fit the check socket from Velocity Labs

The final check socket that you receive from Velocity Labs will include the vacuum plate, lanyard system, valve, check socket and Corflex hip belt. This check socket will allow you to set the hip joint and dynamically align the prosthesis. It is important to keep in mind the basic principals of alignment and keep the weight line in front of the knee. With some hip joints this can be difficult. The 7E7 hip joint from Otto Bock™ is recommended, but is not the only choice. If using the 7E7 you will need an angled tube adaptor to move the joint forward and achieve a stable socket. The use of an intelligent knee will help the amputee with stumble control and even control some instability in the socket, but nothing can replace proper alignment.

11. Have the amputee donn the socket and stand in the parallel bars.

Figure 11

Figure 12

12. Set the componentry up with the proper height. Place an appropriate bonding material on the hip plate and slide the joint under the amputee and let the bonding material set. See figure 13 for suggested placement.

13. Set the hip towards the lateral side of the socket. This will help control the lateral moment during mid-stance.

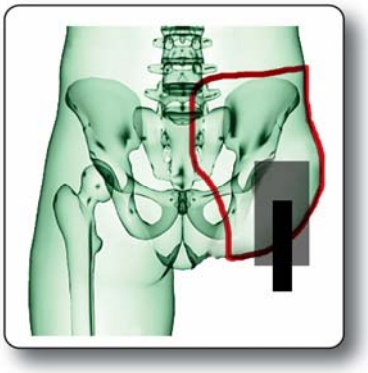


Figure 13

14. Once the bonding material has set, remove the socket and hip joint and secure the hip joint to the socket with bolts through the socket and plate. Secure the bolts with nuts on the plate side.

Figure 14

15. Continue with dynamic alignment until a satisfactory result is achieved.

Figure 15

15. Once a comfortable and well aligned leg is achieved, send the check socket and plate to Velocity Labs for completion.

Figure 16