Patient Guide for Trach, Suction, or Aerosol Patients

Servicing Location: ________________________________

Location Phone Number: __________________________
## Contents

INTRODUCTION ......................................................................................................................................................4  
NORMAL BREATHING ...............................................................................................................................................5  
THE TRACHEOSTOMY ...............................................................................................................................................5  
HOME CARE VS. HOSPITAL CARE ..........................................................................................................................7  
STERILE TECHNIQUE INCLUDES: ............................................................................................................................7  
CLEAN TECHNIQUE INCLUDES: ..............................................................................................................................7  
TOPICS COVERED IN THIS BOOKLET: .....................................................................................................................7  
TRACHEOSTOMY SKIN CARE .....................................................................................................................................8  
THE SUPPLIES NEEDED ARE: ..................................................................................................................................8  
PROCEED AS FOLLOWS: ..........................................................................................................................................8  
CHANGING TRACH TIES ..........................................................................................................................................9  
HOW TO SUCTION THE TRACHEOSTOMY ..............................................................................................................10  
SIGNS AND SYMPTOMS THAT INDICATE THE NEED FOR SUCTIONING INCLUDE: ......................................11  
HERE ARE THE SUPPLIES YOU WILL NEED TO SUCTION: ....................................................................................11  
STEPS FOR SUCTIONING: .......................................................................................................................................12  
CLEANING: UNCUFFED PLASTIC SHILEY TRACH TUBES .....................................................................................13  
SUPPLIES NEEDED: ................................................................................................................................................13  
DIRECTIONS: ............................................................................................................................................................13  
CLEANING: SILICONE BIVONA / CUFFED SHILEY TRACH TUBE .......................................................................14  
SUPPLIES NEEDED: ................................................................................................................................................14  
DIRECTIONS: ............................................................................................................................................................14  
HUMIDIFICATION .....................................................................................................................................................15  
SUPPLIES NEEDED FOR HUMIDIFICATION: ...........................................................................................................15  
AEROSOL COMPRESSORS FOR HUMIDIFICATION .............................................................................................15  
HEAT MOISTURE EXCHANGER (HME) ..................................................................................................................16  
EMERGENCY CARE ..................................................................................................................................................17  
WHAT TO DO IF A PERSON HAS DIFFICULTY BREATHING ...................................................................................18  
WHAT TO DO IF SOMEONE STOPS BREATHING - REMEMBER THE ABC’S OF CPR ............19  
A - AIRWAY - ...........................................................................................................................................................19  
B - BREATHING - ......................................................................................................................................................19  
C - CIRCULATION - ..................................................................................................................................................19  
WHAT TO DO - IF YOU CANNOT INSERT A NEW TRACH TUBE? .................................................................20  
WHAT TO DO - IF THE TRACH FALLS OUT? .........................................................................................................20  
CLEANING AND DISINFECTING RESPIRATORY SUPPLIES: .............................................................................21  
DISINFECT YOUR SUPPLIES: ...............................................................................................................................21  
VINEGAR SOLUTION (OPTIONAL) .......................................................................................................................21  
SUPPLIES THAT CAN BE CLEANED & DISINFECTED FOR REUSE: ...............................................................22  
CLEANING YOUR RESPIRATORY EQUIPMENT WEEKLY: ..................................................................................22  
DO’S AND DO NOT’S: ..............................................................................................................................................22
INTRODUCTION

These pages have been written to help you learn how to take care of your child / adult at home with a tracheostomy. As you learn about the care he / she needs you may have a wide range of feelings. Please feel free to talk about your feelings or concerns with our Respiratory Care Practitioner (RCP) or your doctor.

Remember, before you leave the hospital you will have many chances to practice all of the things that you will need to do at home. A nurse or an RCP will always be with you as you are learning. You may find that reading these pages answers many of your questions. It may also help you think of more questions. Please write down your questions so that you can ask the right people when you see them. If any information within these pages in confusing please ask our Respiratory Care Practitioner (RCP) to explain it. The more you understand about your loved one’s medical condition and care, the more comfortable you will feel at home.

Please note: The information included in this document is for informational purposes only, and is not intended to substitute in any way for medical education, training, treatment, advice, or diagnosis by a healthcare professional. Barnes Healthcare Services makes no warranties related to the information in this document. A qualified healthcare professional should always be consulted before making any healthcare related decisions.
NORMAL BREATHING

Normal breathing takes little effort or thought. Air is inhaled through the nose and passes through the breathing passages into the lungs.

As air passes from the nose to the lungs, it picks up moisture and heat from the body. Oxygen from the inhaled air passes from the lungs into the bloodstream so that it can be used by the tissues and organs of the body.

THE TRACHEOSTOMY

You may already know the reason why your child or adult needs a tracheostomy. If you are not sure, ask your RCP or doctor to explain the relevant medical condition or diagnosis to you.

A tracheostomy is an operation in which a small opening is made into the windpipe (trachea) through a cut made in the skin on the neck. After the skin has healed, the opening is called a stoma or tracheostomy. A tracheostomy tube is kept in the stoma to keep the hole open. Sometimes you may hear people refer to the tracheostomy simply as the “trach”.
There are two different kinds of tracheostomy tubes used for patients:
- Single cannula trach tubes which are used primarily for children; and
- Dual cannula trach tubes which contain an inner cannula for cleaning.

Trach tubes come in a variety of materials, Plastic (PVC), Silicone, & Metal. The operating physician will determine which material is best suited for a patient based on the length of need in addition to any anatomical challenges to maintain the airway.

Note: When applicable, a re-usable inner cannula trach tube is always recommended in the homecare setting for easier cleaning and managing the secretions in trach; (e.g. An 8DCT is the equivalent of an 8LPC).

**Trach Tube Conversion Chart (Disposable to Re-usable)**

<table>
<thead>
<tr>
<th>Disposable Trach Tubes - Hospital</th>
<th>Re-usable Trach Tubes - Homecare</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 DCT, DFEN, DCFS, DCFN</td>
<td>4 LPC, FEN, CFS, CFN</td>
</tr>
<tr>
<td>6 DCT, DFEN, DCFS, DCFN</td>
<td>6 LPC, FEN, CFS, CFN</td>
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<tr>
<td>8 DCT, DFEN, DCFS, DCFN</td>
<td>8 LPC, FEN, CFS, CFN</td>
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<tr>
<td>10 DCT, DFEN, DCFS, DCFN</td>
<td>10 LPC, FEN, CFS, CFN</td>
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HOME CARE VS. HOSPITAL CARE

While your child or adult is in the hospital, you will notice that the nurses will practice sterile technique (only used in the hospital) versus the clean technique which you will be using at home.

STERILE TECHNIQUE INCLUDES:

- Hand Washing
- Wearing sterile gloves
- Using a new trach tube, inner cannula, and trach tie
- Using sterile water (new bottle or bag every 24 hours)
- Discarding suction catheters after each use

CLEAN TECHNIQUE INCLUDES:

- Hand washing
- Using gloves (optional)
- Re-using a trach tube and / or inner cannula that has been properly cleaned
- Using prepared sterile water and normal saline
- Re-using the same trach ties if they are properly cleaned
- Re-Using suction catheters if they are properly cleaned (up to 8 hrs or 3 / per day)

Since the home environment has fewer germs and few sick contacts, the clean technique can be used. For this reason several adaptations have been made. At home you may reuse tracheostomy tubes by using the proper technique for cleaning trach tubes. You may also reuse many of your other supplies with proper cleaning instructions which are outlined in this booklet.

TOPICS COVERED IN THIS BOOKLET:

- Tracheostomy skin care
- Suctioning the tracheostomy
- Changing the tracheostomy tube
- Cleaning of the tracheostomy tube
- Humidification to trach and how to use a Heat Moisture Exchanger (HME)
- How to make sterile water & normal saline at home
- How to clean and disinfect respiratory supplies
- Emergency care
- Daily activities
- Re-order of supplies
TRACHEOSTOMY SKIN CARE

This next section reviews the care of a patient at home. Your nurse will also teach you how to clean the stoma in the hospital.

The skin around the trach requires special care. Secretions (mucus) from the trach can cause the skin to become red and sore if allowed to remain on the skin too long. As much as possible, the skin should be kept clean and dry. You may need to clean the skin around the trach tube several times throughout the day.

THE SUPPLIES NEEDED ARE:

- ✔ Basic trach care kit
- ✔ Wash basin with warm water
- ✔ Mild antibacterial soap (Dial™ hand soap is recommended)
- ✔ 2-3 clean washcloths or gauze dressing
- ✔ Clean Velcro trach ties (if ties need to be changed)
- ✔ Scissors

PROCEED AS follows:

1. Wash your hands thoroughly with soap and water before beginning.
2. Dip a corner of the washcloth in the warm water. Squeeze the water out and apply a very small amount of mild soap to the wet cloth. Rub the corners of the cloth together until the soap is absorbed into the cloth.
3. Remove soiled or wet trach ties. Be sure to secure the trach tube with one hand.
4. Start as close to the stoma as possible.
5. Clean the skin with the soapy washcloth wiping away from the trach opening. Wipe in one direction. Never wipe in a back and forth motion. Repeat the technique with another clean corner of the washcloth until all mucus or drainage has been removed.
6. Dip another corner of the dry washcloth into the warm water. Squeeze dry and rinse soap from around the stoma. Again wipe in one direction.
7. Take the second dry washcloth and dry the skin thoroughly. You may now clean the rest of the neck area.
8. Avoid using baby oils, lotions, or ointments unless ordered by your doctor.
9. Thread new Velcro tie and fasten in back of neck(trach ties are “One size fits all”).
CHANGING TRACH TIES

**Tip:** *It is a good idea to use a spare set of trach ties already cut to the correct size as a guide when cutting another set of trach ties.*

You will need to cut the trach ties to fit the neck properly. The trach tie will have a long end and a short end to attach the trach. You will be cutting the long end. Don’t be afraid to cut the tie. It should not be so long as to lie underneath the phalange (wings). You may also round the edges and cut off the label to increase the comfort. There are two sides to the trach ties. There is a dull side which lies against the neck. The fluffy side lies outward and is the side where the Velcro side will stick. You should not be able to place more than one finger’s width between the trach tie and the neck.

You may place a dry gauze trach dressing between the skin and the trach tube if a lot of tracheal secretions are present. These dressings need to be checked for drainage and changed at least every 2-4 hours.

Make sure the dressing does not cover the trach opening. This could restrict air flow and make it difficult to breathe.

Lastly call your doctor if you see any skin breakdown.
HOW TO SUCTION THE TRACHEOSTOMY

This section is going to review the importance of suctioning, and will cover:

- Signs and symptoms that indicate the need for suctioning.
- Supplies needed to suction
- Step by step instructions on how to complete the suctioning process.

Keeping the trach free of secretions is very important. However, mucus is a normal part of every person’s airway. It helps protect the respiratory system by filtering out dust, dirt, and some germs, which are inhaled with the air we breathe. Sometimes we have more mucus than usual, such as when we have a cold.

The tracheostomized person cannot close off the airway to create enough pressure when coughing to remove secretions. By inserting a small catheter into the trach tube, mucus is removed and a person can breathe more easily. Effective suctioning can decrease the possibility of upper airway infections, pneumonia, and a possible oxygen requirement.

At first, a person may pull away or cry when you try to suction. Suctioning is a little uncomfortable because it causes coughing, but it should not hurt the person. Try to remember you are helping them breathe easier when you suction. Also think about what you are doing, rather than how one is acting when you suction them.
SIGNS AND SYMPTOMS THAT INDICATE THE NEED FOR SUCTIONING INCLUDE:

- Seeing mucus in the opening of the trach tube or hearing mucus in the airway. Increased respiratory rate or effort
- Retractions (which is seen when the skin between the ribs pulls in while breathing)
- Nasal flaring (which is seen when the nostril flares out when a person breathes in)
- Change in skin color from normal to pale or blue
- Changes in activity, such as if a child is upset or inconsolable, or appears to be sleepy.
- Increased coughing

Important: Call your doctor if you notice thick secretions that are yellow or green in color.

Other times to suction include before eating, or before and after sleeping. Be aware that every sound you hear does not mean they need to be suctioned.

HERE ARE THE SUPPLIES YOU WILL NEED TO SUCTION:

- Self-inflating bag (if on oxygen or a ventilator)
- Prepared normal saline
- Suction catheter kit
- Gloves (optional)
- Suction source
- Ziploc bag (1) & Marker
- Oxygen (if required)
STEPS FOR SUCTIONING:

1. Wash your hands thoroughly with soap and water before beginning.
2. Open a suction catheter kit or remove from your marked Ziploc® bag.
3. Use prepared home saline solution.
4. Put on gloves (optional).
5. Attach a suction source to the catheter.
6. Test the force of the catheter by drawing up prepared sterile water through the suction catheter.
7. Measure a pre-set length of the catheter that you will insert into the trach tube. Make this measurement by inserting a catheter into a trach tube that is the same size as the tube. Extend it approximately 1 to 1½ mm past the tip of the tube. This is how far you will insert the catheter for suctioning.

Remember: **DO NOT** get stuck in the suction cycle, “where the more you suction the more secretions you create.”

8. Keeping your thumb off the valve, gently insert the catheter into the trach tube (figure ). Make sure that you are only inserting the pre-set length. If you do not clear the airway, you may have to insert the tube a little farther. **DO NOT FORCE THE CATHETER.**

9. Place your thumb on the suction control as you pull the catheter out (figure ). Roll the catheter between your fingers as you withdraw. The catheter should only stay in the trach for 5-10 seconds at a time because a person cannot breathe during suctioning.

10. Squirt 2-3 drops of prepared normal saline down the trach tube if the mucus appears thick. This will initiate a cough mechanism, so suction immediately. This should not be done routinely, and should only be done if needed. Between suctioning, you may also give 2-3 breaths with the self-inflating bag if necessary.

11. If the airway still sounds noisy, suction 2-3 more times until the lungs sounds clear. Once the lungs are clear do not suction again.

12. Finally suction a good amount of prepared sterile water through the suction catheter to clear the mucus from the connective tubing, then wipe off with gauze dressing. Place the clean catheter back in a zip lock and reuse up to 8 hours.
CLEANING: 
UNCUFFED PLASTIC SHILEY TRACH TUBES

SUPPLIES NEEDED:

✓ Dirty Trach tube and its obturator
✓ Mild anti-bacterial soap and water
✓ Pipe cleaner / brush (from trach care kit)
✓ Clean container or a new zip lock bag
✓ Paper towels
✓ Pen and tape

DIRECTIONS:

1. Clean the tube and obturator with soap and water. Using the obturator or pipe brush clean any mucus from inside the tube.
2. While cleaning, look for cracks or sharp edges. If you find any discard the tube.
3. Rinse the tube and obturator well in water. Soak in a mild soap and water solution for 2-3 hours in a clean container.
4. Rinse the soapy solution off and place the trach on a clean, dry paper towel to air dry. Place a clean paper towel over the wet tube and obturator to protect from dust let dry overnight.
5. Once the tube is dry, handle it by the wing only. Inspect it again for any damage.
6. Store in a clean container or zip lock bag. Label with the size of the trach tube and the date cleaned on the outside of the container or bag.
CLEANING:
SILICONE BIVONA / CUFFED SHILEY TRACH TUBE

SUPPLIES NEEDED:

- Dirty trach tube and obturator
- Mild anti-bacterial soap and water
- Pot or container for boiling water
- New zip lock plastic bag
- Paper towels
- Pen and Tape

DIRECTIONS

1. Clean the tube and obturator with mild soap and water using the obturator to clean any mucus from inside the tube.
2. While cleaning look for any cracks or sharp edges. If you find any, discard the tube. Rinse well with water.
3. Boil water in a pot and remove from direct heat source; or microwave water until it is boiling hot. Place the trach tube and obturator into the hot water. Leave the tube and obturator in hot water until the water is cool enough to pull the trach out using your bare hands. **NEVER boil tracheostomy tubes over direct heat!**
4. Allow water, tube, and obturator to cool. Place on a clean dry surface such as a paper towel. Place a clean paper towel over the wet trach to protect it from dust and let it dry overnight.
5. Store in a clean container or zip lock plastic bag. Label the container with the size of the tube and the date cleaned.
HUMIDIFICATION

The nose and mouth provide warmth, filtering, and moisture for the air we breathe. A trachostomy tube bypasses these mechanisms. Humidification must be provided to keep secretions thin and to avoid mucus plugs. Note, children and adults with tracheostomies do best in an environment of 50% humidity or higher.

SUPPLIES NEEDED FOR HUMIDIFICATION:

- Air Compressor
- Nebulizer Bottle
- Aerosol Tubing
- Aerosol Drainage Bags
- Trach Mask
- Prepared Sterile Water
- Heat Moisture Exchanger (HME) for daytime use; Also known as the following: Thermal Humidifying Filters, Artificial Nose, Thermovent “T”.
- Room Humidifiers

AEROSOL COMPRESSORS FOR HUMIDIFICATION

Humidity should be delivered while sleeping. Attach a mist collar (trach mask) with aerosol tubing over the trach with the other end of the tubing attached to the nebulizer bottle and air compressor. Prepared Sterile water goes into the nebulizer bottle (do not overfill, note line guide). Oxygen can also be delivered via the mist collar if needed with an oxygen bleed-in valve.

Heated mist may be ordered, and is accomplished by an electric heating element that fits onto the nebulizer bottle. Extra care should be taken to be sure the bottle doesn’t go dry, which could melt plastic. Many of these heating elements do not have automatic shut-offs and this could be a potential fire hazard. Also, more moisture will accumulate in the aerosol tubing with heated mist. Moisture that accumulates in the aerosol tubing must be removed frequently to prevent occlusion of the tube and/or accidental aspiration.
Disconnect tubing at the trach end, empty into a container and discard. Do not drain fluid into the humidifying unit. Fluid traps, also called drainage bags, are helpful in preventing occlusions and aspiration. These collection devices also need to be emptied frequently. Position the air compressor and tubing lower than the child to prevent aspiration from moisture in the tubing. A mist collar can also be worn during the day when mucus is thick or blood tinged. Additional fluid intake can also help to keep secretions thinner.

**HEAT MOISTURE EXCHANGER (HME)**

Secretions can be kept thin during the day by applying a Heat Moisture Exchanger (HME) to the trach tube. An HME is a humidifying filter that fits onto the end of the trach tube and comes in several shapes and sizes (all styles fit over the standard trach tube opening). There are also HME’s available for use with the portable ventilators. Bedside ventilators also have an add-on humidifier with a water chamber. HME does also help to prevent small particles or insects from entering the trach tube.
EMERGENCY CARE

In the event of any life threatening / medical emergency please call 911, do not call Barnes Healthcare Services. Only call Barnes Healthcare Services once you or the patient are stable in the Emergency Room to make us aware of the situation.

These pages will cover the prevention of an emergency situation, and what to do in certain situations:

- Your loved one has trouble breathing or stops breathing
- You cannot insert a trach tube
- The trach falls out

The following list is a list of preventative measures that may help to avoid some problems:

Make sure the trach is getting enough humidity. Humidity will keep the mucus loose and decrease the chances of a mucus plug. If you hear a whistling sound from the trach, this might mean that the airway is dry.
Always make sure the trach ties are securely fastened and are tight enough around the neck.
Make sure that the trach is open to air and that nothing is blocking it such as clothing or bedding.
Always have a child nap or sleep with his / her apnea monitor or pulse oximeter on. Do not discontinue using this unless first discussing this with your ENT doctor.
WHAT TO DO IF A PERSON HAS DIFFICULTY BREATHING

The most common reason for breathing problems, other than an illness, is that the track tube becomes plugged with dried mucus. Making sure to provide enough humidity can help prevent this problem. However, if the trach does become plugged, try to remove the plug by suctioning.

If you have trouble passing the catheter into the trach and it feels tight, put a few drops of saline into the tube and try to suction again. Do not force the catheter; it may push the plug in further.

If you are unable to remove the mucus plug, change the trach tube and try to suction again.

Signs and Symptoms of difficulty breathing are:

- **Retractions** - Pulling of the skin between the ribs, under the breastbone or around the trach itself.
- **Sweaty and pale skin** - A person is sweaty and pale and seems to be working hard to breathe while at rest.
- **Dusky lips or nail beds** - The lips or nail beds look dark, dusky, or blue.
- **Feeling restless or frightened** - A person is restless or looks frightened for no apparent reason.
WHAT TO DO IF SOMEONE STOPS BREATHING - REMEMBER THE ABC’S OF CPR

**A - AIRWAY -**

Check to make sure that the tube is open to air. Look, listen, and feel for air coming from the trach and watch the chest for movement. Position the head so the neck is exposed.

**B - BREATHING -**

Use your mouth or self-inflating bag to give the patient two breaths through the trach. Feel for air leaking from the nose or mouth. If this happens, cover the mouth and nose with your hand. If you cannot pass air through the trach, change the tube. You should squeeze the bag slowly and gently with only enough force to see the chest rise.

**C - CIRCULATION -**

Check for signs of movement such as coughing or signs of breathing after giving 2 breaths. After giving the two initial breaths, start compressions.

If someone is available, have them call 911. If no one is available, perform CPR for one minute then call 911. Continue CPR as you were taught until help arrives. You will not be sent home without learning CPR. This will be taught to you while you are in the hospital.
WHAT TO DO -
IF YOU CANNOT INSERT A NEW TRACH TUBE?

Barnes Healthcare Services does NOT recommend inserting a new trach tube in the home unless you have been trained to do so. Please take the patient to an Emergency Room and call the physicians office.

WHAT TO DO -
IF THE TRACH FALLS OUT?

Barnes Healthcare Services does NOT recommend inserting a new trach tube in the home unless you have been trained to do so. Please take the patient to an Emergency Room and call the physicians office.
CLEANING AND DISINFECTING RESPIRATORY SUPPLIES:

The cleaning and disinfecting of your respiratory supplies is essential to the health and wellness of any child or adult. Whenever moisture is present, from water supplies, from body humidity, or any bodily fluid bacteria can grow (24-72 hours). If your supplies are not properly cleaned and dried, bacteria can build up and can lead to infections in the body, especially in the airway passages. Also the oils in our skin and the minerals in tap water can cause premature breakdown in the materials used to manufacture your supplies. Therefore, we recommend the cleaning and infection schedule be followed diligently. Daily cleaning removes dirt and oils that may harbor germs. Disinfection kills germs that may lead to infection. Remember to always wash our hands prior to handling supplies used for everyday care.

You will need the following cleaning supplies:
Mild, non lotion detergent, such as Dawn or Ivory without strong perfumes or dyes.
Wash basin
White distilled vinegar (optional)

DISINFECT YOUR SUPPLIES:

Mix 1/2 ounce (1 tablespoon) of soap with 2 quarts of warm water in a wash basin. First wash and rinse your supplies in the sink, then soak items in a warm soapy solution for 10 minutes. Rinse thoroughly (allow water to run for 2 minutes) with tap water and then allow to air dry. Once dried, the supplies can be put in Ziploc bag and marked clean.

VINEGAR SOLUTION (OPTIONAL)

Wash equipment with warm, soapy water, rinse and then soak equipment in a 50/50 solution of white distilled vinegar and water for 15 to 30 minutes. Rinse well and dry as instructed above.
SUPPLIES THAT CAN BE CLEANED & DISINFECTED FOR REUSE:

✓ Trach Tubes
✓ Trach Swivel Adapters
✓ Trach Ties
✓ Aerosol Masks
✓ T-Pieces / Adapters
✓ Speaking Valves
✓ Nebulizers
✓ Most hard-plastic supplies

CLEANING YOUR RESPIRATORY EQUIPMENT WEEKLY:

1. Always unplug the equipment before cleaning it.
2. Never immerse the equipment in water.
3. Using a slightly wet cloth with water & dish detergent wipe the outside of the equipment.
4. Use a dry cloth to wipe the unit and then let it air dry.
5. Make sure the unit thoroughly dry before plugging it in.
6. For Ventilators / Air Compressors / O2 concentrators... there is a black foam filter that will need the dust rinsed of once per week to assure proper operation of the equipment.

DO’S AND DO NOT’S:

DON’T use alcohol-based products to clean your supplies, because it can cause the materials to become hard and brittle.
DON’T put equipment or supplies in the dishwasher.
DON’T use any caustic or household cleaning solutions such as bleach on your supplies or equipment.
DO follow a regular cleaning schedule.
DeVilbiss® Suction Unit Instruction Guide 7305 Series

RX ONLY
Made in U.S.A.

Guía de Instrucciones para la Unidad de Succion de la Serie 7305 de DeVilbiss®

RX ÚNICAMENTE
Hecho en EE.UU.

Guide d'Instructions L'Unite d'Aspiration DeVilbiss® Série 7305

UNIQUEMENT SUR PRESCRIPTION
Fabriqué aux U.S.A.
TABLE OF CONTENTS

IEC Symbols .......................................................................................................................... EN - 2
Important Safeguards ........................................................................................................... EN - 2
International Travel ............................................................................................................... EN - 3
Introduction ........................................................................................................................... EN - 3
Accessory/Replacement Items ............................................................................................... EN - 3
Important Parts ...................................................................................................................... EN - 4
Set-Up ..................................................................................................................................... EN - 5
How to Operate Your 7305 Series DeVilbiss Suction Unit .................................................. EN - 5
Cleaning Instructions ............................................................................................................. EN - 6
Maintenance ............................................................................................................................ EN - 7
Troubleshooting .................................................................................................................... EN - 8
Specifications/Classifications ............................................................................................... EN - 8
Provider’s Notes .................................................................................................................... EN - 9
Warranty .................................................................................................................................. EN - 9
Guidance and Manufacturer’s Declaration ............................................................................. EN - 9

IEC SYMBOLS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td><img src="image1" alt="Attention, consult instruction guide" /></td>
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</tr>
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<td>“Off” compressor (external battery charging)</td>
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<td><img src="image9" alt="Choking Hazard – Small parts not for children under 3 years or any individuals who have a tendency to place inedible object in their mouths" /></td>
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<td>IPX2 vertically falling drops shall have no harmful effects when the enclosure is tilted at an angle up to 15° on either side of the vertical</td>
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</table>

IMPORTANT SAFEGUARDS

When using electrical products, especially when children are present, basic safety precautions should always be followed. Read all instructions before using. Important information is highlighted by these terms:

**DANGER** – Urgent safety information for hazards that will cause serious injury or death.

**WARNING** – Important safety information for hazards that might cause serious injury.

**CAUTION** – Information for preventing damage to the product.

**NOTE** – Information to which you should pay special attention.

READ ALL INSTRUCTIONS BEFORE USING THIS DEVICE. SAVE THESE INSTRUCTIONS.

**DANGER**

To reduce the risk of electrocution:
1. Do not use while bathing.
2. Do not place or store product where it can fall or be pulled into a tub or sink.
3. Do not place in or drop into water or other liquid.
4. Do not reach for a product that has fallen into water. Unplug immediately.

**WARNING**

To reduce the risk of burns, electrocution, fire or injury to persons:
1. Close supervision is necessary when this product is used by, on, or near children or physically incapacitated individuals.
2. Use this product only for its intended use as described in this guide.
3. Never operate this product if:
   a. It has a damaged power cord or plug.
   b. It is not working properly.
   c. It has been dropped or damaged.
d. It has been dropped into water.  
   Return the product to an authorized DeVilbiss Healthcare service center for examination and repair.

4. Keep the power cord away from heated surfaces.

5. Never use while drowsy or asleep.

NOTE – The 7305D series is not factory equipped with an internal rechargeable battery; it may be purchased separately and installed by your DeVilbiss Healthcare provider.  
7305P series is factory equipped with an internal rechargeable battery and all information regarding battery operation in this guide is applicable.

DANGER

The DeVilbiss Suction Unit is a vacuum suction device designed for the collection of nonflammable fluid materials in medical applications only. Improper use during medical applications can cause injury or death. For all medical applications:

1. All suctioning should be done in strict accordance with appropriate procedures that have been established by a licensed medical authority.

2. Some attachments or accessories may not fit the tubing supplied. All attachments or accessories should be checked prior to use to assure proper fit.

INTERNATIONAL TRAVEL

The 7305 series is equipped with a switch mode power supply allowing operation on any AC voltage (100-240 VAC, 50/60 Hz). However the correct power cord must be used to connect to adaptable wall power.

NOTE – Check power cord for adaptability before using.

INTRODUCTION

Your DeVilbiss Suction Unit is a compact medical suctioning device which has been designed for reliable, portable operation. Because of the small size, light weight and DC operation, the DeVilbiss Suction Unit is Ideal for providing suction in the home, in transport with optional DC cord, or if your model has an internal rechargeable battery, the unit can be operated anywhere. Three container options give the choice between the standard disposable containers or an optional long-term reusable container. Following the recommended operating and maintenance procedures outlined in this instruction guide will maximize the life of this product.

Contraindications

The DeVilbiss Suction Unit should not be used for:

- thoracic drainage
- nasogastric suction

Intended Use Statement

The device is to be used to remove fluids from the airway or respiratory support system and infectious materials from wounds. The device creates a negative pressure (vacuum) that draws fluids through disposable tubing that is connected to a collection bottle. The fluids are trapped in the collection bottle for proper disposal. It is for use on the order of a physician only.

ACCESSORY/REPLACEMENT ITEMS

The following items can be purchased separately as accessories or replacement items for your 7305 Series DeVilbiss Suction Unit:

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' patient tubing</td>
<td>6305D-611</td>
<td>Collection Container Kit (1200 ml reusable container, external bacteria filter, elbow, 4V tubing)</td>
</tr>
<tr>
<td>800 Disposable Container (container and lid only) for use with external bacteria filter (48 pack)</td>
<td>7305D-602</td>
<td>1200 ml reusable container (external bacteria filter, elbow, 4V tubing) (6 pack)</td>
</tr>
<tr>
<td>Collection Container Kit (800 ml disposable container, external bacteria filter, elbow, 3 3/8&quot; and 6' tubing package)</td>
<td>7305D-603</td>
<td>Carrying case</td>
</tr>
<tr>
<td>External bacteria filter (non-sterile) (12 pack) For reusable container and disposable container with external filter</td>
<td>7305D-608</td>
<td>AC to DC adapter/charger</td>
</tr>
<tr>
<td>Collection Container Kit (Internal filter cartridge, splash guard, 800 ml container, 4V&quot; and 6&quot; tubing package)</td>
<td>7305D-633</td>
<td>12V DC power cord (1 each)</td>
</tr>
<tr>
<td>800 ml disposable container with internal filter cartridge, splash guard and 4V&quot; tubing (48 each)</td>
<td>7305D-632</td>
<td>Hospital grade power cord (120 VAC)</td>
</tr>
<tr>
<td>Filter cartridge (12 pack) (For Disposable Container with internal filter)</td>
<td>7305D-635</td>
<td>Power cord for US</td>
</tr>
<tr>
<td>Splash Guard (12 pack) for Disposable Container with internal filter cartridge</td>
<td>7305D-641</td>
<td>Power cord for Continental Europe</td>
</tr>
</tbody>
</table>

NOTE – The use of electrical cables and accessories other than those specified in this manual or referenced documents may result in increased electromagnetic emissions from the product or decreased electromagnetic immunity of the product.
**IMPORTANT PARTS**

### 7305 Series DeVilbiss Suction Unit

**With Disposable Container and Internal Filter Cartridge**

1. ¾" connection tubing
2. Vacuum gauge
3. Vacuum regulator knob
4. DC power input (on side)
5. Power switch
6. Splash guard
7. Collection container
8. Lid
9. Patient tubing
10. Filter cartridge

AC to DC Adapter (not shown)
DC power cord (not shown)
Internal rechargeable battery (not shown) 7305P series only
Carrying case (not shown) 7305P series only

**With Disposable Container and External Bacteria Filter**

1. ¾" connection tubing
2. Vacuum gauge
3. Vacuum regulator knob
4. DC power input (on side)
5. Power switch
6. Collection container
7. Lid
8. Patient tubing
9. Connection elbow
10. External bacteria filter

AC to DC Adapter (not shown)
DC power cord (not shown) optional
Internal rechargeable battery (not shown) 7305P series only
Carrying case (not shown) 7305P series only

**With Reusable Container and External Bacteria Filter**

1. External bacteria filter
2. Vacuum gauge
3. ¾" connection tubing
4. Vacuum regulator knob
5. DC power input (on side)
6. Power switch
7. Collection container
8. Lid
9. Patient tubing
10. Connection elbow

AC to DC Adapter (not shown)
DC power cord (not shown) optional
Internal rechargeable battery (not shown) 7305P series only
Carrying case (not shown) 7305P series only

---

### 7305 Series DeVilbiss Containers

**Disposable Container with Internal Filter Cartridge and Splash Guard**

1. ¾" connection tubing
2. Filter cartridge (Do not get wet)
3. Lid
4. Jar
5. Splash guard
6. Patient tubing connector

**Disposable Container with External Bacteria Filter**

1. ¾" connection tubing
2. Patient tubing connector
3. Jar
4. Connection elbow
5. Bacteria filter

**Reusable Container with External Bacteria Filter**

1. External bacteria filter
2. Lid with o-ring
3. Overflow valve
4. Jar
5. Patient tubing connector
6. Connection elbow
7. Bacteria filter
SET-UP

External Filter Set-Up
Disposable Container or Reusable Container with External Bacteria Filter
1. Fully charge battery for 17 hours (7305P series only).
2. Securely attach lid to container.
3. Insert container into holder.
4. Connect either end of the 4\(\frac{1}{4}\)" reusable tubing or 3\(\frac{1}{8}\)" disposable tubing to the tubing connector then connect the other end to the bacteria filter. Ensure that the clear side of the bacteria filter is toward elbow and container when installing/re-installing. Do not reverse direction of filter.
5. The bacteria filter should then be connected to the 90° elbow connection, and the 90° connection should be connected to the top of the container lid where it says <Vacuum>.
6. The patient tubing should be connected to the container lid at the outlet labeled <Patient>.
7. Please assure that all connections are secure and without leaks before using.
8. Verify that unit is at desired suction level before beginning patient suction.

HOW TO OPERATE YOUR 7305 SERIES DEVILBISS SUCTION UNIT
Before connecting the unit to the AC adapter or 12V DC cord, make sure that the power switch located on the side of the unit is in the “Off” position. Select power source desired.

LED Explanations:
L1- Green- External power supplied to unit from AC power source or DC cord. Illuminated when external power is supplied.
L2 - Yellow- Battery is being charged. Light will go out when battery is fully charged. (7305P Series only)
L3 - Red- Low battery. Seek another power source and charge battery as soon as possible when light remains on continuous. (7305P Series only)

AC OPERATION- Plug the small connector of the AC adapter into the DC power input located on the side of the unit. Plug the AC end into a grounded wall-outlet power source.

NOTE- The power supply may become warm to the touch during charging or running of the unit. This is normal.

12V DC OPERATION- (such as a car lighter receptacle). Plug the small connector of the DC power cord into the DC power input on the side of the unit. Plug the large connector into the 12V DC power receptacle of the automobile.

BATTERY OPERATION- Verify that your unit has an internal rechargeable battery; factory installed on models 7305P series or provider installed on models 7305D series (installed as an option). To ensure proper operation from internal battery, fully charge the battery for 17 hours as explained in the Battery Charging section. To operate the unit from an internal rechargeable battery, ensure that no external power sources are plugged into the DC power input on the side of the unit.

Turn the unit “On” using the power switch located on the side of the unit. The power indicator light displayed on the top of the unit will indicate which power source is being used by staying continuously lit when external power is connected.

WARNING
If the unit is not receiving power from an external source or the battery was not recharged immediately, the low battery indicator light will remain on and the performance of the unit will drop off rapidly. Switch to another power source immediately after the low battery light appears to avoid an interrupted suction procedure.

Adjust the vacuum level from 80 to 550 mm Hg by turning the vacuum regulator knob located on the side of the unit (clockwise to increase vacuum and counter-clockwise to decrease vacuum). The gauge located on the top of the unit near the handle will allow you to select a specific level of vacuum. To accurately read the gauge, block the patient end of the hose or cap off the collection bottle and allow the gauge to reach a stable vacuum reading.

NOTE- Gauge is for reference only. If the unit sustains a severe drop, accuracy of the gauge must be checked.

Suction at the patient is automatically obstructed when liquid level reaches the float shut-off located on the underside of the container lid.

NOTE- Always transport unit with vacuum regulator knob rotated fully clockwise in case unit is dropped.

CAUTION- When automatic float shut-off is activated, contents of the container should be emptied. Further suctioning could cause damage to the vacuum pump.

CAUTION- Should fluid be aspirated back into the unit, equipment provider servicing is necessary as possible vacuum pump damage may result.
**Battery Charging**

On 7305P series, the units are equipped with a factory-installed rechargeable battery. The unit will have a light for low battery and charge indication. On 7305D series, the units are not factory equipped with a rechargeable battery; check with your equipment provider to determine if your unit has been upgraded with a rechargeable battery.

When you connect the unit to an AC or DC power source using the AC adapter or DC power cord, the green external power light will illuminate. The yellow charge indicator will be illuminated while the battery is charging. Verify that this illuminates when charging begins. As the charge nears a full charge, the yellow LED may flash on and off for several minutes. This is normal.

**NOTE**– Charge battery for a minimum of 17 hours before first use.

**NOTE**– Fully recharge battery after each use. The unit will continue to float charge the battery after the charge indicator turns off, so leave the unit connected to AC when not in use.

**CAUTION**– Discharging the battery completely will shorten the life of the battery. Do not operate the unit more than a few minutes if the low battery indicator light is lit. Recharge as soon as possible.

**NOTE**– Unit run time will decrease as the battery ages.

**NOTE**– Unit run time will also be reduced by letting the battery sit at a discharged state for extended periods.

**Storage Note** - Battery should be charged for a minimum of 17 hours prior to storage, and at least once every 6 months. Important - If battery recharge is delayed beyond 6 months, battery may be able to provide full run time after completion of 3 full charge and discharge cycles.

**NOTE**– A fully charged battery will provide approximately 60 minutes of continuous operation at a vacuum level (free flow). Operation time will decrease with higher vacuum levels.

**NOTE**– When charging the battery, use an external power source and verify that the charge light illuminates when the unit is in the “Off” position. If the battery does not charge, please be sure the model you are using has a battery installed prior to contacting your authorized DeVilbiss Healthcare provider.

**NOTE**– The internal rechargeable battery is sealed lead-acid. Contact your local authorities for instruction on proper disposal.

**NOTE**– Do not connect the AC adapter to an outlet controlled by a switch to ensure power is supplied to unit at all times.

**NOTE**– Do not connect the DC power cord to an outlet that is not constantly energized.

**Cleaning Instructions**

**Preparation**
1. Shut off unit using power switch and allow vacuum to drop. Disconnect power source from the DC input receptacle on the unit.
2. Disconnect tubing and remove container from holder.
3. Carefully remove lid and empty contents.

**NOTE**– Container should be emptied and cleaned after each use.

**Warning**

To prevent possible risk of infection from contaminated cleaning/disinfection solutions, always prepare fresh solution for each cleaning cycle and discard solution after use.

**Disposable Collection Container with External Bacteria Filter**

1. Remove bacteria filter, 3-3/8” tubing, and connection elbow and set aside.
2. Wash jar and lid in a solution of warm water with a mild, liquid detergent (e.g. Dawn or Palmolive) and rinse with clean, warm tap water.
3. Soak in 1 part vinegar (>=5% acetic acid concentration) to 3 parts water (131°F-149°F/55°C-65°C) solution for 60 minutes. Rinse with clean, warm water and air dry.

**NOTE**– The disposable collection container and lid are meant for single-patient use.

**NOTE**– The disassembled container may also be washed in a dishwasher, top shelf only, using a cycle with a water temperature between 131°F-149°F/55°C-65°C.
**Suction Unit (single-patient use)**

1. With the power switch in the "Off" position, disconnect the DeVilbiss Suction Unit from all external power sources.
2. Wipe the housing with a clean cloth and any commercial (bacterial-germicidal) disinfectant.

**CAUTION**– Do not submerge in water as this will result in damage to the vacuum pump.

**NOTE**– Do not substitute any other material for this bacteria filter. Substitution may lead to contamination or poor performance; use only DeVilbiss filters.

**Tubing (single-patient use)**

1. Disconnect the tubing from the unit.
2. Rinse thoroughly by running warm tap water through it.
3. Follow by soaking in a solution of 1 part vinegar (>=5% acetic acid concentration) to 3 parts water (131°F-149°F/55°C-65°C) for 60 minutes. Rinse with clean, warm water and air dry.
4. Keep the outer surface of the tubing clean by wiping with a clean, damp cloth.

**Carrying Case (single-patient use)**

1. Wipe the case using a clean cloth dampened with detergent and/or disinfectant.

**NOTE**– Disinfection information is based on AARC Clinical Practice Guideline Suctioning of the Patient in the Home.

**Suction Unit (multi-patient use)**

**Device Cleaning and Disinfection When There is a Patient Change**

When medical devices have already been used with a patient, contamination with human pathogenic germs should be assumed (unless there is evidence to the contrary), and the next patient, user or third party should be protected by appropriate handling and preparation. Therefore, when there is a patient change, people must be protected during the transport and handling of the device and the device must be fully processed, i.e., cleaned and disinfected, by suitably trained personnel before reuse to protect the next patient. The complete processing may only be done by the manufacturer or by a qualified DeVilbiss provider/service technician.

**NOTE** – When the unit is used as per instructions under normal conditions the interior of the unit is protected from exposure to pathogens by the in-line filter on the collection container, hence no disinfection of internal components is necessary.

**NOTE** – If the unit is used without an in-line filter then the interior of the unit has been exposed to pathogens and the unit cannot be disinfected.

**NOTE** – If the following processing of the unit by a qualified DeVilbiss provider/technician is not possible, the unit must not be used by another patient!

DeVilbiss Healthcare recommends that at least the following procedures be carried out by the manufacturer or a qualified third party between uses by different patients.

1. Dispose of all accessory components that are not suitable for reuse, i.e., collection container, filter, tubing and carrying case.
2. With the power switch in the "Off" position, disconnect the DeVilbiss Suction Unit from all external power sources.
3. Visually inspect unit for any damage, missing parts, etc.
4. Wipe the housing with a clean cloth and a commercial (bacterial-germicidal) disinfectant that meets the requirements listed in the NOTE below and is used as per the disinfectant manufacturer’s recommended dilution rates and instructions.

**CAUTION** – Do not submerge in water as this will result in damage to the vacuum pump.

**NOTE** – Do not use any cleaners or disinfectants that contain ammonia, benzene and/or acetone to clean the unit.

**MAINTENANCE**

Inspect suction tubing and container for leaks, cracks, etc. before each use.

**DANGER**

Electric shock hazard. Do not attempt to open or remove cabinet, there are no user-serviceable internal components. If service is required, return unit to a qualified DeVilbiss Healthcare provider or an authorized service center. Opening or tampering with the unit will void warranty.

**Changing Filter Cartridge (single-patient use) Disposable Container**

1. Change filter cartridge if overflow occurs or every two months, whichever comes first.
2. Turn unit off.
3. Remove filter cartridge and 4/8” tubing.
4. Install new cartridge and tubing.

**NOTE**– Do not substitute any other material for this filter cartridge. Substitution may lead to contamination or poor performance; use only DeVilbiss filter cartridges.

**NOTE**– The filter cartridge contains a hydrophobic filter. If the filter media becomes wet, air flow will be stopped. The filter cartridge must then be replaced. Do not remove filter media from filter cartridge.

**NOTE**– Filter cartridges are included with each disposable container. They are also available separately (7305D-635 12/pack).

**Changing Bacteria Filter (single-patient use) Reusable Container and/or Disposable Container**

1. Change bacteria filter if overflow occurs or every two months, whichever comes first.
2. Remove filter by disconnecting it from suction unit and lid assembly.
3. Replace with a clean DeVilbiss bacteria filter (non-sterile) and remount to suction unit and lid. Ensure that the clear side of the bacteria filter is toward elbow and container when installing/re-installing. Do not reverse direction of filter. Additional filters (7305D-608 12/pack) may be purchased from your authorized DeVilbiss Healthcare provider.

**NOTE**– Do not substitute any other material for this bacteria filter. Substitution may lead to contamination or poor performance; use only DeVilbiss filters.

**NOTE**– Bacteria filter must be changed between patients.
TROUBLESHOOTING

NOTE—Your DeVilbiss Suction Unit contains no user-serviceable parts. If you believe your unit is not working properly, BEFORE YOU RETURN IT TO THE HOME MEDICAL EQUIPMENT PROVIDER WHERE YOU PURCHASED IT, please take a few moments to check for these possible causes:

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| Unit does not turn on, but green external power light is illuminated. | 1. Check power sources and connections.  
2. Ensure wall outlet is live by plugging in a lamp.  
3. If running from an internal battery, ensure that your unit has a battery installed.  
4. If battery is installed, check that it is fully charged. |
| Pump runs, but there is no vacuum. | 1. Check that all tubing is connected properly.  
2. Check tubing connections for breaks or leaks.  
3. Ensure that float shut-off is not activated.  
4. Check for leaks or cracks in container assembly. |
| Low vacuum. | 1. Use vacuum adjustment knob to increase vacuum level.  
2. Check system for leaks.  
3. Push vacuum adjustment knob in toward unit and then release. |
| Battery will not charge but charge light is illuminated. | 1. Ensure that unit is equipped with an internal battery by contacting your DeVilbiss equipment provider.  
2. Verify that charge light turns on.  
3. Check electrical connections during charging.  
4. Ensure wall outlet is live by plugging in a lamp. |

SPECIFICATIONS/CLASSIFICATIONS

<table>
<thead>
<tr>
<th>Size/H x W x D inches (cm)</th>
<th>7305P &amp; 7305D Series 9.0 x 7.0 x 8.0 (22.9 x 17.8 x 20.3)</th>
</tr>
</thead>
</table>
| Weight lb. (kg)             | 7305D Series 3.8 (1.7)  
7305P Series 6.3 (2.9)     |
| Electrical Requirements    | 100-240 V AC 50/60 Hz .75 A max; 12 V DC, 33 W max |
| Internal Rechargeable Battery | 7305P Series Factory Equipped  
7305D Series Not Factory Equipped (provider-installed option) |
| Vacuum Range               | 7305P & 7305D Series 80 to 550 mm Hg  
Air Flow @ pump inlet: 27 LPM (free flow) typical (may be less when running from internal battery) |
| Container Capacity         | 7305 D & P Series 800 ml (cc) Disposable (2 filter options)  
7305 D & P Series - Optional 1200 ml (cc) Reusable |
| Environmental Conditions   | Operating Temperature Range 32°F (0°C) - 104°F (40°C)  
Operating Relative Humidity 0-95%  
Operating Atmospheric Pressure 10.2 psi (70 kPa) - 15.4 psi (106 kPa)  
Storage & Transport Temperature Range -40°F (-40°C) - 158°F (70°C)  
Storage & Transport Relative Humidity 0-95%  
Storage & Transport Atmospheric Pressure 7.3 psi (50 kPa) - 15.4 psi (106 kPa) |
| Warranty                   | 7305P Series Two-years limited, excluding internal battery and container  
7305D Series Two-years limited, excluding container  
Internal Battery 90-day |
| Approvals                  | 7305D & 7305P Series IEC 601-1; CAN/CSA-C22.2 No. 601.1-M90; UL 60601-1, EN 60601-1-2  
7305P meets RTCA/D-160D DD-160D - section 21 Category M For battery operation only Airline use |
| Equipment Classifications  | With respect to protection from electric shock Class I and internally powered  
Degree of protection against electric shock Type BF Applied Parts  
Degree of protection against ingress of liquids IPX2 and ordinary power supply  
Mode of Operation Intermittent Operation: 30 minutes on, 30 minutes off  
Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide. |
| ISO Classification         | 7305P Series only - Electrically powered medical suction equipment for field and transport use according to ISO 10079-1 : 1999  
High Flow/High Vacuum  
7305D Series - Electrically powered medical suction equipment for non-transport use according to ISO 10079-1 : 1999 |
PROVIDER’S NOTES
No routine calibration or service is required provided the device is used in accordance with the manufacturer’s directions. In case of a change of patient, the device must be reconditioned to protect the user. Reconditioning must only be carried out by the manufacturer or service provider. Between patients:

1. Visually inspect unit for any damage, missing parts etc.
2. Ensure that unit and accessories are clean.
3. Use an independent vacuum gauge to verify the unit provides the proper vacuum level as stated in Specifications.
4. Discard and replace collection container, filter, and tubing between patients.
5. Wipe the surface using a clean cloth dampened with disinfectant.

TWO-YEAR LIMITED WARRANTY
The compressor portion of the DeVilbiss Suction Unit 7305P & 7305D Series (excluding internal rechargeable batteries) is warranted to be free from defective workmanship and materials for a period of two years from date of purchase. Internal rechargeable batteries are warranted for 90 days. Any defective part(s) will be repaired or replaced at DeVilbiss Healthcare’s option if the unit has not been tampered with or used improperly during that period. Make certain that any malfunction is not due to inadequate cleaning or failure to follow the instructions. If repair is necessary, contact your DeVilbiss Healthcare Provider or DeVilbiss Service Department for instructions: U.S.A. 800-338-1988 or 814-443-4881, Europe +49-(0) 621-178-98-0.

NOTE—This warranty does not cover providing a loaner unit, compensating for costs incurred in rental while said unit is under repair, or costs for labor incurred in repairing or replacing defective part(s).

THERE IS NO OTHER EXPRESS WARRANTY. IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THE EXPRESS LIMITED WARRANTY AND TO THE EXTENT PERMITTED BY LAW ANY AND ALL IMPLIED WARRANTIES ARE EXCLUDED. THIS IS THE EXCLUSIVE REMEDY AND LIABILITY FOR CONSEQUENTIAL AND INCIDENTAL DAMAGES UNDER ANY AND ALL WARRANTIES ARE EXCLUDED TO THE EXTENT EXCLUSION IS PERMITTED BY LAW. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, OR THE LIMITATION OR EXCLUSION OF CONSEQUENTIAL OR INCIDENTAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Manufacturer’s Note
Thank you for choosing a DeVilbiss Suction Unit. We want you to be a satisfied customer. If you have any questions or comments, please send them to our address on the back cover.

For Service Call Your Authorized DeVilbiss Healthcare Provider:

Phone       Purchase Date       Serial #

DEVILBISS GUIDANCE AND MANUFACTURER’S DECLARATION

WARNING
Medical Electrical Equipment needs special precautions regarding Electromagnetic Compatibility (EMC) and needs to be installed and put into service according to the EMC information provided in the accompanying documents.

Portable and Mobile RF Communications Equipment can affect Medical Electrical Equipment.

The equipment or system should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the equipment or system should be observed to verify normal operation in the configuration in which it will be used.

NOTE—The EMC tables and other guidelines provide information to the customer or user that is essential in determining the suitability of the Equipment or System for the Electromagnetic Environment of use, and in managing the Electromagnetic Environment of use to permit the Equipment or System to perform its intended use without disturbing other Equipment and Systems or non-medical electrical equipment.

Guidance and Manufacturer’s Declaration – Emissions All Equipment and Systems

This device is intended for use in the electromagnetic environment specified below. The customer or user of this device should assure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Emissions Test</th>
<th>Compliance</th>
<th>Emissions Test</th>
<th>Compliance Level</th>
<th>Electromagnetic Environment - Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Emissions CISPR 11</td>
<td>Group 1</td>
<td></td>
<td></td>
<td>This device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td>
</tr>
<tr>
<td>RF Emissions CISPR 11</td>
<td>Class B Radiated and Conducted Emissions</td>
<td></td>
<td></td>
<td>This device is suitable for use in all establishments including domestic, and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.</td>
</tr>
<tr>
<td>Harmonica IEC 61000-3-2</td>
<td>Class A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flicker IEC 61000-3-3</td>
<td>Complies</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Immunity Test</th>
<th>IEC 50601 Test Level</th>
<th>Compliance Level</th>
<th>Electromagnetic Environment - Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic Discharge (ESD) IEC 61000-4-2</td>
<td>±6kV contact ±8kV air</td>
<td>±6kV contact ±8kV air</td>
<td>Floors should be wood, concrete or ceramic tile. If floors are synthetic, the relative humidity should be at least 30%.</td>
</tr>
<tr>
<td>Electrical Fast Transient/burst IEC 61000-4-4</td>
<td>±2kV on AC Mains</td>
<td>±2kV on AC Mains</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>Surge IEC 61000-4-5</td>
<td>±1kV Differential ±2kV Common</td>
<td>±1kV Differential ±2kV Common</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11</td>
<td>&gt;95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles &gt;95% Dip for 5 Seconds</td>
<td>&gt;95% Dip for 0.5 Cycle 60% Dip for 5 Cycles 30% Dip for 25 Cycles &gt;95% Dip for 5 Seconds</td>
<td>Mains power quality should be that of a typical commercial or hospital environment. If the user of this device requires continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power supply or battery.</td>
</tr>
</tbody>
</table>

EN - 9
### Immunity Test

<table>
<thead>
<tr>
<th>Power Frequency 50/60Hz Magnetic Field IEC 61000-4-8</th>
<th>IEC 60601 Test Level</th>
<th>Compliance Level</th>
<th>Electromagnetic Environment - Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A/m</td>
<td>3A/m</td>
<td>Power frequency magnetic fields should be that of a typical location in a typical commercial or hospital environment.</td>
<td></td>
</tr>
</tbody>
</table>

### Conducted RF

<table>
<thead>
<tr>
<th>IEC 61000-4-6</th>
<th>3 Vrms from 150 kHz to 80 MHz</th>
<th>V1 = 3 Vrms</th>
<th>Portable and mobile RF communications equipment should be separated from the device by no less than the recommended separation distances calculated/listed below:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>D=(3.5/V1)√P</td>
</tr>
</tbody>
</table>

#### Magnetic Field

- **IEC 61000-4-8**
- **3A/m**
- Power frequency magnetic fields should be that of a typical location in a typical commercial or hospital environment.
- **Compliance Level**
- **Electromagnetic Environment - Guidance**

#### Power Frequency 50/60Hz

- **Magnetic Field**
- **IEC 61000-4-8**
- **3A/m**
- Power frequency magnetic fields should be that of a typical location in a typical commercial or hospital environment.
- **Compliance Level**
- **Electromagnetic Environment - Guidance**

### Radiated RF

<table>
<thead>
<tr>
<th>IEC 61000-4-3</th>
<th>3 V/m 80 MHz to 2.5 GHz</th>
<th>E1 = 3V/m</th>
<th>D=(3.5/E1)√P 80 to 800 MHz D=(7/E1)√P 800 MHz to 2.5 GHz Where P is the maximum power rating in watts and D is the recommended separation distance in meters. Field strengths from fixed transmitters, as determined by an electromagnetic site survey, should be less than the compliance levels (V1 and E1). Interference may occur in the vicinity of equipment containing a transmitter.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>If V1 and E1 exceed these values, the device may cause electromagnetic interference.</td>
</tr>
</tbody>
</table>

### Conducted RF

- **IEC 61000-4-6**
- **3 Vrms from 150 kHz to 80 MHz**
- **V1 = 3 Vrms**
- Portable and mobile RF communications equipment should be separated from the device by no less than the recommended separation distances calculated/listed below:
- **D=(3.5/V1)√P**

### Radiated RF

- **IEC 61000-4-3**
- **3 V/m 80 MHz to 2.5 GHz**
- **E1 = 3V/m**
- **D=(3.5/E1)√P 80 to 800 MHz**
- **D=(7/E1)√P 800 MHz to 2.5 GHz**

Where P is the maximum power rating in watts and D is the recommended separation distance in meters. Field strengths from fixed transmitters, as determined by an electromagnetic site survey, should be less than the compliance levels (V1 and E1). Interference may occur in the vicinity of equipment containing a transmitter.

### Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and this device. This device and system are NOT Life-Supporting

This device is intended for use in the electromagnetic environment in which radiated disturbances are controlled. The customer or user of this device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF Communications Equipment and the device as recommended below, according to the maximum output power of the communications equipment.

<table>
<thead>
<tr>
<th>Maximum Output Power (Watts)</th>
<th>Recommended Separation Distances for the device (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 kHz to 80 MHz</td>
</tr>
<tr>
<td>0.01</td>
<td>0.11667</td>
</tr>
<tr>
<td>0.1</td>
<td>0.36894</td>
</tr>
<tr>
<td>1</td>
<td>1.1667</td>
</tr>
<tr>
<td>10</td>
<td>3.6894</td>
</tr>
<tr>
<td>100</td>
<td>11.667</td>
</tr>
</tbody>
</table>

For transmitters rated at a maximum output power not listed above, the recommended separation distance D in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

**Note 1:** At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

**Note 2:** These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.