

Auxivo LiftSuit®

Handbook and User Guideline



Auxivo LiftSuit. Handbook and User Guideline.

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Version 1.0
May 2020

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1 Introduction

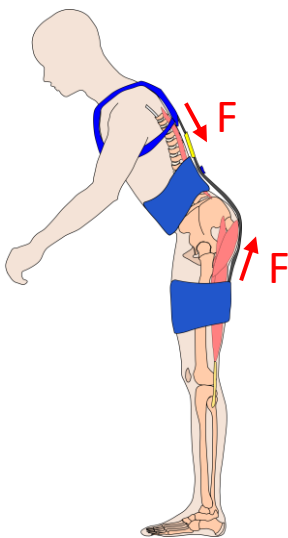
THE QUALITY OF THE LIFTSUIT SUPPORT, THE BENEFIT OF ITS USE AS WELL AS THE WEARING COMFORT DEPEND ON A CORRECT USE AND GOOD FIT OF THE LIFTSUIT. THEREFORE, PLEASE TAKE ENOUGH TIME TO READ THIS HANDBOOK, TO ADJUST THE LIFTSUIT TO YOUR INDIVIDUAL NEEDS AND TO LEARN HOW TO USE IT. IT IS IMPORTANT TO UNDERSTAND WHAT KIND OF WORK IS SUPPORTED BY THE LIFTSUIT, AND HOW MUCH SUPPORT IT CAN PROVIDE. IN CASE OF ANY QUESTIONS REGARDING THE LIFTSUIT, PLEASE CONTACT US FOR ADVICE.

1.1 The LiftSuit

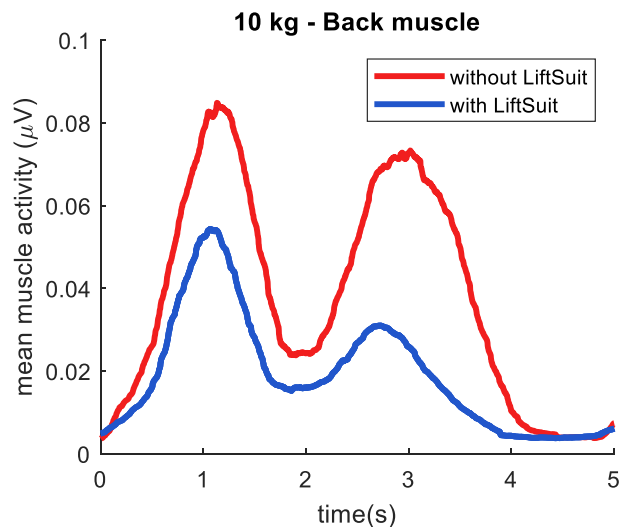
The LiftSuit® is a lightweight (<0.9 kg), textile exoskeleton that supports the back and hip muscles when lifting objects or working in a forward-leaning position. It features integrated elastic elements that store energy which is then being used to support the user and reduce the workload. The solution offers an easy-to-use, small, and lightweight support system that the user can activate whenever support is needed, and which can be worn the entire day without being constraining.

1.2 How it supports you when working

The LiftSuit is designed to support your back and hip muscles when you lift objects from below hip level, or when you remain in a forward-leaning position. It functions as a layer of additional muscles on the outside of your body to reduce the load on your own muscles. The LiftSuit is designed to reduce the load on your back and hip muscles between around 10% and 30% when you lift loads between 5 kg and 20 kg. By doing so, the LiftSuit can prevent your muscles from fatiguing. In addition, you can use the LiftSuit to keep your back straight when lifting objects.



The LiftSuit supports your back and hip muscles by providing you with a set of external muscles on your back.



The Diagram shows muscle activity measurements of a person's back muscles when lifting 10 kg from the ground and putting it back down. The red line is the muscle activity without the LiftSuit, the blue line with LiftSuit support. The considerable reduction in muscle activity shows the support provided by the LiftSuit.

2 LiftSuit User Guidelines



DO NOT USE THE LIFTSUIT WITHOUT HAVING RECEIVED A TRAINING FIRST.

2.1 What kind of work is supported by the LiftSuit?

It is important to understand during what kind of work the LiftSuit provides support, and when it will not. By design, the LiftSuit can support your back and hip muscles when you lean forward or reach down to pick and lift an object from below hip level.

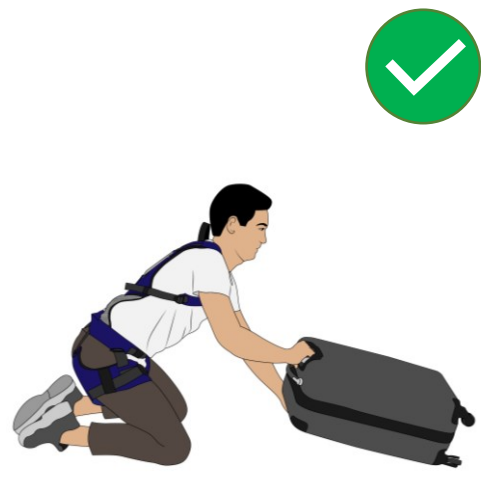
The LiftSuit (when activated), will support you each time when you pick something up, or while you remain in a forward leaning position. Consequently, you will benefit the most from the LiftSuit if your work includes a lot of repetitive lifting tasks or prolonged periods in a forward leaning position. Specifically, this means that using the LiftSuit should be considered for work that requires:



Repetitive lifting from below hip level.



Work requiring you to remain in a forward leaning position.



Handling objects while on your knees and having to reach for the objects.

2.2 What kind of work is not supported?

The LiftSuit is NOT designed to support other movements or other muscles besides the ones shown above! It will not prevent you from doing these tasks, but it will not provide you with support. Specifically, this means you cannot expect much support during tasks such as:



Handling jobs that are above hip level and do not require you to bent down or lean forward.



Overhead work where your upper body remains in an upright position.

2.3 What if my work includes multiple tasks described above?

If your job consists of several tasks, some of which are supported, some of which are not supported, you can still use the LiftSuit. Simply activate the Suit during the suitable tasks and deactivate it when you do not need it. With less than 900 grams of mass and a fully textile design, you will barely notice it and it will not restrict your movements.

2.4 Who can use the LiftSuit?

The LiftSuit reduces the load on your back and hip muscles by equipping you with “external” muscles. While the forces on your back and hips are not expected to increase when wearing the LiftSuit, as a precaution people with back or hip problems are not allowed to use the LiftSuit without prior consultation with a medical professional.



THE LIFTSUIT MUST NOT BE USED BY USERS WITH BACK OR HIP PROBLEMS.

Everyone else can use the LiftSuit. However, you must never conduct any work while wearing the LiftSuit that would not be considered safe to conduct without the LiftSuit, e.g. lifting very heavy objects. The LiftSuit does not make you immune to injuries.



NEVER CONDUCT ANY WORK WHILE WEARING THE LIFTSUIT THAT IS NOT CONSIDERED SAFE WITHOUT WEARING THE LIFTSUIT.

2.5 Getting started with the LiftSuit

Before you start using the LiftSuit yourself, or before you hand it out to be used in your company, we advise you to take the time and read the following sections of this handbook carefully. While the LiftSuit is not a complicated piece of equipment, you will only benefit by using it correctly. It is a wearable device that can be connected to your body for hours. This will need some getting used to until it feels like a new natural way of working. To get the maximum benefit from your LiftSuit, we recommend the following steps:

1. Learn how to put it on, and how to adjust it to your body size.
2. Learn how to use it intuitively without thinking about it. Learn when and how to activate it, and when and how to deactivate it.
3. Get used to it. Do not use it for 8 hours per day from the beginning. Start with one hour per day and increase over time until it feels perfectly natural.
4. Follow the exercises in section 4 of this handbook. We have summarized a few helpful tips that will help you to get used to the LiftSuit quickly.

Once you have adjusted the LiftSuit to your body correctly, learned how to use it intuitively without even thinking about it and are used to wearing it while working, it will provide you with the support you want to reduce the load and strain on your muscles and make your work life easier.

“Now that I don’t wear it anymore, I miss the support”

User during early prototype testing after one day

3 LiftSuit Manual

3.1 System overview

The LiftSuit consist of five main elements:

1. The **Vest** that is connected to your upper body.
2. The **Hip Belt** that secures the LiftSuit around your waist.
3. The **Thigh Cuffs** that connect the LiftSuit to your legs.
4. The **Activation Mechanism** that allows you to activate and deactivate the support.
5. The **Elastic Energy Storages (EES)** on your back that store your movement energy that is used to support you when working.



IF YOU HAVE ANY QUESTIONS REGARDING THIS MANUAL, PLEASE CONTACT US TO AVOID ANY MISUNDERSTANDING AND RESULTING RISKS.

3.2 System details and components

For operation, maintenance, cleaning and exchanging of the EES it is important to understand how and where to locate the individual components. If you just get started, feel free to skip this for now and come back later for more information.



3.3 Preparing the LiftSuit for use

Before using the LiftSuit, make sure that it is adjusted to your individual body height. A total of four straps need to be adjusted, two on each side. One is the lower EES connecting strap, and one is the elastic strap that connects the thigh cuffs laterally to the hip belt. Each pair of adjustment buckles should be attuned to the same position to guarantee a symmetric setting. Once you have roughly adjusted it, put it on and check the length. You can readjust it later.



Extend connections if necessary

- If your body height is around 190 cm, adjust both elements on each side to maximum length as shown in the picture
- Make sure the left and right cuff and EES length are adjusted to the same length.



Shorten connections if necessary

- If your body height is around 160 cm, shorten both elements on each side by 5 - 10 cm.
- The buckle of the lower EES strap might move upwards through the hip belt tunnel as illustrated in the picture above.

3.4 How to put on the LiftSuit

3.4.1 Put on the LiftSuit loosely

OBJECTIVE: Before the LiftSuit is individually adjusted, all connections should be closed.



1 Put on the vest

- Place the vest loosely over shoulders
- All other components hang freely on the back



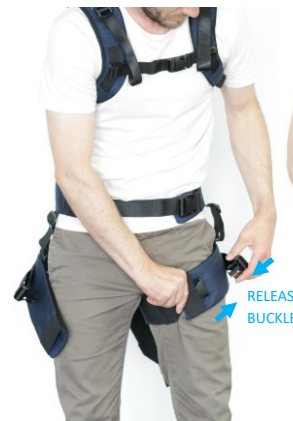
2 Close the hip belt and tighten it

- Grab both parts of the release buckle laterally at the right/left side of the body
- Close **buckle always on left side** of the body
- Tighten hip belt, but rather loosely



3 Loosely fasten the chest belt

- Close the two parts of the release buckle of the chest connection
- Extend distance if necessary (release)



4 Loosely close the cuffs

- Grab the buckle part at the loose end of the strap between the legs and run it through the guiding loop at the padded end of the cuff
- Close the release buckle on the front of the leg
- Repeat with second side



3.4.2 Adjusting the vest

OBJECTIVE: ideal fit for the best support effect with maximum comfort on chest and shoulders

- The vest should sit tightly on the upper body so that a slight pressure on the chest can be felt when inhaling.
- With outstretched arms, the edge of the vest should not press against the arms.
- Activation buckles should be at collarbone level.



5 Tighten the vest at side connection and chest belt

- Pull at the loose end of the strap
- For easier tightening it can help to lift the buckle slightly
- The vest should fit tightly to the upper body

6 Adjust the height of chest belt

- The cross connection over the chest should be max. 4 fingers away from the lower edge of the breastbone
- Both sides must be moved separately and positioned symmetrically at the same height to the right/left



7 Check position and fit

- Stand upright and straight >> Are the activation buckles positioned at collar bone level?
- Take a deep breath. Any pressure on the chest, ribs or back?
- Re-adjust if necessary



8 Check mobility

- Stretch out your arms and fold your hands: Evaluate the freedom of movement at the edge of the vest
- If the pressure/friction against arm base is uncomfortable >> Loosen vest slightly at sides and tighten chest belt

3.4.3 Adjusting the thigh cuffs

OBJECTIVE: ideal adjustment for maximum comfort with good fit on thigh and groin.

- The cuff should sit so tightly that a flat hand can be pushed between the thigh and the cuff without much effort.
- The **elastic connection** to the hip belt should be **vertically straight** on the side, if necessary, turn/move the thigh cuff around the thigh.



9 Place and tighten the cuffs

- Adjust right and left side one after the other
- Push upwards to the crotch of the trousers
- Pull at the loose end of the strap and tighten until cuffs no longer hang loose



10 Check position and fit

- Turn the cuff around the thigh until the elastic connection is straight on both sides in a vertical direction



11 Check optimal tightness of cuffs

- Make sure that the cuffs have a tight fit without squeezing your leg. It shouldn't move in use and still be comfortable to wear.
- it should be possible to slide your hand between cuff and leg
- when placed between cuff and leg there should be a light pressure on the hand



12 Readjust/-position when working on knees

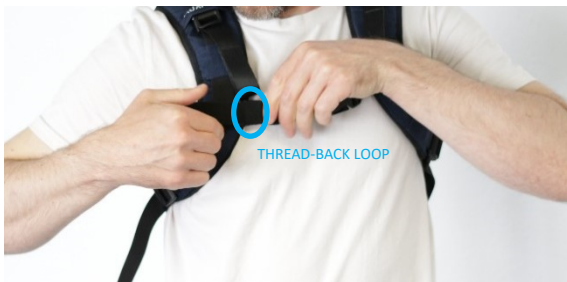
- When working on the knees or squatting, the position should be re-adjusted (slightly loosened > release by tilting the buckle on the side of the loose end of the strap)
- Align the elastic connection on the sides if it has been shifted by readjustment

3.4.4 Securing loose straps



IT IS IMPORTANT THAT YOU CAREFULLY SECURE ALL LOOSE STRAPS BEFORE YOU START WORKING. OTHERWISE THERE IS A RISK THAT THEY GET COUGHT IN MOVING PARTS LIKE CONVEYOR BELTS.

- Ensure that all strap ends are guided through the elastic thread-back loops provided.
- Thread-back loops should be as far away from the buckle as possible.



13 Chest connection

- Put the webbing end through the thread-back loop
- Move the thread-back loop as far as possible away from the release buckle

14 Side adjustment

- Put the strap ends on both sides (right/left) through the thread-back loops
- Move the thread-back loops as far as possible away from the tension lock buckle



15 Hip belt

- Put the strap end through the slidable and the fix thread-back loop
- Move the slidable thread-back loop as far as possible away from the buckle

16 Cuffs

- Put the strap ends on right/left cuff through the thread-back loops
- Check again if the buckle runs through the guiding loop at the front end of the padding (correct by re-opening the buckle and putting either part of the buckle below the guiding loop)

3.5 Activating and deactivating the LiftSuit

Make sure that you activate the LiftSuit when you want support. But also make sure that you deactivate it again once you finished your task.



DEACTIVATE THE LIFTSUIT WHENEVER YOU DO NOT NEED THE SUPPORT, E.G. DURING BREAKS. THIS WAY YOU ENSURE THAT IT DOES NOT CONSTRAIN YOUR MOVEMENTS.

ACTIVATE



Place thumbs in the loops of activation straps and ...



... in an upright position pull forward until stop.

DEACTIVATE



Tilt the levers of the de- / activation buckles upwards and...



... slightly bend forward (activation loops slide as far as they will go).

3.6 Customization options

If friction or pressure points occur during use, corrections can be made by readjusting the vest and thigh cuffs. This might be necessary especially during the first hour of use, when the LiftSuit “settles” after putting it on, or when you change your workplace and you switch e.g. from standing work to working on your knees.

TIGHTEN

Pull the loose end of the strap away from the buckle to tighten it.

Eventually also tilt the buckle slightly to reduce tension.

LOOSEN

Grab the buckle and tilt it on the side of the loose strap end and pull it.



How to tighten the chest belt



How to loosen the chest belt



How to tighten the side connection



How to loosen the side connection



How to tighten the thigh cuffs



How to loosen the thigh cuffs

3.7 How to take off the LiftSuit



1 - Make sure the system is deactivated before taking the LiftSuit off.



2 - Open all 4 release buckles. Chest belt, Hip belt and both thigh cuffs.



3 - Take it off by removing the vest. Hip belt and cuffs follow if you opened all buckles.



4 - Hang it somewhere if possible. This way it is much easier to put it back on and this allows the LiftSuit to dry in case you were sweating.



HEAT: AS THE LIFTSUIT IS AN ADDITIONAL LAYER OF FABRIC, IT CAN GET WARM. ESPECIALLY UNDERNEATH THE VEST OR THE THIGH CUFFS. THIS IS USUALLY NOT A PROBLEM AND THE LIFTSUIT CAN BE WASHED IF YOU ARE SWEATING. IN CASE IT GETS UNCOMFORTABLY WARM UNDERNEATH THE LIFTSUIT, TAKE IT OFF TO AVOID OVERHEATING DURING WORK.

4 How to get started with the LiftSuit

Like any other kind of new equipment, you will need some training to learn how to use the LiftSuit. Please take enough time to learn how to correctly put the LiftSuit on, how to adjust it to your size and how to use it during work. This will ensure that you get the most benefits out of using the LiftSuit.

As a wearable device, your body but also your mind will need some time to adjust to the support provided by the LiftSuit. It will change the work “feeling”. Give yourself enough time to get used to it.

Start using the LiftSuit only for one hour initially on the first day, then increase duration over time. Also give yourself enough time to find the optimal setting of the Suit to provide the right amount of support. You can also test the LiftSuit at the beginning of your work when you are well rested, and at the end of your work when your muscles are already fatigued.

The following tips will help you to quickly learn and understand the support provided. The goal is that you wear it without noticing it, while you activate and deactivate it intuitively to get the support you want during any given situation

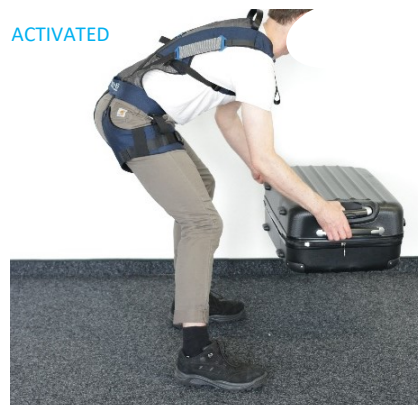
4.1 Testing the support provided

It is important to understand the level of support the LiftSuit provides. It is designed to reduce the load on your muscles by around 10%-30%. Before using it during work, test the support of the LiftSuit. Activate the support and test it. Then deactivate and test it. When focusing on your lower back muscles, you will feel a difference.

TEST WITH ACTIVATED SYSTEM



Activate the system



Lift an object (around 5kg) five to ten times from the floor.

TEST WITH DE-ACTIVATED SYSTEM



Deactivate the LiftSuit



Lift the same object again. Do you feel the difference?

4.2 Deactivate support while under tension

This test is another way to experience the support provided by the LiftSuit. You will deactivate the support while you are in a forward leaning position. Focus on how your back muscle react.



Activate the system



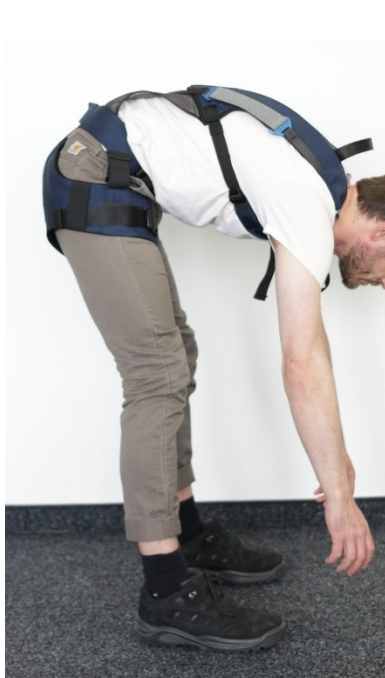
Lean forward and feel the support



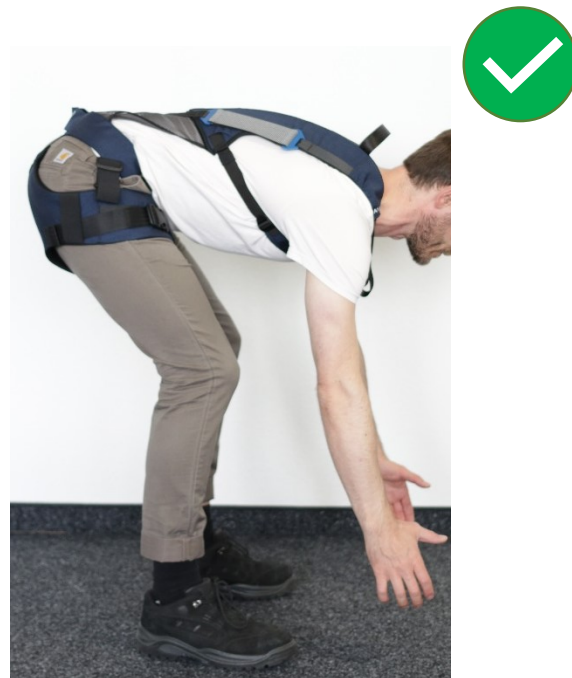
Deactivate the system by tilting the activation buckles with your thumbs, while remaining in the forward-leaning position.

4.3 Train a good posture by using the LiftSuit

You will feel the support that is provided by the LiftSuit. Use this information as a reminder to correct you back posture if necessary. Your back should remain straight while lifting.



You will feel the assisting force of the LiftSuit on your thighs and shoulders.



Every time you feel this force, remind yourself that you are now lifting and try to keep you back straight.

4.4 Adjusting the support according to your current work

You may need different levels of support in different situations. Below you can find some recommendations. But eventually it is important that you adjust the LiftSuit yourself so that it is supportive and comfortable to you.



When you lean forward only a little bit, the preload of the elastic energy storage elements can be high to provide support.



When you lean forward for a deep lift, the preload on the elastic energy storage elements can be lower. It should not restrict you from bending down.



When kneeling, the preload can also be readjusted. Make sure the LiftSuit is deactivated when you transfer from a standing to a kneeling position. Activate once on your knees.



You can adjust the preload on the EES with the activation mechanism. **Left:** The Activation Straps on your chest are short. In this position the suit will only support you during a deep lift. **Right:** The Activation Straps on your chest are long. In this position the suit will already support small upper body movements.

4.5 General tips when using the LiftSuit



Before you start working, remember to activate it.



When you are on a break, deactivate the system.



When you sit down, you should deactivate the system. Simply tilt the activation buckles up while sitting down.



Make sure the LiftSuit is deactivated when climbing stairs.

5 Technical Specifications

The main technical specifications of the LiftSuit are summarized below.

Characteristic	Value
Mass overall	0.9 kg
Dimensions (packed)	Around 25 cm x 50 cm x 10 cm
Dimension on a coat rack	Around 110 cm x 30 cm x 15 cm
Size	One size fits all (M-L)
Back height	45-60 cm
Chest circumference	88-130 cm
Hip circumference	75-120 cm
Thigh circumference	46-75 cm

6 Cleaning, Care and Maintenance

6.1 General care

- Avoid touching sharp and piercing objects with LiftSuit.
- Ensure that the LiftSuit is stored in a dry and ventilated place without direct sunlight.
- Keep your LiftSuit clean from oil and chemicals that could damage it.

6.2 Inspections



CONDUCT A VISUAL INSPECTION OF YOUR LIFTSUIT AT LEAST ONCE A MONTH TO ENSURE THAT THERE ARE NO PROBLEMS CAUSED BY WEAR AND TEAR. IN CASE YOU IDENTIFY A POSSIBLE PROBLEM, REMOVE THE LIFTSUIT FROM OPERATION AND CONTACT THE MANUFACTURER.

For the visual inspection, follow the checklist below:

Activation Mechanism:

Are there any signs of wear and tear on the [activation buckle](#) (rounded spikes)?



Activation Mechanism:

Are there any signs of wear and tear on the [activation straps](#) obviously created by abrasion and interaction with the buckle?



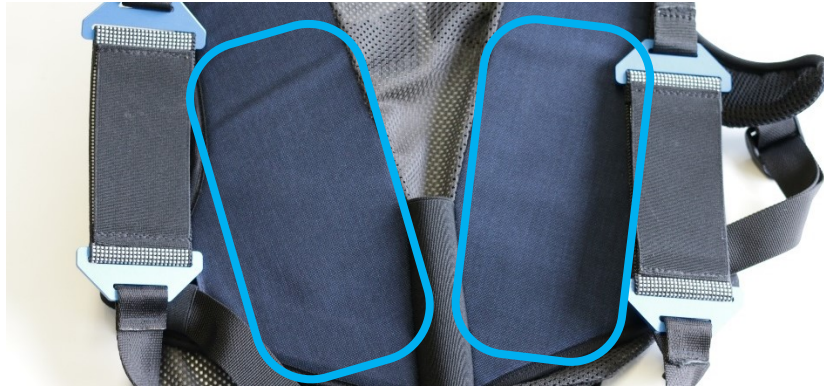
EES:

Are there any signs of abrasion on the **back side of the EES** elastics?



EES:

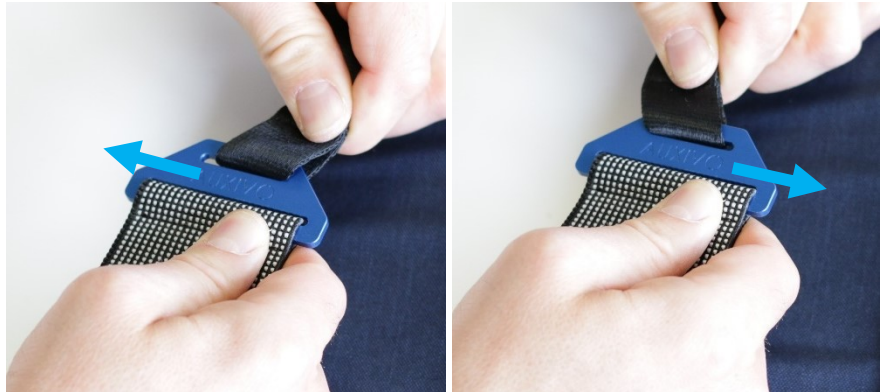
Are there any signs of excessive abrasion on the **main fabric** of the vest behind the EES?



EES:

Are there any signs that the hooks are slipping out the connecting loops?

Please run a short test by moving all 4 hooks quickly back and forth from the left to the right.



Thigh Cuffs:

Are there any signs of wear and tear at the cuffs? Please check especially the **edges of the elastic part**.



IN CASE YOU IDENTIFY ANY POTENTIALLY PROBLEMATIC WEAR AND TEAR, REMOVE THE LIFTSUIT FROM OPERATIONS AND EITHER REPAIR IT (E.G. BY REPLACING THE EES), OR CONTACT THE MANUFACTURER FOR FURTHER ASSISTANCE.

6.3 Changing the Elastic Energy Storages (EES)

For certain circumstances you might need to remove or replace the elastic energy storage elements:

- For cleaning and washing.
- To replace them in case of wear and tear.
- To switch them with different (stiffer or softer) EES to adjust the support to your personal needs.

If you want to attach, remove or replace them, simply follow these steps.

Detaching the EES



1 - Push the connecting loop to the side and pull it away from the EES hook



2 - When the loop slips out at the opening, pull the EES hook out of the loop

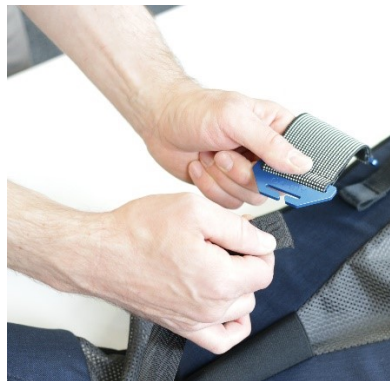


3 - Repeat on the other end of the EES

Attaching the EES



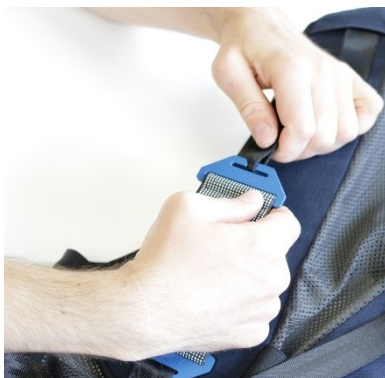
1 - Take one EES with the AUXIVO Logo facing you in your hand



2 - Grab the lower connecting strap from the right thigh cuff. Make sure it runs through the right side of the Hip Belt tunnel.



3 - Insert the longer side of the EES hook into the loop first. Then squeeze the loop to let the shorter side of the hook also slip in the loop.



4 - Grab the connecting loop coming from the left shoulder and insert the hook at the upper end of the EES and repeat the same procedure as already done on the now inserted EES hook.



5 - Check again that the logos on the EES hooks and also the elastic webbing with the white dots are facing you.



6 - Repeat steps 1 to 5 and double check that the crossing section of the connecting strap from the cuffs is above the hip belt. Make sure there is no twist in the connecting straps.

6.4 Cleaning the LiftSuit

To wash the LiftSuit, please move ahead as follows to avoid damaging the LiftSuit:

1. Remove the elastic energy storages (EES) as described above in chapter 6.3.
2. Close all release buckles before washing.
3. Machine wash at 30°C. Do not use fabric softener. Use mild detergent. Wash separately. Only gentle spinning. Do not tumble-dry.
4. Air dry the LiftSuit. Make sure that it is fully dried before using it again.
5. When also the paddings are completely dry - put both elastic energy storages back in.
6. Conduct a quick inspection to ensure that all parts of the LiftSuit are in a correct position and orientation for the next use.

6.5 Multiple users for one LiftSuit.



DO NOT USE THE SAME LIFTSUIT OPERATIONALLY FOR MULTIPLE USERS WITHOUT WASHING IT BETWEEN USERS.

For hygiene reasons, the LiftSuit needs to be washed if handed over from one user to another. To ensure fit and comfort, the LiftSuit has to be adjusted for every new user.

7 Warranty

The LiftSuit comes with a sending-in warranty of 1 year. The Elastic energy storing elements (EES) have a warranty of six months and can be replaced. For replacement parts, please contact your Auxivo sales representative. For all warranty issues, please contact us via E-Mail or Phone.

8 Contact and Support

Please contact us in case you have any questions or comments. You can contact us by E-mail or by phone during office hours.

E-Mail support: info@auxivo.com

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