



## Original instructions



# AVANTI

## AVANTI SERVICE LIFT

Installation manual

Model SWP L02 CE-AECO



**Date of publication:**  
2nd Edition: June 2019  
Revision 1: 17/06/2019

This manual covers products with Serial numbers from A2-L0001

AT00010650 SWP L02 CE-AECO Ed.02 R01 – Language: ENGLISH





CE certificate for SWP L02:

# CERTIFICATE

## EC Type Examination

EC-Directive 2006/42/EC, Article 12, Section 3b  
Machinery

Number of registration: 01/205/0950/19

Certification body for machinery NB0035  
at TÜV Rheinland Industrie Service GmbH  
herewith confirms for the company

**AVANTI WIND SYSTEMS TECHNOLOGY, S.L.**  
Calle Angeles (Los), Num. 88  
Pol. Industrial Centrovia  
50196 Muela (La) - (Zaragosa)  
Spain

the close conformity of the product

**Service lift inside wind turbine systems**

### Technical data:

Type:	SWP L01	SWP L02	SWP XL01	SWP XL02
- max. load capacity:	240 kg / 2 persons		320 kg / 3 persons	
- traction hoist:	M508		M608	
- fall arrest device (FAD):	ASL508		ASL608	
- lifting speed:	18 m/min (50 Hz) or 21 m/min (60 Hz)			
- triggering speed of FAD:	30 m/min or 40 m/min			
- net weight:	190 kg		220 kg	
- cabin doors:	Roller-door		Sliding-door	
- max. travelling height:	140 m			
- optional:	<ul style="list-style-type: none"> <li>- Cabin external send function</li> <li>- Wind turbine platform send / call function</li> <li>- high (2.4 m) and low (1.1 m) fences</li> </ul>			

with the requirements according to annex I of Directive 2006/42/EC about machinery and amending the Directive 95/16/EC of the European Parliament and the Council from May 2006 for adaptation of legal and administration regulations of the member countries regarding safety of machinery.

The verification was proved by EC-type approval test, Test-Report- No.: 19\_006-1 from 2019-01-19 and is valid only duly considering the requirements mentioned in this document. The examination was realized on site in Cologne.

This certificate is valid until 2024-02-04

Cologne, 2019-02-04



Certification body  
Notified under No. 0035  
certifier

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 **TÜVRheinland®**  
Precisely Right.



AECO certificate for SWP L02:



**UL LLC**

Presents this

**AECO CERTIFICATE**

Certificate Number: **201712154787904922**

Date: 2017-12-15

To

**AVANTI WIND SYSTEMS A/S  
Rønnevangs Allé 6  
3400 HILLEROED DENMARK**

For certification in accordance with the ASME A17.7-2007 / CSA B44.7-07 (Reaffirmed 2012)  
of the following Elevator Subsystem:

***Turbine Service Lift***

*(See addendum for details)*

***Effective from: December 15, 2017 Until December 15, 2020***

*Muhammad Asad*

Issued by: Muhammad Asad  
AECO Certification Services

*Lenworth E. Grant*

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*Gregory DeLaFuente*

Reviewed by: Gregory DeLaFuente, PE  
AECO Certification Services

*Please look for the UL Classification Mark and Certificate Number on the product*





**Date of publication:**

*2nd Edition: June 2019*

*Revision 1: 17/6/19*

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Ed.Rev	Notes
01.01	New document
02.01	Definitive (approved) edition. Option of 2 or 3 counterweights in the safety wire rope. Manufacturer updated. Certificates updated.

## 6 AVANTI Service Lift for Wind Turbines



# 1. Limited Warranty

Avanti Wind Systems Technology, S.L. warrants that commencing from the date of shipment to the Customer and continuing for a period of the longer of 365 days thereafter, or the period set forth in the standard AVANTI warranty, the Product<sup>1)</sup> described in this Manual will be free from defects in material and workmanship under normal use and service when installed and operated in accordance with the provisions of this Manual.

This warranty is made only to the original user of the Product. The sole and exclusive remedy and the entire liability of Avanti under this limited warranty, shall be, at the option of Avanti, a replacement of the Product (including incidental and freight charges paid by the Customer) with a similar new or reconditioned Product of equivalent value, or a refund of the purchase price if the Product is returned to Avanti, freight and insurance prepaid. The obligations of Avanti are expressly conditioned upon return of the Product in strict accordance with the return procedures of Avanti.

This warranty does not apply if the Product (i) has been altered without the authorization of Avanti or its authorized representative; (ii) has not been installed, operated, repaired, or maintained in accordance with this Manual or other instructions from Avanti; (iii) has been subjected to abuse, neglect, casualty, or negligence; (iv) has been furnished by Avanti to Customer without charge; or (v) has been sold on an "AS-IS" basis.

Except as specifically set forth in this Limited Warranty,

ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, COURSE OF DEALING, LAW, USAGE OR TRADE PRACTICE ARE HEREBY EXCLUDED TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW AND ARE EXPRESSLY DISCLAIMED BY AVANTI. IF, PURSUANT TO ANY APPLICABLE LAW, TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED AS PROVIDED IN THIS LIMITED WARRANTY, ANY IMPLIED WARRANTY IS LIMITED IN TIME TO THE SAME DURATION AS THE EXPRESS WARRANTY PERIOD SET FORTH ABOVE. BECAUSE SOME STATES DO NOT PERMIT LIMITATIONS ON THE DURATION OF IMPLIED WARRANTIES, THIS MAY NOT APPLY TO A GIVEN CUSTOMER. THIS LIMITED WARRANTY GIVES CUSTOMER SPECIFIC LEGAL RIGHTS, AND CUSTOMER MAY HAVE OTHER LEGAL RIGHTS UNDER APPLICABLE LAWS.

This disclaimer shall apply even if the express warranty fails of its essential purpose.

In any cases of dispute the English original shall be taken as authoritative.

<sup>1)</sup>Avanti service lift ("Product")

## 2. Introduction

### 2.1 Observations

**Only trained people may use this lift.**

This manual must be available to staff at all times during installation, maintenance and operation.

Additional copies are available from the manufacturer upon request.

All measurements are indicative only and subject to change without notice.



*The pictures and sketches in this manual may not reflect the product aesthetics, colours, arrangement precisely. This has no impact on the function or safety.*

### 2.2 Symbols

Symbol	Signal word	Meaning	Possible injury if not observed
--------	-------------	---------	---------------------------------

#### Safety instructions



**DANGER!**

IMMEDIATE or possibly imminent danger:

Death or severe injury!



**DANGER!**

IMMEDIATE or possibly imminent danger of hazardous voltage:

Death or severe injury!



**CAUTION!**

Potentially hazardous situation:

Light injury or material damage.

#### Additional instructions



**ATTENTION!**

Potentially dangerous situation:

Damage to equipment or workplace



**IMPORTANT!**

Useful tips for optimum working procedure

None



**VERSION!**

Differentiation between CE versions and AECO version.



Reference to written specification/documentation

## 2.3 Cautions

Use and daily inspection of the service lift shall only be performed by person who has gone through the relevant training associated with the Avanti service lift use and daily inspection and is in possession of a valid (non expired) certificate for the task. Installation and maintenance of the service lift shall only be performed by certified technicians. Personnel must be at least 18 years of age. The staff must be familiar with the relevant accident prevention instructions and must have received proper training in these.

Personnel are obliged to read and understand this Installation Manual. Personnel shall wear PFPE (safety helmet, full body harness, shock absorber, lanyard and slider) at all times, when using the lift.

A copy of the Installation Manual must be handed out to the personnel involved and must always be available for reference.

If more than one person is entrusted with installation tasks, the employer shall appoint a supervisor in charge of the operation.

Self-locking nuts must be used at all times. The screw must extend from the nut by at least half of the thread diameter. The nut may not be used once it has become possible to loosen by hand!

If any damage or faults are found during operation, or if circumstances arise which may jeopardize safety: immediately interrupt the work in progress and notify the supervisor or employer!

All tests/repairs of electrical installations may only be performed by AVANTI or certified technicians.

All repairs to the traction, braking and supporting systems may only be performed by AVANTI or certified technicians.

If any supporting parts are repaired or replaced, the operational safety of the system must be tested and verified by AVANTI or certified technicians.

Only original fault-free parts may be used.

Use of non-original parts will render the manufacturer's warranty void and any type approval invalid. No modification, extension or reconstruction of the service lift is allowed without AVANTI's prior written consent.

No warranty is provided against damage resulting from reconstruction or modification of equipment or use of non-original parts which are not approved by AVANTI.

Service lift must be inspected by AVANTI or by certified technician before first use.

Service lift must be inspected at least once a year or after 60 hours of use (whichever occurs first) by AVANTI or certified technicians.

Service lift is designed for a lifetime of 20 years with an operating frequency of approximately 60 hours/year for the first year and the 10 hours/year for the rest of the years (250 h in total).

Service lift may not be used by persons who are under the influence of alcohol or drugs which may jeopardize working safety.

The service lift shall not be used in case of fire in the tower.

Service lift shall ONLY be used when the turbine is not generating power.

All wind farm site specific rules must be followed. Service lift shall not be used during inclement weather, including wind speeds over 25 m/s (55.5 mph), electric storms, hurricanes, temperature out of lift's operating range (-25°C to +60°C), and any other that jeopardize safe operation.

Personnel shall be equipped with a wired or wireless two way communication device that shall be connected to a location staffed by authorised personnel. Personnel shall be equipped with portable lights of minimum 200 lx 1) (i.e. headlamps).



*Avoid injury – follow all instructions!*



*The tower owner must verify the need for third party service lift inspections with the local authority and comply with the standards specified.*



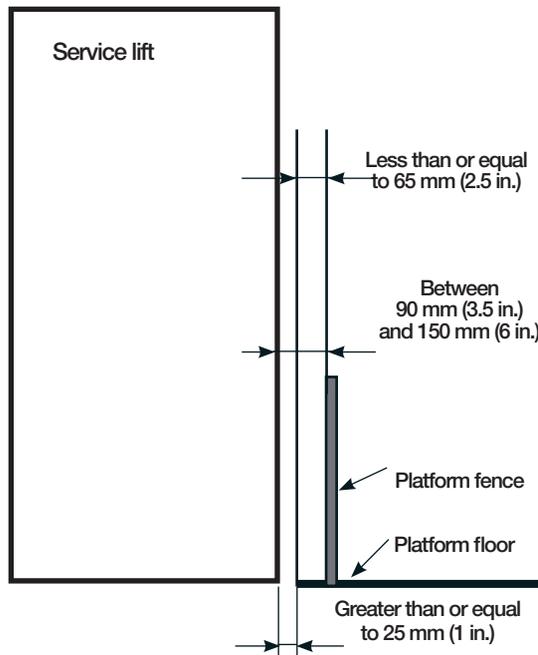
*<sup>1)</sup> Optional for CE versions. Mandatory for AECO version.*

## 2.4 Terms and definitions

Terms	Definitions
<b>Certified technician</b>	Person who has received relevant training from Avanti or a qualified instructor associated with the intended work and who holds valid certification (current) for the task in question.
<b>User</b>	Person who has received relevant training associated with using the Avanti service lift and carrying out the corresponding daily inspections and who holds valid certification (current) for the task in question.
<b>Manual descent (also: descent without electrical power)</b>	Action performed to descend the cabin at a controlled speed without electrical power, by releasing the traction system's electromagnetic brake manually.

## 2.5 WTG requirements

The gaps on the loading side of the service lift shall conform to the applicable requirements of 5.11 of ASME A17.1-2013/CSA B44-13<sup>1)</sup>.



<sup>1)</sup> Optional for CE versions. Mandatory for AECO version.

### 2.5.1 Tower illumination

The platform operating panels shall be properly illuminated (e.g. an illumination of at least 50 lux according to EN 50308).

The loading side of the platform holes shall be properly illuminated.

The landing platform shall be properly illuminated (e.g. an illumination of not less than 27 lx at the standing surface according to A17.1, 5.11).

The tower shall provide emergency lighting in case of power failure (e.g. an illumination of at least 10 lux according to EN 50308).

## 3 Installation

### 3.1 Cautions



Please familiarise yourself with these instructions and the User's Manual before installing the service lift. Ensure that all specified parts are present before commencing installation.

No warranty is provided against damage and injury resulting from not following this "User's, Maintenance and Installation Manual" i.e. reconstruction or modification of equipment or use of non-original parts which are not approved by the manufacturer.

Prior to installation, ensure that:

- Building sections involved will be able to withstand the service lift loads.
- All parts are available and fully functional.
- by checking references and by visual inspection.
- Travel zone is protected by fences at each platform.
- Walking way surfaces are dry and not slippery

The customer must define the maximum allowable wind speed ensuring safe installation.

During installation tasks, personnel shall:

- Wear at least the following PFPE: fall arrest equipment if falling height is higher than 2 m, hand gloves, helmet, safety glasses, working gear.
- Use a hand winch attachable to the ladder when elevating heavy weights.
- Use a wire rope clamp or grip when lowering wire ropes, in order to avoid the risk of personnel losing the wire rope, and wire rope getting damaged or person being hit. The clamp shall be secured to a platform anchor point. The diameter of the clamps or grips shall match the diameter of the wire ropes.
- Not work at different levels if tasks involve risk of falling objects.



Electrical connection of the system must be made in accordance with EN 60204-1 and EN 60204-32.



When plugging the service lift to the power supply, ensure that supply phases are correct!



### 3.2 Freight kit

The service lift shall be transported to destination inside a box.

1. Open the box.
2. Turn the service lift from horizontal to vertical position by means of the freight kit.
3. By means of shackles and slings, attach the lifting machinery (i.e. forklift, chain hoist, crane, etc.) to the lifting eye.
4. Use the lifting machinery to lift the service lift over the pallet level. One person is needed to ensure the lifting process is being done properly.
5. In the picture below you can see the detail of where the lift must lay during the lifting.



6. Place the lift inside the lift shielding at bottom platform.
7. Remove the freight kit.

### 3.3 The wire ropes

**i** Carefully place the cabin in the tower. Do not drag in order to avoid any damage on the bottom of the cabin.

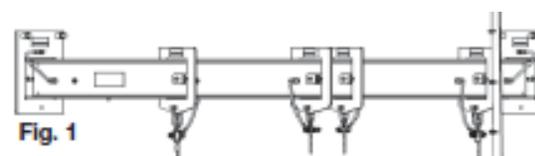
Wire rope lengths depend on the tower height and should be specified when ordering. The coils are marked with their length.



Ensure that lift emergency escape from the lift to the tower ladder is possible.

#### 3.3.1 Tower top

The wire rope coils hang from the suspension beam.



Attach the thimble end of the wire ropes to the beam by means of the 2T shackles. The nuts of the shackles must be secured by means of cotter pins.

- 1) Fit the top limit device on the traction wire rope and to the guiding wire rope next to lift's door (Fig. 2 a, 2b and 2c). Do not tighten wire locks in excess to prevent damaging the wires, just make sure it does not slide when it is hit by the lift's top. Reference distance to top platform is indicated in the integration drawing. Adjust if necessary during inspection before first use.

Fig. 2a

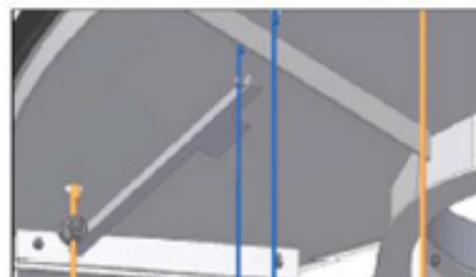


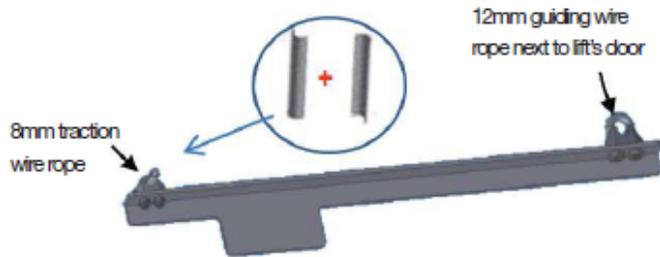
Fig.2b





Tightening torque required: 6Nm for 8mm traction rope grip plus half-bushings, 20 Nm for 12mm guiding wire rope grip. See Annex B.

Fig.2c

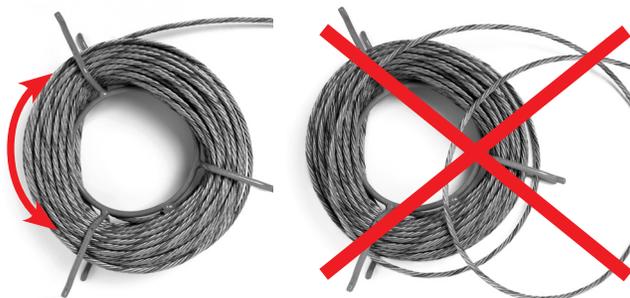


! 2 pieces protection bushing included in the top limit device set must be installed only in the 8mm wire rope. To install it, just put the 2 pieces together around the wire rope in the position where the wirelock are going to be fixed.

i Apply the torques indicated with lubricated screws (not dry). Only use lubricant type 'Molykote G-Rapid Plus' or similar which ensures no damage to screws.

2) Uncoil wire ropes correctly (Fig. 3).

Fig. 3



i All wire ropes are evenly uncoiled as shown in Fig 3 to prevent looping and kinks.

! Ensure that no obstacles are in the way of the service lift. Do not pull wire over edges.

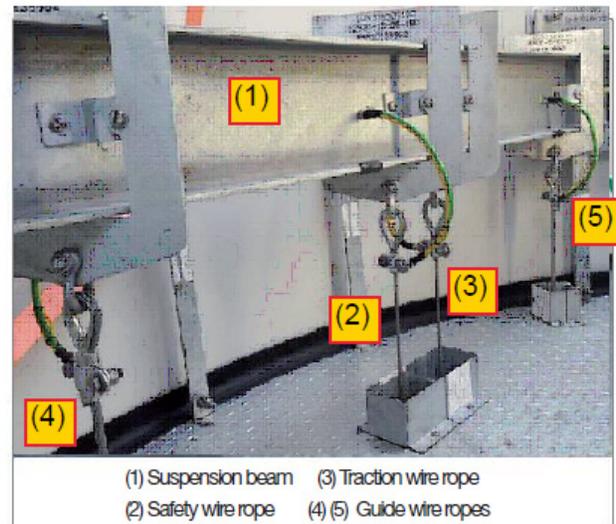
3) The wires must be uncoiled carefully as descending them one by one to the bottom of the tower in a controlled way.

Once the wires are securely attached to the top suspension beam, take the tip of the first guiding wire, pass it through its corresponding hole in the yaw platform and manually lower it in a controlled way while another technician in direct communication guide you from the ladder and help avoiding obstacles if necessary.

When the first guiding wire is fully installed under bottom platform (see section 3.3.4), repeat the process with the other one.

Then descend successively the traction and the safety wires and install them according to sections 3.5 and 3.6.

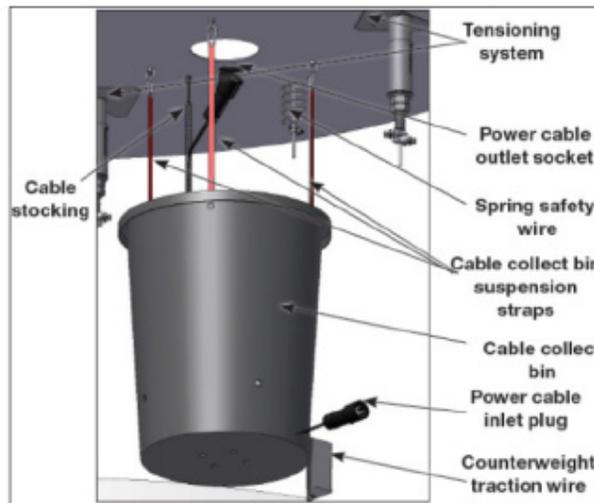
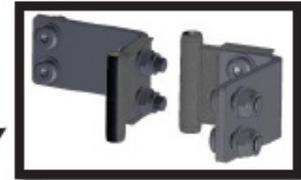
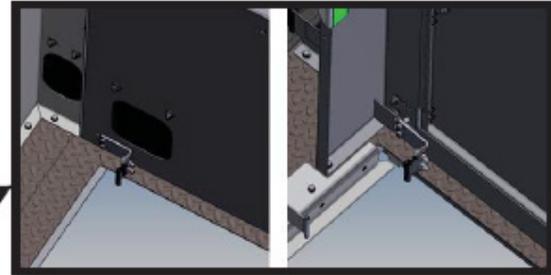
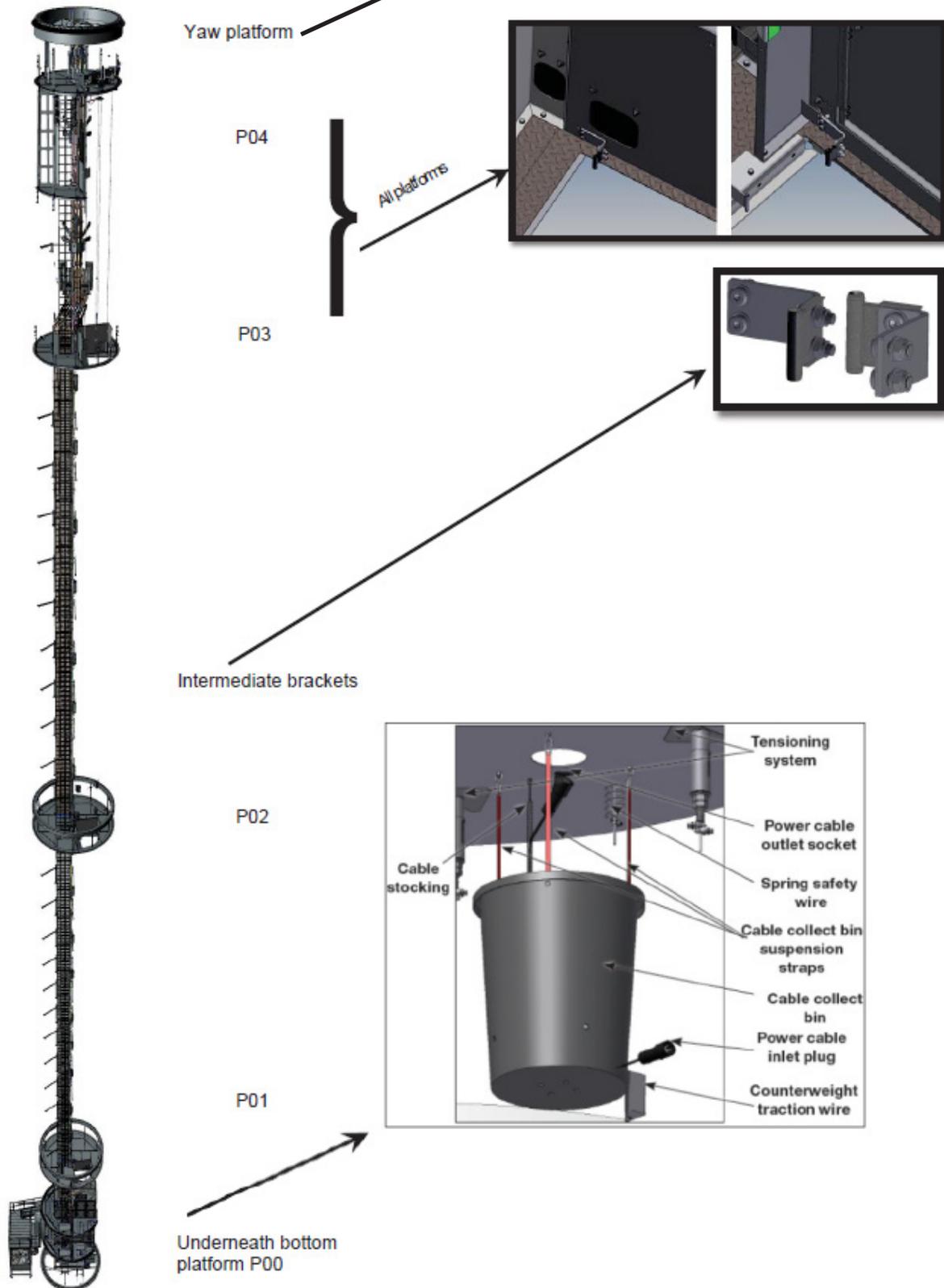
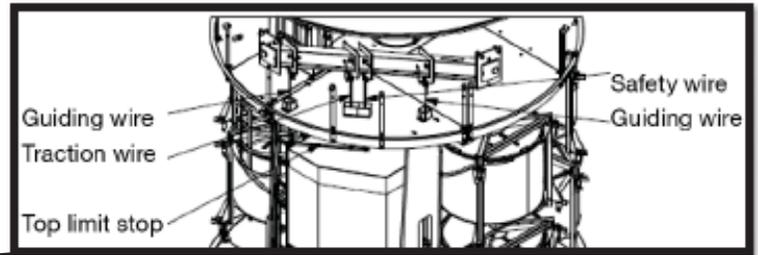
! When descending wires keep the lowering speed and direction always under control to prevent it from causing damage to or becoming blocked in one of the tower's components.





### 3.3.2 Guiding wire rope fixations

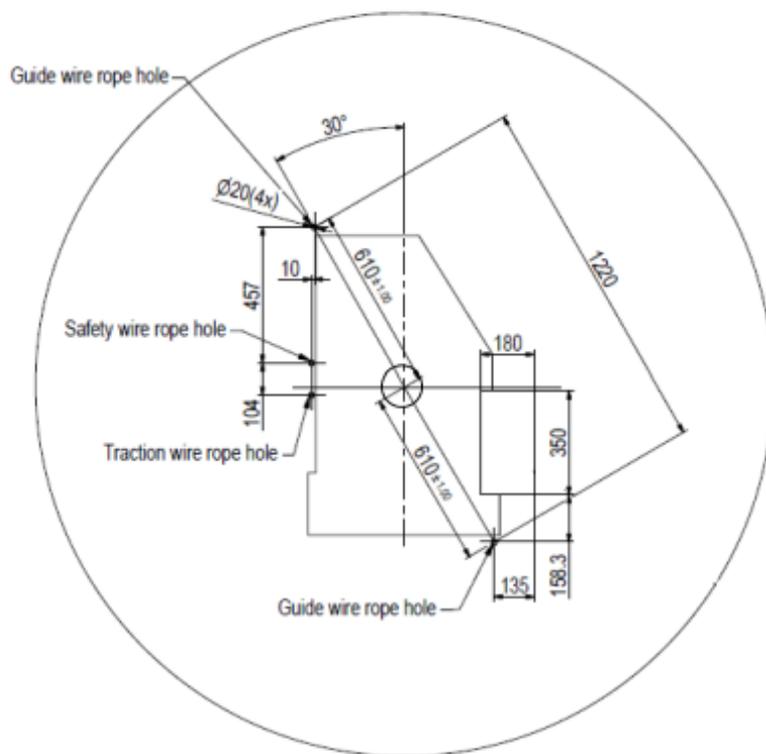
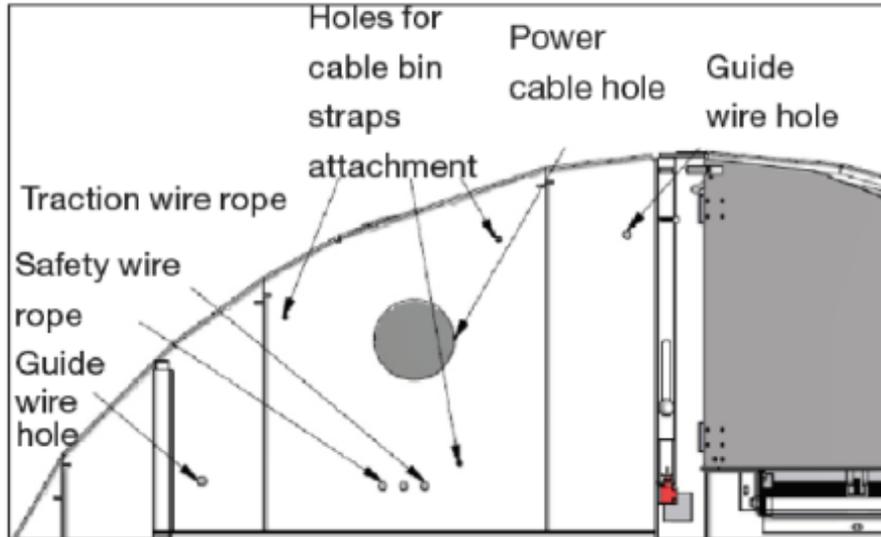
The two 12mm wire ropes for guiding the lift from the top beam at Yaw platform to the tensioners at the basement are attached along the tower by means of wirefixes at platforms and additionally between platforms to ensure optimal guiding as shown below for a typical installation.





### 3.3.3 Tower bottom

Holes in the bottom platform of the tower for wire ropes bushings and trailing power cable hole are positioned as shown in Fig. 4a and 4b.



### 3.3.4 Securing the guiding wire rope-ground level

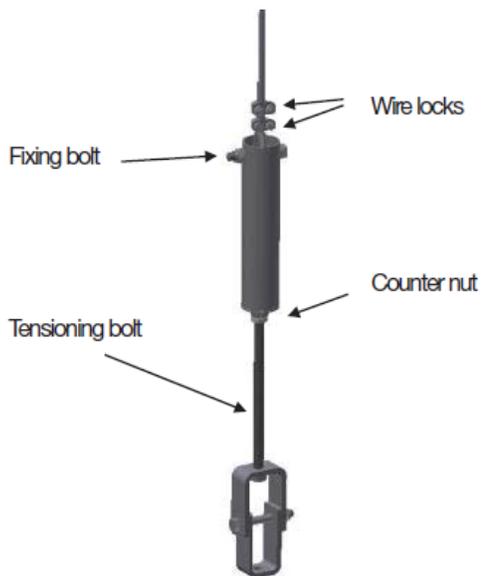
Two possible options are shown depending on the tower integration: attach the tensioner on the basement foundation floor (fig. 5a) or on the basement beam provided (fig. 5c).

- i** Prior to installation, make sure the tensioners are in the position of minimum tension (tensioning bolt fully backed out) in order to be able to reach the required tension value later on.
- i** For easier tensioning, make sure the threads of the tensioners are clean and grease them prior to tighten.
- i** Apply the torques indicated with lubricated screws (not dry). Only use lubricant type 'Molykote G-Rapid Plus' or similar which ensures no damage to the self-locking nuts.

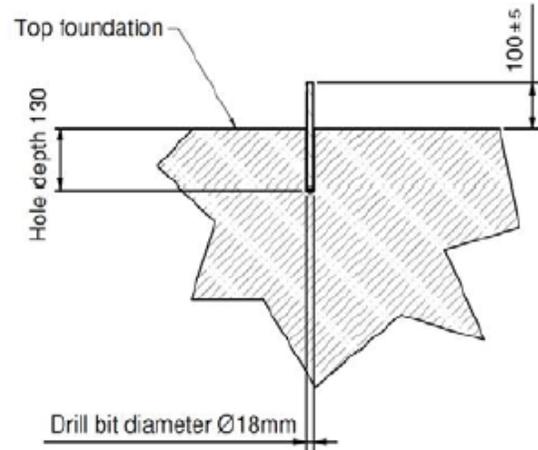
#### 3.3.4.1. Guiding wire ropes in foundation floor

Mount the wire rope as shown in Fig. 5a following the procedure below.

Fig. 5a



1. Drill 2 holes  $\text{Ø}18 \times 130$  mm in the concrete foundation aligned with the 2 guiding wire ropes holes of the bottom platform (see fig. 4b) and install the M16 threaded rods according to specific SWP Work Instruction. See drawing below:



2. Fix the preassembled tensioner to the M16 threaded rods.
3. Feed the guiding wire rope around the fixing bolt.
4. Pretension the wire rope by hand and fix with 2 wire rope grips. Torque the U-bolts of the 12mm wire rope grips to 20Nm (see Annex B).
5. To make wirefixes adjustment easier, pre-tension guiding rope to around 3kN in the graduated scale by means of the tensioning bolt.
6. Coil the excess of wire rope and fix with at least 3 cable ties (see fig 5b).

Fig. 5b

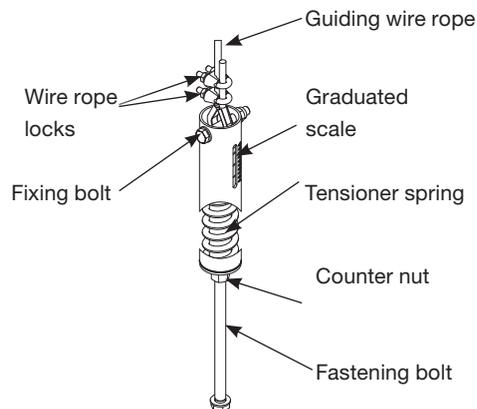


7. Repeat the previous steps for the second guiding wire rope.
8. After first run, when the wirefixes have been installed/adjusted, tension the wire ropes to their final tension (7 kN).

### 3.3.4.2 Guiding wire ropes in beam

Mount wire ropes as shown in Fig. 6b following procedure below.

**Fig. 6b**



1. Mount the preassembled tensioner on the bottom beam.
2. Feed the guiding wire rope around the fixing bolt.
3. Pretension the wire rope by hand and fix with 2 wire rope grips. Torque the 12mm wire rope grips to U-bolts to 20Nm (see Annex B).
4. To make wirefixes adjustment easier, pre-tension guiding rope to around 3kN in the graduated scale by means of the tensioning bolt.
5. To tension the wire rope: loosen the counter nut, turn the tensioning bolt while holding the counter nut loose. Secure the tensioning bolt with the counter nut when desired tension value is reached.
6. Coil the excess of wire rope and fix with at least 3 cable ties (see fig 5d).

**Fig. 5d**



7. Repeat the previous steps for the second guiding wire rope.
8. After first run, when the wirefixes have been installed/adjusted, tension the wire ropes to their final tension (7 kN).

! Check the distance between the wire ropes ( $1220\text{ mm} \pm 2\text{mm}$ ) so that the wire rope fix and wire ropes are in the centre of the wire rope guides.

! Tension the guiding wire ropes after the first run to their final tension (7kN).

## 3.4 Electrical connections

### 3.4.1 Power supply



The electrical connection of the traction system must be made in accordance with EN 60204-1.

The power supply must be protected by a fuse and an earth leak circuit breaker (30mA). Disconnect the main power supply before handling power units. Verify that the rated grid and motor voltages are identical. The three-phase motor is supplied in a star connection configuration.

- Check the correct phase lay after first installation and after each work at control box and/or power supply. In case the lift travels up when the down button is pushed, switch two phases on the power cable plug.

SWP L CE 690V 3 phases+gnd. 50 Hz Y I = 2.3A 1.5 kW 18m/min  
SWP L CE 690V 3 phases+gnd. 60 Hz Y I = 2.8A 1.5 kW 18m/min  
SWP L AECO 480V 3 phases+gnd. 60 Hz Y I = 4.1A 1.8 kW 21m/min  
SWP L AECO 400V 3 phases+gnd. 60 Hz Y I = 5.1A 1.8 kW 21m/min  
**Control voltage: 230V**

### 3.4.2 Installation of main switch

The main switch is installed on the bottom platform fence (Fig 7).

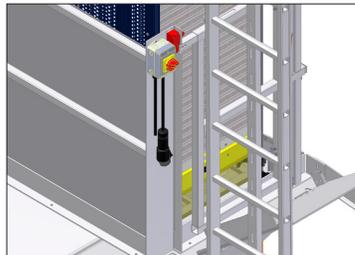


Fig. 7

Mount the send and call control boxes to the platform fences and connect them to the main switch control box according to the wiring diagram supplied in the main control box of the cabin.

1. Connect the power input cable to the WTG electrical cabinet.
2. Connect the circuit to the plug available on the power cable coiling bin under the platform.

### 3.4.3 Supply cable

1. The length of the cable depends on the height of the tower. The power cable is marked with its length.
2. Use heavy rubber cable strips for fastening the supply cable to service lift.
3. An installed generator will have to provide at least 2.5 times the output of the traction system.

### 3.4.4 Power connection

1. Push the EMERGENCY STOP button of the cabin operation box.
2. Check that the various stop switch cables and fall arrest device cable are connected to the power cabinet according to colour code.
3. If cable coiling bin is used (Fig. 8):

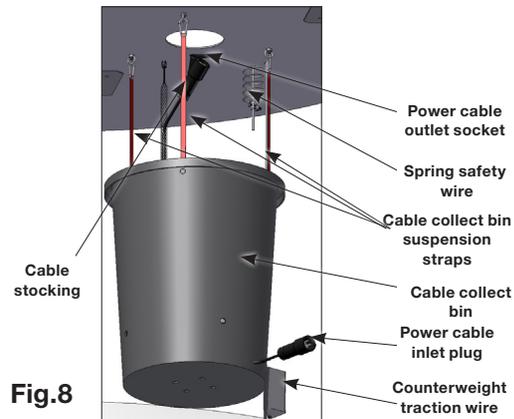


Fig.8

- 3.1 Hang the cable collect bin underneath the power cable hole of the bottom platform. Attach the straps on the holes shown in Fig. 4.
- 3.2 Hang the bucket in the full length of the webbing. Keep the webbing as long as possible.
- 3.3 Cut the transport strips and tape which hold the wire rope inside the bin.



The plug and socket connection between the lift and cable bin must be placed inside the engine room.

4. Connect the power cable outlet socket to the service lift inlet plug using cable stocking. Attach shackle to the eyebolt on the back of the service lift (Fig. 10).
5. Connect the power cable plug to the grid (Pre-fuse 16A).
6. Pull the EMERGENCY STOP button to deactivate. The wiring diagram is found in the electrical control box.

Fig. 10



## 3.5 Installation of traction and safety wire rope in lift

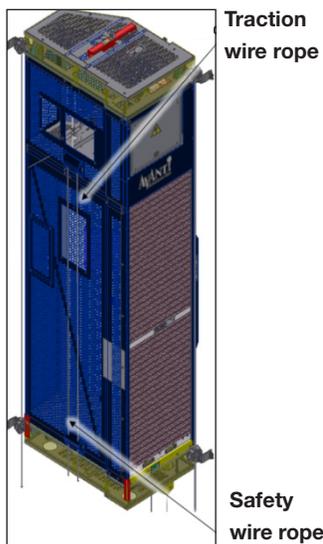


*Wear protective gloves when handling wire ropes.*

### 3.5.1 Traction wire rope installation

1. Remove top cover plate from the service lift (see Fig.12). Remove wheels cover inside the cabin (see Fig.13a and 13b).
2. Put the wire rope into the traction system's wire rope inlet opening.
3. Push the UP button on the cabin operation control (manual control from inside the cabin) and feed wire rope through until the traction system starts pulling. Ensure that the wire rope can exit without obstruction!
4. Continue feeding the wire rope underneath (round) the back guide wheel and over the front guide wheel.
5. Let the traction wire rope pass through until it is slightly tightened.
6. Feed wire rope through cabin bushings and then through the platform floor towards the basement.

Fig. 12



### 3.5.2 Safety wire rope installation

1. Unlock the fall arrest device by pushing up the black lever. Feed the safety wire rope through the fall arrest device.
2. Like the traction wire rope, continue feeding the wire rope underneath (round) the back guide wheel and over the front guide wheel.
3. Pull the safety wire rope to tighten it.
4. Feed wire rope through cabin bushings and then through the platform floor towards the basement.
5. Mount the wheels cover and top cover plate back on the service lift.

Fig. 13a

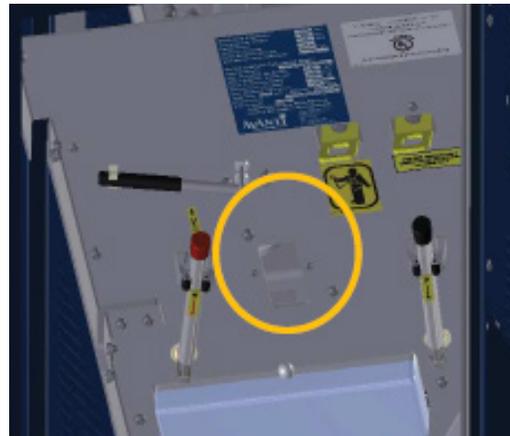


Fig. 13b



## 3.6 Securing the traction and safety wire rope

The traction wire rope is fastened as described in point 3.6.1 below and the safety wire rope is fastened as shown in point 3.6.2.

**i** Apply the torques indicated with lubricated screws (not dry). Only use lubricant type 'Molykote G-Rapid Plus' or similar which ensures no damage to screws.

### 3.6.1 Traction wire rope counterweight

An 11kg (25,25 lb) weight is mounted approximately 200mm (7,87 in) below the bottom platform on the traction wire rope hold by means of two wire rope grips torqued to 6 Nm (see Annex B). Excess of wire rope is coiled with at least three strips (see fig. 14a and 14b).



Ensure that counterweight and wire rope coils can rotate freely.

Fig. 14a

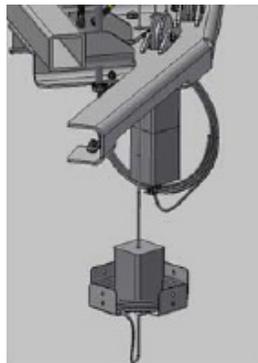


Fig. 14b

### 3.6.2 Safety wire rope push spring



Before fastening the safety wire rope carry out the fall arrest device test.

Fig. 15

Steps to install the push spring are detailed below (see fig 15):

1. Feed the safety wire rope through the bottom platform hole.
2. Ascend the service lift 50 cm.
3. Activate the fall arrest device.

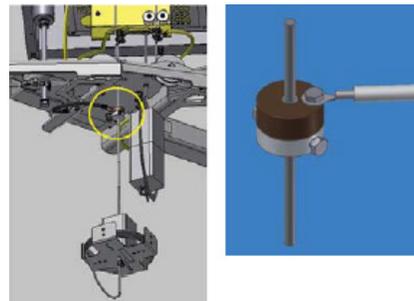
4. Perform manual descent so that the weight of the service lift is transmitted to the safety wire rope.
5. Compress the spring to 40 mm and fix with cable ties.
6. Feed the safety wire rope through the compressed spring.
7. Pull the safety wire rope downwards by hand as much as possible.
8. Place and fasten the two wire rope grips (torqued to 6Nm according to Annex B).
9. Cut the cable ties so that the spring decompresses to 55 mm.

Optionally, the push spring can be replaced by two or three 11 kg counterweights (depending on the configuration) as the used on the traction wire rope.



### 3.6.3 Traction and safety wire ropes grounding

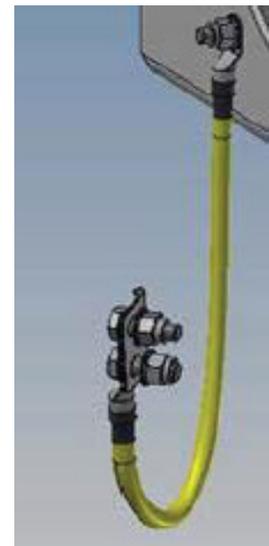
To allow the rotation of the traction wire rope and provide the proper grounding of it, a "rotating grounding unit" may be used. See picture below:



To install the rotating ground unit: prior to counterweight installation, insert the traction wire rope through the unit and fix it in a suitable position below the lower bracket by means of the two M8 screws in the lower part of the unit. Torque required is 4Nm (see Annex B).

The earthing cable is then attached to the unit by another M8 screw located on the top of it. Torque value is not specified for this screw, just 'snug-tight' required.

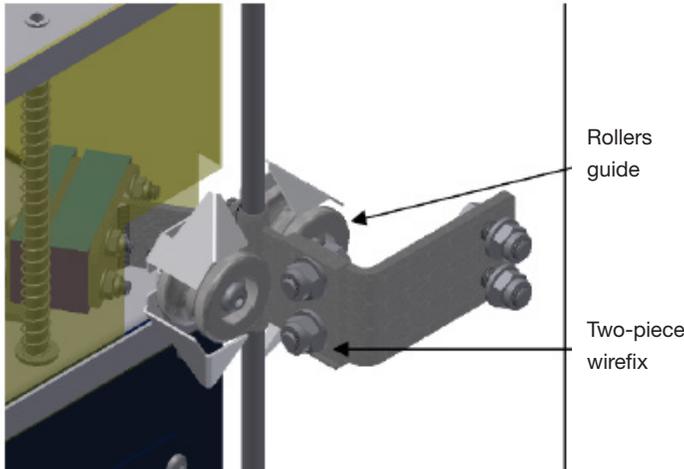
The safety wire rope's lower end can be grounded by simply connecting the earthing cable to the wire by means of an appropriate bracket, similarly to the top end of the wire ropes. See picture to the right:



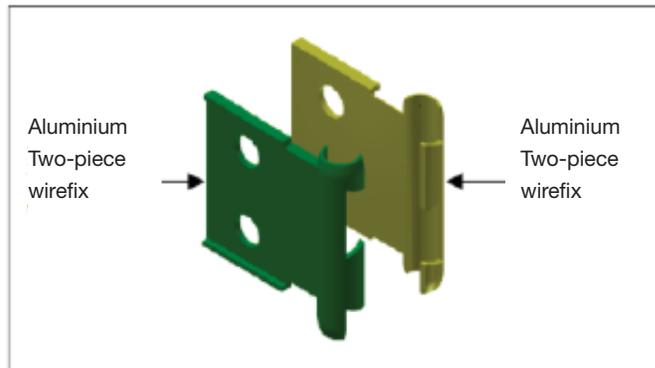
### 3.7 Wire rope fix alignment

Having mounted the service lift, the wire ropes, and the power cable, adjust the wire rope fix alignment during the first run.

**Fig. 16** Rollers guiding system



The wirefixes are made of two parts. These two-piece concept allows the wirefix to be installed at any moment, without having to introduce it through the bottom end of the wire rope but just putting the 2 pieces together around the wire rope.



*There are 2 installation windows located on the rear of the service lift. These shall only be used during installation and maintenance tasks.*



*In order to avoid risks, turn the power supply off from the service lift before opening the 2 installation windows. Do not turn the power supply back on until the windows are closed.*



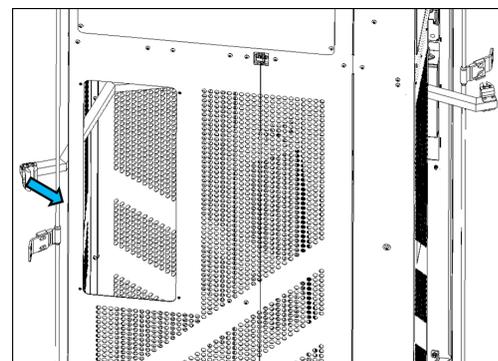
*Besides, in order to install/adjust wirefixes, the lift's door has to be opened. People have to be always attached to the anchor point when using the lift. Confirm you are properly secured before opening the door.*

The final position of the wire rope fixes shall be adjusted with the help of the installation tool (item number AT00011211, see Fig. 17) and following the procedure below. The distance between wirefixes is  $1220 \pm 2$  mm.



**Fig. 17**

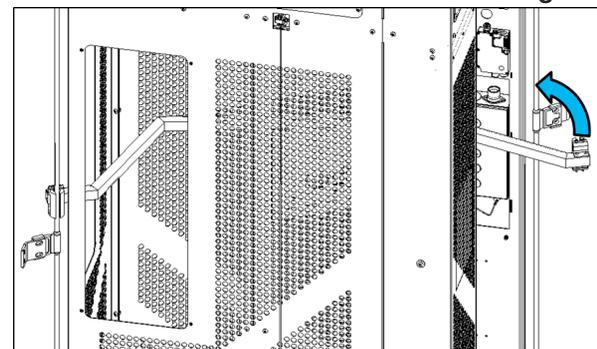
1. Put the installation tool inside the lift and ascend to the installation position of the first pair of wirefixes.
2. Turn the operation selector to OFF position, push emergency stop switch, and then open the two installation windows.
3. Install the first pair of wire fixes to the tower structure using the holes provided.
4. Attach the left end of the installation tool to the left guiding wire rope (see Fig. 18).



**Fig. 18**

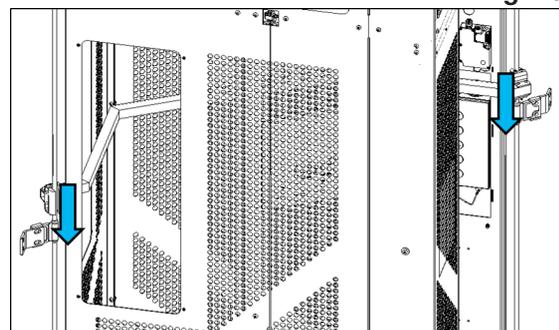
5. Attach the right end of the installation tool to the right guiding wire rope (see Fig. 19).

**Fig. 19**

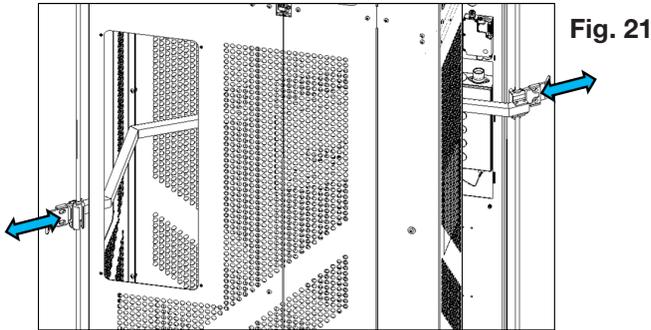


6. Slide the installation tool downwards until it contacts the wire rope fixes (see Fig. 20).

**Fig. 20**



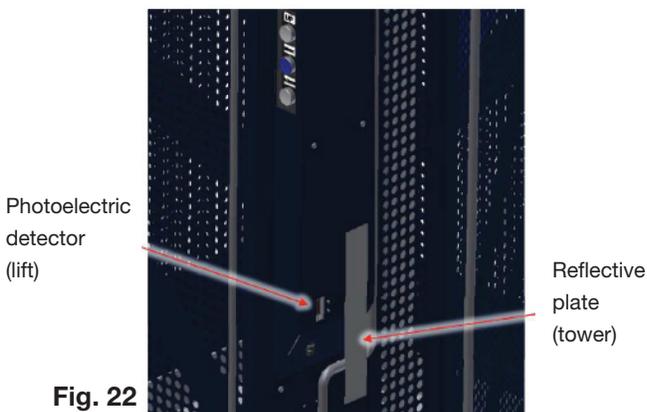
7. Adjust the position of the wire rope fixes horizontally by means of the oblong holes so that they insert in the indentations of the installation tool (see Fig. 21).



8. Tighten the bolts of the wire rope fixes.
9. Slide the installation tool upwards.
10. Release the right end of the installation tool from the right guiding wire rope.
11. Release the left end of the installation tool from the left guiding wire rope.
12. Put the installation tool inside the service lift.
13. Close the installation windows, and then turn the operation selector to INT position. Release the emergency stop button and push the reset button.
14. Repeat the process with each pair of wirefixes throughout the travel path.

### 3.8 Installation of reflectors at platform levels

The service lift door should be able to be opened whenever the cabin is in alignment with the platform (tolerance  $\pm 150\text{mm}$ ). To enable this the lift is equipped with a photoelectric sensor detecting reflectors installed at platform levels where the lift door should be allowed to open (see Fig. 22). The reflector is an adhesive tape that sticks to the reflector plate installed on the platform guard rails. Before applying the reflector tape, make sure the contact surface of the reflector bracket is clean and dry. Make sure to remove the protective film on the reflector top side; otherwise they might not work properly.



### 3.9 Adjustment of top limit device

The top limit device is adjusted so the top obstruction switch stops the lift in alignment with the top landing platform. To make sure not to hit the top beam, place first the top stop limit device about 2950mm from the top platform floor. Measure the distance the lift stops under platform level and re-adjust the device position according to this value.

### 3.10 Danger zone! sticker

Mount the “Danger Zone” sticker (Fig. 23) visible in the tower behind the lift. Make sure the wall and platform are clean and dry before attaching the sticker.



 Make sure that nobody is exposed to danger below the service lift, for instance from falling parts.

### 3.11 Inspection before first use

A service lift certified technician must carry out an inspection before first use. At least, all the points in “Installation checklist” (Annex A) must be checked.

-  Inspection shall only be carried out by AVANTI or certified technicians. Refer to the “AT00010648\_Service Manual SWP L02 CE EN” document for further details.
-  Follow and fill in the “Installation checklist” (see Annex A).
-  Owner must ensure that the results of the inspection before first use are logged in the “AT00010646\_Inspection and Maintenance Log Book” (1st copy).
-  Alternatively, this information may also be stored electronically, as long as it is always available for reference.

 Only certified technicians can perform the inspection of Avanti Service Lifts.

## 3.12 Disassembling

Disassemble in reverse order and dispose of in accordance with local authority regulations. A basic guideline to carry out the job is listed below, taking into consideration the lift is still functional. If this is not the case, the operations performed from the lift will have to be carried out using the appropriate mechanical or electrical help and taking all the extra precautions needed in order to perform the job in a safe manner.

1. Get into the lift and go to top platform carrying the hoist, slings and wire clamps for the wire ropes disassembling later on.
2. Dismount the top limit device.
3. As descending, from inside the cabin, dismount the platform detection reflector and the wirefixes.
4. Carrying the dismantled parts inside the lift, move down to next platform.
5. Repeat previous steps at every platform and intermediate brackets.
6. Park the lift at bottom platform standing on its four rubber feet by means of the override switch.
7. Dismount the 12mm guiding wire ropes from their tensioners.
8. Dismount the counterweight and push spring (or the counterweights) from the traction and safety wire ropes respectively.
9. Take the traction and safety wire ropes out from the lift.
10. Take the guiding wires excess to bottom platform.
11. Disconnect lift from main power and dismount the main switch.
12. Climb up to top platform.
13. Install the hoist hanging from the suspension beam.
14. Grab one of the wire ropes with the wire rope clamp, disassemble it from the beam and lower it to bottom platform using the hoist.
15. Repeat the process with the three remaining wire ropes.
16. Mount the transportation bracket (see 3.2 “Freight kit” and Fig. 24) on the top of the lift.
17. Attach the hoist’s hook to the lifting eye and take the lift out of the lift’s shielding. Take the hoist and the rest of elements down to bottom platform and then out of the WTG.
19. Dismount the cabin as necessary to be able to take the parts out of the WTG.
20. Collect all the tools and clean the working area.

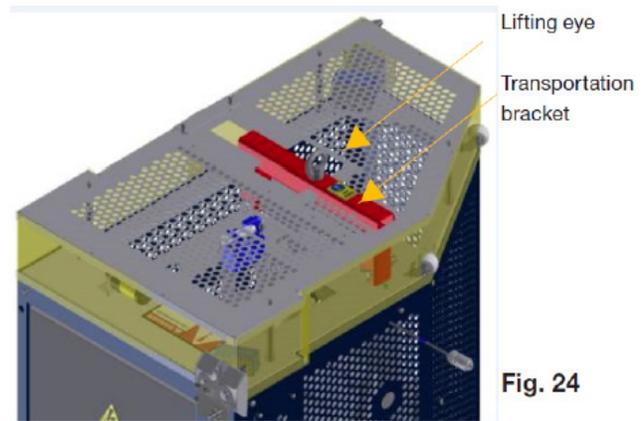


Fig. 24

**!** The above steps may differ from one installation to another depending on the circumstances (such as the overall dismantling tasks – or others- taking place in the wind farm) and means available (cranes, etc.).

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