Amendment to Avanti Service Lift, Model DOLPHIN

This amendment applies to the manual 45540046 Ed.05 Rev.06 of the Avanti service lift, Model DOLPHIN.

2.3 Cautions

(The following paragraph has been added)
The service lift shall not be used in case of fire in the tower.

(The following section has been added)

2.4 Terms and definitions

Terms	Definitions
Certified technician	Person who has gone through the relevant training associated with the scheduled task from Avanti or from a certified trainer and is in possession of a valid (non expired) certificate for the task.
User	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.

(The following section has been updated)

6. Maintenance

All the inspections / maintenance operations (periodical or extraordinary) must be logged in the appropriate Inspection Appendix.
All inspections and service tasks made to the hoist and fall arrest device must be carried out by certified technicians. The relevant maintenance instructions are provided to each person during the training.

6.1 Recommended planning

Avanti recommends the following maintenance planning:

Frequency	Performed by	Components
Daily	User	Overall / Travel zone
		Control and safety devices
		Fall arrest device
Annually	Certified Technician	Overall / Travel zone
		Control and safety devices
		Cabin
		Traction hoist
		Fall arrest device
		Overload limiter
		Traction and safety wire ropes
		Guiding system
		Electrical system
		Information signs and documents
		Doors and hatches
		Cabin control box
		Safety switches
		Interlock system
		Platforms
Every two years	Certified Technician	Fall arrest device
Every five years or 50 hours (whatever occurs first)	Certified Technician	Traction hoist
Every 20 years or 250 hours of operation (whatever occurs first)	At Avanti Workshop	Traction hoist
		Fall arrest device
V164 only: Annually, at least every 125 hours of operation	Certified Technician	Wire guide replacement

6.2 Alternative planning

Owners who strictly follow the maintenance program and the daily inspections, and can document it could decide with taking over the responsibility as well to provide the following alternative planning:

Frequency	Performed by	Components
Daily	User	Overall / Travel zone
		Control and safety devices
		Fall arrest device
Annually	Certified Technician	Overall / Travel zone
		Control and safety devices
		Cabin
		Traction hoist
		Fall arrest device
		Overload limiter
		Traction and safety wire ropes
		Guiding system
		Electrical system
		Information signs and documents
		Doors and hatches
		Cabin control box
		Safety switches
		Interlock system
		Platforms
Every ten years or every 125 hours of operation (whatever occurs first)	Certified Technician	Traction hoist
		Fall arrest device
Every 20 years or 250 hours of operation (whatever occurs first)	At Avanti Workshop	Traction hoist
		Fall arrest device
V164 only: Annually, at least every 125 hours of operation	Certified Technician	Wire guide replacement

6.3 Cautions

Before any maintenance task, ensure that walking way surfaces are dry and not slippery.
Before any maintenance operation, check that the service lift is properly out of service.
In case of a fault, do not use the service lift until it is solved. If required secure workplace.
During maintenance tasks, personnel shall

- Wear at least the following PFPE: fall arrest equipment (when falling height is more than 2 m), hand gloves, helmet, safety glasses and working gear.
- Place cabin at bottom platform and disconnect power supply.
- Use an electricity measuring tool when performing inspection of electrical components.
- Use a hand winch attachable to the ladder when handling big/ heavy loads and shall be performed at least by 2 persons.
- Panel parts shall be removed to facilitate access to confined spaces.
- Use a cable grip when replacing travelling cable.
- Keep cabin doors closed when using a 3-step ladder.

Only certified technicians shall perform electrical installation tasks.

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

6.4 Daily inspection

Travel zone:
Ensure that there are no obstacles in the travel zone which may obstruct the travel of the service lift.
Service lift:
1. Check that the service lift components are mounted in accordance with the specifications and without any noticeable defects or missing components.
2. Check that the traction and safety wire ropes are not damaged or jammed.
3. Check that the safety devices are in place and working:
3.1 Main switch: Turn the main switch on the interlock control box to the OFF position. The green light must be OFF. The service lift must not run. Turn it ON, the light shall be ON.
3.2 Green light (Ready) – Service lift: Close and lock the bottom platform gallery door and the service lift door. Turn the trapped key to the ON position. The green light must be ON. It should not be possible to remove the trapped key unless it is switched OFF again.

3.3 Emergency stop button: Press the emergency stop button on the cabin control box. The service lift should not move UP / DOWN. Release the emergency stop and drive the lift UP approximately 1 meter.
3.4 Service lift door: Pull the door to open. The door should not open. Unlock the top sliding door from the bottom sliding door and pull to open. The top sliding door should open, the green light must be OFF and the lift must not move UP / DOWN. Close the top sliding door and apply the lock to the bottom sliding door
3.5 Activate the fall arrest device by pulling down the red locking knob. Press and hold the DOWN button of the cabin control box. The service lift should not descend. Try to perform manual descent. The service should not descend. Press and hold the UP button of the cabin control box. The service lift should ascend. Unlock the fall arrest device by pulling down the black unlocking knob.
3.6 Perform a manual descent test for a meter. The lift should descend and the buzzer should sound.
3.7 Drive the service lift down until the Bottom obstruction device hits the bottom platform. The service lift should stop before the rubber bumpers hit the bottom platform. The service lift door and the fence door should be unlocked.
3.8 Top obstruction device 1): activate top stop by pressing it down. The service lift should not ascend until top obstruction device is released.
3.9 Slack rope sensor1): Activate the slack rope sensor by manually pulling the traction wire rope upwards. Descent should not be possible.
4.When the lift is at the top platform, check the wire rope fastenings.
5. Record the hour meter reading in the "Inspection log sheet" Appendix.

If any faults occur during work,
- stop working,
- if required secure the workplace and
- rectify the fault!

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

Cabin control from outside of the cabin-Automatic:
The automatic mode function is only available from the control buttons outside of the cabin at the bottom platform and top platform. It shall be checked as follows:
1. Press the UP button on the control box. The lift should ascend.
2. Press the emergency stop button on the control box. The lift stops.

1)Note: Optional for CE versions. Mandatory for AECO version.

3. Pull the emergency stop button and press the DOWN button. The service lift should descend until the bottom obstruction device engages.

6.5 Annual inspection

Have the entire system tested by a cerified technician at least once a year, especially the traction hoist and the fall arrest device. However, it may be required more frequently depending on use and the conditions of use and operation. The traction hoist and fall arrest device must be inspected according to intervals included in the sections 6.1 or 6.2 tables (see above). Hour counter is found in the main control box.

A certified technician must carry out the annual inspection following th appropriate Inspection Appendix.

Owner must ensure that the results of all annual and extraordinary inspections are logged in the appropriate Inspection Appendix.

In case of replacement of hoist, Fall Arrest Device and/or 8 mm. wire ropes, the operation/s and the related total hours of use of this/these component/s, must be logged in the appropriate Inspection Appendix.

6.5.1 Cabin

Inspect the cabin structure, joints, attachments and accessories.

6.5.2 Traction hoist

The traction hoist shall be maintained according to maintenance planning (please see sections 6.1 or 6.2). Relevant maintenance instructions are provided to each person during the training. These maintenance inspections must be only carried out by a certified technician.

6.5.3 Fall arrest device

The fall arrest device shall be maintained according to maintenance planning (please see sections 6.1 or 6.2). Relevant maintenance instructions are provided to each person during the training.
These maintenance inspections must be only carried out by a certified technician.

If fall arrest device has engaged due to a dynamic fall, a certified technician must verify the safety of the fall arrest device, the wire rope, and wire rope fastenings.

After FAD has engaged, if the FAD damper has moved downwards, the FAD unit must be replaced by a certified technician.

6.5.4 Traction, safety and guiding wire ropes

The inspection of the wire ropes can be carried out from inside the cabin. To do so, open the maintenance cover. The cabin panel has a white sticker attached to it. This sticker makes the wire ropes´ silhoutte stand out and therefore facilitates the inspection of the wire ropes.

Carry out the following inspections and adjust if necessary:
1. Inspect all the wire ropes along their entire length.
2. Pay special attention to the wire rope ends, parts of the wire ropes running over sheaves and wire ropes under frictional wear by external components.
3. When inspecting the wire ropes, consider the following points: type and number of wire breaks, position and time sequence of wire breaks, decrease of the wire rope diameter during operation, corrosion, abrasion, deformation, influence of heat, and operating time.
4. Check that the traction and safety wire ropes are fed correctly around the 2 wire rope guide wheels.
5. Check that the wire rope ends are coiled separately under the bottom platform and tied with at least 3 cable ties.
6. Check that the guiding wire rope tensioning system is correctly installed and that the wire rope locks and fixes are properly fastened.
7. Check that the compression spring on the safety wire rope is correctly installed and that the wire rope locks are properly fastened.
8. Check that the counterweight on the traction wire rope is properly fastened. The traction wire rope coil and counterweight shall be able to rotate freely. Do not attach them to a fixed part.
9. Check that the guiding wire ropes are correctly tensioned.

Record any visible change of the condition of the wire ropes on the appropriate Inspection Appendix, and monitor closely throughout time.

6.5.4.1 Lubrication of the traction and safety wire ropes

Traction / safety wires are lubricated by supplier and should keep their lubrication during operation. When touched you should find little grease on finger tip. To ensure this, the storage of the wires MUST be adequate and without any harmful conditions as for example dust, water, etc.

1. Position the lift at the bottom platform.
2. Open the maintenance cover by unscrewing its screws.
3. Apply lubricant on the traction and safety wire ropes by means of a spray can.
4. While applying the lubricant, use the second hand to place and hold a cloth around both wire ropes. This way, the lubricant will be distributed uniformly on both wire ropes.
5. While the first user uses the spray can and the cloth, a second user presses and holds the UP button from inside the lift. This way, while the service lift ascends, the lubricant is applied along the complete length of the two wire ropes.
6. After applying the lubricant, leave the maintenance cover open and carry out a descent back to the bottom platform.
7. While descending, check that the two wire ropes have been properly and uniformly lubricated.
8. Once the service lift is at the bottom platform, clean off any lubricant accidentally applied on the cabin panels.
9. Finally, close the maintenance cover by screwing back its screws.

Only use specialised wire rope lubricants. Do not use lubricants based on lithium soap grease or bitumen. Do not use disulphide-containing lubricants like Molycote ®.
Apply lubricant using a spray can, brush, drip applicator or pressurized device.
Pay special attention to sections of the wire rope where dehydration or denaturation of the lubricant can be seen.
Re-lubricate the wire ropes before they show signs of corrosion or run dry, and taking in mind that:
• A poor lubrication leads to corrosion and to a quick wear of components.
• An excessive lubrication leads to dirt agglomeration on the wire rope surface. As a result, this can lead to quick wear of wire rope, sheaves and drum.
• A correct lubrication keeps the efficiency factor of the wire rope, protects against corrosion, helps to elongate their lifetime significantly and ensures a safe operation.

6.5.4.2 Measuring of the wire rope diameter

When measuring the diameter of the wire ropes, use a digital calliper with broad measuring faces.

In general, measure the diameter of the wire rope at each WTG tower platform, and under the service lift, where the wire rope is less loaded. Specifically, if a wire rope wear is detected, measure on the affected area.

Rotate the calliper around the wire rope to measure the minimum and maximum wire rope diameter at each measurement point.

6.5.4.3 Discard criteria

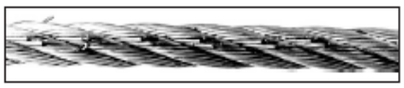
The discard criteria of the wire ropes should be based on ISO 4309: Cranes - Wire ropes - Care and Maintenance, inspection and discard.

Determine and eliminate the cause before installing a new wire rope.

AVANTI recommends to replace the traction and safety wire ropes after 250 hours of operation corresponding with the refurbishment of the traction hoist and fall arrest device. Please check with your local authority regulations if it's mandatory in your case.

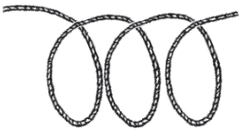
Check and replace the respective wire rope(s) if one of the following defects is found:

• For traction and safety wire ropes, if there are more than one 4-wire strand break on a wire rope length of 250 mm.



• For guiding wire ropes, if there are more than one 8-wire strand break on a wire rope length of 360 mm.
• If there is severe corrosion on the surface or the inside.
• If there is heat damage, evident by the wire rope colour.
• For traction and safety wire ropes, if the wire rope diameter is less than 7,6 mm.
• For guiding wire ropes, if the wire rope diameter is less than 11,4 mm.
• If there is damage on the wire rope surface (see following figures for most common examples of wire rope damage).

Kinks resulting from counterweight of traction wire rope not being able to rotate freely.



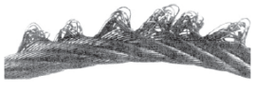
Wire rope strap/ loop, which cannot be unwound

Loop knot forming when a wire loop is pulled tight

Bends resulting from inappropriate treatment (e.g. securing the load with the wire)

Damage resulting from crushing, squeezing, running over, etc.

Wire bags



Loop formation

On AECO service lifts, according to A17.1 5.11, traction and safety wire ropes must be replaced after 250 hours of operation or 5 years whichever occurs first, corresponding with the refurbish ment of the traction system.

6.5.5 Electrical cables

Check and replace the power supply and control cables if the cable jacket or cable connections are damaged.

6.5.6 Overload check and adjustment

Annual test: Test switches and perform overload test as specified in the "Adjustment of the overload limiter" Appendix.

6.5.7 Information signs and documents

Verify availability and legibility of all data plates and information signs. Replace missing or illegible plates and signs!

6.6 Repairs

Repairs to traction hoist equipment must ONLY be performed by AVANTI, and only using original spare parts. If the gearbox oil needs to be replaced, use one of the lubricants specified below, corresponding to the temperature range in which the traction hoist equipment is used.

• Amount required: 1,5 l
• Traction hoist: M508
• Oil: Mobil SHC 632.

Each oil has to be verified by AVANTI.

6.7 Wire guides

For the V164 WTG, the wire guides must be replaced every 125h maximum.
Depending on the type of wire guide, this may require uninstalling the guide wires, following the steps on 4.4.2.1 in reverse order. After replacing the wire guides the steps on 4.4.2.1 must be followed for reinstalling and tensioning the guide wires.

6.8 Ordering spare parts

Only use original parts.
Spare part lists are available from AVANTI. Please indicate lift model when requesting a spare part list.