Original instructions

AVANTI SERVICE LIFT

Installation and Maintenance Manual

Model Service Lift PEGASUS

CERTIFICATE

EC Directive 2006/42/EC, Article 12, Paragraph 3b
Machinery

Certificate Registration No.: 01/205/0823/14 B

Certification body for machinery NB 0035
of TÜV Rheinland Industrie Service GmbH
hereby certifies the company

AVANTI WIND SYSTEMS, S.L.

Pol. Ind. Centrovía – c/ Los Ángeles, nº88
E-50196 La Muela, Zaragoza
España

Conformity of the product

Vertical Platform Service Lift
Inside Wind Turbine Systems

Type: PEGASUS-250 kg

Modification: additional basket "tool kit"

Technical data:

Ident. No: 20LP0001
Type of drive: Electric / Pinion-Rack
Max. Lifting height: 150 m
Max. load capacity: 250 kg / 2 People
Max. Lifting speed: 0,33 m/s

with the requirements defined in Annex I to Directive 2006/42/EC on machinery and amending Directive 95/16/EC of the European Parliament and the Council in May 2006 on the approximation of laws, regulations and administrative Member States relating to machinery.
Proof has been furnished on the basis of an EC Type Examination, Report No.: AE.COL.00022-12 from 03.02.2014, and is valid subject to compliance with the requirements stated in this document.
This certificate is valid until 17.09.2018

TÜVRheinland 0035 Notified Body

Berlin, 28.02.2014

Certification body
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CERTIFICATE

EC Type Examination

EC Directive 2006/42/EC, Article 12, Paragraph 3b
Machinery

Certificate Registration No.: 01/205/0898/16

Certification body for machinery NB 0035
of TÜV Rheinland Industrie Service GMBH
hereby certifies the company

AVANTI WIND SYSTEMS, S.L.

Pol. Ind. Centrovía – c/ Los Ángeles, nº88
E-50196 La Muela, Zaragoza
España

Conformity of the product

Vertical Platform Service Lift
Inside Wind Turbine Systems
Type: PEGASUS XL- 300 kg

Technical data:

Ident. No: 20LP0437
Type of drive: Electric / Pinion-Rack
Max. Lifting height: 100 m
Máx. load capacity: 300 kg / 3 People
Máx. Lifting speed: 22,8 m/min

with the requirements defined in Annex I to Directive 2006/42/EC on machinery and amending Directive 95/16/EC of the European Parliament and the Council in May 2006 on the approximation of laws, regulations and administrative Member States relating to machinery.

Proof has been furnished on the basis of an EC Type Examination, Report No.: AE.COL.00001-16 from 27.01.2016, and is valid subject to compliance with the requirements stated in this document.

This certificate is valid until 07.03.2021

TÜVRheinland 0035 Notified Body

Berlin, 07.03.2016

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LIFTINSTITUUT

CERTIFICATE OF CONFORMANCE

Acting under ASME A17.7.1/CSA B44.7.1 issued by Liftinstituut B.V.
identification number ANSI AECO #0842
(AECO = Accredited Elevator/Escalator Certification Organization)
Certification system 3 according to ISO Guide 67: 2004

Certificate no.	:	NA14-0842-1004-018-01 Revision no.: 1
Description of the product	:	Wind Turbine Elevator
Type	:	Pegasus L
Model no.	:	-
Name and address of the manufacturer	:	Avanti Wind Systems SL Poligono Industrial Centrovia Calle Los Angeles n°88 Nave 1 50198 La Muela (Zaragoza) Spain
Name and address of the certificate holder	:	Avanti Wind Systems A/S Rønnevangs Allé 6 DK-3400 Hillerød Denmark
Certificate issued on the basis of the following requirements	:	ASME A17.7-2007 / CSA B44.7-07 (I-4 Elevator Systems)
Test laboratory/location	:	Avanti Wind Systems SL
Date and number of the laboratory report	:	None
Date of verification of conformance	:	June 2013 – September 2014
Annexes with this certificate	:	Certificate of Conformance Report no: NA14-0842-1004-018-01 Rev. 1
Additional remarks	:	For GESRs, SPs and other information see supporting report.
Conclusion	:	The Elevator System meets the requirements of the ASME A17.7-2007 / CSA B44.7-07, taking into account any additional remarks mentioned above.

Issued in Amsterdam
Date of issue : 27-10-2014
Valid thru : 27-10-2017

ing. A.J. van Ommen
Manager Business Unit
Certification

Certification decision by

LIFTINSTITUUT

CERTIFICATE OF CONFORMANCE

Acting under ASME A17.7.1/CSA B44.7.1 issued by Liftinstituut B.V.
identification number ANSI AECO #0842
(AECO = Accredited Elevator/Escalator Certification Organization)
Certification system 3 according to ISO Guide 67: 2004

Certificate no.	:	NA15-0842-1004-018-02 Revision no.: -
Description of the product	:	Wind Turbine Elevator
Type	:	Pegasus XL
Model no.	:	-
Name and address of the manufacturer	:	Avanti Wind Systems SL Poligono Industrial Centrovia Calle Los Angeles n°88 Nave 1 50198 La Muela (Zaragoza) Spain
Name and address of the certificate holder	:	Avanti Wind Systems A/S Rønnevangs Allé 6 DK-3400 Hillerød Denmark
Certificate issued on the basis of the following requirements	:	ASME A17.7-2007 / CSA B44.7-07 (I-4 Elevator Systems)
Test laboratory/location	:	Avanti Wind Systems SL
Date and number of the laboratory report	:	None
Date of verification of conformance	:	March 2015 - August 2015
Annexes with this certificate	:	Certificate of Conformance Report no: NA15-0842-1004-018-02
Additional remarks	:	For GESRs, SPs and other information see supporting report.
Conclusion	:	The Elevator System meets the requirements of the ASME A17.7-2007 / CSA B44.7-07, taking into account any additional remarks mentioned above.

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ing. A.J. van Ommen
Manager Business Unit
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This manual must be available to staff at all times during installation, maintenance and operation. Additional copies are available from the manufacturer upon request.
This manual, including, but not limited to, measurements, procedures, components, descriptions, instructions, recommendations and requirements, is subject to change without prior notice. Please check Avanti website/ manuals for the latest revisions of the manuals. Any additional cost related to or arising from any changes in the manuals does not entitle Customer to any form of compensation or other legal remedies.

Contents

1. WTG requirements 9
1.1 Height and angle 9
1.2 Lift holes at platforms and air gap to tower parts 9
1.3 Tower brackets 9
1.4 WTG electrical supply requirements 10
1.5 Tower illumination 10
1.6 Other requirements 10

2. Transport 11
2.1 Cabin 11
2.2 Installation accessories 11
2.3 Mast sections 11
2.4 Installation type B notes 11

3. Delivery inspection 11

4. Storage 12
4.1 Before installation of service lift on WTG tower section 12
4.2 After installation of service lift on WTG tower section 12
4.3 During WTG tower erection 12
4.4 After service lift is put into service 12

5. Installation 12
5.1 Cautions on site 12
5.2 Torques assurance 13
5.2.1 Torques assurance of Pegasus L/L03 13
5.2.2 Torques assurance of Pegasus XL 15
5.3 Installation of Pegasus L/L03 17
5.3.1 Tower section T3 in tower factory of Pegasus L/L03 17
5.3.2 Tower section T2 in tower factory of Pegasus L/L03 17
5.3.3 Tower section T1 in tower factory of Pegasus L/L03 17
5.3.4 Installation on site of Pegasus L/L03 19
5.3.5 Electrical connections on site of Pegasus L/L03 20
5.3.6 Differential controller of Pegasus L/L03 20
5.3.7 Alignment stickers of Pegasus L/L03 bucket type 21
5.3.8 Two runs without grease on the rack of Pegasus L/L03 21
5.3.9 Inspection before the first use of Pegasus L/L03 21
5.4 Installation of Pegasus XL 22
5.4.1 Installation of Pegasus XL in T1 at tower factory 22
5.4.2 Installation of Pegasus XL in T2 at tower factory 26
5.4.3 Installation of Pegasus XL in T3 at tower factory 28
5.4.4 Installation on-site of Pegasus XL after T1 is erected 29
5.4.5 Inspection before the first use of Pegasus XL after T1 is erected 29
5.4.6 Installation on-site of Pegasus XL after T2 is erected 30
5.4.7 Inspection before the first use of Pegasus XL after T2 is erected 30
5.4.8 Installation on-site of Pegasus XL after T2 is erected 31
5.4.9 Inspection before the first use of Pegasus XL after T2 is erected 31

5.4.10 Installation on-site of Pegasus XL after T3 is erected 32
5.4.11 Inspection before the first use of Pegasus XL after T3 is erected. 32

6. Maintenance 33
6.1 Maintenance planning 33
6.2 Cautions 33
6.3 Annual inspection 34
6.3.1 Pinions 34
6.3.2 Ladder rack 34
6.3.3 Guiding rollers and counter guiding rollers 35
6.3.4 Anti-derailment brackets 36
6.3.5 Torques assurance 36
6.3.6 Overload limiter 37
6.3.7 Motor group 37
6.3.8 Obstruction devices 37
6.3.9 Differential controller. 37
6.3.10 Bottom and top mechanical stops 37
6.4 Ordering spare parts 37

7. Disassembling. 37

Appendix A: Adjustment of the overload limiter 38
Appendix B: Inspection checklist 39
Appendix C: Inspection log sheet 43
Appendix D: AVANTI lift anchor point 46
Appendix E: Service tool kit for Pegasus L only 50
Appendix F: Test and adjustment of the electromagnetic brakes 55

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.
Manual descent	Action performed to descend the lift at a controlled speed without power supply by manually opening the hoist electromagnetic brake. (Also manual no-power descent)

1 WTG requirements

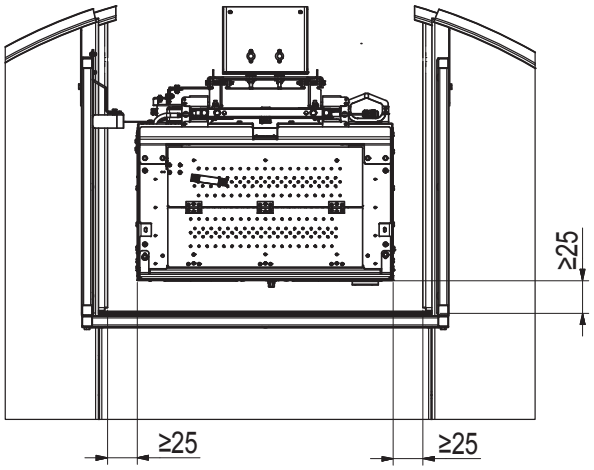
The following information is necessary for the correct integration of the service lift inside a wind turbine tower.

1.1 Height and angle

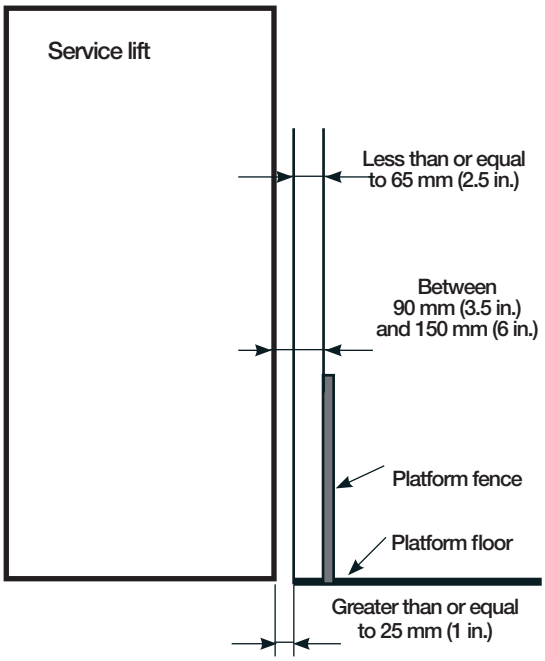
The service lift can be installed in towers up to 150 m high for Pegasus L/L03, and up to 100 m high for Pegasus XL.
The maximum inclination angle to the ladder axis is of ±2° and of ±0,5° for every 3 m of ladder.

1.2 Lift holes at platforms and air gap to tower parts

The service lift must have an air gap of at least 25 mm around it along the tower to avoid collision with tower components and to avoid finger trapping. The wind tower manufacturer must verify this as part of the integration process not only in the static position but also considering possible movement of components inside the tower as a consequence of the tower sway.



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 [1].

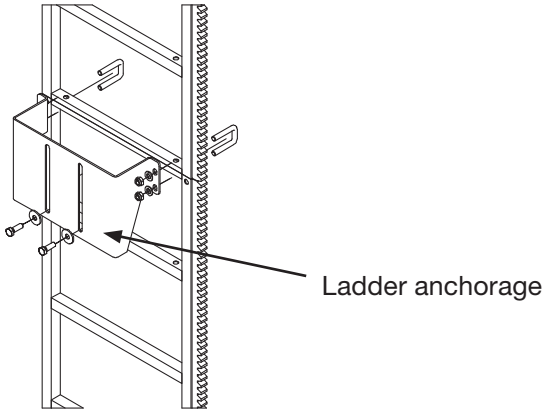


The components subject to possible movement inside the tower may include, but are not limited to, dampers, cables, doors, hatches, etc. The service lift needs a gap of 500mm below the lowest landing area to accommodate the bottom mechanical stop.

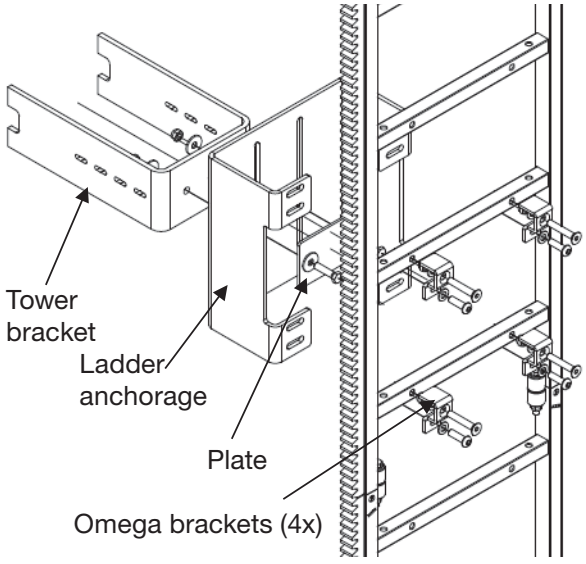
1.3 Tower brackets

The ladder is attached to the tower brackets by means of ladder anchorages (there shall be a ladder anchorage in each ladder section). These may be distanced maximum 3000 mm for Pegasus L/L03 CE [2], 2100 m for Pegasus L AECO, and 1500 m for Pegasus XL CE and AECO between ladder rungs attachments.
The tower brackets shall be so designed that the ladder anchorages can be mounted.
When designing the tower brackets, the reaction forces on the screws shall be considered.
The general requirements stated above may vary depending on the installation characteristics. Contact AVANTI to get detailed information.

Pegasus L/L03:



Pegasus XL:



CE AECO

[1] Optional for CE versions. Mandatory for AECO version.
[2] Pegasus L CE stands on behalf of following versions: Pegasus L CE & L03 CE bucket type and Pegasus L CE sliding door. Otherwise differences are stated.

1.4 WTG electrical supply requirements

Electrical supply requirements		
Version	**CE**	**AECO**
Power Supply Type	3 Phase +PE + N	3 Phase + PE
Voltage	400 V ± 10 %	400 V ± 5 %
Frequency	50 / 60 Hz	60 Hz
Current	16 A	20 A
Protection	Acc. To EN 60204 - 1 and EN 60204-32	UL 508A

The WTG power supply must be protected against indirect contacts according to local regulations. Verify that the rated grid and motor voltages are identical.

1.5 Tower illumination

The platform control boxes 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).

1.6 Other requirements

The WTG manufacturer must provide any other means necessary to ensure the safe use of the service lift according to AVANTI´s recommendations and its own risk assessment for the integration that shall include items which are not under AVANTI´s scope.

A detailed list of integration requirements is available from AVANTI upon request.

2.Transport

The transport conditions shall be agreed with the customer. If special transport requirements are needed, the customer must specify them to AVANTI prior to delivery. The following conditions shall be considered.

2.1 Cabin

- Land transport: rear support over pallet, non-stackable.
  Dimensions for Pegasus L/L03: 2800x1100x1000 mm.
  Dimensions for Pegasus XL: 2655x1167x1280 mm.

- Sea transport: package using wooden box and plastic shrink on a pallet.
  Dimensions for Pegasus L/L03: 2800x1100x1000 mm.
  Dimensions for Pegasus XL: 2655x1167x1280 mm.

2.2 Installation accessories

The installation accessories other than mast sections (rest platforms, power cable, etc.) are supplied on a European pallet.

2.3 Mast sections

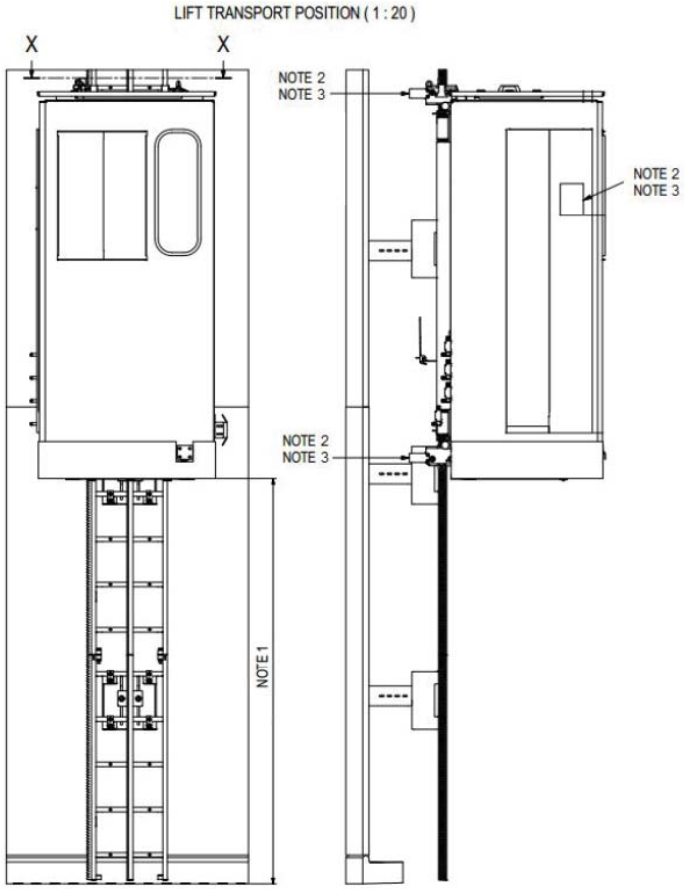
Mast sections are supplied on a pallet.
The dimensions of these pallets depend on the length of mast sections being supplied.

2.4 Installation type B notes

1. Position the cabin so that the bottom guiding rollers of the cabin are right above the wall support plate allowing the installation of the transport brackets.

2. Install the transport brackets and place the “remove transport bracket label” on the cabin’s door.

3. Remove the transport brackets and the “remove transport bracket label” before the first cabin use.



3. Delivery inspection

Check the delivery against shipping lists and look for transport damages. Should there be any damage, report it to the responsible transport insurance company within 24 hours from the date of arrival of the goods.

Other claims should be made to AVANTI representative within the same period.

4. Storage

The storage conditions shall be agreed with customer. If special storage requirements are needed, customer shall specify them to AVANTI prior to delivery. The following conditions shall be considered.

4.1 Before installation of service lift on WTG tower section

Keep the service lift in its original packaging until it is mounted on the WTG tower section.
Avoid direct contact of package with floor by placing a pallet under it. Position the pallet on a stable ground.
Store the service lift in a dry place and protected from rain (i.e. in roofed areas). In corrosive environments (i.e. near the sea or in foggy places) store indoors.
Store in a clean and ventilated place, free of negative influences of chemical and water vapours or other corrosive substances.
Store within the survival temperature range. If possible, avoid sudden temperature changes.
Handle the service lift with care and store in a safe place in order to avoid unintended damages.
Do not stack.
Should any of these conditions not be maintained, the service lift could be spoilt with dirt or other substances, which could start corrosion before even the service lift is put into operation.
Store the package so that its labelling is clearly readable.

4.2 After installation of service lift on WTG tower section

After installing the service lift in the WTG tower section, confirm that the service lift is properly attached to the ladder (i.e. pinions are engaged with rack, and rollers and anti-derailment brackets are mounted).

Close top and bottom holes of WTG tower sections with covers to prevent water entry.

4.3 During WTG tower erection

During the erection of the WTG tower sections, and while there is risk of rain entry, protect the service lift with wrapping film to prevent water entry.

If WTG tower erection is left uncompleted, close the top hole of the WTG tower section with a cover.

4.4 After service lift is put into service

If the service lift is not going to be used for a long period of time:

- Clean all the parts of the service lift using non-abrasive brushes.
- Clean the pinions and racks thoroughly and grease them to prevent corrosion.

Before using the service lift, if it has not been used for a long period of time:

- Clean all the parts of the service lift of accumulated dust.
- Grease the shafts, pinions and rack.

5. Installation

5.1 Cautions on site

All installation process must be made according to the installation drawing supplied by AVANTI.

Prior to installation, check the instructions and drawings.

Prior to installation, ensure that building sections involved will be able to withstand the service lift loads.

Prior to installation, ensure that all necessary parts and tools are available and fully functional.

Prior to installation, ensure that platform holes are protected with fences.

Wear PFPE for protection against falls if falling height us higher than 2 m.

Installation shall only be carried out by certified technicians.

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

For Pegasus L/L03, at the end of the workday security measures must be taken to put the elevator out of service and make the ladder accessible. Place a warning sign: OUT OF SERVICE.
Pegasus XL shall be always left energized and ready to be operated.

The service lift may be used during its installation phase, but only to carry out the installation itself.

5.2 Torques assurance

All the screw connections listed in the following tables shall be marked to indicate their position once the final tightening torque is applied.

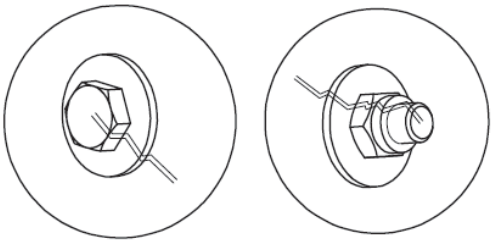
Check the tightening torque of all the screw connections, using an approved and calibrated torque wrench, in each of the following cases:
1. In the tower factory, during the assembly of the ladder section to the tower section.
2. On site, during the pre-commissioning, and in each annual inspection.
The correct tightening torque of each screw connection is listed the following tables.

Apply the torques indicated in the table with lubricated screws (not dry).

Only use lubricant type Molycote G-Rapid Plus.

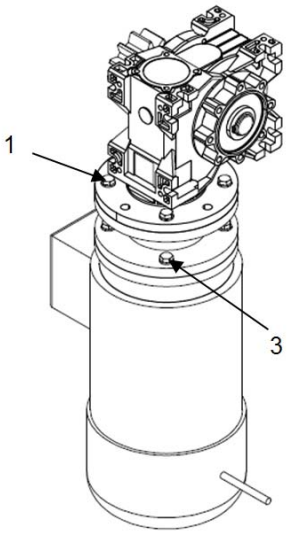
Replace the selflocking nuts that are loose.

Mark the screws and nuts after tightening them (preferably with a white mark).

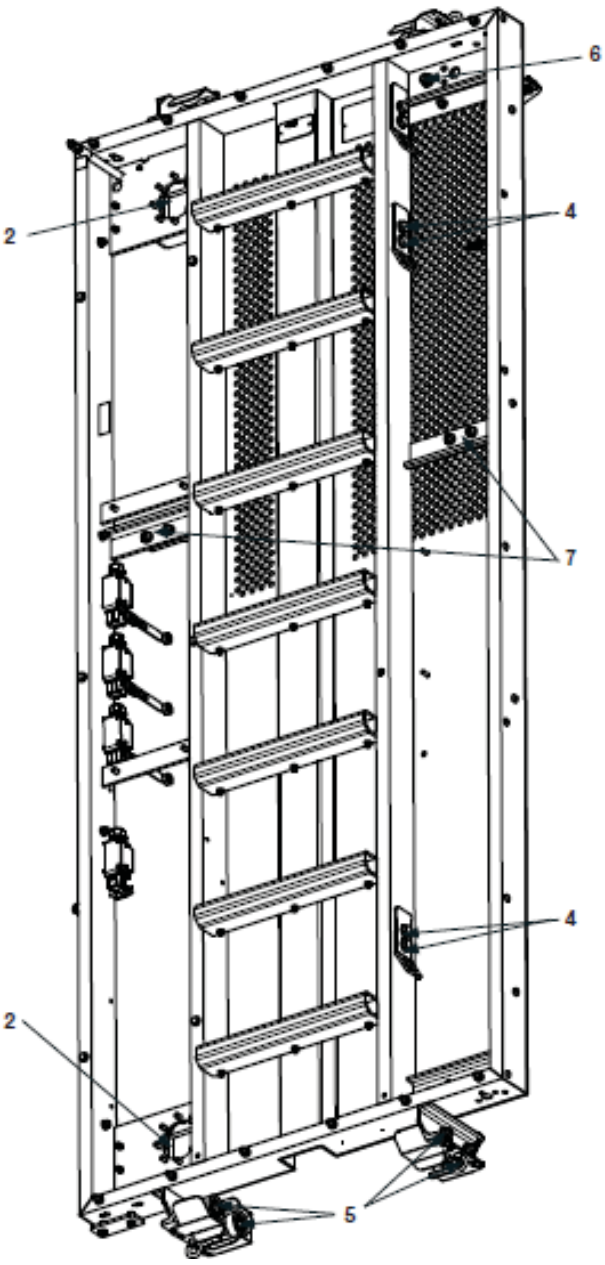


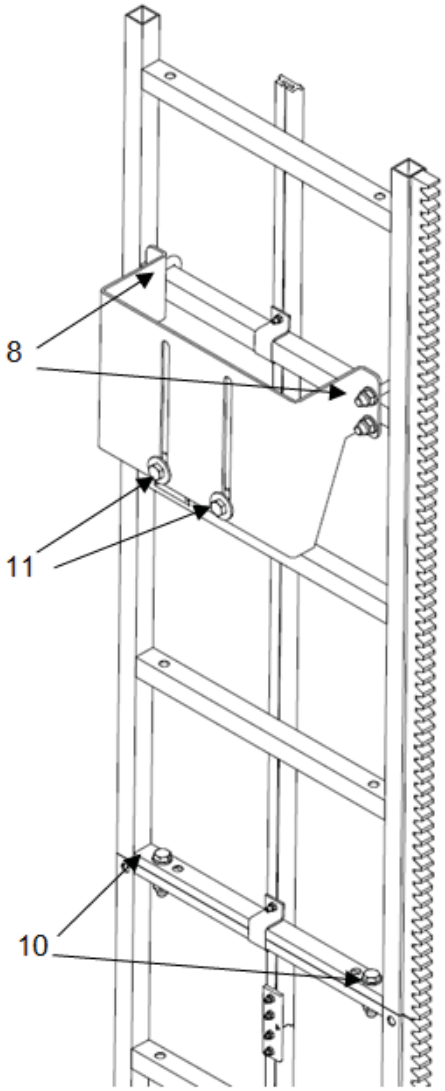
5.2.1 Torques assurance of Pegasus L/L03

JOINT		METRIC	TORQUE (N·M) AT TOWER FACTORY	TORQUE (N·M) ON SITE
1	Gear box – Centrifugal brake	8	15	15
2	Motor group – Main structure	8	15	15
3	Motor – Centrifugal brake	8	15	15
4	Fall protection anchor point – Cabin	12	15	15
5	Roller shafts – Main structure	12	50	50
6	Counter roller guide shafts – Main structure	12 (L)	50 (L)	50 (L)
		16 (L03)	80 (L03)	80 (L03)
7	Anti-derailment brackets	10 (L)	30 (L)	30 (L)
		8 (L03)	30 (L03)	30 (L03)
8	Rung U-bolts	12	50	50
9	Rest platforms attachment	12	50	50
10	Ladder sections	12	50	50
11	Ladder anchorages – Tower brackets	12	50	12 for CE 50 for AECO
12	Ladder – Top mechanical stop	8	15	15
13	Ladder – Bottom mechanical stop	8	15	15

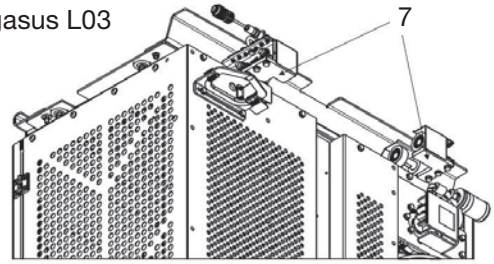


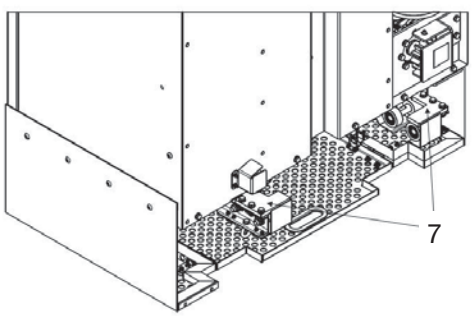
Pegasus L

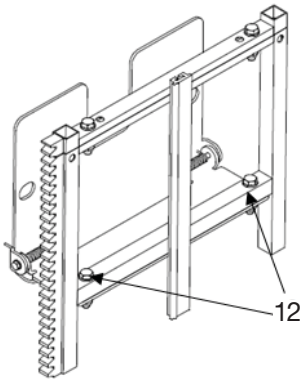


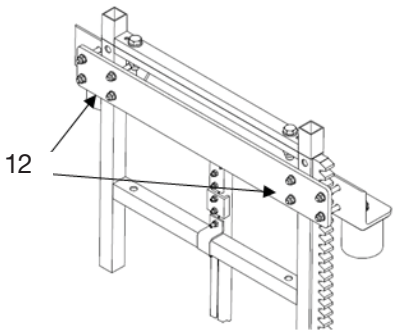


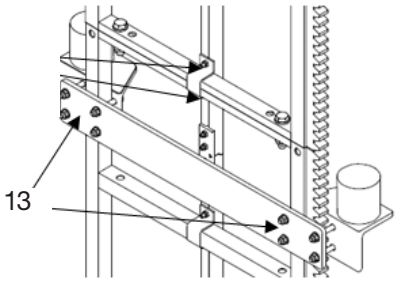
Pegasus L03





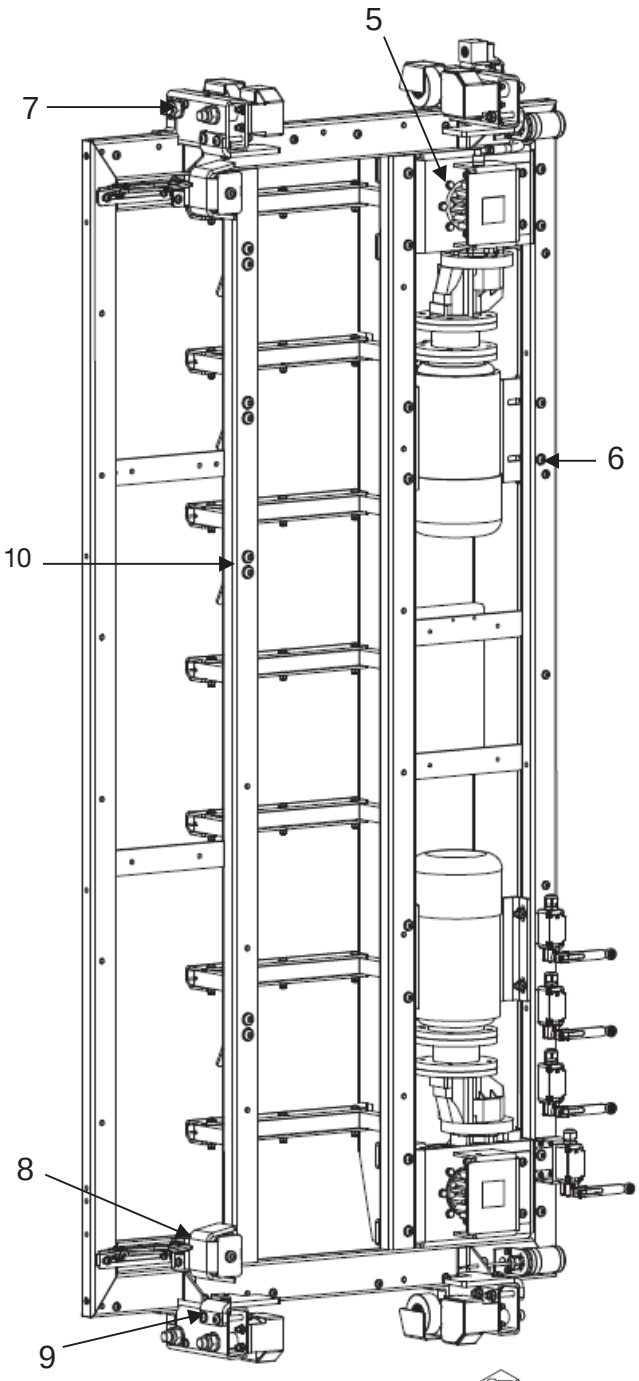


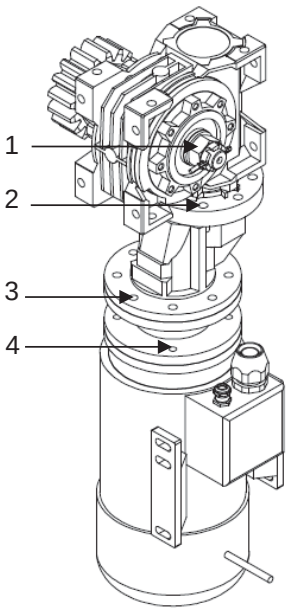


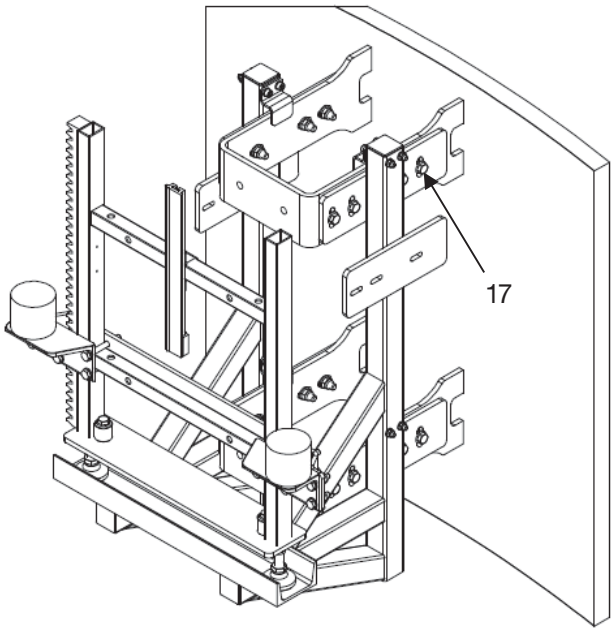


5.2.2 Torques assurance of Pegasus XL

JOINT		METRIC	TORQUE (N·M) AT TOWER FACTORY AND ON SITE
1	Slotted hex nut with locking pin	24	N/A
2	Gearbox 1 – Gearbox 2	8	15
3	Gearbox 2 – Centrifugal brake	8	15
4	Centrifugal brake - Motor	8	15
5	Gearbox 1 – Main structure	8	15
6	Motor groups – L profiles of the main structure	10	30
7	Guiding roller – Main structure	20	244
8	Counter guiding roller – Main structure	20	244
9	Anti-derailment bracket – Main structure	10	70
10	Anchor point – Main structure	12	15
11	Omega bracket – Ladder anchorage	12	50
12	Rest platform - Ladder	12	50
13	Ladder sections	12	50
14	Ladder anchorage – Tower bracket	12	60
15	Top mechanical stop - Ladder	8	15
16	Bottom mechanical stop - Ladder	8	15
17	Pit ladder support – Tower bracket	12	65



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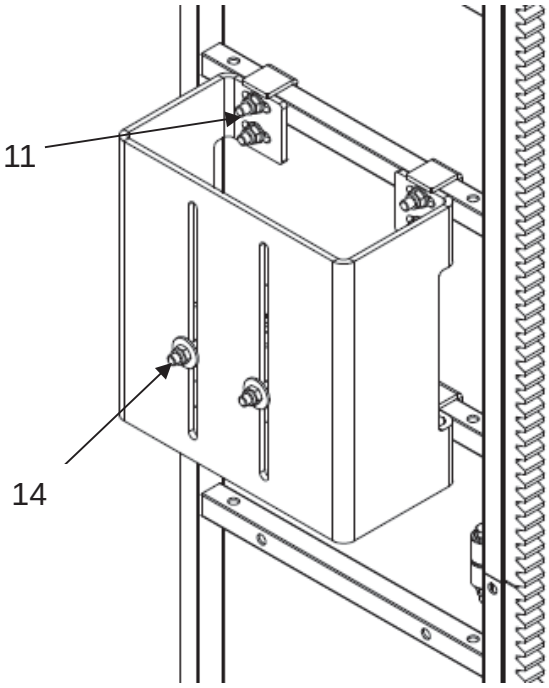
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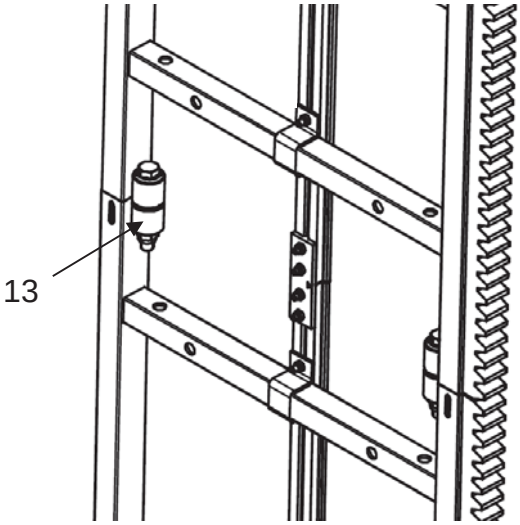
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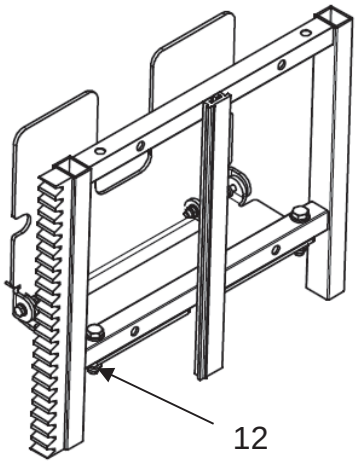
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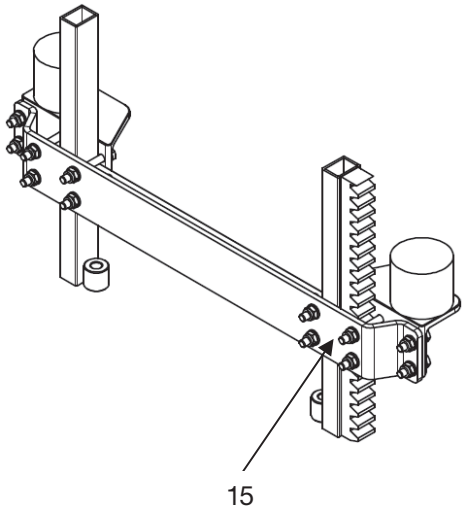
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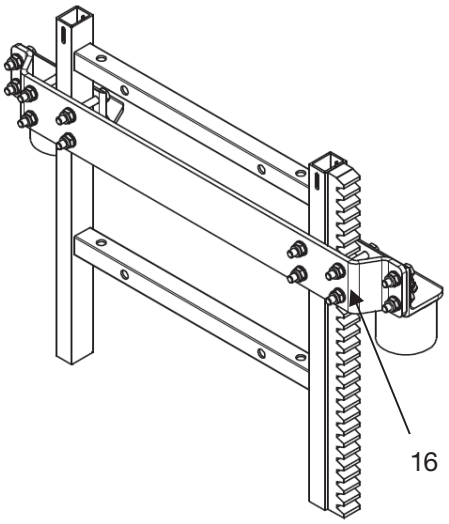

16

5.3 Installation of Pegasus L/L03

5.3.1 Tower section T3 in tower factory of Pegasus L/L03

1. Install and adjust upper ladder section at the top of the top tower section (see Fig. 1 and installation drawing). Use 15 N·m torque for M8 and 50 N·m for M12.

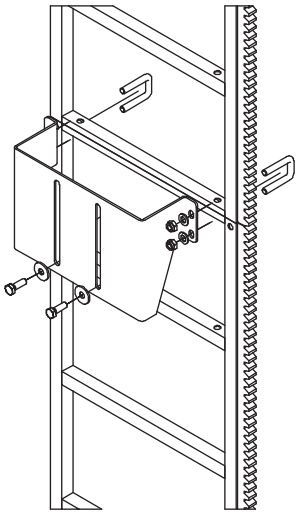


Fig. 1

2. Install the rest of the ladder sections from top to bottom (see Fig. 2).

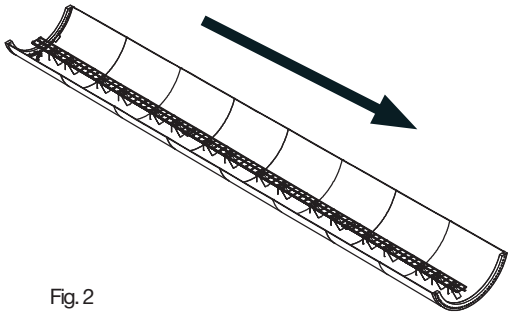


Fig. 2

3. Install the rest platforms approximately every 9 m (see Fig. 3 and installation drawing).

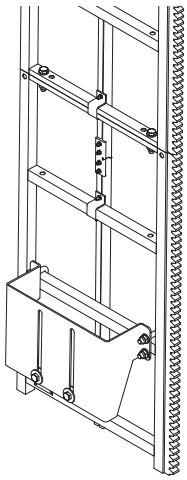


Fig. 3

4. Install the top mechanical stops and the top limit plate (see Fig. 4 and installation drawing). Use 15 N·m torque for M8 and 50 N·m for M12.

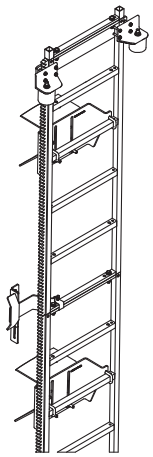


Fig. 4

5.3.2 Tower section T2 in tower factory of Pegasus L/L03

1. Install and adjust upper ladder section at the top of the intermediate tower section (see Fig. 1 and installation drawing).

2. Install the rest of the ladder sections from top to bottom (see Fig. 2).

3. Install the rest platforms approximately every 9 m (see Fig. 3 and installation drawing).

4. Install the electric cable arm support (see Fig. 5 and installation drawing).

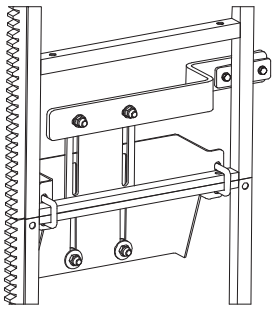


Fig. 5

5. (If platform switch [1)] on service lift is provided) install a safe zone plate on the ladder at each platform.

5.3.3 Tower section T1 in tower factory of Pegasus L/L03

1. Install and adjust upper ladder section at the top of the bottom tower section (see Fig. 1 and installation drawing).

CE AECO

[1)] Optional for CE bucket type version. Mandatory for CE full sliding door version. Optional for L AECO version.

2. Install the rest of the ladder sections from top to bottom (see Fig. 2).

3. Install the rest platforms approximately every 9 m (see Fig. 3 and installation drawing).

4. Position the cabin inside the bottom tower section ensuring that bottom guiding rollers are aligned with a ladder anchorage support (see Fig. 6).

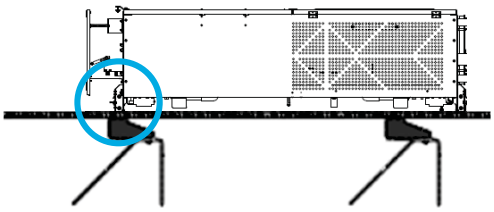


Fig. 6

Mount the guiding rollers shafts into the correct holes: green shafts into green coloured holes and orange shafts into orange coloured holes.

Pegasus L

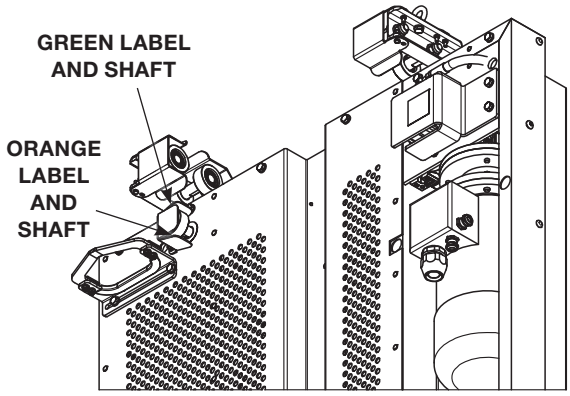


Fig. 7

Pegasus L03

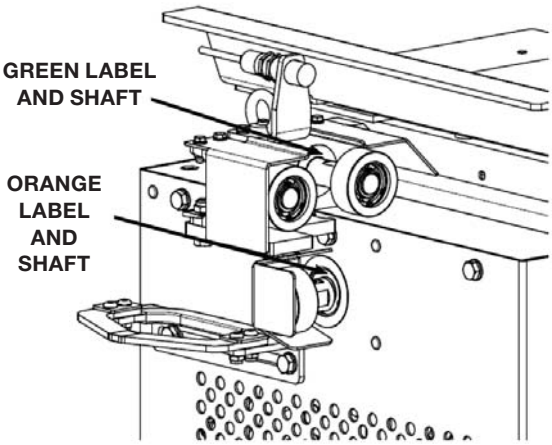


Fig. 8

5. Install the bottom mechanical stop and the bottom limit plate (see Fig. 9 and installation drawing).

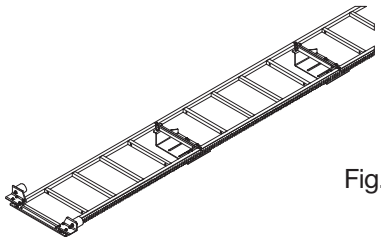


Fig. 9

It is also possible to install the cabin and bottom mechanical stop on site.

5.3.4 Installation on site of Pegasus L/L03

After the tower sections are erected:

1. Climb up to the second tower flange.
2. While descending to the previous tower flange, loosen connection bolts between the ladder rack anchorages from the tower support brackets.
3. Lower down the loose ladder section until it contacts the previous ladder section, so that no gap exists.
4. Tighten the connection bolts between the ladder sections (see Fig. 10).

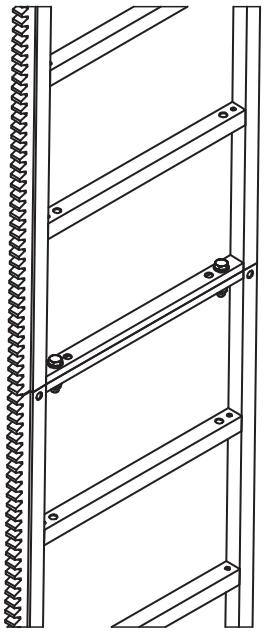


Fig. 10

5. Check that the dimension C (see 6.3.2.2) is between acceptable ranges.

6. While climbing up, tighten the connecting screw (M12) between the ladder rack anchorages and tower support brackets with a torque of 12 N·m for CE (50 N·m for AECO) (see Fig.11).

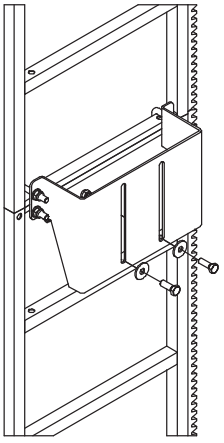


Fig. 11

Check that the gap between each connecting screw (M12) and the top end of its corresponding oblong hole is at least 5 mm.

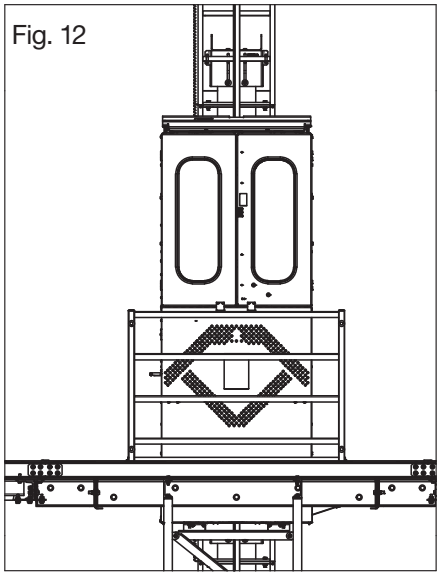
7. Climb up to next tower flange and repeat actions 2 to 5 until there are no gaps between the ladder sections.

8. Check that gap between anti-derailment bracket and ladder stile is according to point 6.3.4.

9. With the service lift at bottom platform:
9.1. For bucket type [1]: adjust the bottom mechanical stop so that it is possible to open the double door just above the fence railing. The service lift must stop when obstruction device reaches the bottom mechanical stop (see Fig. 12).

9.2 For bucket type [1]: with bottom limit switch configuration, adjust the bottom limit plate stop so that is possible to open the double door just above the fence railing.

Fig. 12



9.3. For full sliding door without bottom limit switch configuration [2]: adjust bottom mechanical stop so that cabin floor is lined up with platform floor.

9.4 For full sliding door with bottom limit switch configuration [3]: adjust bottom limit plate so that cabin floor is aligned with platform floor.

[1] Applicable to CE bucket type version.
[2] Applicable to CE full sliding door version. Optional for L AECO version.
[3] Optional for L AECO version.

5.3.5 Electrical connections on site of Pegasus L/L03

Electrical connections must be made in accordance with EN 60204-1 and En 60204-32 for CE versions and in accordance with UL 508A for AECO version.

1. Install the top and bottom platform control boxes and connect the cable connections and the electrical boxes.

2. Use cable ties to attach the fixed cable to the cable tray (see Fig. 13).

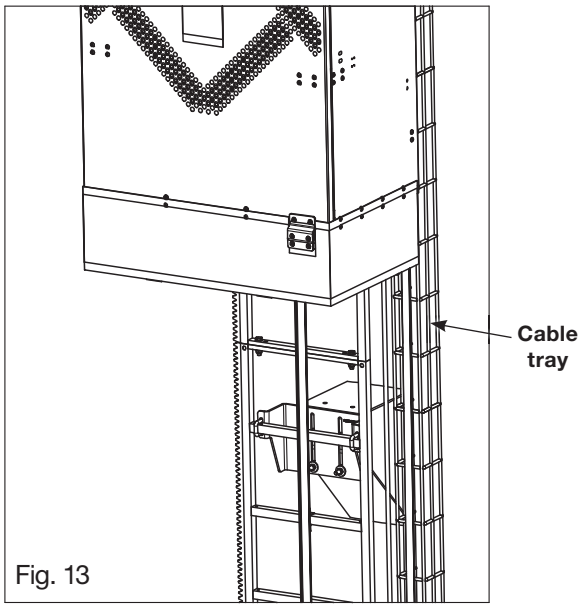
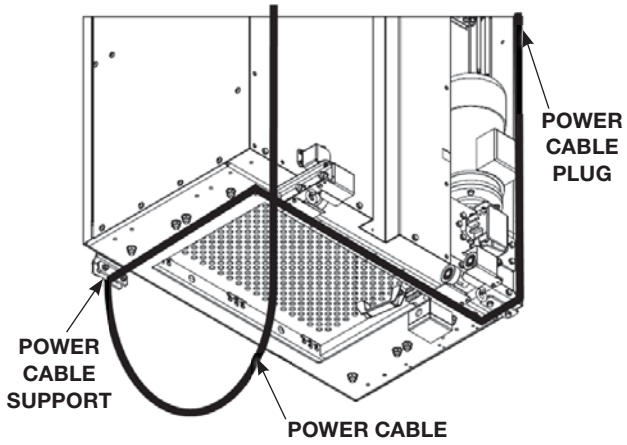


Fig. 13

3. Install and connect the power cable.



When unwinding the power cable, ensure that it does not present loops nor twists. If the cable length is too long wind up the cable excess and fix it to the intermediate platform by means of cable ties.

5.3.6 Differential controller [1] of Pegasus L /L03

The differential controller is already mounted inside the cabin control box.

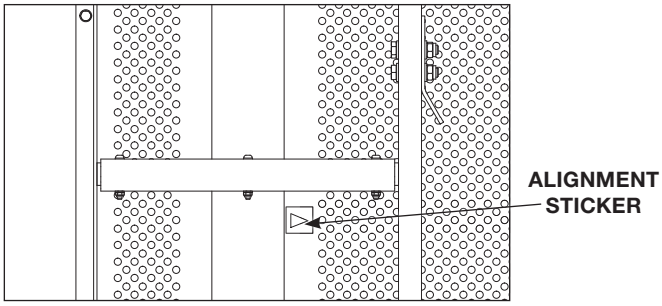
The detailed instructions of the adjustment of the differential controller are available from AVANTI upon request.

The serial numbers of the sealing stickers of the differential controller, shall be written down in the "Inspection log sheet" Appendix.

[1] Not available for CE versions. Mandatory for AECO versions.

5.3.7 Alignment stickers of Pegasus L/L03 bucket type

1. Stick the alignment sticker inside the cabin next to the grid of holes at a height of 1,5 m from cabin floor.



2. There is an alignment sticker for each tower platform. Stick the sticker on right ladder stile at a height of 1,5 m from each platform, and with triangle pointing to the left.

3. For top platform, and for ring shape platforms, stick the sticker on right ladder stile at 0,9 m under each platform, and with triangle pointing to the left.

5.3.8 Two runs without grease on the rack of Pegasus L/L03

1. Once the installation is complete, and before applying the grease on the rack, ascend and descend the service lift along the complete travel path two times. This way, any metal swarfs coming from the galvanised rack will be removed.

2. Remove the pinion covers and clean off the galvanising flakes.

3. Put back the pinion covers.

4. Grease the rack.

5.3.9 Inspection before the first use of Pegasus L/L03

An inspection shall be carried out before the first use of the service lift.

The inspection before the first use shall only be carried out by certified technicians.

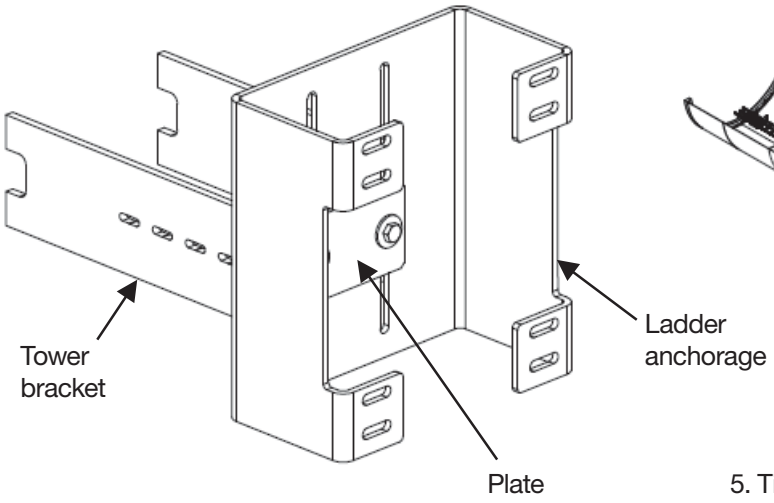
The inspection before the first use shall be carried out following and filling in the “Annual Inspection checklist” Appendix and the “Inspection log sheet” Appendix for future possible reference. The chapter “6.3 Annual inspection” shall be used as a more detailed guideline for some of the inspection steps.

5.4 Installation of Pegasus XL

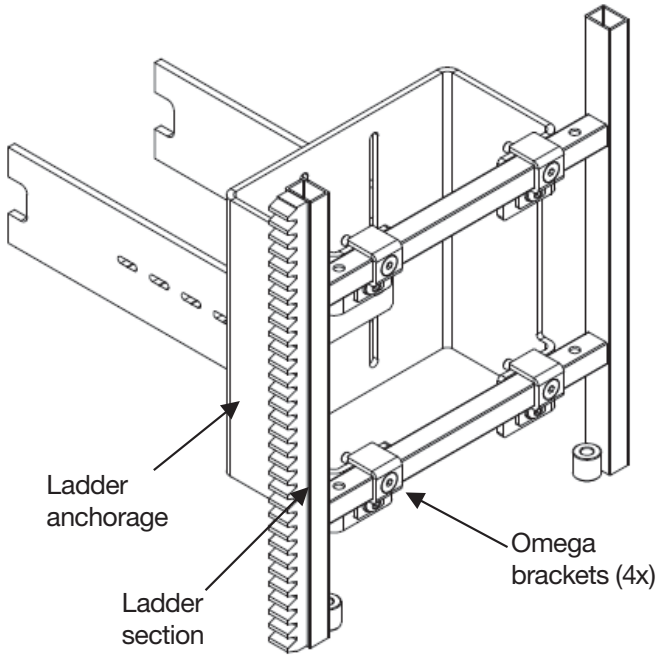
5.4.1 Installation of Pegasus XL in T1 at tower factory

Installation type A

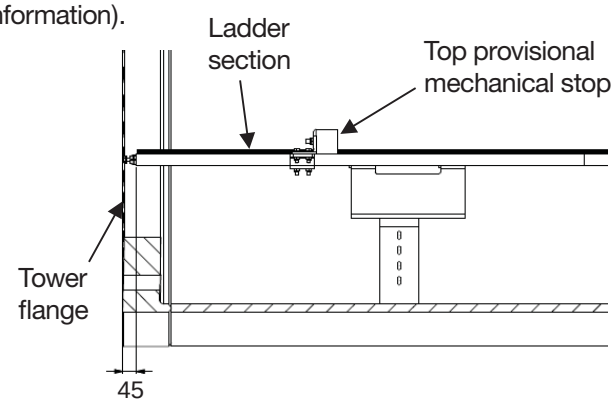
1. Install the ladder anchorages on the tower brackets, leaving the screws loose.



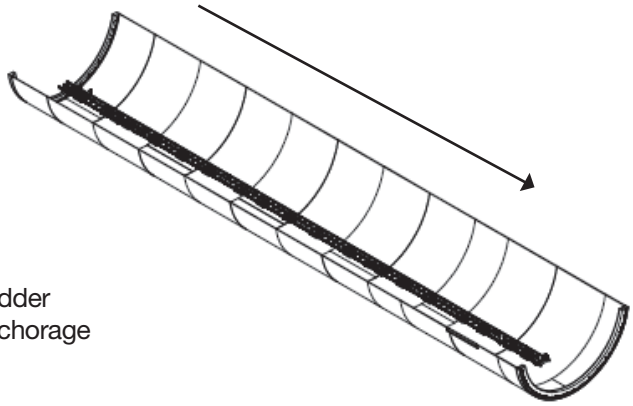
2. Install the top ladder section on the ladder anchorages.



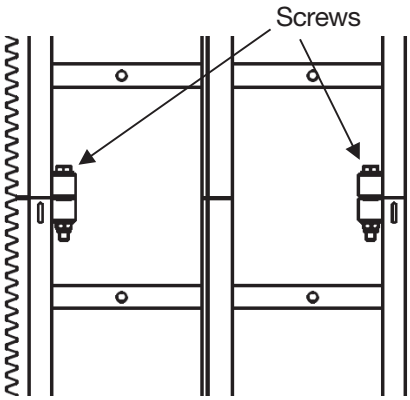
3. Leave the screws loose and leaving a gap to the top tower flange (see the Installation Drawing for more information).



4. Install the rest of the ladder sections from top to bottom.

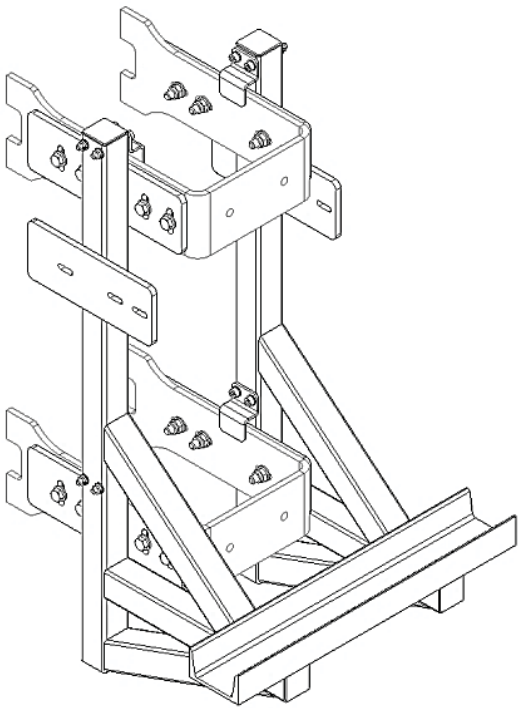


5. Tighten the screws connecting the ladder sections between them.

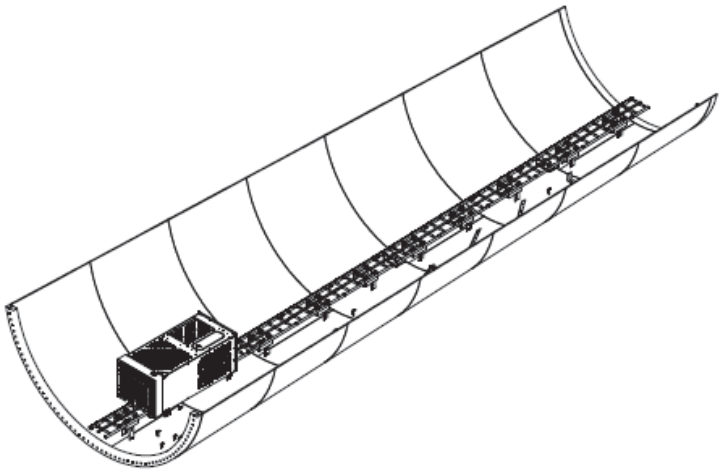


6. Tighten the screws connecting the omega brackets with the ladder anchorages.
7. Tighten the screws connecting the ladder anchorages with the tower brackets.
8. Install the safety rail.
9. Install the provisional top end of the safety rail.
10. Install the provisional top mechanical stop.

11. Install the pit ladder support.



12. Mount the ladder feet.
13. Adjust the ladder feet so that they contact the ladder bottom support.
14. Install the rest platforms (the distance between consecutive rest platforms shall be no more than 6 m., except in case of a single flight only, which can be extended to no more than 10 m.).
15. Place the cabin on the ladder.

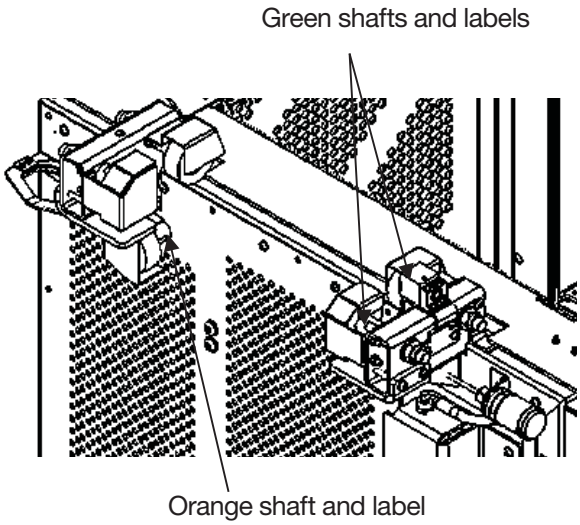


16. Mount the following components on the cabin: back guiding rollers (and its covers), counter guiding rollers (and its covers), anti-derailment brackets and the inductive sensor.

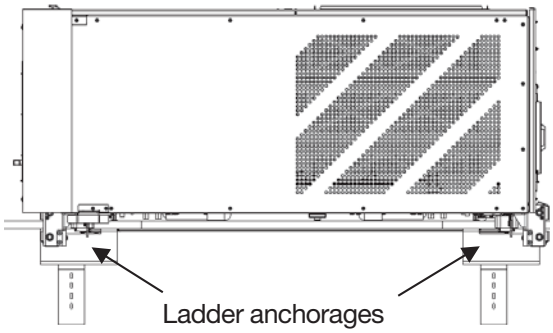
17. Test and adjust the rollers, pinions and brakes.

STOP

Mount the guiding rollers shafts into the correct holes: green shafts into green coloured holes and orange shafts into orange coloured holes.



18. Position the cabin so that the bottom guiding rollers are aligned with a ladder anchorage.

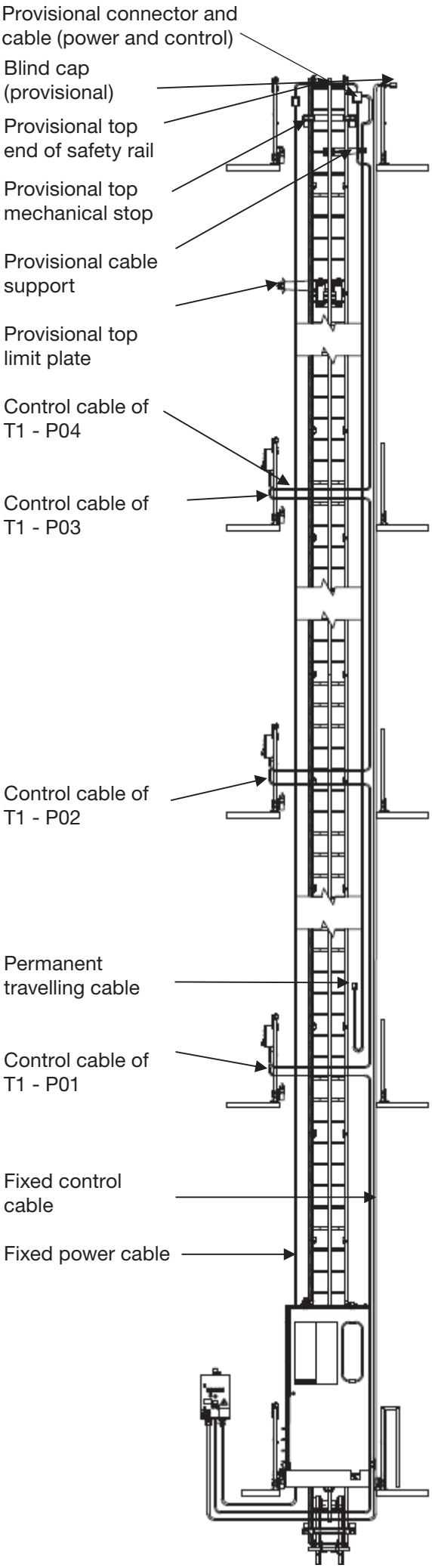


19. Wrap the cabin with plastic film.
20. Install the bottom mechanical stop and the bottom limit plate.
21. Install the platform fences.

STOP

The tightening of the platform fence is critical to guarantee an appropriate rigidity of the fence.

22. Install the provisional top limit plate.
23. Install the safe zone plates.
24. Install the platform control boxes.
25. Install the provisional cable support.
26. Install the control and power cables.
27. Install the blind cap.



Installation type B

1. Install the aluminum ladder.

2. Install the ladder anchorage on the tower bracket, leaving the screws loose.

3. Install the ladder section on the ladder anchorage.

4. Leave the screws loose and leaving a gap to the top tower flange (see the Installation Drawing for more information).

5. Tighten the screws connecting the omega brackets with the ladder anchorage.

6. Tighten the screws connecting the ladder anchorage with the tower bracket.

7. Install the safety rail.

8. Install the provisional top end of the safety rail.

9. Mount the ladder bottom support.

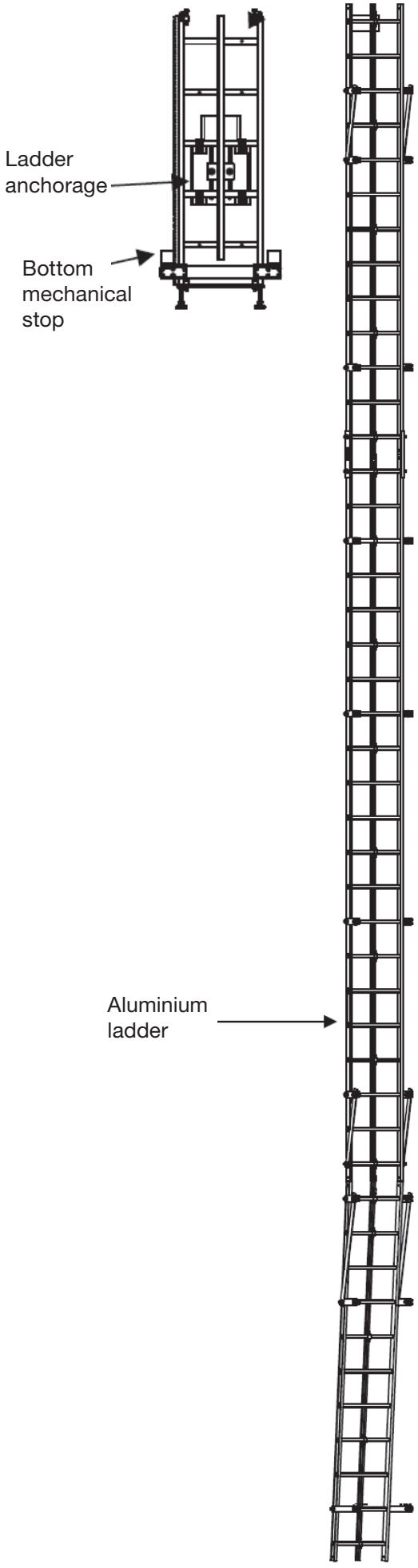
10. Mount the ladder feet.

11. Adjust the ladder feet so that they contact the ladder bottom support.

12. Install the bottom mechanical stop and the bottom limit plate.

13. Install the bottom platform fence.

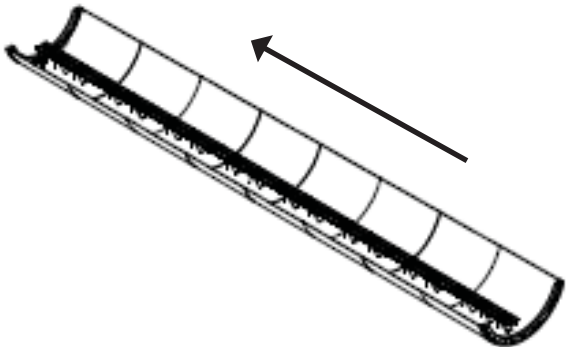
14. Install the safe zone plates.



5.4.2 Installation of Pegasus XL in T2 at tower factory

Installation type A

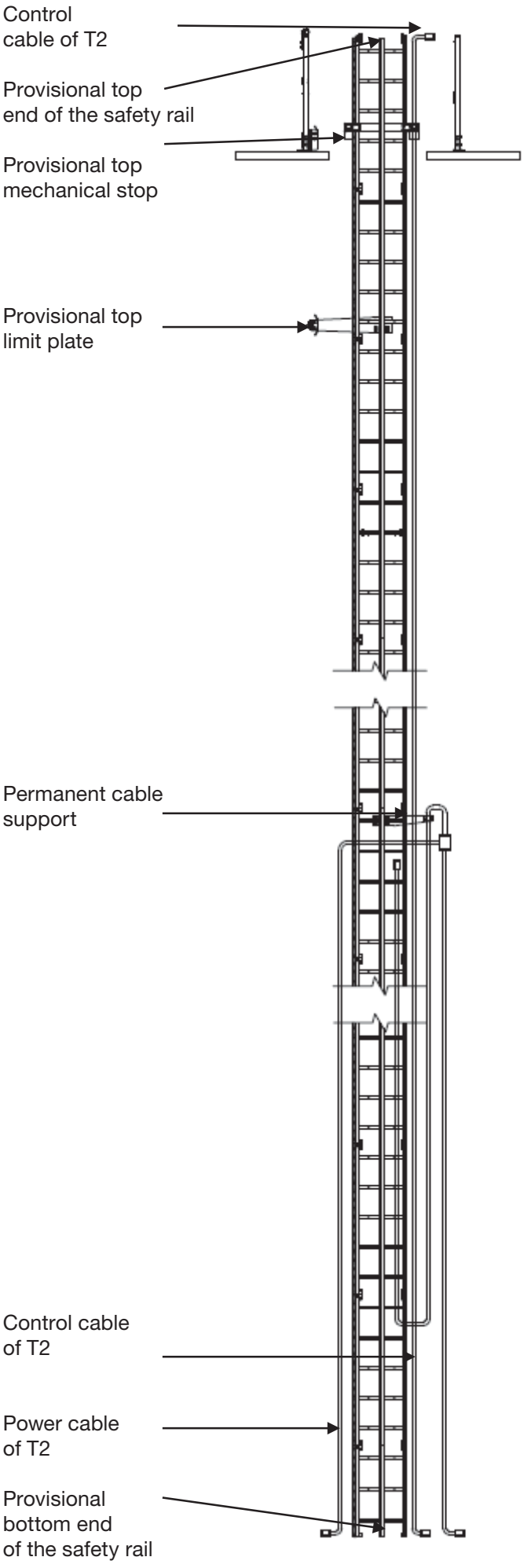
1. Install the ladder anchorages on the tower brackets, leaving the screws loose.
2. Install the bottom ladder section on the ladder anchorages, leaving the screws loose.
3. Leave a gap between the bottom ladder section and the bottom tower flange (see the Installation Drawing for more information).
4. Install the rest of the ladder sections from bottom to top.



5. Leave a gap between the bottom ladder section and the bottom tower flange (see the Installation Drawing for more information).
6. Tighten the screws connecting the ladder sections between them.
7. Tighten the screws connecting the omega brackets with the ladder anchorages.
8. Tighten the screws connecting the ladder anchorages with the tower brackets.
9. Install the safety rail.
10. Install the provisional top end of the safety rail.
11. Install the provisional top mechanical stop.
12. Install the rest platforms.
13. Install the platform fence.

The tightening of the platform fence is critical to guarantee an appropriate rigidity of the fence.

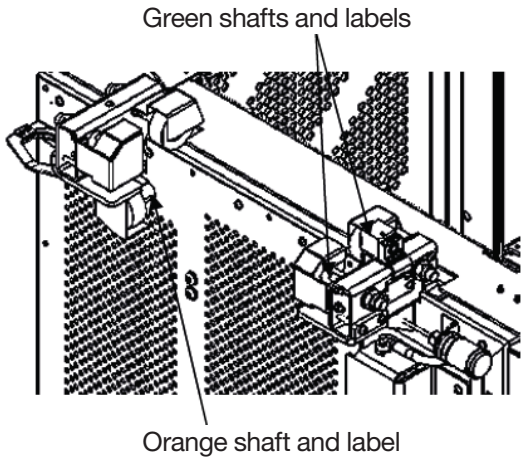
14. Install the provisional top limit plate.
15. Install the safe zone plate.
16. Install the cable support.
17. Install the provisional bottom end of the safety rail.
18. Install the control and the travelling cables.



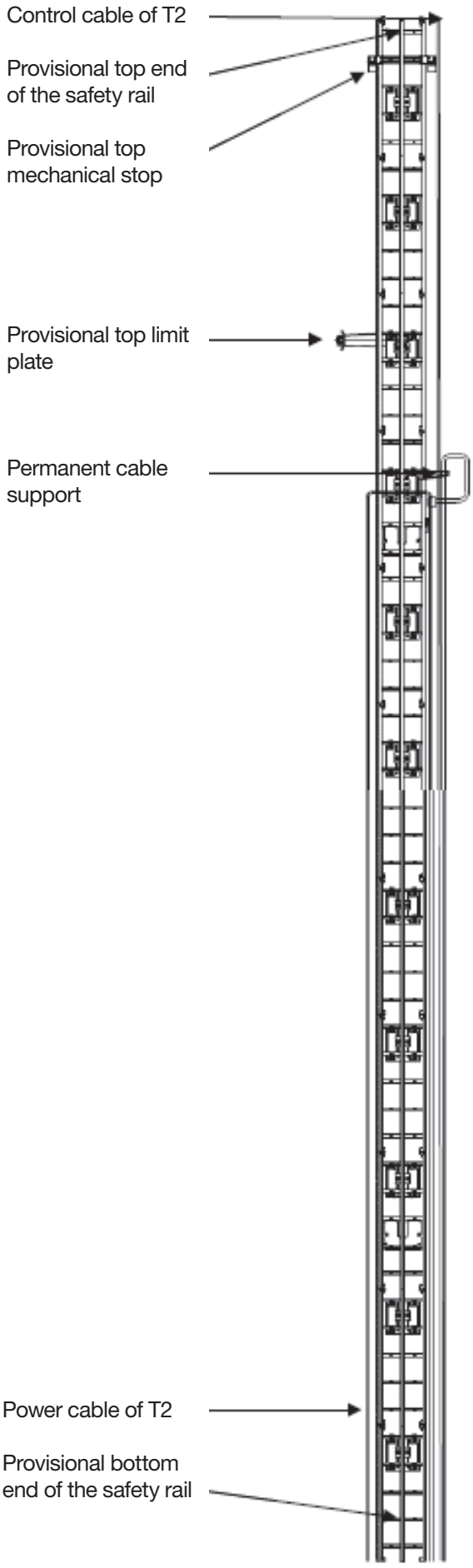
Installation type B

1. Install the ladder anchorages on the tower brackets, leaving the screws loose.
2. Install the bottom ladder section on the ladder anchorages, leaving the screws loose.
3. Leave a gap between the bottom ladder section and the bottom tower flange (see the Installation Drawing for more information).
4. Install the rest of the ladder sections from bottom to top.
5. Leave a gap between the bottom ladder section and the bottom tower flange (see the Installation Drawing for more information).
6. Tighten the screws connecting the ladder sections between them.
7. Tighten the screws connecting the omega brackets with the ladder anchorages.
8. Tighten the screws connecting the ladder anchorages with the tower brackets.
9. Install the safety rail.
10. Install the provisional top end of the safety rail.
11. Install the provisional top mechanical stop.
12. Install the rest platforms.
13. Place the cabin on the ladder.
14. Mount the following components on the cabin: back guiding rollers (and its covers), counter guiding rollers (and its covers), anti-derailment brackets and the inductive sensor.

Mount the guiding rollers shafts into the correct holes: green shafts into green coloured holes and orange shafts into orange coloured holes.



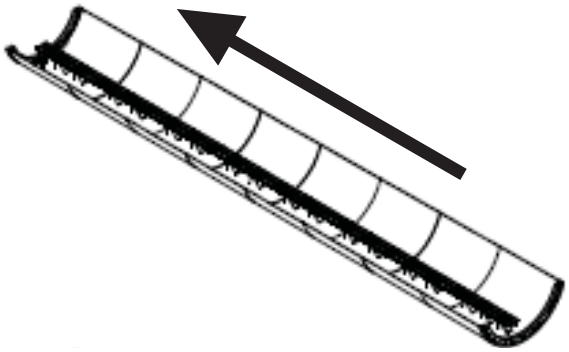
15. Test and adjust the rollers, pinions and brakes.
16. Position the cabin so that the bottom and top guiding rollers are aligned with a ladder anchorage.
17. Wrap the cabin with plastic film.
18. Install the platform fence.
19. Install the provisional top limit plate.
20. Install the safe zone plate.
21. Install the cable support.
22. Install the provisional bottom end of the safety rail.
23. Install the control and the travelling cables.



5.4.3 Installation of Pegasus XL in T3 at tower factory

Installation type A/B

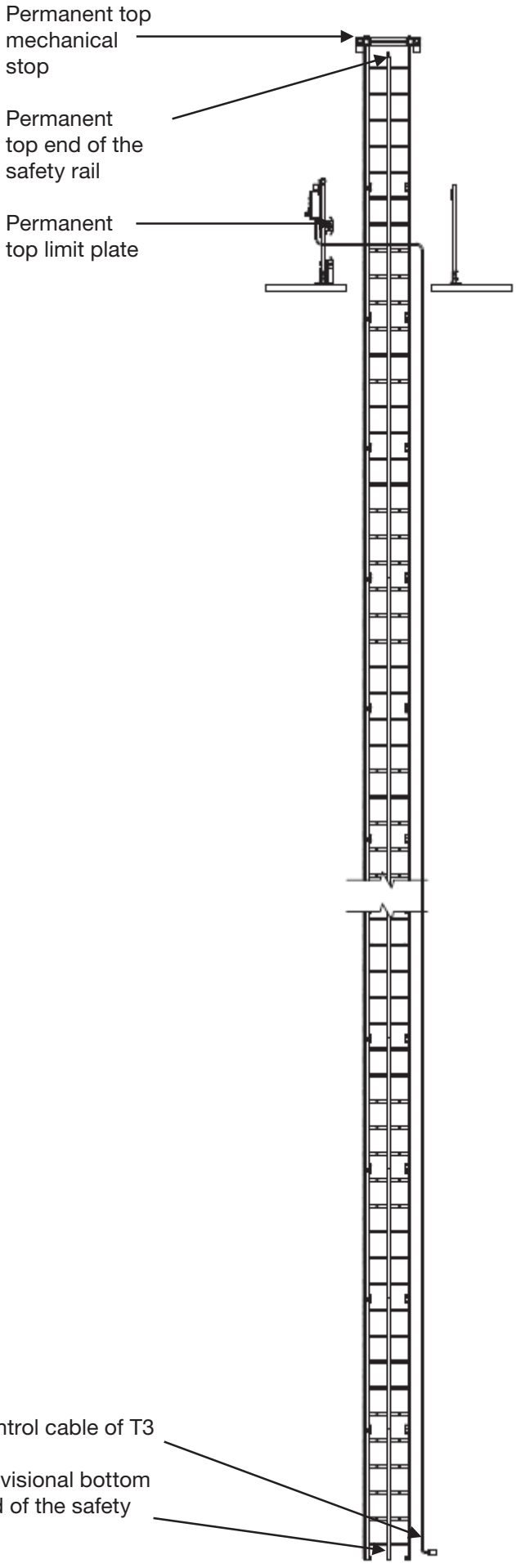
1. Install the ladder anchorages on the tower brackets, leaving the screws loose.
2. Install the bottom ladder section on the ladder anchorages, leaving the screws loose.
3. Leave a gap between the bottom ladder section and the bottom tower flange (see the Installation Drawing for more information).
4. Install the rest of the ladder sections from bottom to top.



5. Tighten the screws connecting the ladder sections between them.
6. Tighten the screws connecting the omega brackets with the ladder anchorages.
7. Tighten the screws connecting the ladder anchorages with the tower brackets.
8. Install the safety rail.
9. Install the top end of the safety rail.
10. Install the top mechanical stop.
11. Install the rest platforms.
12. Install the platform fence.

The tightening of the platform fence is critical to guarantee an appropriate rigidity of the fence.

13. Install the top limit plate.
14. Install the safe zone plate.
15. Install the provisional bottom end of the safety rail.
16. Install the control cable.



5.4.4 Installation on-site of Pegasus XL after T1 is erected

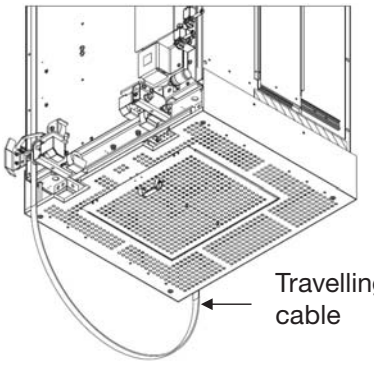
Installation type A

1. Unwrap the cabin
2. Connect the travelling cable to the cabin.

For installation type B, this tower section T1 can not be used until T2 is installed.

Electrical connections must be made in accordance with UL 508A (for Pegasus XL AECO) and with EN 60204-1 and EN 60204-32 (for Pegasus XL CE).

When unwinding the power cable, ensure that is does not present loops nor twists.



The differential controller is already mounted inside the cabin control box. The detailed instructions of the adjustment of the differential controller are available from AVANTI upon request. The serial numbers of the sealing stickers of the differential controller, shall be written down in the "Inspection log sheet" Appendix.

3. Before applying the grease on the rack of T1, ascend and descend the service lift two times along the travel path of T1.
4. From P00, remove the pinion covers and clean off the galvanising flakes.
5. Put the pinion covers back on.
6. Grease the rack of T1.
7. Adjust the position of the safe zone plates and of the provisional top limit plate.
8. Install the platform alignment stickers.

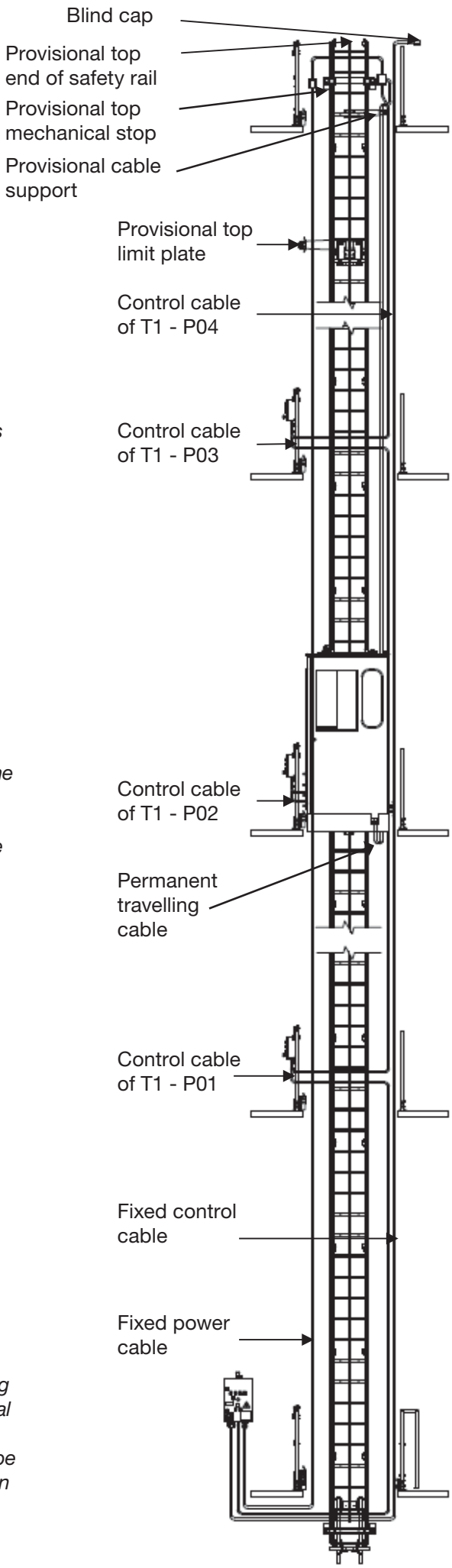
5.4.5 Inspection before the first use of Pegasus XL after T1 is erected

An inspection shall be carried out before the first use of the service lift after T1 is erected.

This inspection shall only be carried out by certified technicians.

This inspection shall be carried out following and filling in the "Inspection checklist" Appendix and the "Annual inspection log sheet" Appendix for future possible reference. The chapter "6.3 Annual inspection" shall be used as a detailed guideline for some of the inspection steps.

After this inspection is carried out successfully, the service lift can be used as long as the inspected system is not changed.



5.4.6 Installation on-site of Pegasus XL after T2 is erected

Installation type A

1. Untighten the screws connecting the ladder anchorages with the tower brackets of T2.
2. Slide down the ladder in a controlled way until it contacts the ladder of T1.
3. Fix the ladder of T2 to the ladder of T2.
4. Tighten the screws connecting the ladder anchorages with the tower brackets of T2.
5. Remove the provisional components from T1.
6. Connect the permanent travelling cable to the cabin.
7. Before applying the grease on the rack of T2, ascend the service lift to P04.
8. From P04, remove the pinion covers and clean off the grease from the pinions.
9. Put the pinion covers back on.
10. Ascend and descend the service lift two times along the travel path of T2.
11. From P04, remove the pinion covers and clean off the galvanising flakes.
12. Put the pinion covers back on.
13. Grease the rack of T2.
14. Adjust the position of the safe zone plates and of the provisional top limit plate.

5.4.7 Inspection before the first use of Pegasus XL after T2 is erected

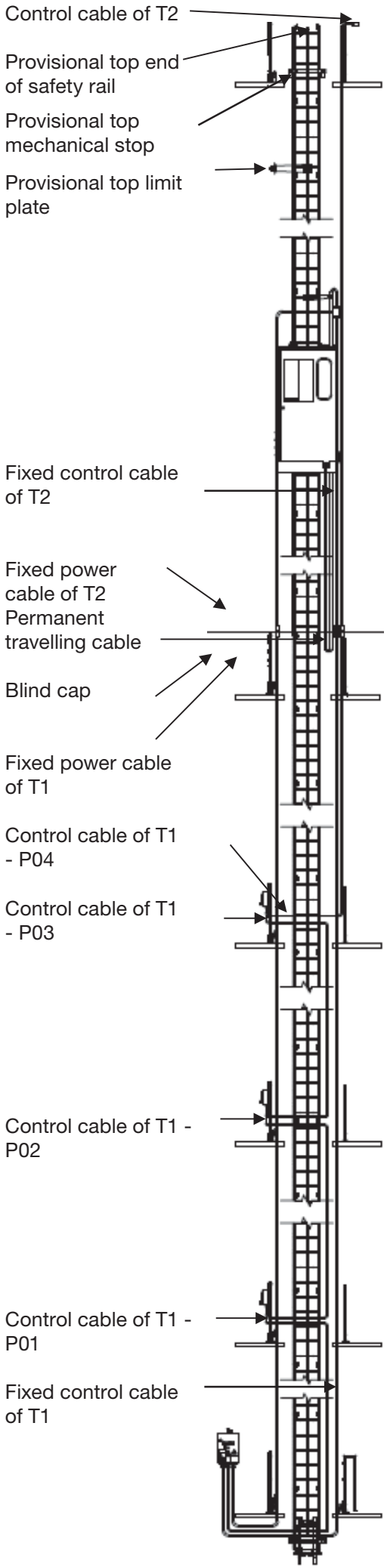
Installation type A

An inspection shall be carried out before the first use of the service lift after T2 is erected.

This inspection shall only be carried out by certified technicians.

This inspection shall be carried out following and filling in the "Annual inspection checklist" Appendix and the "Inspection log sheet" Appendix for future possible reference. The chapter "6.3 Annual inspection" shall be used as a detailed guideline for some of the inspection steps.

After this inspection is carried out successfully, the service lift can be used as long as the inspected system is not changed.



5.4.8 Installation on-site of Pegasus XL after T2 is erected

Installation type B

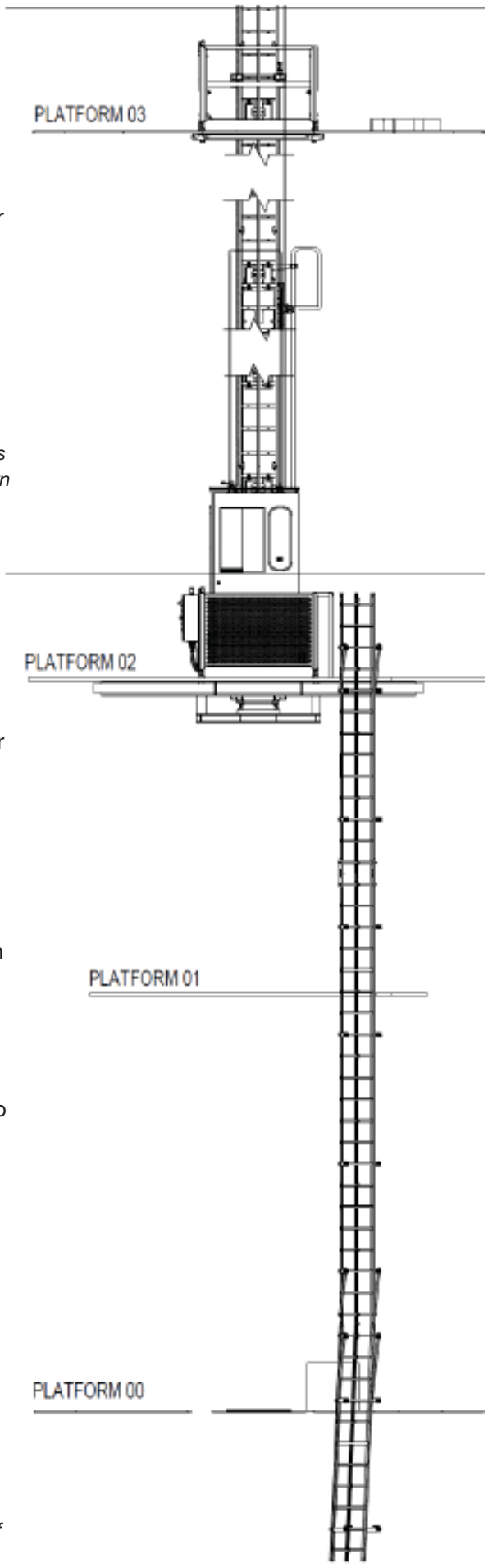
1. Unwrap the cabin
2. Remove the transport brackets and the “remove transport bracket label” before the first cabin use.
3. Connect the travelling cable to the cabin.

Electrical connections must be made in accordance with UL 508A (for Pegasus XL AECO) and with EN 60204-1 and EN 60204-32 (for Pegasus XL CE).

When unwinding the power cable, ensure that is does not present loops nor twists.

The differential controller is already mounted inside the cabin control box. The detailed instructions of the adjustment of the differential controller are available from AVANTI upon request. The serial numbers of the sealing stickers of the differential controller, shall be written down in the “Inspection log sheet “ Appendix.

4. Untighten the screws connecting the ladder anchorages with the tower brackets of T1.
5. Slide up the ladder of T1 in a controlled way until it contacts the ladder of T2, acting on the head of the screws of the support base. Once adjusted, block the rotation of the screw by tightening the nut (located just below the screw head) against the support.
6. Fix the ladder of T1 to the ladder of T2.
7. Tighten the screws connecting the ladder anchorages with the tower brackets of T1.
8. Connect the permanent travelling cable to the cabin.
9. Before applying the grease on the rack of T2, ascend the service lift to P03
10. From P03, remove the pinion covers and clean off the grease from the pinions.
11. Put the pinion covers back on.
12. Ascend and descend the service lift two times along the travel path of T2+T1.
13. From P03, remove the pinion covers and clean off the galvanising flakes.
14. Put the pinion covers back on.
15. Grease the rack of T2+T1.
16. Adjust the position of the safe zone plates and of the provisional top limit plate.
17. Install the platform alignment stickers.



5.4.9 Inspection before the first use of Pegasus XL after T2 is erected

Installation type B

An inspection shall be carried out before the first use of the service lift after T2 is erected.

This inspection shall only be carried out by certified technicians.

This inspection shall be carried out following and filling in the “Inspection checklist” Appendix and the “Annual inspection log sheet” Appendix for future possible reference. The chapter “6.3 Annual inspection” shall be used as a detailed guideline for some of the inspection steps.

After this inspection is carried out successfully, the service lift can be used as long as the inspected system is not changed.

5.4.10 Installation on-site of Pegasus XL after T3 is erected

Installation type A/B

1. Untighten the screws connecting the ladder anchorages with the tower brackets of T3.
2. Slide down the ladder of T3 in a controlled way until it contacts the ladder of T2.
3. Fix the ladder of T3 to the ladder of T2.
4. Tighten the screws connecting the ladder anchorages with the tower brackets of T3.
5. Remove the provisional components from T2.
6. Remove the blind cap from the cable of T1 – P04 (or T1-P02).
7. Connect the control cable of T2 with the control cable of T1.
8. Connect the control cable of T3 with the control cable of T2.
9. Before applying the grease on the rack of T3, ascend the service lift to P05 (or P04).
10. From P05 (or P04), remove the pinion covers and clean off the grease from the pinions.
11. Put the pinion covers back on.
12. Ascend and descend the service lift two times along the travel path of T3.
13. From P05 (or P04), remove the pinion covers and clean off the galvanising flakes.
14. Put the pinion covers back on.
15. Grease the rack of T3.
16. Adjust the position of the safe zone plates and of the permanent top limit plate.

5.4.11 Inspection before the first use of Pegasus XL after T3 is erected

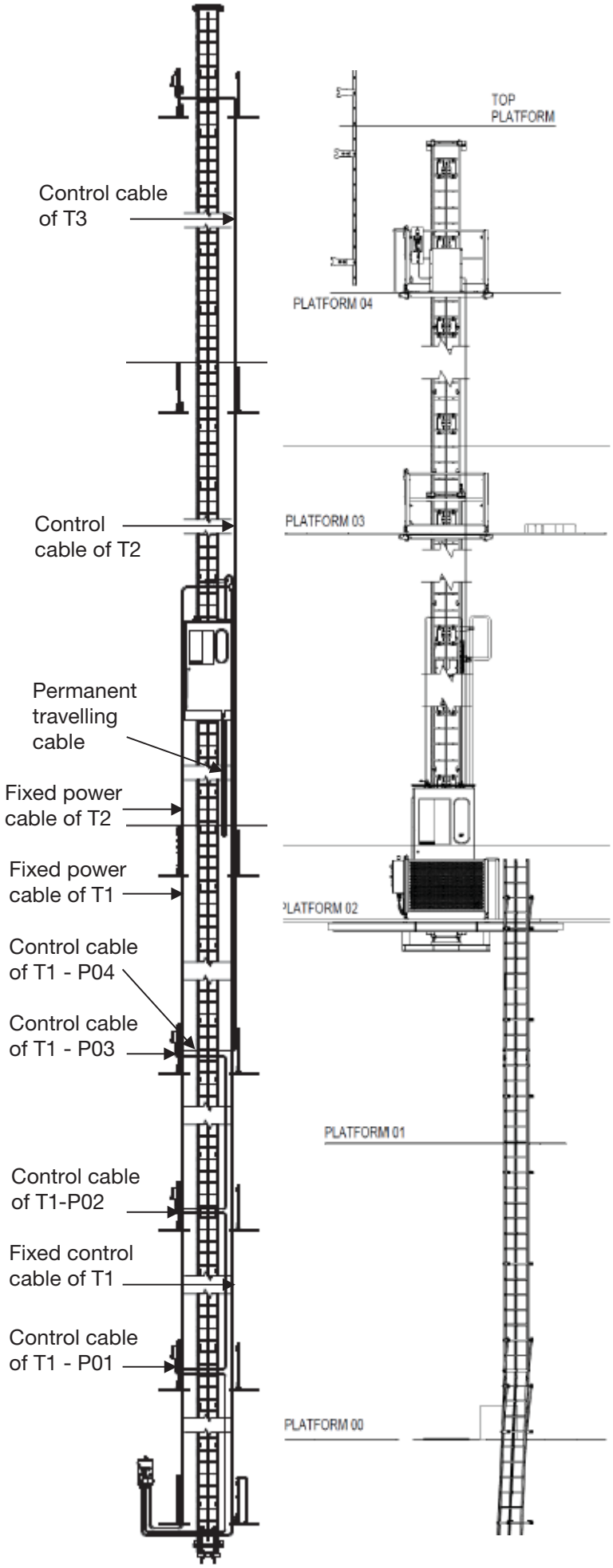
Installation type A/B

An inspection shall be carried out before the first use of the service lift after T3 is erected.

This inspection shall only be carried out by certified technicians.

This inspection shall be carried out following and filling in the "Annual inspection checklist" Appendix and the "Inspection log sheet" Appendix for future possible reference. The chapter "6.3 Annual inspection" shall be used as a detailed guideline for some of the inspection steps.

After this inspection is carried out successfully, the service lift can be used as long as the inspected system is not changed.



6. Maintenance

A maintenance is required and necessary:

- To avoid premature wear
- To prolong the lifetime of the machine
- To maintain the level of safety which the service lift was designed and manufactured to.

6.1 Maintenance planning

The lift must be inspected by an expert that has been trained by AVANTI. The inspection should be annual or every 40 hours of use, whichever occurs sooner.
The service lift is designed for a lifetime of 20 years with a frequency of use of approximately 12.5 h/year of 250 h during lift. In case frequency of use is higher, service and inspections are required and replacement of components might be necessary according to the replacement criteria stated on this manual.
The traction system must be overhauled at an authorised workshop by the manufacturer for every 250 hours of operation.

The inspections shall be carried out filling in the "Annual inspection checklist" Appendix and the " Inspection log sheet" Appendix for future reference.

Frequency	Carried out by	Inspection checklist reference	Components
Daily	Supervisor	1	Travel zone
		2	Control and safety devices
		3	Cabin
At least every 12 months, depending on local regulations	Certified technicians	1	Travel zone
		2	Control and safety devices
		3	Cabin
		4	Guiding system
		5	Doors and hatches
		6	Electrical system
		7	Electronic system
		8	Motor groups
		9	Overload limiter
		10	Trapped key
		11	Guard locking
		12	Platforms
		13	Information signs and documents
		14	Final assessment

6.2 Cautions

Before any maintenance operation check that the service lift is out of service.

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.

Before any maintenance task, ensure that walking way surfaces are dry and not slippery.

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 service lift at bottom platform and disconnect power supply.
- Use an electricity measuring tool when carrying out inspection of electrical components.
- Use a hand winch attachable to the ladder when handling big/ heavy loads and carried out at least by 2 persons.
- The panel parts shall be removed to facilitate access to confined spaces.
- The guiding rollers shall be replaced one by one.
- Use a cable grip when replacing travelling cable.
- Keep service lift doors closed when using a 3-step ladder.

Electrical installation tasks shall be carried out only by certified technicians.

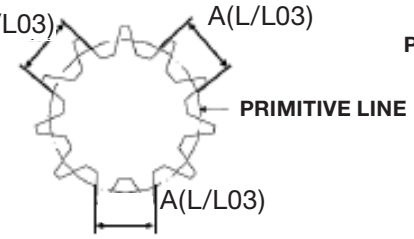
6.3 Annual inspection

Annual inspection shall only be carried out by certified technicians.

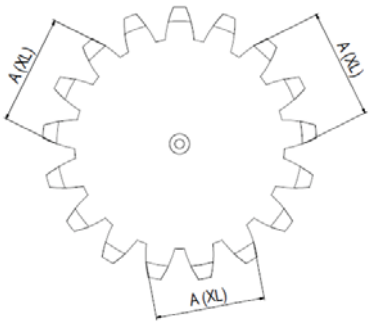
6.3.1 Pinions

Check that the pinions are free from deterioration, damage or abrasion.
Measure the wear limit of the pinion on the primitive line and at 3 different points, each separated 120º. The “A” dimension shall be within the range stated in the table.

Pegasus L/L03:



Pegasus XL:



The pinion replacement criteria is shown in the table below:

DIMENSION	NEW PINION (mm)	REPLACEMENT CRITERIA (mm)
A(L/L03)	27.49	< 26.49
A(XL)	46.32	< 45.32

6.3.2 Ladder rack

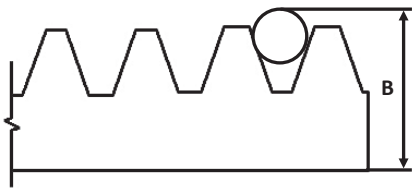
The personnel shall inspect the full length of the ladder by climbing along the ladder.

1. Check that the rack is free from deterioration, damage or abrasion.
2. Check that the ladder has no cracks, dents or damages.

The detailed instructions of the measuring procedure of the rack and pinions are available from AVANTI upon request.

6.3.2.1 Wear limit

1. Using a calibrated rod of Ø 12 mm h6, check that the dimension control “B” is between 33.39 and 34.59 mm.
2. Repeat this measurement on each mast section.

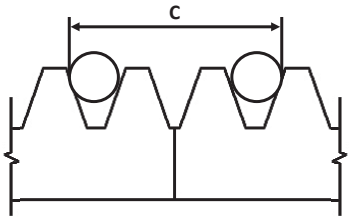


The rack replacement criteria is shown in the table below:

DIMENSION	NEW RACK (mm)	REPLACEMENT CRITERIA (mm)
B	34.59	< 33.39

6.3.2.2 Tolerance between 2 consecutive ladder sections

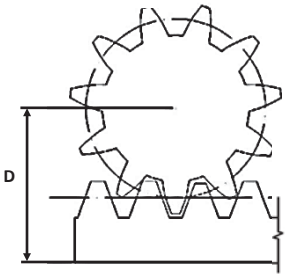
Using 2 calibrated rods of Ø 12 mm h6 check that the distance “C” is within the range described in the following table.



DIMENSION	MINIMUM (mm)	MAXIMUM (mm)
C (L/L03)	49.1	49.9
C (XL)	49.1	49.9

6.3.2.3 Looseness limit:

To evaluate the looseness, check that the control dimension “D” is within the range described in the following table. If “D” is not OK, the shafts of the counter guiding rollers need to be revised.

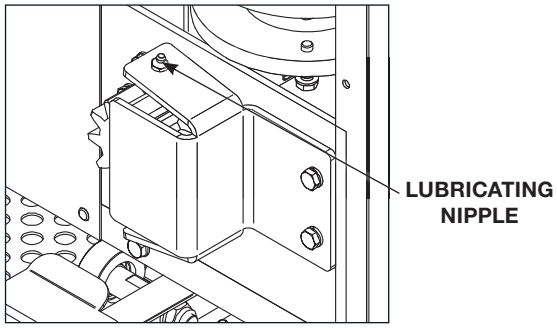


DIMENSION	MINIMUM (mm)	MAXIMUM (mm)
D (L/L03)	57	58
D (XL)	75.9	76.9

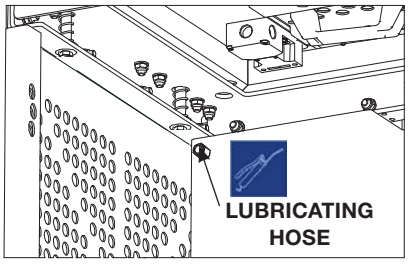
6.3.2.4 Lubricate the rack

Check that the lubricant on the rack and pinions is in proper conditions. If the lubricant is not in proper conditions, proceed as follows:

1. Place the lift at the bottom platform and disconnect the power supply.
2. Clean the old lubricant off the rack and pinions.
3. Use a grease gun and a zipper sleeve to lubricate the low pinion through the lubricating nipple.



4. Turn on the power supply and enter the lift.
5. Remove the female adaptor form the grease gun and connect the gun to the lubricating hose. Its location is indicated by means of a lubricating point sign.
6. Apply lubricant to the top pinion from inside the cabin throughout the ascent.
7. Repeat the lubrication throughout the descent.
8. If necessary, clean the excess of new lubricant off the rack.



The type of grease shall be LUBERKRAFFT KL.

In case of using an equivalent grease, it must be previously verified by AVANTI.

6.3.3 Guiding rollers and counter guiding rollers

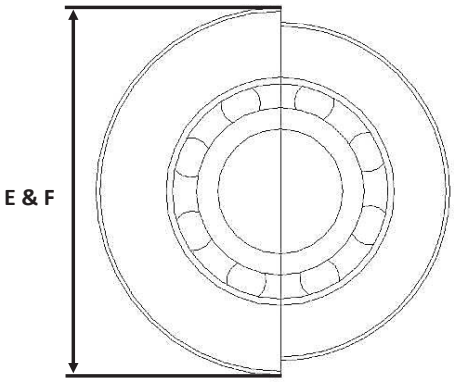
Clean and lubricate the rack every time you replace a section of the ladder. If use is more severe, it will be necessary to lubricate more often.

1. Check that the outer surface of the rollers is uniform and free from damage.
2. Check that the control dimension “E” on each counter guiding roller is within the range described in the following table.

DIMENSION	NEW COUNTER GUIDING ROLLER (mm)	REPLACEMENT CRITERIA (mm)
E (L/L03)	50	<48
E (XL)	79	<77

3. Check that the control dimension “F” on each guiding roller is within the range described in the following table.

DIMENSION	NEW GUIDING ROLLER (mm)	REPLACEMENT CRITERIA (mm)
F (L/L03)	50	<46
F (XL)	79	<75



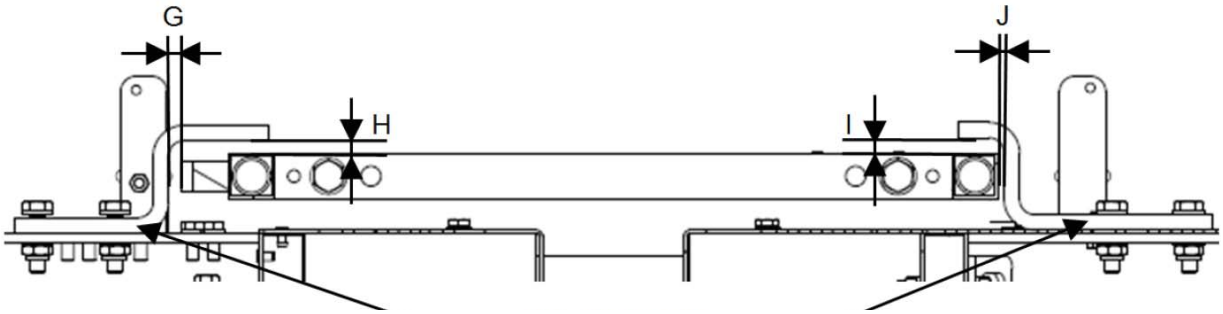
6.3.4 Anti-derailment brackets

Check that the gaps between the anti-derailment brackets and the ladder stiles are within the ranges described in the following table.

DIMENSION	MINIMUM (mm)	MAXIMUM (mm)
G (L) / G (L03)	7	9
H (L) / H (L03)	6	8
I (L) / I (L03)	6	10
J (L) / J (L03)	3	4
G (XL)	5	7
H (XL)	4	7
I (XL)	4	7
J (XL)	2	4

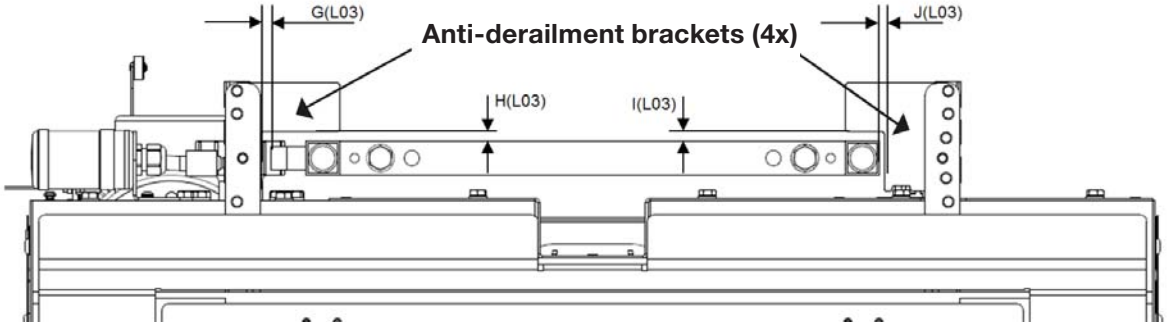
Check the gaps on ALL the anti-derailment brackets.

Pegasus L:

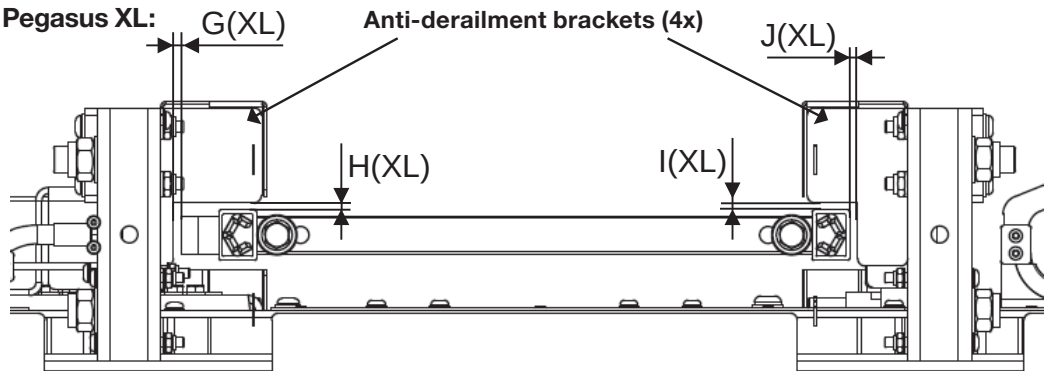


Anti-derailment brackets (2x)

Pegasus L03:



Pegasus XL:



6.3.5 Torques assurance

Check the torques of the screws. See point 5.2.1 or 5.2.2.

6.3.6 Overload limiter

1. Introduce 250 kg inside the cabin for Pegasus L/L03 (or 300 kg for Pegasus XL).
2. Press and hold the UP button. The lift shall ascend.
3. Introduce 25 kg more for Pegasus L/L03 (275 kg in total) or 30 kg for Pegasus XL (330 kg in total) inside the cabin.
4. Press and hold the UP button. The lift shall not ascend, and the overload light (yellow) shall light up.
5. If any of the previous steps is unsatisfactory, readjust the overload limiter by following the instructions of the "Adjustment of the overload limiter" Appendix.

6.3.7 Motor group

6.3.7.1 Gear box

1. Visually check for oil leaks. If an oil leak is found, certified technicians shall check that the gear box is proper conditions.
2. If needed, replace the gasket of the gear box cover, and re-fill with oil as needed.
3. Then close the cover of the gear box and apply the correct torque to the screws.

6.3.7.2 Centrifugal brakes

If the hour counter reads 90 h or more since the last inspection of the centrifugal brakes follow the steps below.

1. Open the motor cover.
2. Dismount the bottom motor from the centrifugal brake.
3. Extract the brake hub from the brake housing.
4. Replace brake linings if their thickness less than 1,5 mm.
5. Insert the brake hub back in the brake housing.
6. Mount the bottom motor on the centrifugal brake.
7. Repeat the previous steps with the top motor.
8. Close the motor cover.

Record the thickness measurings and the hour counter reading in the "Inspection log sheet" Appendix. The detailed instructions of the adjustment of the motor brakes are available from AVANTI upon request.

This operation shall be done only by certified technicians and following the centrifugal brake manufacturer instructions.

6.3.7.3 Electromagnetic brakes

The test and adjustment of the electromagnetic brakes shall be done only by certified technicians and following the steps described in the "Test and adjustment of the electromagnetic brakes" Appendix.

6.3.8 Obstruction devices

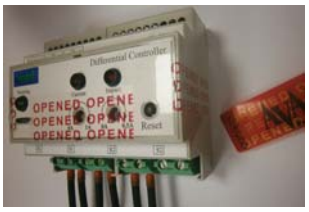
Clean and lubricate the guiding shafts of the top and bottom obstruction devices, in order to guarantee that the obstruction devices compress and decompress properly.

6.3.9 Differential controller [1)]

1. Open the cabin control box.
2. Check that the 3 sealing stickers of the differential controller have not been manipulated and that their serial numbers coincide with those written in the "Inspection log sheet" Appendix.

If any of the sealing stickers has been manipulated, the differential controller needs to be adjusted.

Sealing sticker OK



Sealing sticker NOK

The detailed instructions of the adjustment of the differential controller are available from AVANTI upon request.

6.3.10 Bottom and top mechanical stops

1. Check that the bottom and top mechanical stops are not bent.
2. If the mechanical stops are bent, fix them, and revise the bottom, top and emergency limit switches thoroughly.

6.4 Ordering spare parts

Only original parts must be used. Spare parts list is available from AVANTI upon request.

7. Disassembling

The disassembling shall be done following the installation instructions but in reverse order.

The disposal shall be done in accordance with local authority regulations.

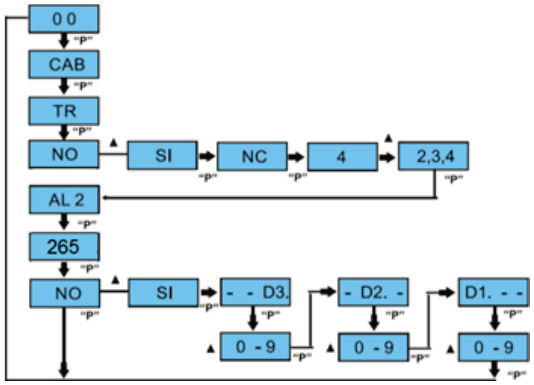
CE AECO

[1)] Not applicable to Pegasus L/L03 CE.

Appendix A: Adjustment of the overload limiter

The adjustment of the overload limiter shall be done only by certified technicians and following the steps described below.

A.1 Workflow



A.2 Buttons

The “P” button is used to confirm the value and to continue to the next step. The “UP Arrow” button is used to change the value of a parameter.

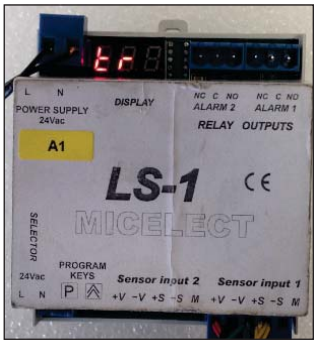
“P” button “UP Arrow” button

A.3 Instructions

1. Switch ON the lift and open the cabin control box.
The display shows “0 0”.

2. Press and hold the “P” button for 2 or 3 seconds until the display shows “CAb”.

3. Press the “P” button.
The display shows “tr”.

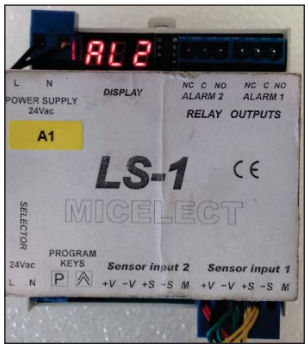


4. Press the “P” button.
The display shows “NO”.

5. Press the “UP Arrow” button.
The display shows “SI”.

6. Press the “P” button.
The display shows “SI”.
It is flashing.
You have 10 seconds to get out the lift.
Then the lift measures the weight of the empty cabin.

7. Once the “no load” setting is set, the display shows “NC” which means “number of cells”.



8. Press the “P” button.
The display should show “4”.
(Informational note: this value should be set 4 from factory.)
8.1 If the display shows “4”, press the “P” button to confirm.
8.2 If the display shows a value different to “4”, correct it by pressing the “UP Arrow” button and finally confirm by pressing the “P” button.
9. The display shows “AL2”, which is the top overload limit to be set.

10. Press the “P” button.
The display shows the triggering limit of the overload limiter.
It must be 265 kg for Pegasus L/L03 (or 320 kg for Pegasus XL).
10.1 If the display shows “265” for Pegasus L/L03 (or “320” for Pegasus XL)
press the “P” button.
The display shows “NO”.
Finally, press the “P” button.
The display shows “0 0”.
The process is finished.

10.2 If the display does not show “265” for Pegasus L/L03 (or “320” for Pegasus XL),
press the “P” button.
The display shows “NO”.
10.2.1 Press the “UP Arrow” button.
The display shows “SI”.
10.2.2 Press the “P” button.
The display shows a dot next to the third digit.
10.2.3 Press the “UP Arrow” button to modify the value of the third digit as needed.
10.2.4 Press the “P” button.
The display shows a dot next to the second digit.
10.2.5 Press the “UP Arrow” button to modify the value of the second digit as needed.
10.2.6 Press the “P” button.
The display shows a dot next to the first digit.
10.2.7 Press the “UP Arrow” button to modify the value of the first digit as needed.
10.2.8 Finally, press the “P” button.
The display shows “0 0”.
The process is finished.

Appendix D: AVANTI lift anchor

D.1 Caution

AVANTI LIFT ANCHOR is an anchor point used for protection against falls from heights intended for use with a full body harness approved according to EN 361 or Z359.1:2007 as applicable. Connection to the LIFT ANCHOR is only allowed by using self-closing connectors according to EN 362 or Z359.1:2007 as applicable.

Use in connection with other equipment than specified, may be potentially dangerous. User shall be equipped with a means of limiting the maximum dynamic forces exerted on the user during the arrest of a fall to a maximum of 6kN. In case of doubt, please contact AVANTI.

The maximum load that can be transmitted in service from the anchor device to the structure is 22.2 kN in ±15° vertical direction. The maximum deflection of the anchor point that can occur in service is 10mm.

AVANTI LIFT ANCHOR is tested and approved only to be mounted on AVANTI lifts. This manual always needs to be represented in language of sale and provided for use by all technicians. Activities at height are dangerous and may lead to severe injury or even death.

Gaining an adequate apprenticeship in appropriate techniques and methods of protection is important and is your own responsibility.

Users are obliged to read and understand this User Manual. Further they need to be proper equipped and instructed with the use of the necessary fall arrest equipment and emergency procedures in case of injury or sudden illness.

Users going to install AVANTI LIFT ANCHOR need to be familiar with the installation section of this manual. It's essential to the safety, that the user always attach the energy absorber as high as possible above his/her position, to minimize the fall distance most possible in case of a fall.

The position of the anchor point is crucial for fall arrest – the height of the fall, elongation of lanyard and energy absorber or pendulum movement of the user should be considered in order to minimize the risk of impact in obstacles in case of a fall. It's prohibited for the user to do many modifications or use non original Avanti components when assembling AVANTI LIFT ANCHOR.

Re-use of demounted AVANTI LIFT ANCHORS or parts is not allowed. Any changes or other uses beyond this manual are strictly forbidden.

Any changes or other uses beyond this manual are strictly forbidden. This documentation must be kept in the service lift for the purpose of subsequent examinations of the anchor device.

D.2 Danger

The AVANTI LIFT ANCHOR is for the use of one person only. It is strictly forbidden to carry out work if the person is in unfit mental or physical condition. Climbing and working under the influence of alcohol, drugs or any medication which can interfere with the safety are also much prohibited.

If there are any doubts to the safety of the AVANTI LIFT ANCHOR, or it isn't proper fixed, deform or damaged with cracks or similar incompatible harms it may never be used – Please contact the manufacture immediately. In case of corrosion the anchor immediately needs to be removed.

Observations:

Only to be used by instructed workers! Instructed workers must be aware, instructed and prepared to utilize site rescue plans.

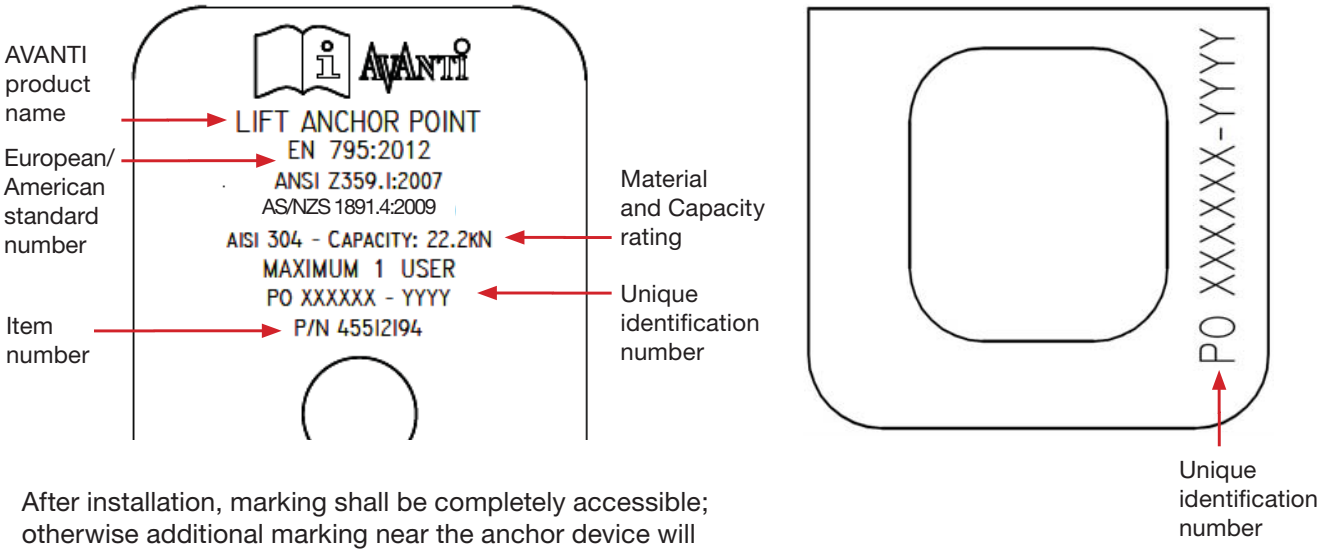
Only to be used for preventing vertical fall!

Only to be used for fall arrest, not to hoist or hang in goods or similar! Before attaching in the ANCHOR the user needs to check it is sitting fixed and screws are sitting tight and proper.

If AVANTI LIFT ANCHOR has arrested a fall it may never be used again. Part must be removed from service immediately.

D.3 Marking

Marking on Lift Anchor plate:



After installation, marking shall be completely accessible; otherwise additional marking near the anchor device will be necessary.

D.4 Installation

The installation must be performed by a certified technician following the instructions of this manual.

AVANTI LIFT ANCHOR is tested and approved only to be installed on AVANTI lift. AVANTI LIFT ANCHOR made from AISI 304 Steel has to be screwed with two bolts DIN 933 A2-70 M12 mm, 4 washers DIN 125A A4 and self locking nuts DIN 985 A4 M12. In case of doubt, please contact AVANTI.

Before installing the AVANTI LIFT ANCHOR in heights, assure to be proper secured against fall from height by using relevant fall arrest equipment.

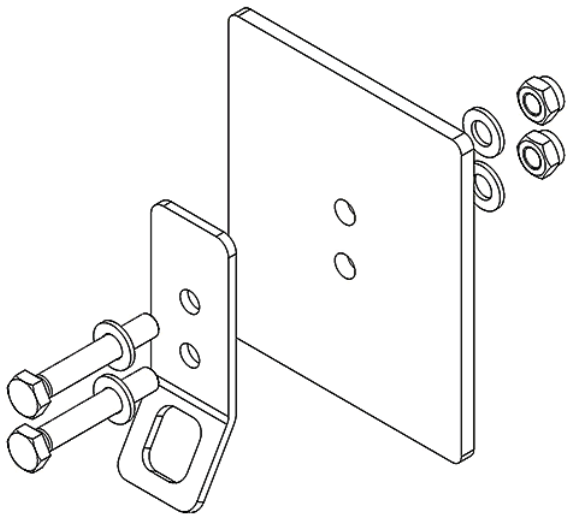
AVANTI LIFT ANCHOR:
1. Fix the anchor point to the structure using the supplied hardware as shown in the picture below.

2. Torque the nuts with 15 N·m (11 lb·ft).

3. Make sure the Anchor is fully seated and properly tightened.

4. Fill in “Installation form”.

5. Carry out yearly inspection by following the procedure in the section “Inspection”.



D.5 Inspection

After installation:
An inspection must be carried out by a certified technician following the inspection form in this manual.

Before use:
Each time using the AVANTI LIFT ANCHOR the user inspects the ANCHOR visual and manually by twisting / pulling. Check the parts are properly fixed and free of deformities, damages, cracks or similar unacceptable defects.

Periodical examination:
A periodic examination at least every 12 month is essential for the safety of the AVANTI LIFT ANCHOR. The examination must be performed by a certified technician following the inspection form in this manual.

For the AVANTI LIFT ANCHOR the certified technician only needs to be trained in any metallic component covered by the European/American standard norms for fall arrest equipment.

D.6 Inspection form

PFPE Anchor:	Manufacturer:	Avanti
	Type / Model:	Lift Anchor
	Identification no.:	
Fixing structure:	Lift serial no.:	
	Lift model:	
	Wind farm / WTG no.:	
Installed by:		
Installation company:		

	OK	**not OK**
1. Lift structure does not show any deterioration.		
2. Anchor locking screws are fully inserted and tightened with 15 N·m.		
3. Anchor does not show cracks, deformities, corrosion or other damages.		
4. Anchor installed on the lift structure according to the instructions.		
5. Anchor marking is clearly readable.		

Is the Anchor in good condition to be used?	
Yes	No (Replace)

Signature of competent:
Name of competent in capital letters:
Date:

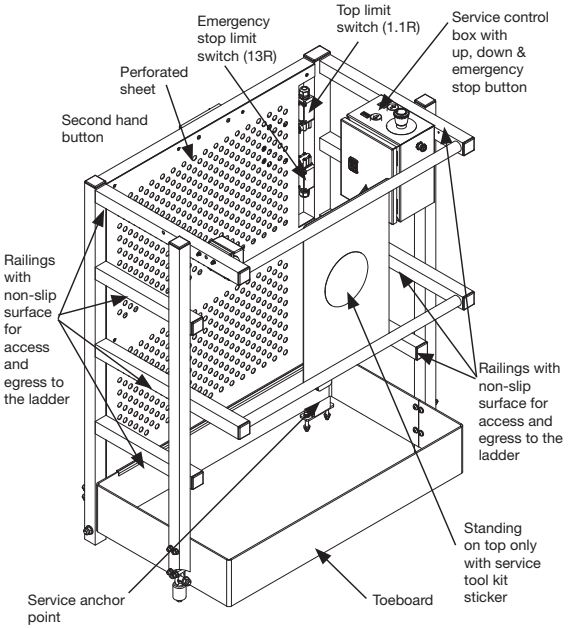
If the AVANTI LIFT ANCHOR is found not OK, it must be removed / replaced by a new AVANTI LIFT ANCHOR! The result of the periodic examination must be recorded in the Registration form of anchor.

Appendix E: Service tool kit [1] for Pegasus L only

E.1 Description

The service tool kit is an optional portable tool that allows a user to ride on top of the service lift in order to perform installation and service tasks along the travel zone:

- During erection of WTG: installing WTG power supply and auxiliary cables running close to the lift.
- Maintenance: tightening and verifying torque of WTG flange bolts.
- Repair: replacing components which are accessible from the lift: lights, junction boxes and cables.



1. When STK is mounted on lift:
- the top obstruction device (roof) is compressed and therefore activated; consequently control is interrupted.

2. When STK is mounted on lift and service control box is connected:
- the controls of cabin control box and platform control boxes are overridden, but
- the controls of service control box are still not operational.

3. When STK is mounted on lift, service control box is connected, NORMAL/SERVICE selector of cabin control box is turned to SERVICE position, and MANUAL/AUTO selector [2] is turned to AUTO position:
- the controls of cabin control box and platform control boxes are overridden,
- the controls of service control box are operational, and
- the rated load inside the cabin is decreased from 250 kg to 30 kg. This way it is not possible to travel inside the cabin when STK is installed.

The connection of the service control box does not override any safety: if any hatch, door or limit switch, or emergency stop button, is activated, no travel will be possible. There are three controls available on the service control box: UP and DOWN buttons and an emergency stop button. Horizontal railings have non-slip surface.

E.2 Technical specifications

Service tool kit	
Service tool kit weight	<25 kg
Rated load inside the cabin when service tool kit installed	30 kg
Max. n° persons inside the cabin	0 person
Max. n° persons on service tool kit	1 person
Free working space (W x D)	583 x 500 mm
Height of guardrail	1100 mm

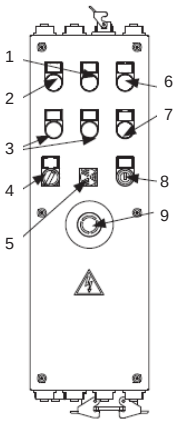
E.3 Dimensions

Space inside the service tool kit is limited to one user only.

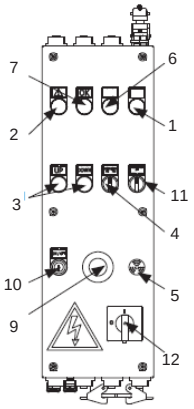
E.4 Cabin control box

When service tool kit is supplied, the cabin control box features a NORMAL/SERVICE selector.

CE cabin control box with service tool kit configuration:



AECO cabin control box with service tool kit configuration:



1. Platform Light (Green)
2. Fault Light (Red)
3. Up / Down Buttons
4. Normal / Service Selector
5. Buzzer for Send [1] and Call Operations
6. Overload Light (Yellow)
7. Ready Light (Green)
8. On / Off Selector (Green)
9. Emergency Stop Button
10. Trapped Key Selector
11. Manual / Auto Selector
12. On / Off Selector

E.5 Cautions

Only one user on service tool kit is allowed.
During service tool kit travelling, no person is allowed inside the cabin.
During service tool kit travelling, user shall constantly verify that travel zone is free of obstacles.
During service tool kit travelling, user shall be attached to service anchor point at all times.
During service tool kit travelling, user shall use both hands to actuate the two-hand control buttons.
During service tool kit travelling, user shall not extend body parts beyond the service tool kit perimeter.
During service tool kit travelling, no person is allowed at platforms located over it.

CE AECO

[1] Optional for CE versions and for L AECO version. Not available for Pegasus XL AECO version.
[2] Not available for CE versions. Mandatory for AECO versions.

E.6 Information signs and documents

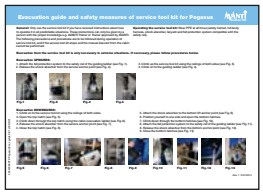
The following information signs and documents are supplied with the service tool kit and shall always be available.

Location	Document
Service tool kit	Standing on top only with service tool kit sticker
	Quick guide of service tool kit
	Electrical hazard warning sticker
	Evacuation guide of service tool kit
	Pull to release sticker [1)]

Standing on top only with service tool kit sticker

Service tool kit quick guide

Electrical hazard warning sticker



Evacuation guide of service tool kit

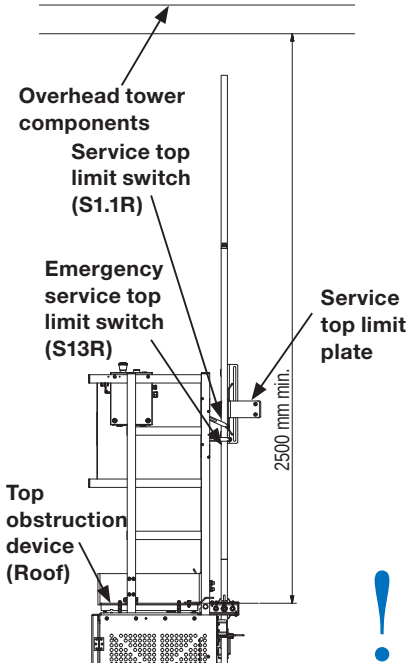
E.7 WTG integration requirements

Special attention shall be given to the integration of the service tool kit in the WTG.

WTG component	General integration requirements
Fences of intermediate and top platforms.	Top surfaces of horizontal railings shall feature non-slip treatment.

E.8 Service top limit plate

The service top limit switches override those ones on the cabin. They are activated by a service top limit plate, which shall be installed on the ladder so that top obstruction device (roof) is at least 2500 mm from overhead tower components when the service lift reaches its maximum top travel.

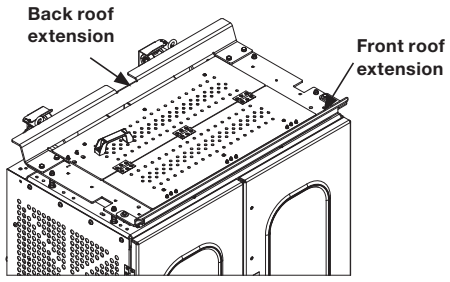


The service tool kit shall be mounted on the top of the cabin at the bottom platform.

E.9 Installation

The preassembled set can be entered through the tower door. The service tool kit is installed on the top of the cabin and fastened with bolts through lifting eyes.

1. Install the service top limit plate on the ladder.
2. Remove the front and back roof extensions.



3. Fix the lifting eyes on to the cabin.
4. Position the preassembled structure over the service lift roof.
5. Insert the bolts through the vertical profiles, the three lifting eyes and the reinforment for installation.
6. Tight the bolts with nuts.
7. Connect the service control box to the cabin control box.
8. Turn the NORMAL/SERVICE selector of the cabin control box to the SERVICE position.

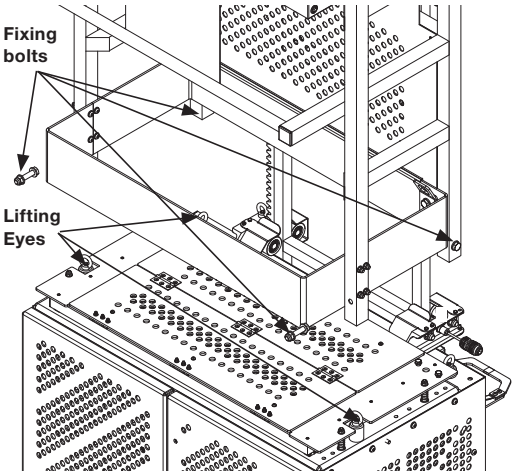
Disassembling is done in reverse order.

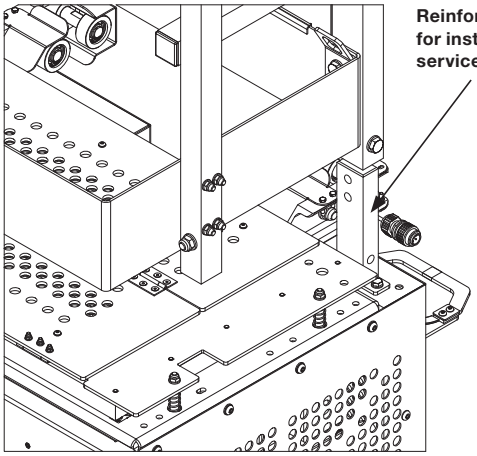
STOP *After the service tool kit has been disassembled from the service lift, perform an inspection filling in the "Annual inspection checklist" Appendix and the "Inspection log sheet" Appendix.*

STOP *After the service tool kit has been disassembled from the service lift, remember to remove the lifting eyes, the reinforcement for installation and the service top limit plate! And remember to install the front and back roof extensions!*

CE AECO

[1)] *Optional for CE versions. Mandatory for AECO version.*





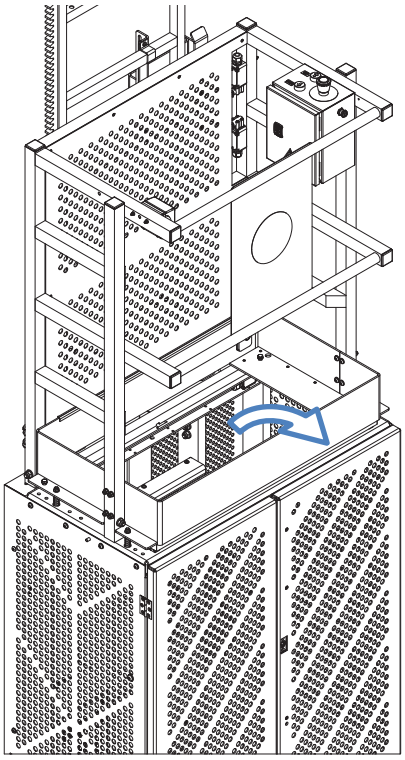
Disassembling is done in reverse order.

When standing on top of cabin, installer shall be attached to safety ladder by means of the fall arrest equipment.

Use a hand winch attachable to the ladder to safely elevate preassembled service tool kit over service lift.

After installation of the service tool kit and before use, an inspection must be performed following the "E.15 Inspection checklist" and results shall be recorded in "Inspection log sheet" Appendix.

E.10 Instructions for use at bottom platform



To access service tool kit from bottom platform:
1. Level service lift floor with platform floor.
2. Climb up the internal cabin ladder.
3. Open top hatch and climb through it, using the lateral non-slip railings of the service tool kit.
4. Close the top hatch.
5. Hook your fall arrest equipment to the service anchor point.
6. Press and hold the UP and OK buttons simultaneously (two-hand controls) to ascend.

Egress from service tool kit is done in reverse order.

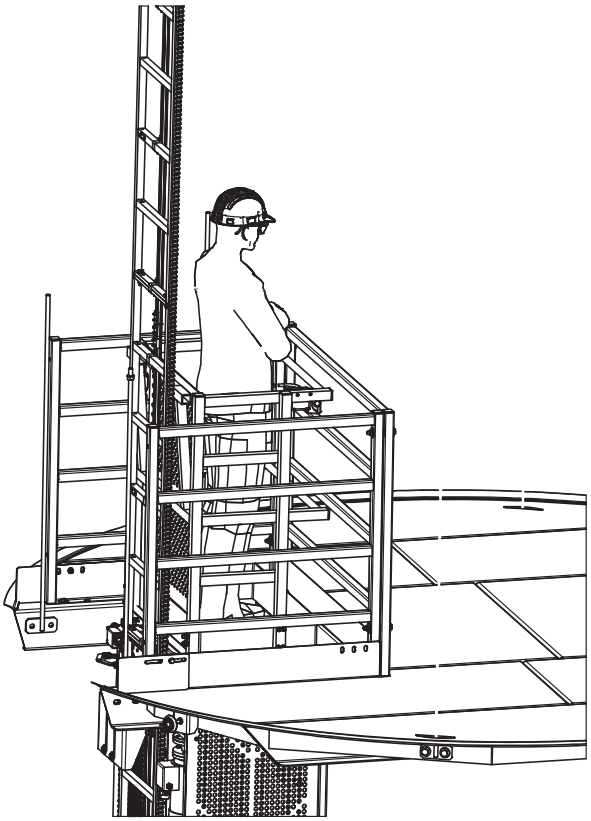
E.11 Instructions for use at intermediate and top platforms

To egress to intermediate and top platforms from service tool kit:

1. Level service lift roof with platform floor.
2. Attach second fall arrest equipment to guiding ladder.
3. Release first fall arrest equipment from service anchor point.
3. Climb over service tool kit fence and overpass platform fence as specified by manufacturer.
4. Release fall arrest equipment from guiding ladder.

To access the service tool kit from intermediate and top platforms:

1. Attach fall arrest equipment to guiding ladder.
2. Overpass platform fence as specified by manufacturer and climb over service tool kit fence.
3. Attach second fall arrest equipment to the service anchor point.
4. Release fall arrest equipment from guiding ladder.



E.12 Safety measures

If lift is stopped between platforms with unconscious person on service tool kit:

1. Climb up to the lift.
2. Check that victim has no body parts extending through service tool kit perimeter.
3. Enter the cabin through the bottom hatches.
4. Perform manual descent to the closest platform.
5. Use a hand winch attached to a ladder to elevate the victim over service tool kit and to place him on platform floor.

When attaching the shock absorber to the guiding ladder, it must be hooked to the right stile (no rack side).

E.13 Maintenance planning

Frequency	Performed by	Components
Daily	Supervisor	Control and safety devices of service tool kit (only when mounted)
Annually	Certified technicians	Control and safety devices of service tool kit (only when mounted)

Appendix F: Test and adjustment of the electromagnetic brakes

The test and adjustment of the electromagnetic brakes shall be carried out only by certified technicians and following the steps described below.

1. Readjust the overload limiter to allow to carry 315 kg for Pegasus L (or 375 kg for Pegasus XL) in the cabin. To do so, follow the instructions of the "Adjustment of the overload limiter" Appendix of the manual, but inserting a value of 320 instead of 265 for Pegasus L (or 385 instead of 320 for Pegasus XL).

2. Load the cabin with 315 kg (or 375 kg for Pegasus XL).

3. Release one of the 2 motor brakes by actuating its manual descent actuator.

4. While keeping the brake open, press and hold the DOWN button and stop after 3 m. The brake shall stop and hold the lift (the lift shall not slide down).

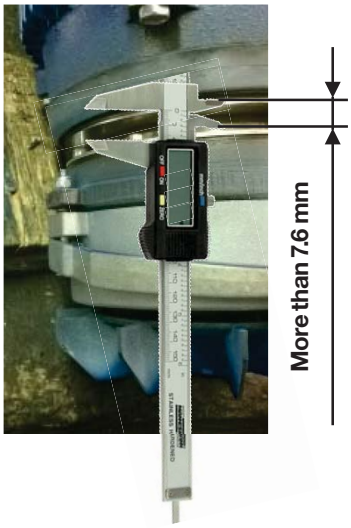
5. If the brake fails to stop and hold the lift, go to point 9.

6. Repeat the test with the second motor brake. If the second brake fails to stop and hold the lift, go to point 9.

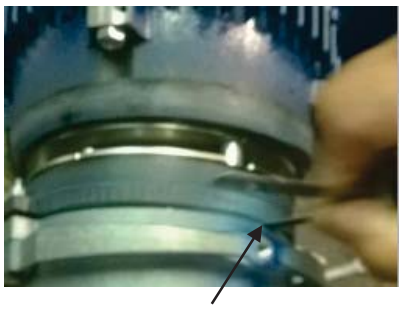
7. Unload the cabin.

8. Readjust the overload limiter to allow to carry 250 kg for Pegasus L (or 300 kg for Pegasus XL). To do so, follow the instructions of the "Adjustment of the overload limiter" Appendix of the manual. The process is finished.

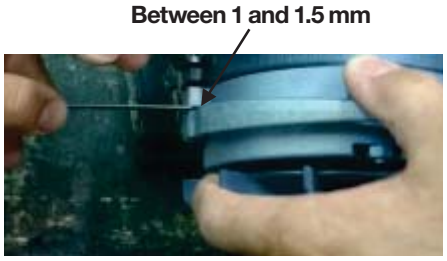
9. Measure the thickness of the brake disc. Replace the brake disc if needed.



10. Measure the gap between the magnetic body and the anchor plate. Adjust the gap if needed.



11. Measure the gap between the magnetic body and the handle. Adjust the gap if needed.

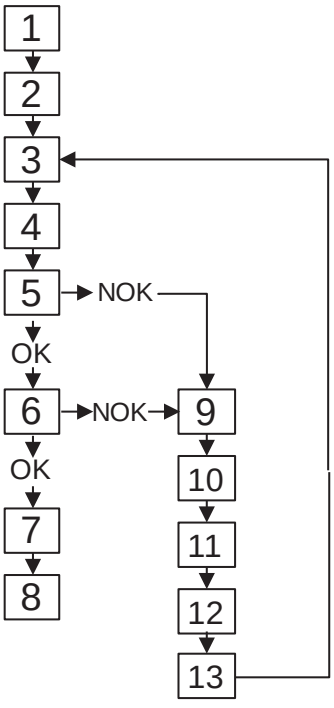


12. Repeat the measurements with the second electromagnetic brake.

13. After replacing or adjusting, repeat the dynamic tests (go to point 3).

The detailed instructions of the adjustment of the electromagnetic brakes are available from AVANTI upon request.

Workflow:



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