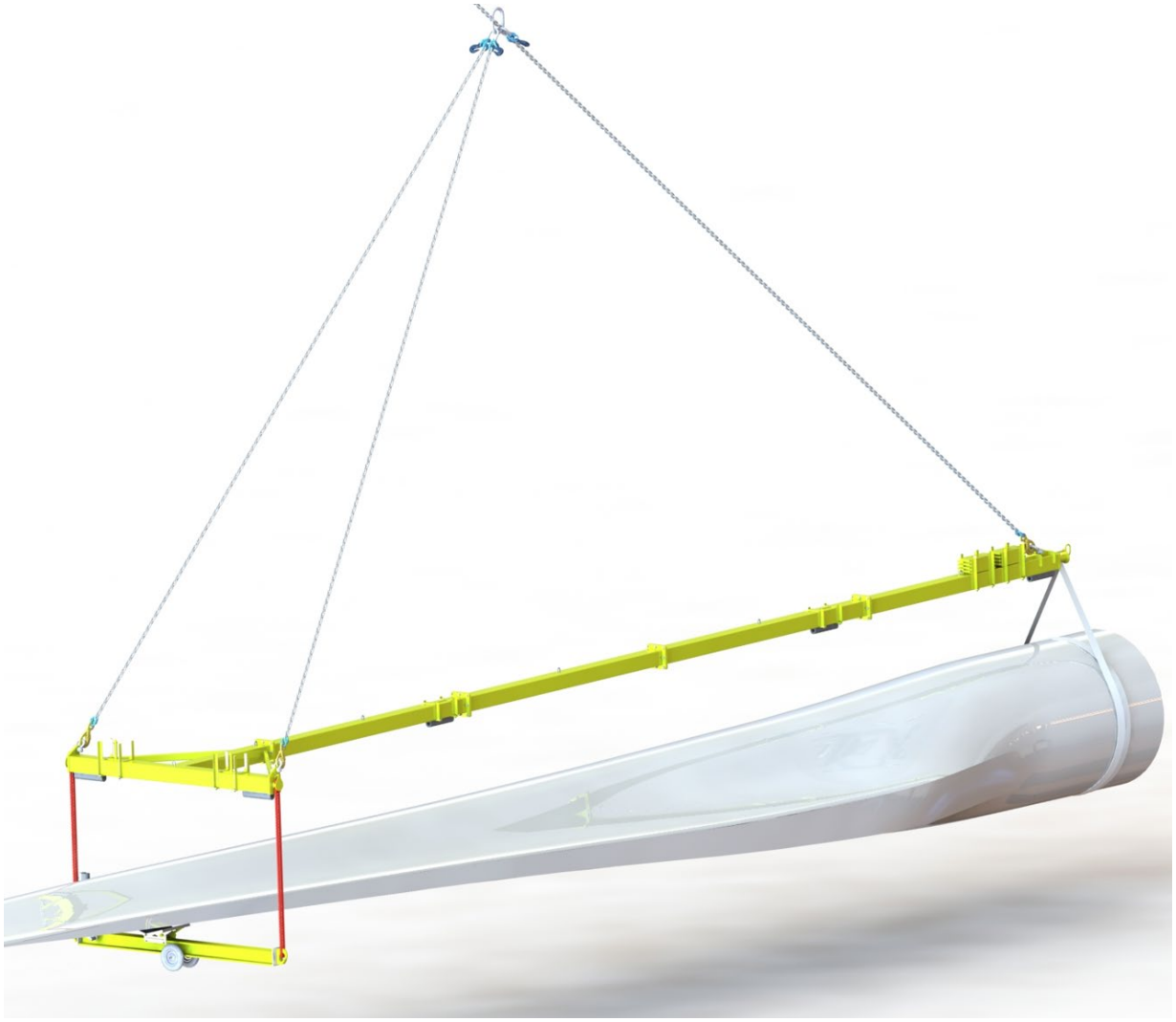
User Manual

SINGLE BLADE LIFTING KIT

WLL 14T

MODEL: AXL TY14



Dear Customer.

In order to avoid damage to property and/or injury to persons, the given instructions in the present user manual must be observed and the lifting equipment must be properly and adequately maintained.

The instructions provided in this user manual must be read, understood and observed by all people supervising, operating or working with the lifting equipment, or if they will be in the anticipated danger zone of the lifting equipment and/or attached lifting accessories.

This user manual specifies a recommended minimum safety level and personnel protective clothing requirement to operate the lifting machinery and accessories described in this user manual. However, it must be noted that all additional safety recommendations specified by the operator's company Health and Safety Manuals must be complied with, as well as all local rules and regulations.

It is important that all lifting accessory user instruction manuals are also read, understood and complied with.

This user manual must be retained with the lifting equipment at all times.

In the case of damage and/or functional disturbance due to incorrect handling, as a result of the fact that the user manual instructions were not complied with, the manufacturer cannot be held responsible or liable.

If difficulties or queries should arise when using the lifting equipment, please contact the manufacturer directly:

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Definitions

For the purpose of this instructional user manual, the following definitions apply.

Ref: [1] Directive 2006/42/EC
[2] EN 62079

- danger zone[1] — Means any zone within and/or around machinery in which a person is subject to a risk to their health and safety.
- guard[1] — Part of a product specially used to provide protection by means of a physical barrier.
- harm[2] — Physical injury or damage to the health of people or damage to property or the environment.
- Hook load — Load on crane hook, to which the lifting equipment is attached.
- hazard[1] — Means a potential source of injury or damage to health
- instruction (for use)[2] — Information by the producer of a product for the safe and efficient use of the product.
- instruction manual[2] — Any applicable means for the transfer of information containing instructions.
- intended use[1] — The use of machinery in accordance with the information provided in the user manual.
- lifting accessories[1] — A linking device, part, chain, sling or other connection part which is attached to the lifting device for connection to the load. These must be independently marked and approved if not forming a part of the full assembly.
- maintenance[2] — Combination of all technical and administrative actions intended to retain an item or product in a usable and safe condition, in which it can perform the intended design function. This includes repairing, adjusting and cleaning.
- manual[2] — Document containing all relevant user information.
- marking[1] — Legible sign or inscription for the identification of the type of a component or device, attached by the manufacturer of the component or device and the designation of certain features of the product for its safe use.
- modification[2] — Change carried out on a product in order to alter its intended use, and /or a revision of the instructions after a modification of a product,
- risk[1] — Combination of the probability and the degree of an injury, or damage to health that can arise in a hazardous situation.
- operator[1] — Person installing, operating, maintaining, cleaning, repairing or moving the machinery.

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-	skilled person[2]	Person with relevant education and experience to enable him or her to perceive risk and to avoid hazard which operation or maintenance of a product can create.
-	specification[2]	Document that states requirements, functionally related characteristics, processes, or a product shall possess
-	supervisor[1]	A supervisor is an appointed responsible person for the productivity, training and actions of a small group of employees.
-	WLL	Working Load Limit – This is the maximum loading limit specified by the manufacturer and must never be exceeded (EN13155).
-	WTG	Wind Turbine Generator
-	LE	Leading edge
-	TE	Trailing edge

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Identification of Equipment

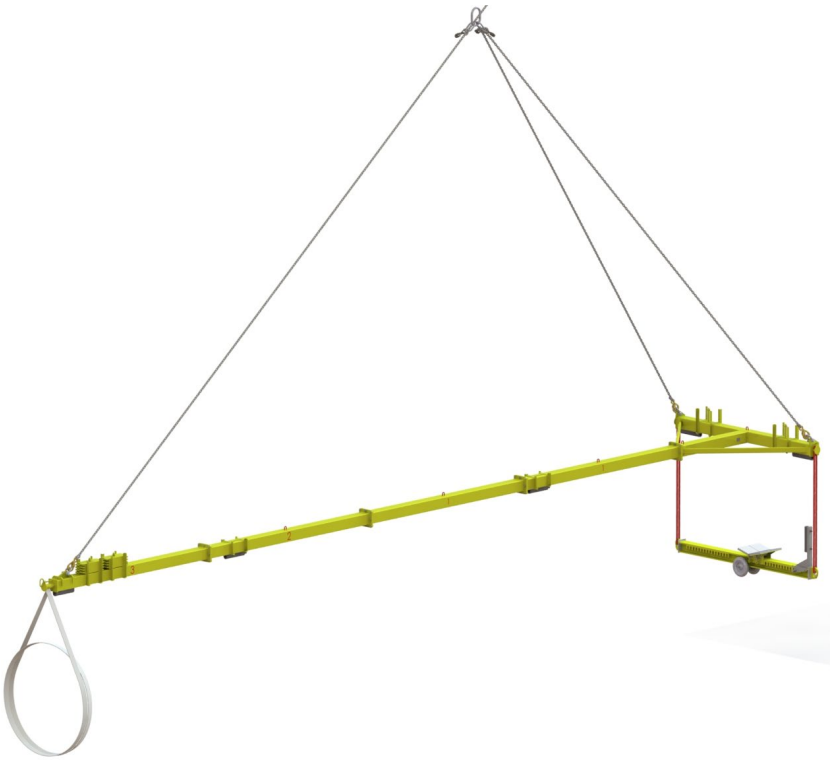

Figure 1: AXL TY14

3.1 Product Type and Designation

Type / Name: SINGLE BLADE LIFTING KIT, Model: AXL TY14

Drawing No.: 6208AXL000001

WLL: 14T (Metric).

3.2 Design and Approval Basis

The AXL TY14 has been designed in accordance with Directive 2006/42/EC, EN13155 and ASME B30.20 and BTH-1.

The AXL TY14 has been load tested according to Directive 2006/42/EC with 1,5xWLL.

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3.3 Product Revision Number / Revision of the User Manual

Revision	Performed by	Date	Comments
1	MAN	27-09-2024	New Manual
2	GJF	24-01-2025	New product number, change from 99.DKAM0000001 to 6208AXL000001 Add V82 configuration Add service instructions for pads and bolts Update Table 4 Update spare part table references
3	GJF	17-02-2025	Add beam references for 15m configurations
4	GRK	27-03-2025	Consolidation of tool name (SINGLE BLADE LIFTING KIT, WLL 14T MODEL AXL TY14) and added missing part numbers on the lifting straps.

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General Description

4.1 Intended Use

The AXL TY14 is designed for lifting of blades for WTG, and its primary use is for mounting and demounting blades.

The AXL TY14 can be completely disassembled, and all parts will fit in a container or on a truck bed.

4.1.1 Main Structure

The structure is supported by chain slings, which are individually adjustable in length, enabling the AXL TY14 to be easily pre-set to lift of different blades.

The root end of the AXL TY14 is mounted with a flat Lifting strap and the Tip end is mounted with a support beam in simple sling setup. The slings can easily be exchanged for different lifts if needed.

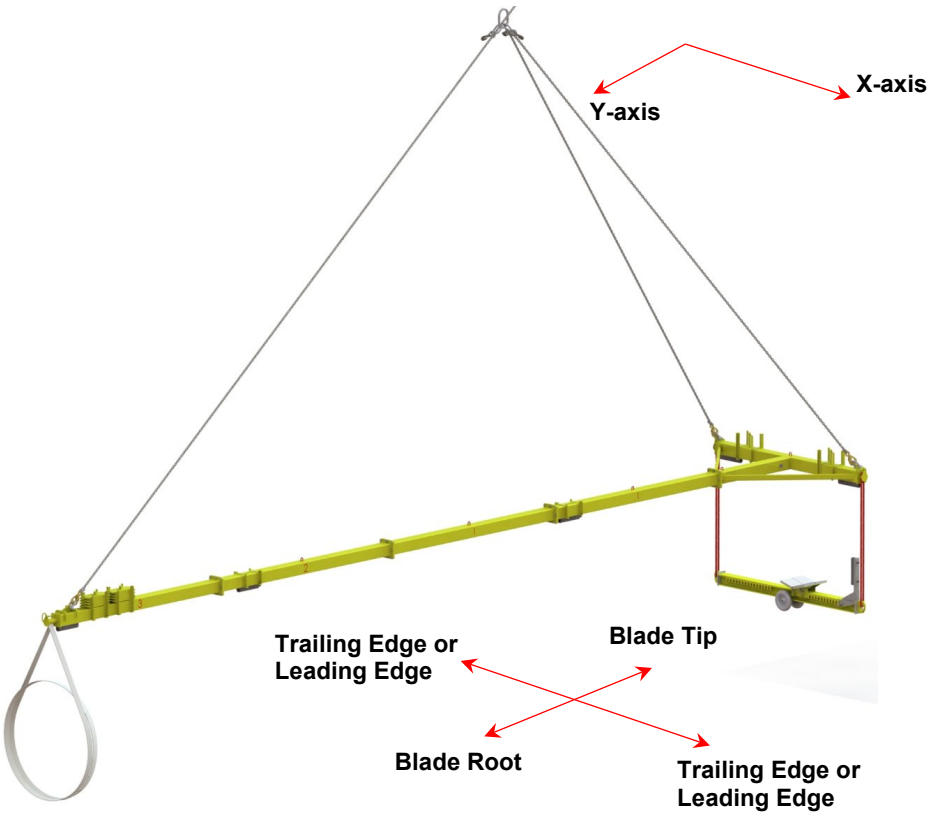

Figure 2: Orientation of AXL TY14

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4.1.2 Blade Orientation

The turbine blade is supported in the root by a flat lifting strap and in the tip by a universal saddle setup on a support beam.

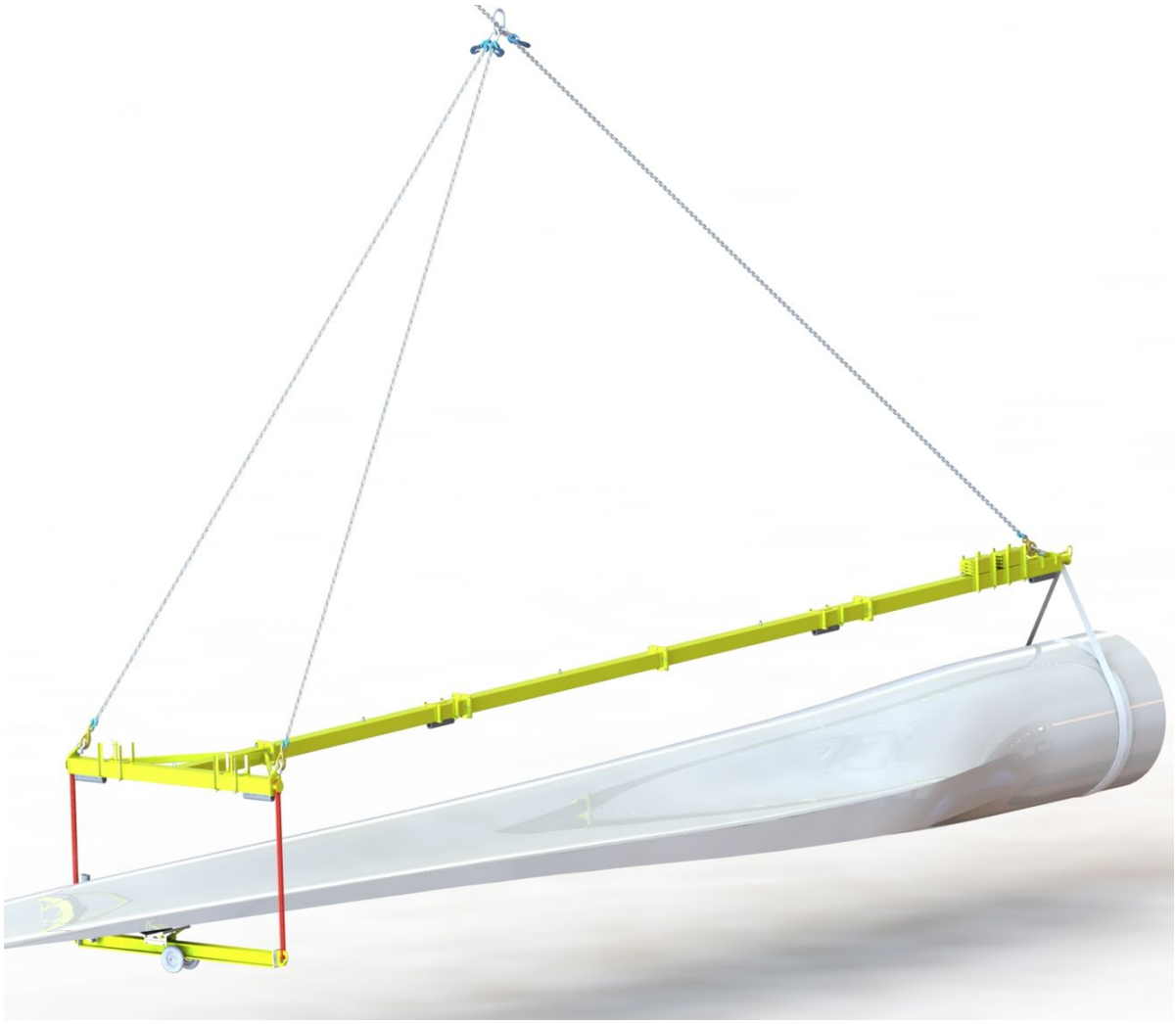

Figure 3: Blade Orientation

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4.2 System Parts and Description

The AXL TY14 consists of several parts. The major components and features are named as illustrated in Figure 4 Parts of AXL TY14

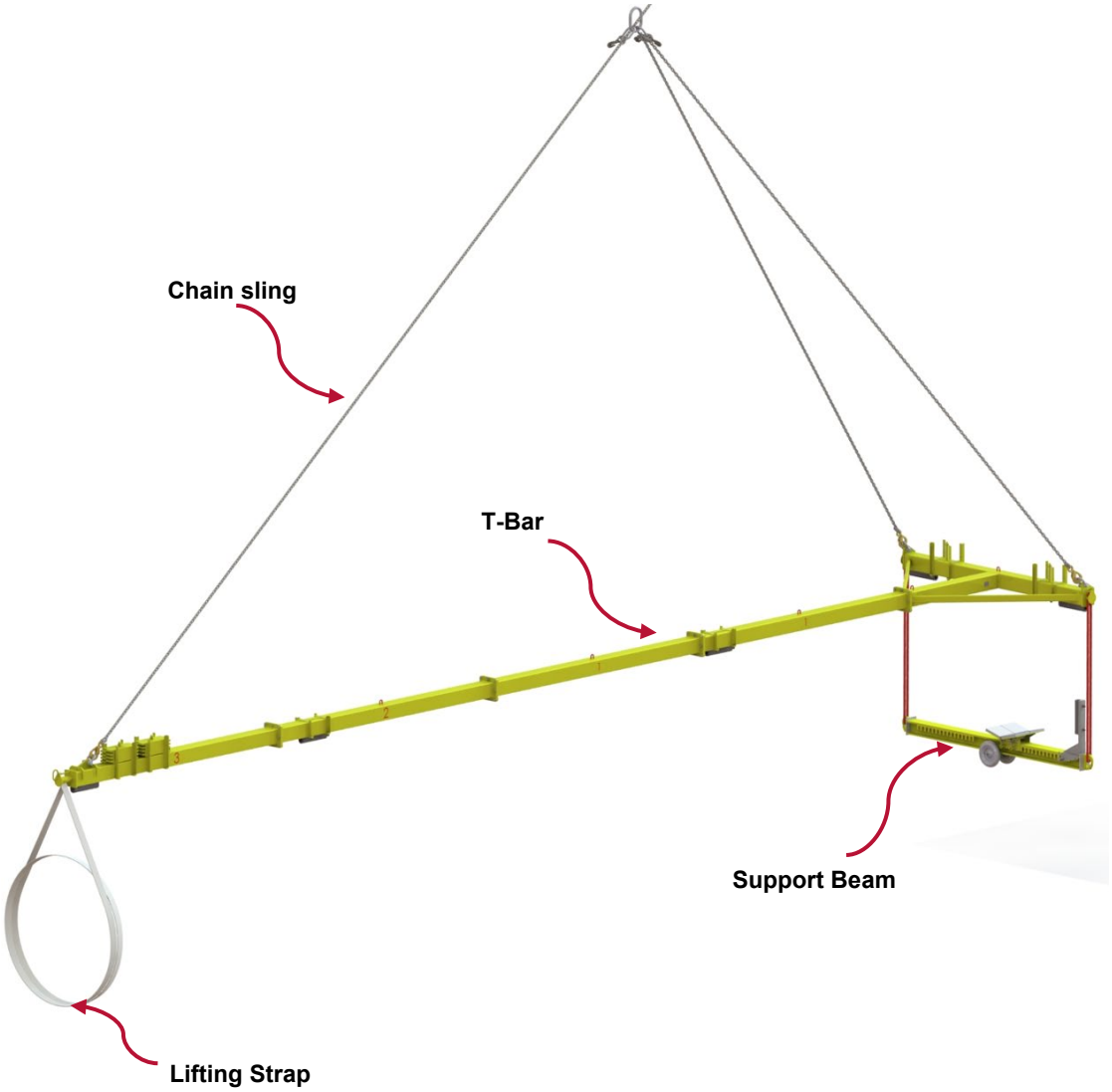

Figure 4 Parts of AXL TY14

In the following sections, the different parts will be described.

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4.2.1 T-bar

The T-bar consists of the below components.

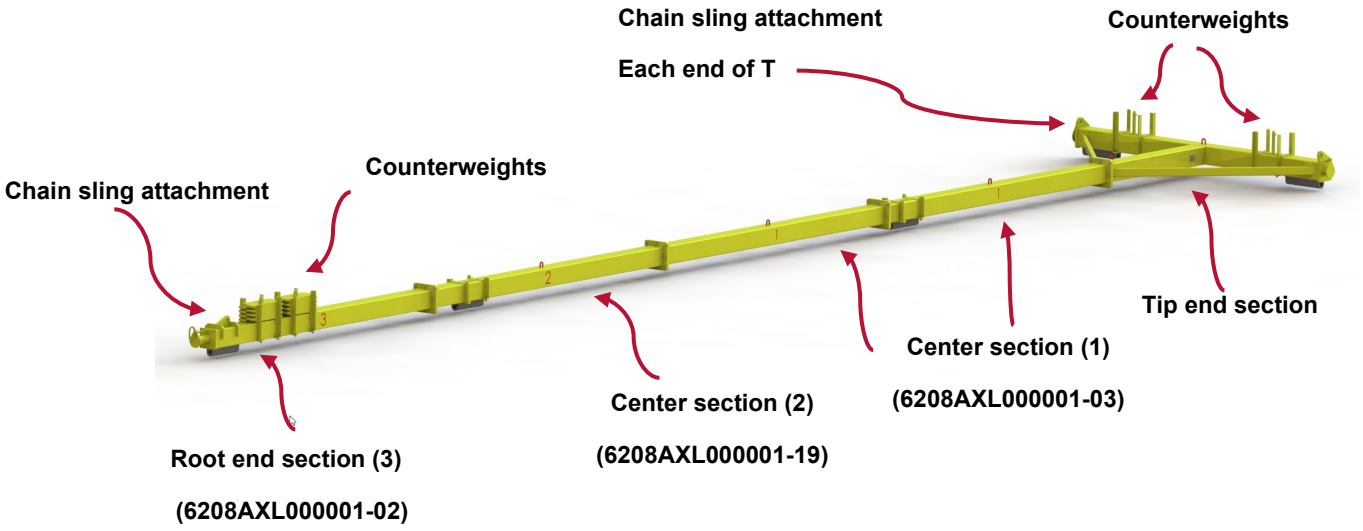

Figure 5 T-bar designation Top view

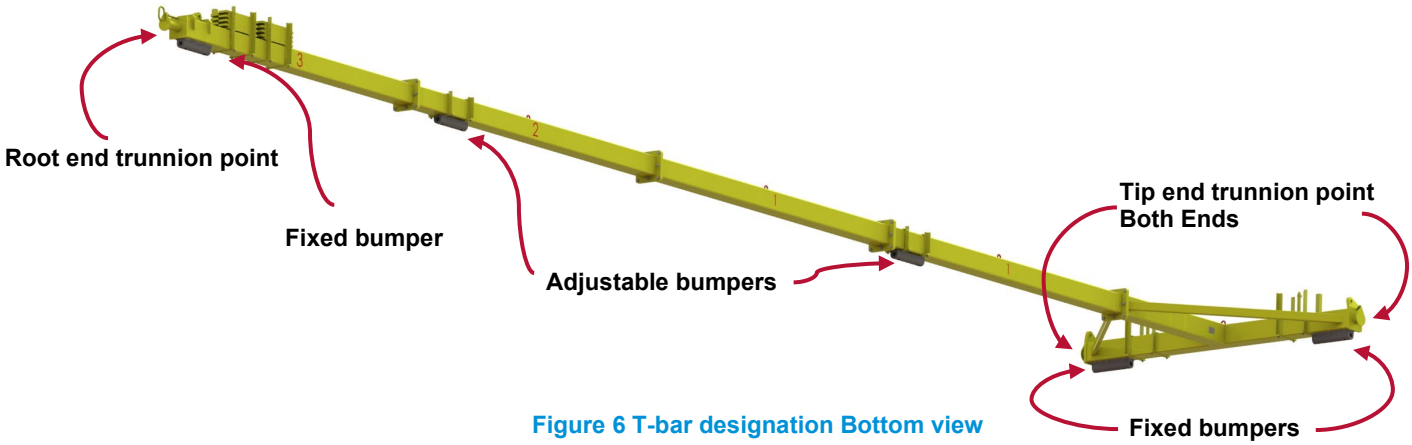

Figure 6 T-bar designation Bottom view

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4.2.1.1 Sections

The T-bar consists of 5 sections in total (Figure 5 on page 12), which are:

- 1 tip end section
- 2 centre section (1)
- 1 centre section (2)
- 1 Root section (3)

Above 49 m blades

Lift of blades above 49 m (see Table 5 on page 27) is with all 3 centre sections included – see picture below.

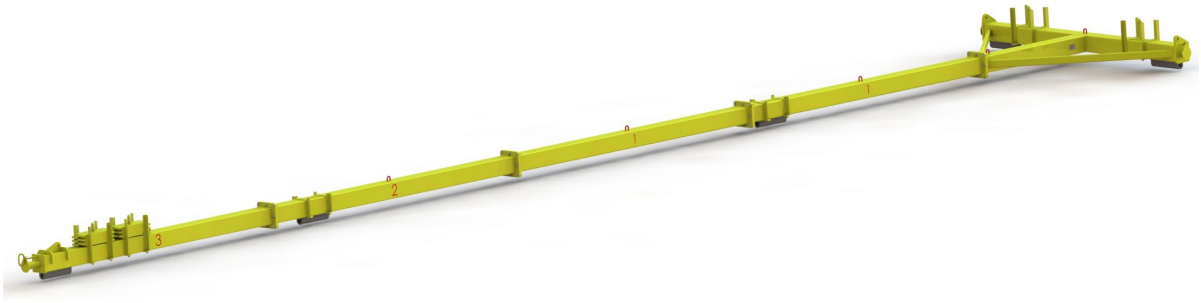

Figure 7 Long T-bar configuration (Above 49)

Up to 49 m blades

Lift of blades below 49 m by removing 1 centre section (number 2, item number 6208AXL000001-19) – see picture below.

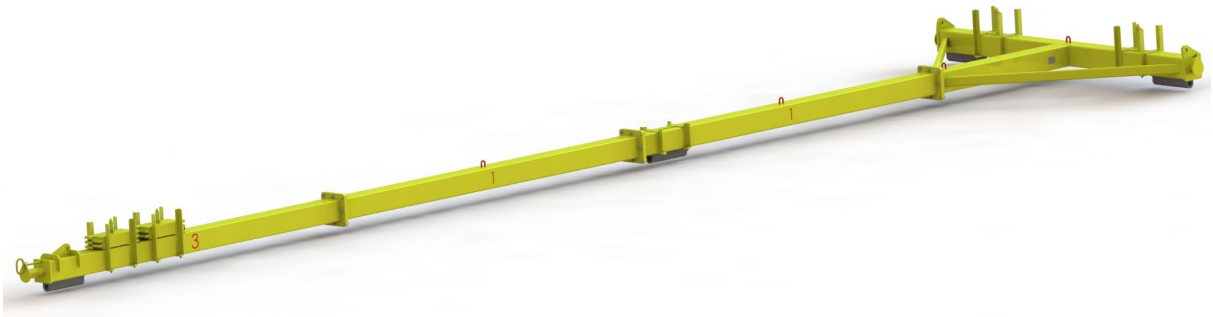

Figure 8 Short T-bar configuration (49 m blades and below)

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4.2.1.2 Counterweights

The Yoke comes with a total of 16 counterweight plates. The counterweights are kept in place with a adjustable holder which can be moved based on the lift performed. Each holder can have a maximum of 8 plates and there are a total of 4 holders on the yoke, 2 in each end. The plates are secured using a locking pin.

OBS. The plates own weights are each 22,5 kg approximately.

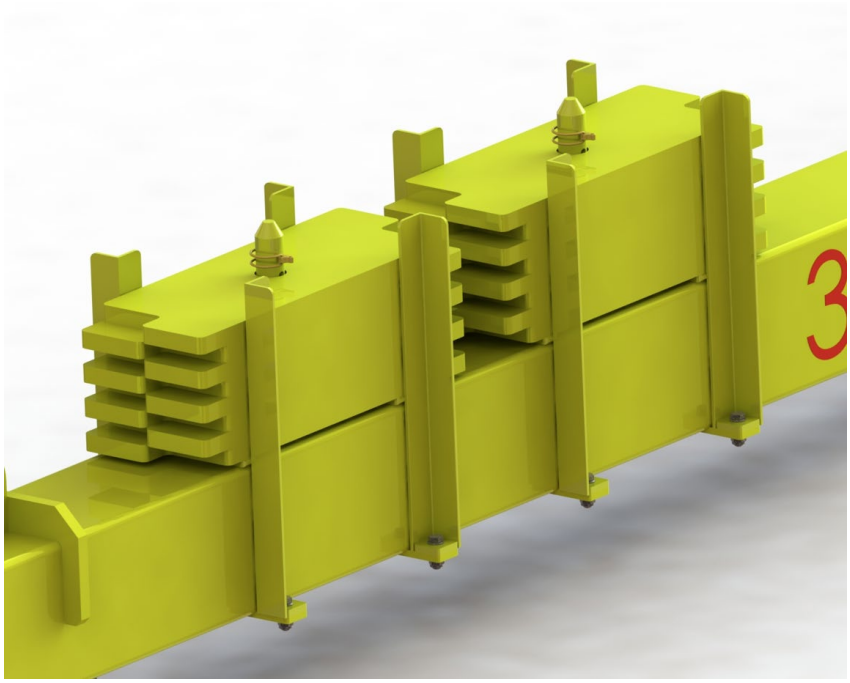

Figure 9 Counterweights

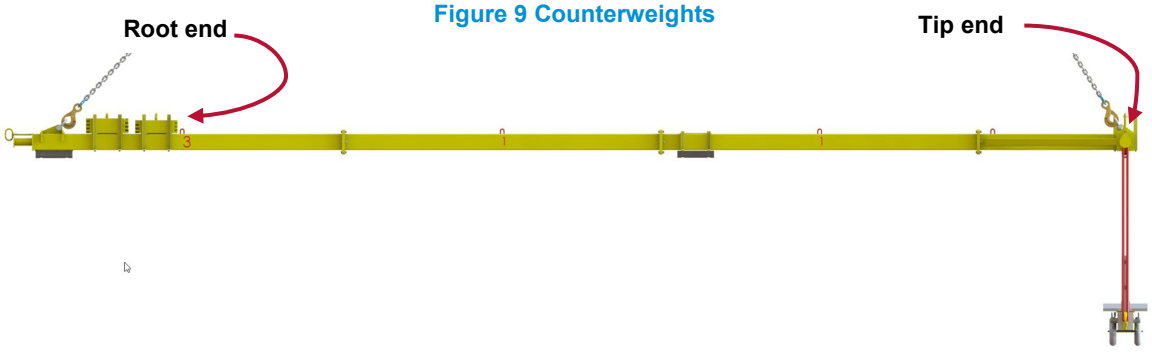

Figure 10 Counterweight designation

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Based on the lift to be performed the counterweight plates will be shifted from on end to the other. Below is the pre-setting guidance based on different COG positions.

NB! This is only for general guidance and should always be checked considering the COG of the blade being lifted. If the COG position does not correspond with the blade lift, contact us prior to operation and we can make a rigging setup for the lift.

OBS. Counterweights are always divided equally in the two holders in each end. Example if the lifting config needs 8 plates in root, put in 4 in each.

COG distance from root of blade (mm)	Corresponding blade type	Counterweight Root (pcs)	Counterweight Tip (pcs)
10172	V80	15	0
10778	V90	8	0
10599	V90-De icing	10	0
12058	V100	0	8
13082	V105	11	0
14628	V110	0	4
12886	V112	12	0
12500	V82	0	16

Table 1 Counterweights for each blade type

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4.2.1.3 Trunnion points and Chain sling connection

Each end of the AXL TY14 has trunnion points for easy attachment of the Root end strap or the tip end Slings.

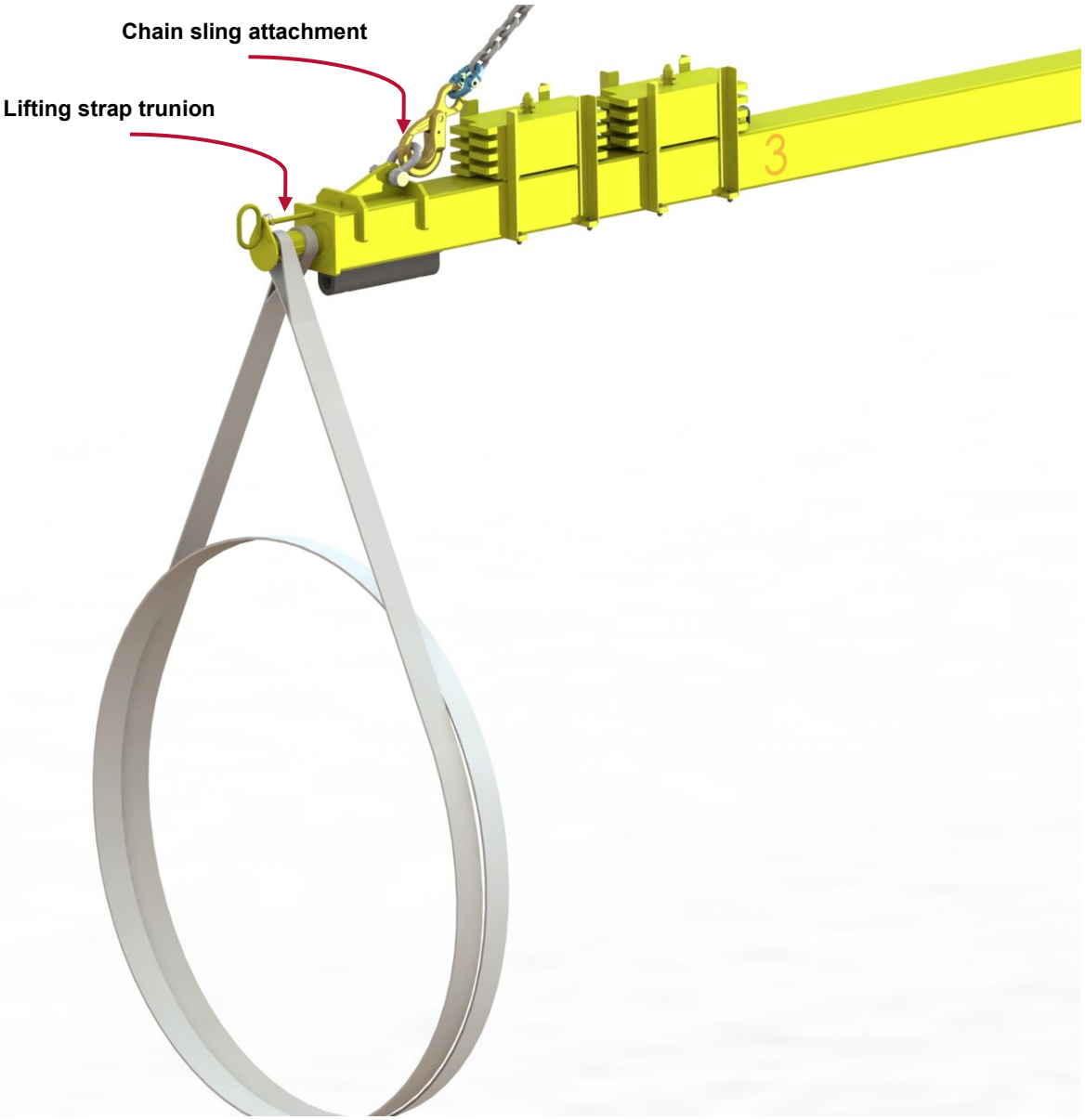

Figure 11 Root end trunnion and chain sling attachment

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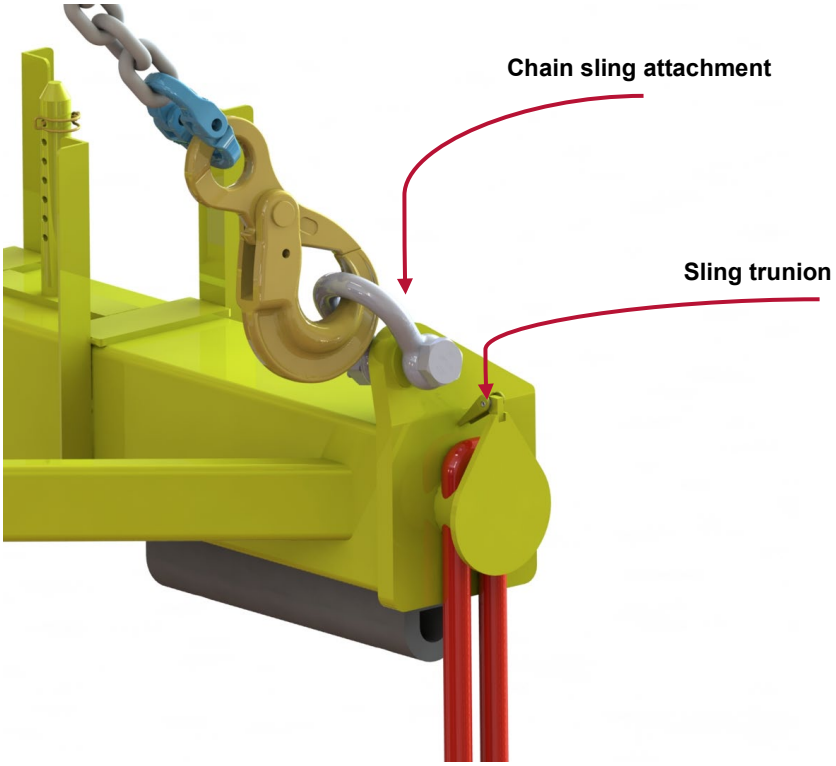

Figure 12 Tip end trunnion and chain sling attachment

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4.2.2 Lifting Strap

The root end of the T-bar is lifting the blade using a Lifting strap which is hooped twice.

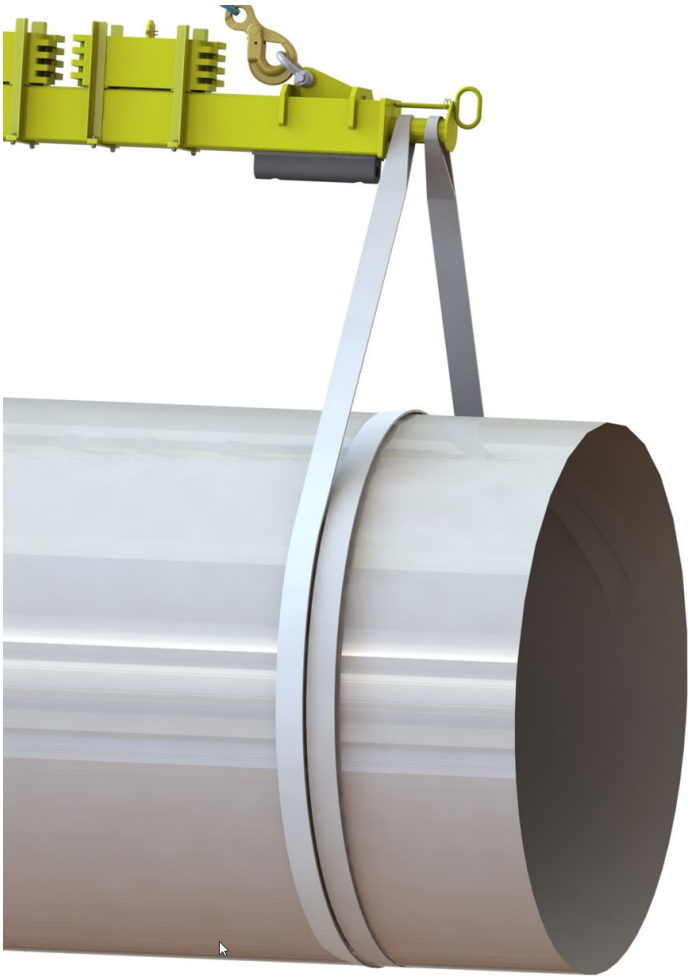

Figure 13 Hooped root end sling

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Lifting strap is designed to be positioned approximately 1 meter from root end of blade

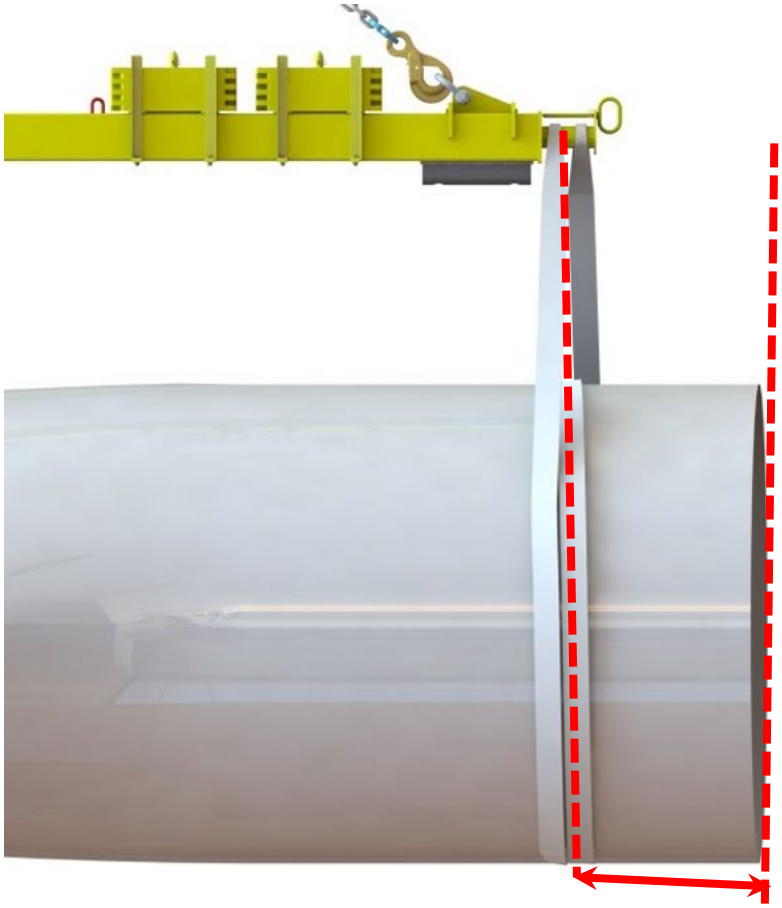

Figure 14 Position of root Hooped sling

Based on the lift to be performed the Lifting strap will be changed. Below is the pre-setting guidance based on different Root diameters.

NB! This is only for general guidance and should always be checked considering the specific Root diameter of the blade being lifted. If the Root diameter does not correspond with the blade lift, contact us prior to operation and we can make a rigging setup for the lift

Root diameter of blade (mm)	Corresponding blade type	Lifting strap length (m)
1800	V80 V90 V100 V110	14
1900	V82	14
2590	V105 V112	17,5

Table 2 Lifting strap for each blade type

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4.2.3 Support Beam

The Support beam consists of the components below.

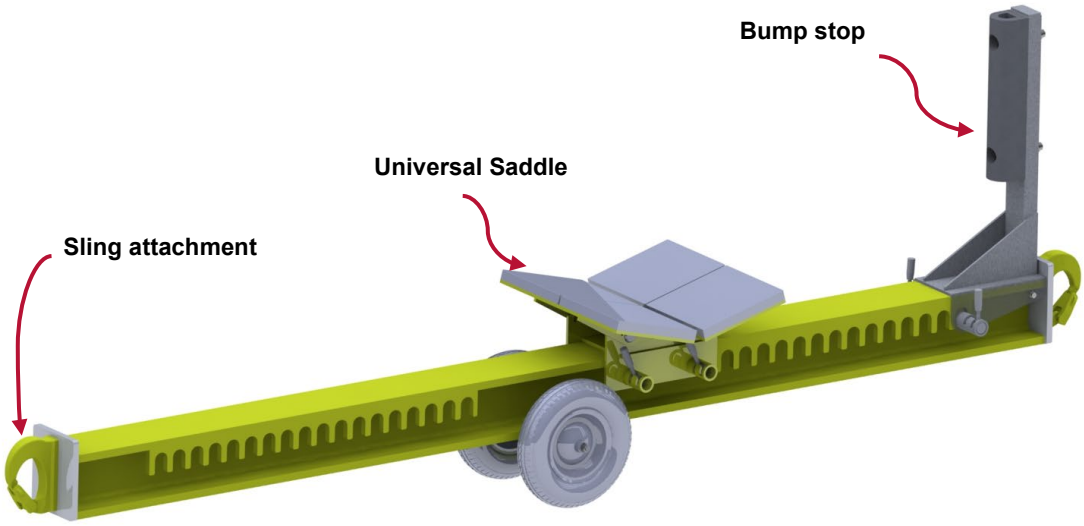

Figure 15 Support beam

The Support beam is connected to the T-Bar with a simple round sling

Figure 16 Support beam sling connection to T-bar

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4.2.3.1 Saddle placement

The Saddle is designed to support the reinforced area of the blade. The distance is controlled by setting up the distance between the bump stop and the Universal Saddle.

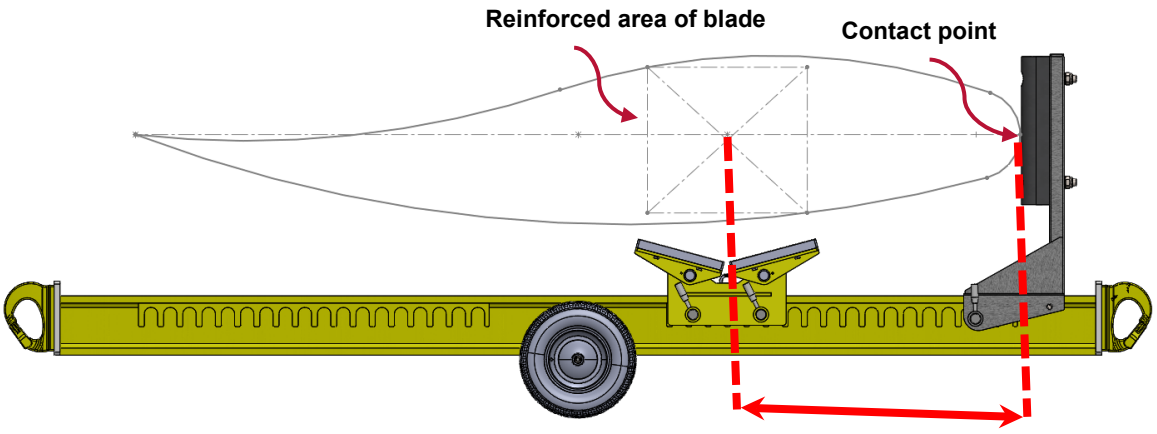

Figure 17 reinforced area of blade

Based on the blade lifted the estimated distance should be as below, this is based on a yoke length according to below specifications.

NB! This is only a estimated distance and should always be checked considering the specific reinforcement of the blade being lifted. If the reinforcement area does not correspond with the blade lift, contact us prior to operation and we can make a setup for the lift

Yoke lenght (mm)	Corresponding blade type	Distance from bump stop to center of reinforced area of blade
15000	V80 and V90	829 mm
15000	V82	1050 mm
15000	V100	Estimate NOT Known Yet
19500	V105	Estimate NOT Known Yet
19500	V110	Estimate NOT Known Yet
19500	V112	725

Table 3 Bump stop position for each blade type

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The Saddle can be lifted using the lifting point located in the middle – see picture below.

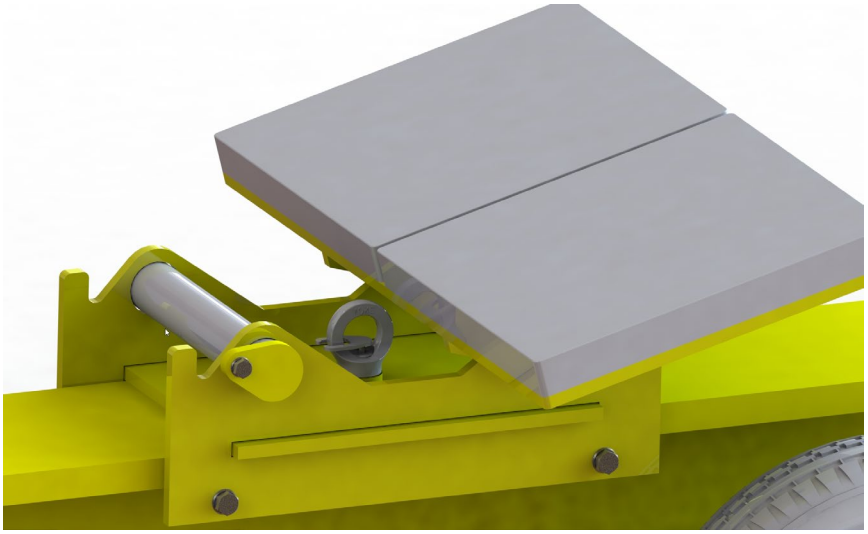

Figure 18 Handling point Saddle

4.2.3.2 Support beam bumper

The bumper has two locking handles in order to be used on both sides of the support beam if necessary.

Figure 19 Bumper locking handles

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4.2.3.3 Bumpers

To reduce risk of blade damage, the T-yoke is supplied with bumpers in different locations – see pictures below. Two of the bumpers are movable to adjust position to most critical area for the specific lift.

Figure 20 Bumpers Tip End

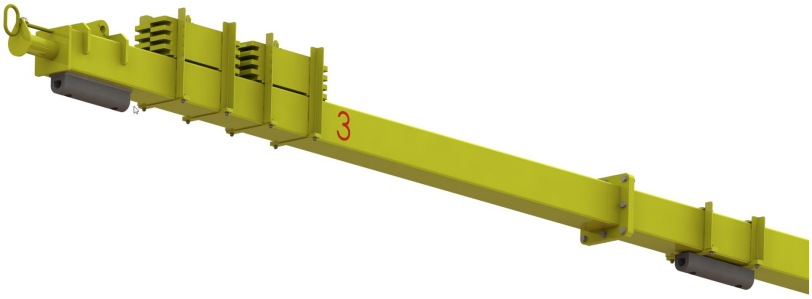

Figure 21 Bumpers Root End

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4.2.4 Chain sling

The T-bar is suspended in a simple 3-part chain sling with shortening hooks to adjust length according to the lift performed. This will be based on the COG position of the blade being lifted.

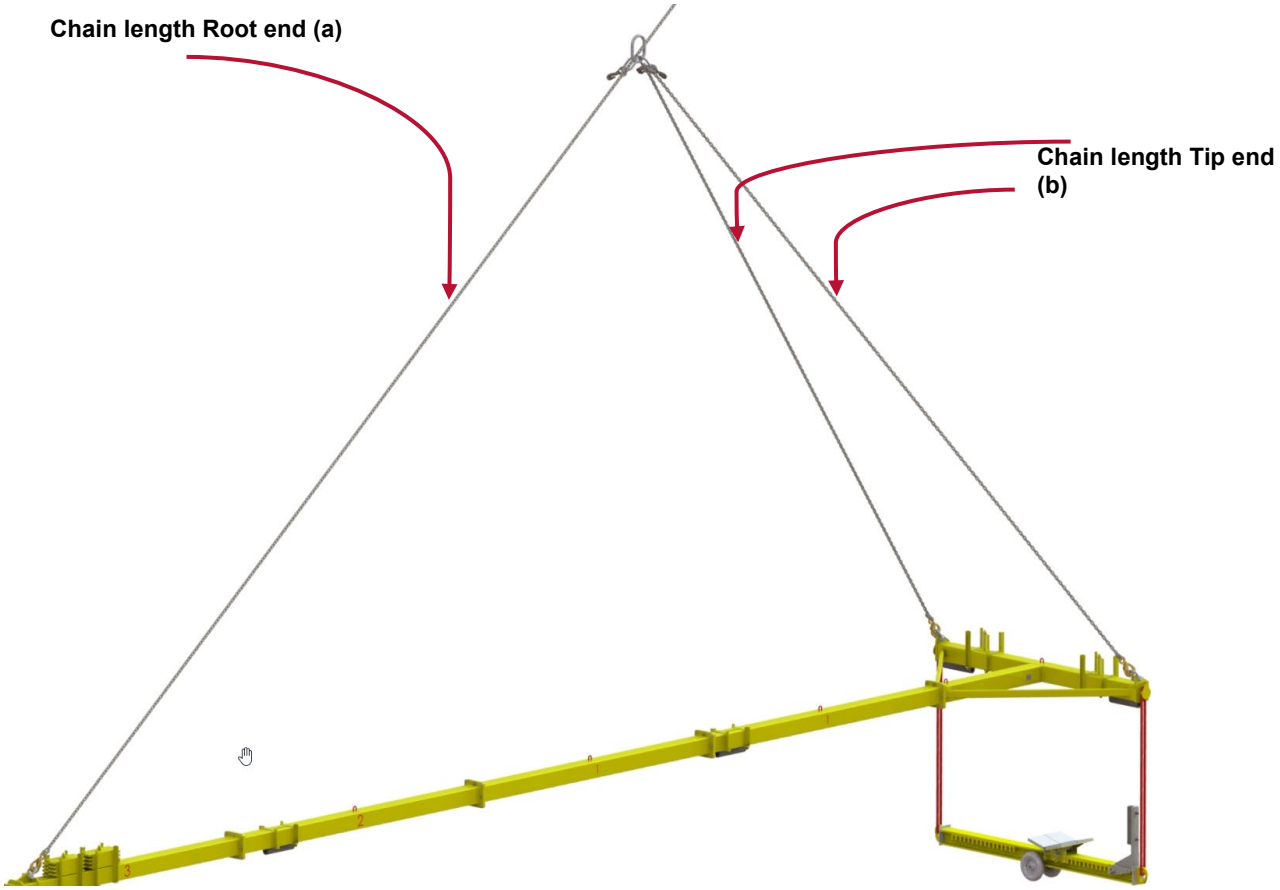

Figure 22 Chain sling

The top of the suspension is made of a simple master link with shortening hooks. The chain rig pre-setup is based on different COG positions. Below is the pre-set for the chain rig for different lifts.

NB! This is only for general guidance and should always be checked considering the specific COG of the blade being lifted. If the COG position does not correspond with the blade lift, contact us prior to operation and we can make a rigging setup for the lift

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COG distance from root of blade (mm)	Corresponding blade type	Chain length (a) (mm)	Tag in chain link (chain link nº)	Offset from marking	Chain length (b) (mm) - 3	Tag in chain link (chain link nº)	Offset from marking
10172	V80	12524	7 (243)	+1	10874	4 (210)	0
10778	V90	12956	5 (252)	+1	10586	6 (204)	0
10599	V90- De icing	12860	6 (250)	+1	10682	5 (206)	0
12058	V100	13916	4 (272)	+1	10057	7 (193)	0
13082	V105	14732	3 (289)	+1	11883	2 (230)	+1
14628	V110	15960	1 (317)	0	10970	3 (212)	0
12886	V112	14924	2 (293)	+1	12391	1 (243)	0
12500	V82	13916	4 (272)	+1	9961	8 (190)	+1

Table 4 Chain length adjustment table

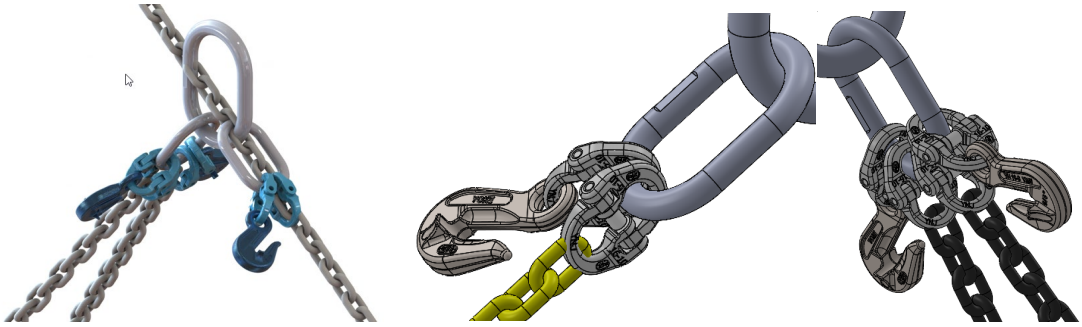

Figure 23 Master link

When adjusting the chain length look for the stamped number at the painted chain link for correct length pre adjustment.

When setting chains to position number 1, the marked link is connected directly to the master link with the use of a coupler (no shortening hook used).

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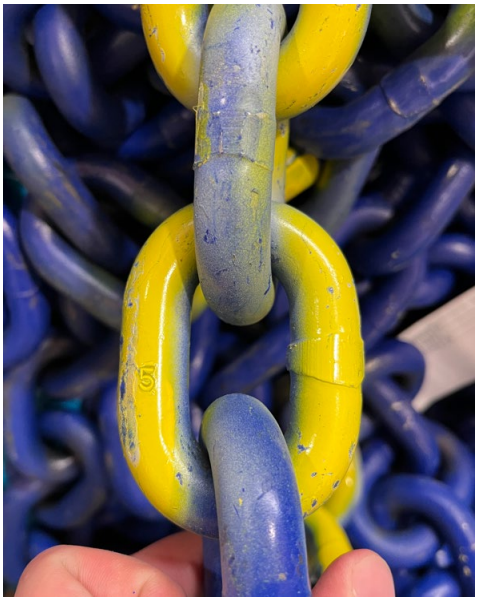

Figure 24 Stamping or colored chain links

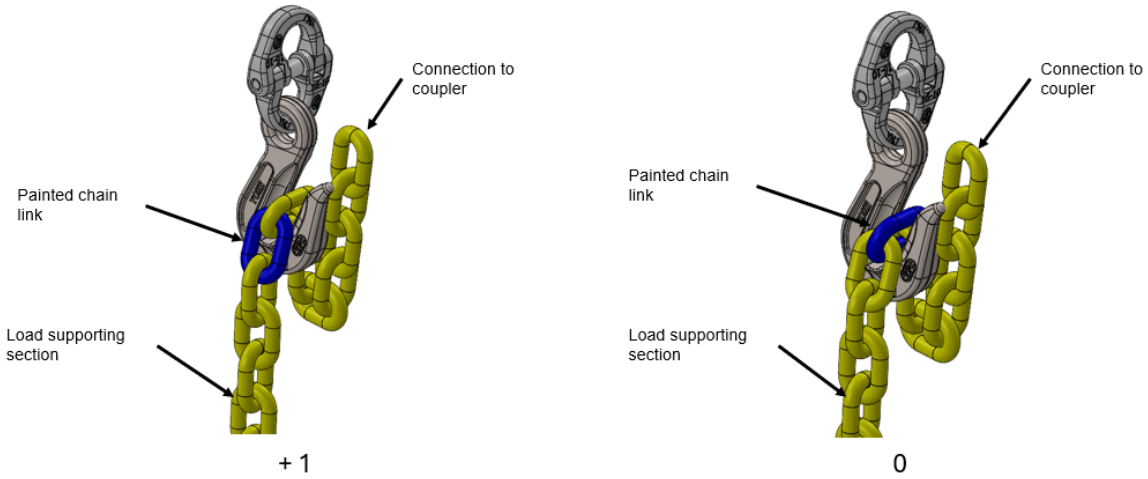

Figure 25 Marking offset

ISO 9001 · ISO 14001 · ISO 45001 Management System Certification
BUREAU VERITAS Certification Denmark A/S

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4.2.5 Configuration overview

Description	V80	V82	V90	V90 D	V100	V105	V110	V112
LEG A - Position	POS 7	POS 4	POS 5	POS 6	POS 4	POS 3	POS 1	POS 2
LEG A - Offset	+1	+1	+1	+1	+1	+1	0	+1
LEG B - Position	POS 4	POS 8	POS 6	POS 5	POS 7	POS 2	POS 3	POS 1
LEG B - Offset	0	+1	0	0	0	+1	0	0
Lifting strap length (mm)	14,000	14,000	14,000	14,000	14,000	17,500	14,000	17,500
Lifting strap position from the root (mm)	1,000	1,350	1,000	1,000	1,000	1,000	1,000	1,000
Counterweight Root (pcs)	15	-	8	10	-	11	-	12
Counterweight Tip (pcs)	-	16	-	-	8	-	4	-
T bar length (mm)	15,000	15,000	15,000	15,000	15,000	19,500	19,500	19,500
Saddle Placement (mm)	829	1,050	829	829				725

Table 5 Setup overview for each configuration

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4.3 Assembly Modes

The AXL TY14 parts can be arranged in several possible modes:

- Operation mode — Assembled and ready for lift
- Transport Mode — Road, inter-windfarm and normal transport
- Container Transport Mode — Sea and rail transport

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Safety and Limitations

The AXL TY14 is a lifting equipment and should only be used as such and for the intended use

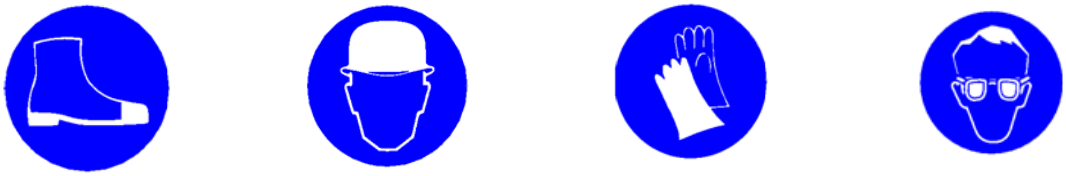
5.1 Safety

For safe operation the following must be observed:

- Operator must be trained in the use of the AXL TY14 before use
- If operator is in doubt, they must contact the supervisor before using the equipment.
- Never be used with attachments which have not been approved by Certex
- The operator must be positioned so that he/she always has a general overview of the lifting situation.
- The operator must be able to see the AXL TY14 and its orientation.

5.1.1 Personal Protection Equipment / Operator Safety

When working on or in the vicinity of the AXL TY14 always use safety footwear, gloves, safety helmet and safety glasses.



Please observe that local rules and requirements may apply.

Never put hands or other body parts close to the AXL TY14 when in operation or when it is being adjusted / during movement, as there may be risk of being crushed / caught by moving parts.

Note: No guards are fitted as the AXL TY14 is designed to be operated at a safe distance by trained personnel.

Do not under any circumstances stand, work or pass under a hanging load.

Always ensure that the AXL TY14 is correctly and securely attached to the lifting equipment / crane, by direct connection using the approved lifting slings or chains the device is supplied with.

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5.2 Limitations

The AXL TY14 may:

- never be used for loads above the specified WLL.
- be utilized with appropriate saddles and other equipment.
- never be used to lift persons or other living creatures

The AXL TY14 is designed for a maximum of 20.000 lifting cycles and may not be utilized beyond this.

No alterations, including welding and heat treating, may be made to the AXL TY14 without written permission from Certex. The warranty and EC Declaration will be voided if this condition is not observed.

5.3 Limitations on Blade

The CoG of the blade must be placed at centre of the chain sling masterlink.

5.4 Environmental Conditions

The AXL TY14 is designed for outdoor use

The ambient air temperature must be within -20 to +50ºC.

The wind speed must be below or equal to 10 m/s as a mean wind over 10 minutes or 15 m/s as a gust wind over 3 seconds.

Wind conditions are depending on the tagline system. The tagline may only be held by hand by the tagline operator.

If the saddles are covered by ice, snow, dirt or other debris they must be cleaned thoroughly.

Blade gripping area cannot be covered in ice. In case there are risk of ice on blade surface the area needs to be cleaned using deicing or similar to ensure surface areas are clean of ice.

When the AXL TY14 is not in use, always cover the saddles with tarpaulins.

5.5 Slings and Accessories

Only use the specified rated lifting slings and attach them as specified.

5.5.1 Attachments / Auxiliary Lifting Accessories

Auxiliary lifting accessories, e.g. lifting points, shackles, chains, etc, used in connection with the AXL TY14 may:

- only be used if approved by Certex for use with the AXL TY14 or be marked and approved for lifting
- never be utilized above their individual WLL
- never be utilized beyond their intended use.

Refer to the individual part instructions for use and instructions.

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5.6 Emissions

N/A

5.7 IP Codes:

N/A

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General Usage

The AXL TY14 is utilized in the assembly state “Operation mode”.

When disassembled and arranged the AXL TY14 can be transported on road.

When disassembled into “Container Transport Mode” the AXL TY14 can be packed into standard containers and shipped.

When assembled in operation the yoke can be transported inter-windfarm.

6.1 General Notes

- Assembly details are given in drawings in appendix 1.
- All bolts are metric sizes, torqued according to Appendix 1.
    - To ease assembly and disassembly we recommend lubricating bolts.
- The Device can be transported inter-windfarm in operation mode.
    - COG must be placed in centre of transport surface.
    - Device must be lashed properly to prevent sliding and other forms of movement.

6.2 Transport

The AXL TY14 can be disassembled in the below sections and transported on a normal truck bed.

Always make sure all components are lashed securely to the truck bed.

- All slings and chains will be transported with a secondary pallet.
    - We always recommend using a pallet with sides and a top.
- All counterweights and bumpers should be kept on the lifting equipment.

See also appendix 1.

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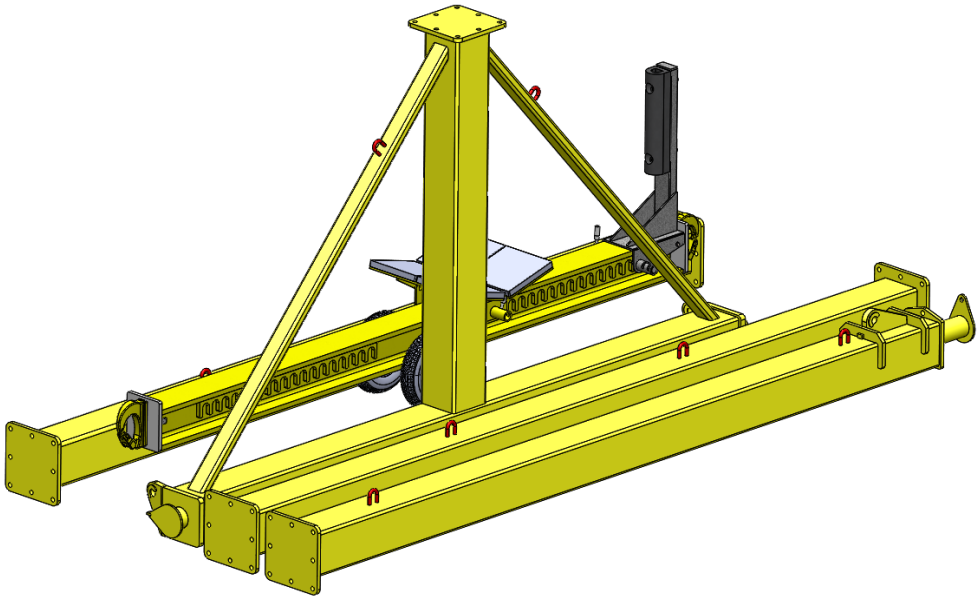

Figure 26 AXL TY14 disassembled for transportation

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As an option a transport frame can be purchased which is designed to ease the storage and assembly of the TY14.

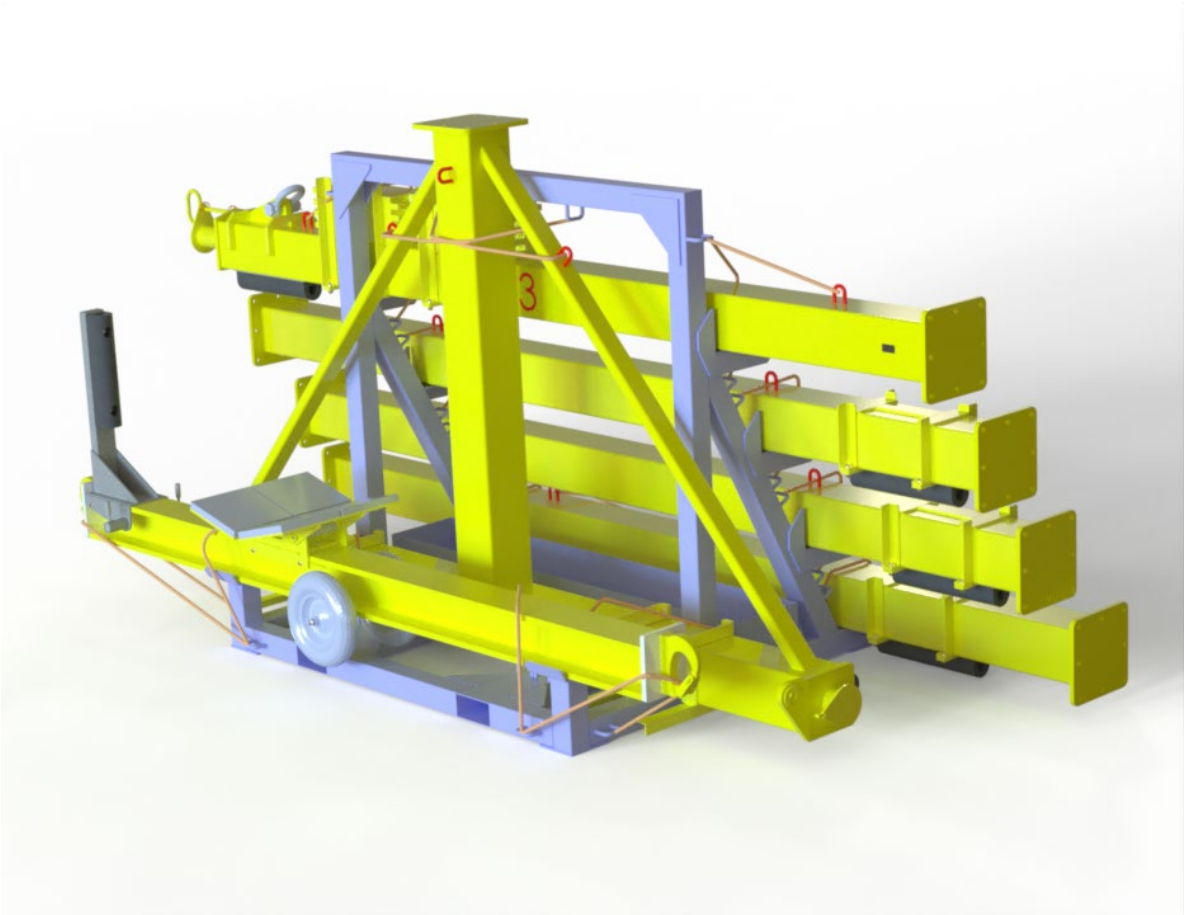

Figure 27 TY14 in optional transport frame

6.3 Operation

- Blade from Storage to Hub (see 6.3.3)
- Blade from Hub to Storage (see 6.3.4)

6.3.1 Pre-Operation

In order to prepare the AXL TY14 for lifting, it is mandatory to conduct the following process prior to any lift. For specific pre-setting information see chapters:

- 4.2 System Parts and Description

- T-bar – see also 4.2.1 T-Bar
  - Check all bolts are tightened. – see appendix 1.
  - Check all locking pins are present.
  - Check Counterweights are positioned correctly.
- Lifting strap – See also 4.2.2 Lifting Strap

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- Check lifting strap is in proper condition to lift

Support Beam – See also 0 Table 2 Lifting strap for each blade type

- Support Beam
  - Check saddle is correctly prepositioned.
  - Check Saddle is firmly locked.
  - Check saddle pads don't present any cracks.
  - Check there is no dust or dirt collected on top of the pads.
  - Check bump stop is correctly prepositioned.
  - Check bump stop is firmly locked.
  - Check sling is in proper condition to lift.
  - Check sling connection is correctly attached.
- Chain sling – see also 4.2.4 Chain sling
  - Check chain sling lengths are according to COG position of blade.
  - Check connection to T-bar is locked securely.
  - Check chains and other components are in proper condition to lift.

6.3.2 COG alignment

To make sure the blade COG is aligned with the COG of the AXL TY14 use following steps.

- Make sure chain sling legs are adjusted to the wind turbine COG.
- Make sure AXL TY14 is in correct configuration.
- Make sure counterweights are adjusted according to intended lift.
- Make sure T-bar Root end lifting strap is placed approximately 1 m from root end.
  - And the correct length is used.

6.3.3 Blade from Storage to Hub

The blade is supported in root and tip frames. There is adequate space beneath the blade at the lifting area.

- Lift T-bar without Surfboard
  - With surfboard slings connected to trunnion points.
  - With one end of liftings strap connected to root trunnion point.
  - Check the angle of the T-bar is OK to connect with surfboard.
- Place surfboard at correct position below the blade according to length of T-yoke.
- Lift T-bar above blade.
- Connect slings to surfboard.
- Hoop Root lifting strap 1 meter from root end of blade.
- Connect other end of lifting strap to trunnion point.
- Lift blade and check angle is sufficient for mounting blade to hub.
- Lift blade to hub.
- Secure Blade to hub.
- dismount root lifting strap from Nacelle roof.
- Lower T-yoke so Support beam not longer supports blade
  - Be aware of collision between Yoke and Blade.

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- Hoover the T-yoke and surfboard out of the blade towards the tip
  - Be aware of collision between Yoke and Blade.
- Lower T-yoke to ground

Warning: Never dismount the root transport frame from blade while the blade is fully suspended

6.3.4 Blade from Hub to Storage

- Lift complete AXL TY14 assembly from ground.
  - With one end of liftings strap connected to root trunnion point.
  - Check the angle of the surfboard is OK.
- Lift AXL TY14 assembly to hub height.
- Hoover the T-yoke carefully from the tip side of the blade
  - Be aware of collision between Yoke and Blade.
- Continue until the root end of the T-bar can be reached.
- Hoop Root lifting strap 1 meter from root end of blade.
- Connect other end of lifting strap to trunnion point.
- Lift with the crane and check the blade comes up horizontally.
- If needed change length of Leading edge and Trailing edged strap
  - To make sure Blade will not rotate when lifted
- Dismount blade from Hub
- Lift blade to ground
- Lower until Support beam is resting on ground.
- Dismount support beam slings at ground position.
- Dismount root lifting strap.
  - Be aware of collision between Yoke and Blade.
- Lift complete AXL TY14 assembly from blade
- Remove the Support beam from underneath the blade.

Warning: If the T-bar cannot be brought to level when suspended, refasten blade to hub and abort the operation.

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6.4 Container Mode

In order to achieve a container mode, all bolted / pinned connections should be disassembled. Keep bolts and loose parts sorted in suitable containers, in order to ease assembly. It is recommended to mark assembly points of individual parts in reference to each other to ease assembly.

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Service and repair by Service agent:

7.1 Service cycle for the safe operating:

The AXL TY14 must be inspected at least every twelve months.

The service inspection must only be completed by suitably qualified skilled personnel or lifting equipment technicians, who have the suitable required training.

Only approved spare parts may be used.

7.1.1 Saddle pads cleaning.

All dust and dirt collected on top of the saddle pads needs to be removed regularly in order to restore de pad's friction coefficient, to prevent the lifted blade to slip.

The cleaning is performed with the use of paper towels and Isopropyl Alcohol.

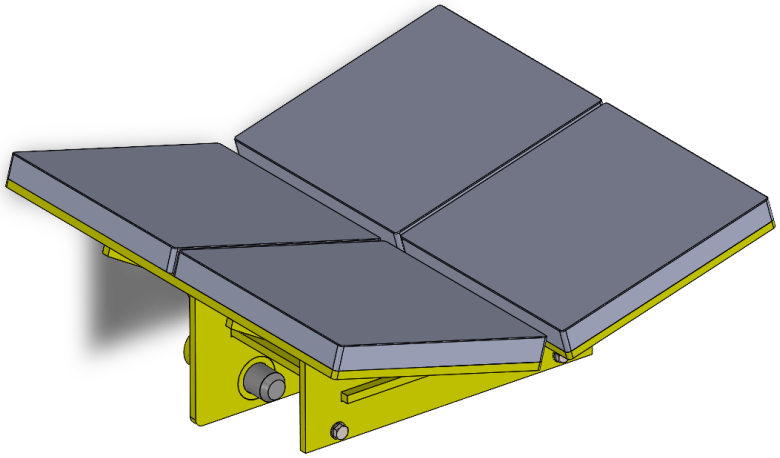

Figure 28 Saddle pads

7.1.2 Bolt replacement.

No reason to regularly replace bolts, they should be replaced if they are visibly damaged.

7.2 Service agent address:

See manufacturers recommendations.

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Other Approved Service Agent can be used. They must service and maintain as specified by the manufacturer or after updated regulations as required.

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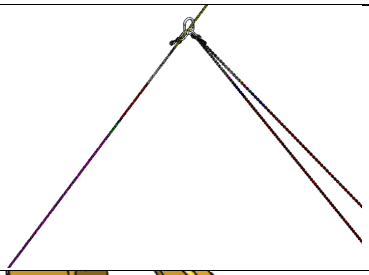
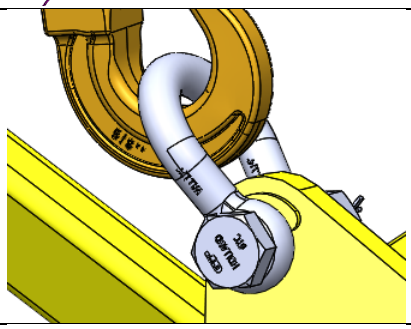
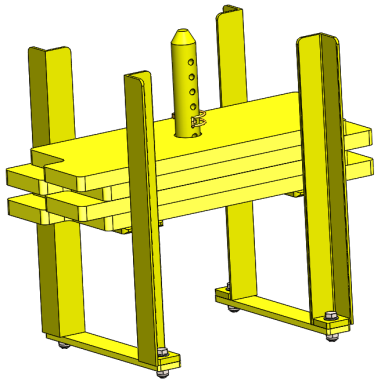
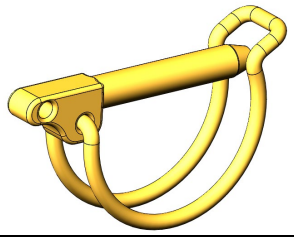
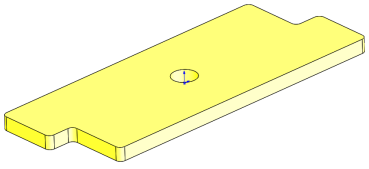
Spare parts and consumables:

Name	Picture	Number	Qty. (In yoke)
3-leg Chain sling		6208AXL000001-20	1
12 tonne shackle *Connection from chain sling to T-bar*		420101200860	3
Counterweight holder *Including 4 counterweight plates*		6208AXL000001-14	4
Locking pin – Ø8x40 *Safety pin for counterweight holder*			4
Counterweight plates		6208AXL000001-038	16

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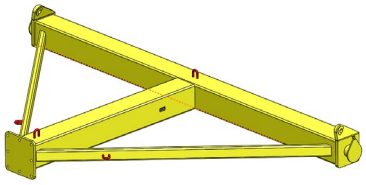
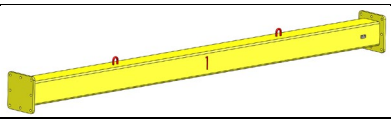
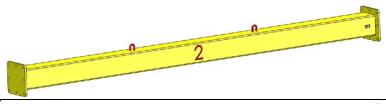
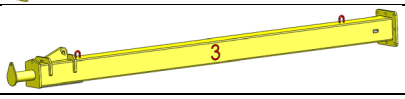
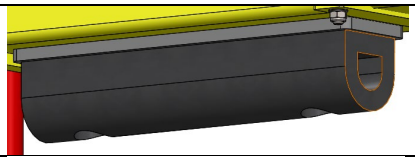
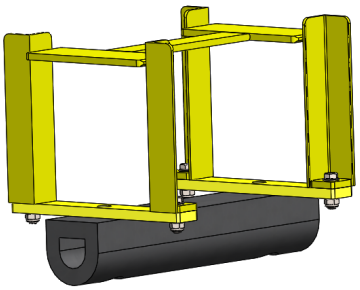
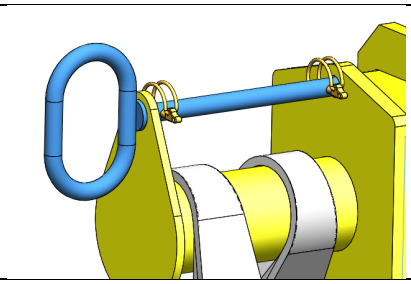
T-bar Tip section		6208AXL000001-04	1
T-bar Centre section (1)		6208AXL000001-03	2
T-bar Centre section (2)		6208AXL000001-19	1
T-bar Centre section (3)		6208AXL000001-02	1
Bolt: M20x75 *T-bar flange connection*		99.DK488021120080	32
Washer: M20 *T-bar flange connection*		99.DK488221220	64
Nut: M20 *T-bar flange connection*		99.DK488121120	32
D-fender *Fixed (same D-fender used on movable)*		6208AXL000001-068	3
D-Fender Movable *Including D-fender* *Including holder*		6208AXL000001-32	1
Locking pin Trunion Root end		6208AXL000001-08	1

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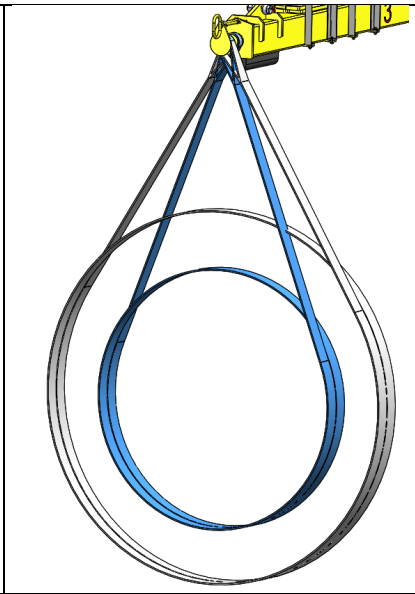
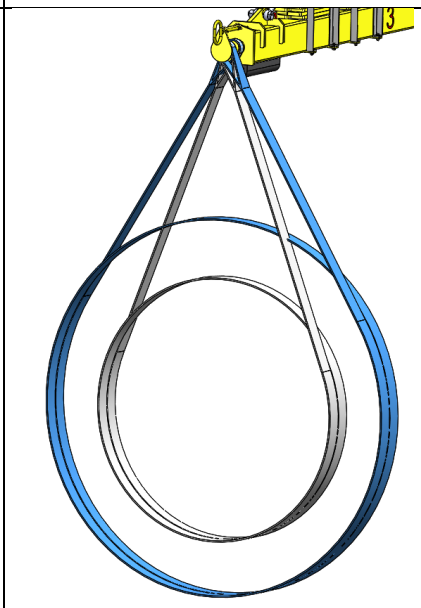
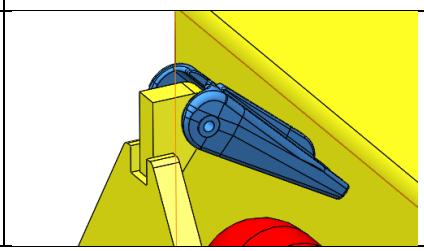
Lifting strap Width 120mm, WLL 4 t EWL 14000 mm		341100401400380	1
Lifting strap Width 120mm, WLL 4 t EWL 17500 mm		341100401750380	1
Safety latch		9840YOK8P04413 Or 16.10PCB1419047	2

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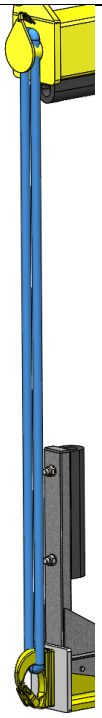
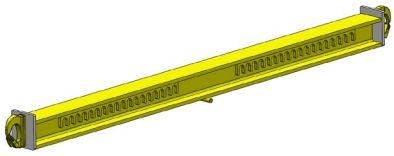
Round sling WLL 5 tonne EWL 2,5m		340100500250150	2
Supporting beam		6208AXL000001-06	1
Bump stop		6208AXL000001-23	1

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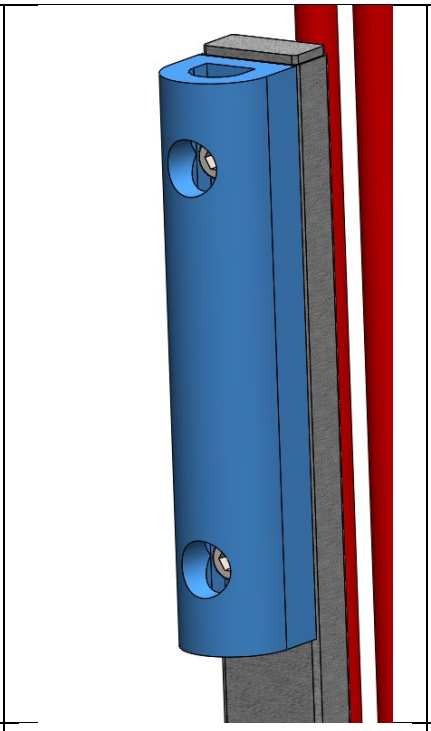
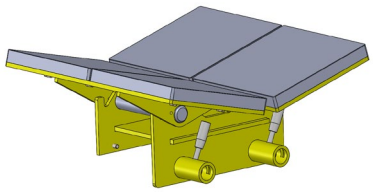
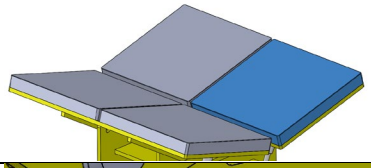
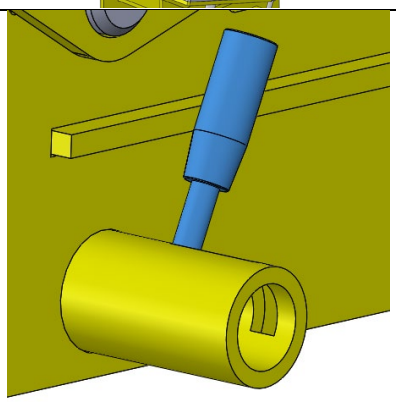
D-fender *For bump stop*		6208AXL000001-068	1
Universal saddle		6208AXL000001-09	1
Rubber pads			4
Handle pin		EH24350.0140	2

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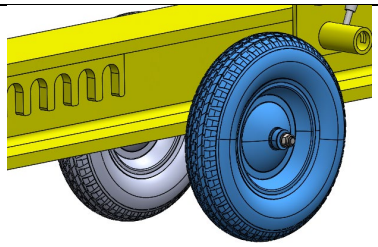
Wheel		6208AXL000001-032	2

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