CONTINUOUS BELAY SYSTEM

INSTRUCTIONS FOR USE, INSTALLATION, INSPECTION AND MAINTENANCE

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KOALA Equipment - 1191 Route de Bidaille - 74930 SCIENTRIER - FRANCE
Tel: +33 (0)4 50 97 50 10 - info@koala-equipment.com
Koala Equipment is a brand of Altus

2025 modifications (compared with version n° 2023-03) :

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1. WARNING

The owners, installers and operators should read and keep this manual which includes instructions for the installation, operating, inspection and maintenance of the product and compatible materials and equipment. Only those techniques presented and not crossed out are allowed. Any other installation and/or use is to be excluded. Some examples of misuse are shown. A multitude of other bad applications exist and it is impossible for us to enumerate them all, nor even imagine them. If you have any doubts or problems, please contact Koala Equipment. The installation and operating must conform to the following recommendations and to the relevant standards (EN 15-567, ACCT, PRECA, ASTM).

Activities at height are potentially hazardous and may result in serious injury or death.
This risk concerns installers, operating staff and users.
The installation should only be carried out by competent and responsible people. They assume all risks and responsibilities for any damage, injury or death that may arise due to improper installation of the products in any manner whatsoever.If you are not able to assume this responsibility or to take this risk, do not install this equipment.
Operating should only be carried out by competent and responsible people.
They assume all risks and responsibilities for any damage, injury or death that may occur due to improper use of our products in any manner whatsoever.
If you are not able to assume this responsibility or take this risk, do not use this equipment.

It should be noted that no safety system can prevent deliberate misuse.

Koala continuous belay system and its components are designed as a protection against falls at height for sports and leisure activities such as high ropes courses, zip lines ...
The use of Koala continuous belay system and its components for any other purpose is prohibited without written consent from Koala Equipment.
Failure by the operator to respect any and all instructions, warnings and cautions in this manual for the correct installation, operating, care and maintenance of Koala continuous belay system and its components, may result in serious injury and/or death.
PPE user notices must be available for the users.

Symbols used in these instructions

The following safety symbols are used to highlight good practice and potential hazards to the installation and operating of the equipment.
Be sure to read and understand all procedures regarding assembling and installation, the way the product is to be used, inspection and care of the Koala continuous belay system and its components.

PROHIBITED - Indicates a hazardous situation which, if not avoided, may result in serious injury and/or death.

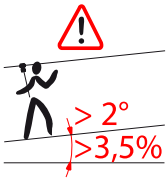
CAUTION - Indicates a potentially hazardous situation that requires a risk analysis to determine one or more precautions to be taken.

GOOD PRACTICE - Indicates proper installation or use of materials/equipment.

RECOMMENDATION - Round symbol, blue background, indicates proper use of materials/equipment.

2. FUNCTION OF THE DEVICE

Koala continuous belay system enables users to avoid falls at height.



It is designed for activities/obstacles with no more than a 2° or 3.5% slope. For activities with a greater slope such as net bridge, stairs with handrails...., users' safety must be ensured by the activity itself (net, handrail....) or with a fall arrester. In these cases, the continuous lifeline does not ensure safety but simply allows for continuity of the lifeline.

Some examples of vertical sloping activities where the activity itself protects against a fall.

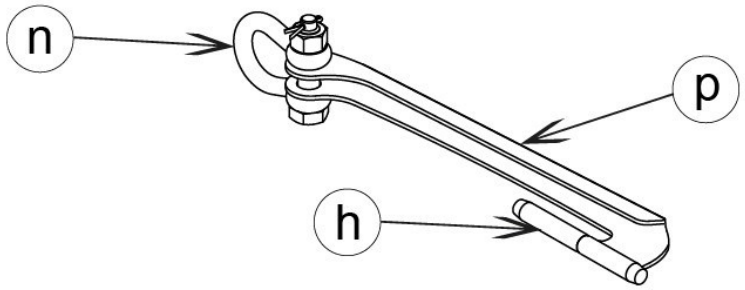
On vertical activities, ascending or descending, either a Climb-up or a Switch must be installed. The Switch must be associated with a fall arrester or a descender. It is your responsibility to check that these devices are compatible.
For pendulum jumps (Tarzan swing) the Switch must be associated with the wire rope/ jump rope.

For zip lines, the wire rope slope, user speed and the type of arrival area must be correctly adapted to ensure user safety.

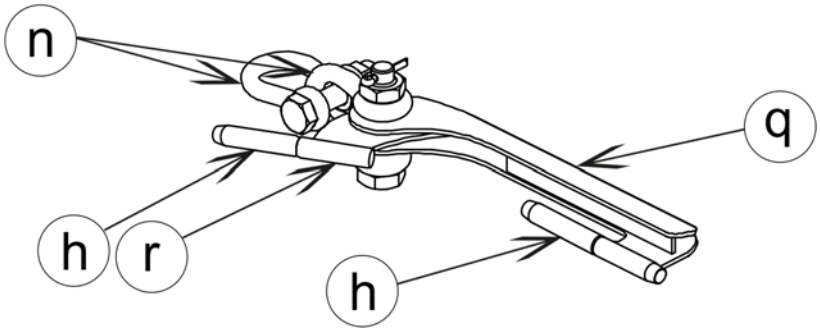
Koala continuous belay system and its components are only compatible with Koala Pouliz trolleys/pulleys.

2.1 Parts list for arm assembly

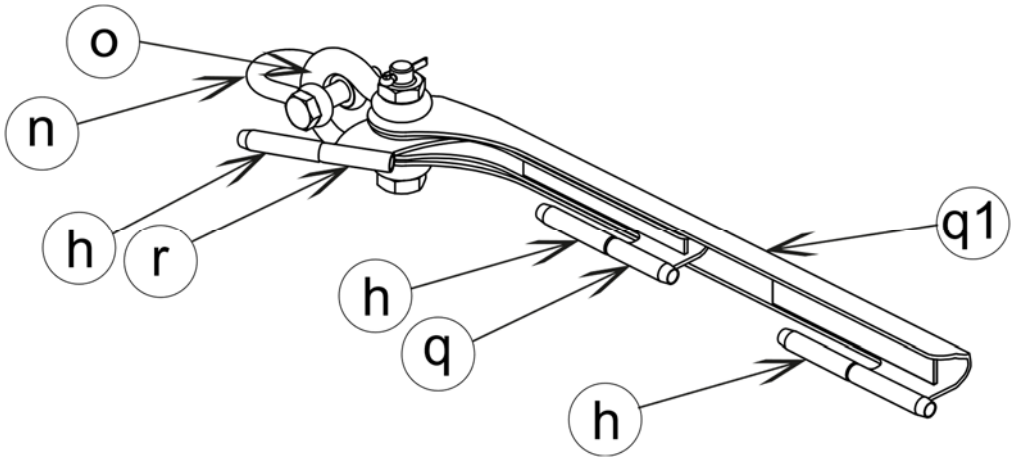
Activity arm :



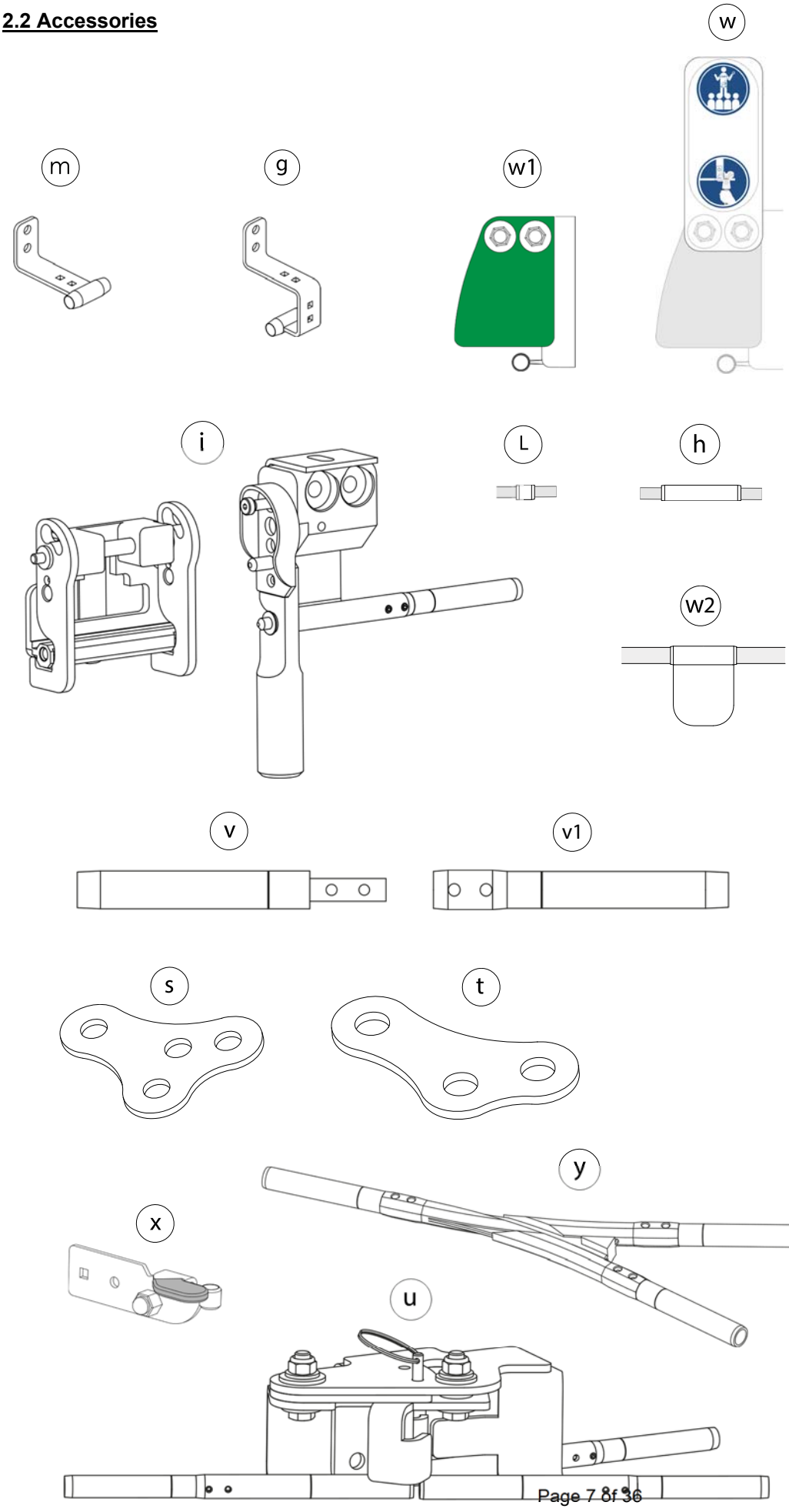
Arm for zip line up to 150 m :



Arm for zip line beyond 150 m :



2.2 Accessories



2.3 List of components and references

	ITEM	REFERENCE for wire rope Ø12MM	REFERENCE for wire rope Ø1/2 INCH
g	INVERTED BRACKET - ELONGATED	ME326-F	ME326-F -US
h	FERRULE 85mm	ME15	ME15-US
i	SWITCH STATION & SHUTTLE	ME87-FD/G + ME86-F	ME87-FD/G US + ME86-F
v + v1	REMOVABLE CONNECTING FERRULE	ME12	ME12-US
L	SMALL FERRULE 18mm	ME14	
m	METAL BRACKET - ELONGATED	ME325-F	ME325-F -US
n	BOW SHACKLE 3,25 T	QU112-325	
o	BOW SHACKLE 6,50 T	QU112-650	
p	ACTIVITY ARM	ME300-F	ME300-FUS
q	ARM FOR ZIP LINE	ME76-F	ME76-FUS
q1	BIG ARM FOR ZIP LINE	ME310-F	ME310-FUS
r	BACK UP FOR ZIP LINE	ME78-F	ME78-FUS
s	ZIP LINE ADJUSTMENT PLATE L	ME77-F	
t	ZIP LINE ADJUSTMENT PLATE XL	ME312-F	
u	MECHANICAL SWAPPER	ME09-1/3	ME09-1/3US
v	REMOVABLE MALE FERRULE	ME06-MA	ME06-MAUS
v1	REMOVABLE FEMALE FERRULE	ME06-FE JON	ME06-FE JONUS
w	CONTINUOUS BELAY ENTRY PLATE	ME103-V2F AR	
w1	BACK STOP	ME114-F	
w2	BACK STOP FERRULE	ME11-FUS	
x	CLIMB-UP FOR VERTICAL LADDER	ME208-F	
y	Y SWAPPER 2.0	ME108-V2F	ME108-V2FUS

3. ASSEMBLY AND INSTALLATION

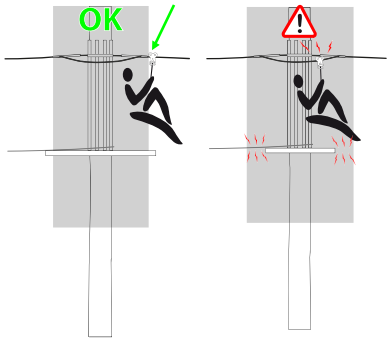
Koala continuous belay lifeline is designed to be installed with the following wire ropes:
- Galvanized steel wire rope, 6x7, textile core, Lang Forming,
- Galvanized steel wire rope, 19x7 metallic core, anti-rotating,
- Swaged galvanized steel wire rope, 6x26, metallic core.

It can be installed with Ø12 mm wire rope or ½ " depending on the materials you have chosen.

NO !

Never install materials designed for Ø ½'' wire rope on Ø12 mm wire rope and vice versa.

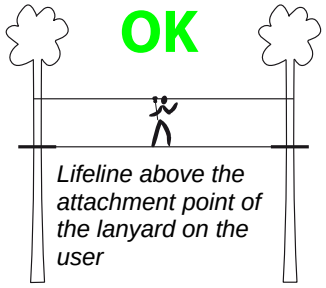
3.1 Instructions



The continuous lifeline can only be installed once the platforms and activities have been built.

To avoid premature wear and tear of the wire rope due to fatigue, ensure that the platforms are big enough to avoid the users from hanging between 2 arms (grey zone on the drawing), attached on the same tree.

Take time to read the instructions carefully as once the wire rope has been swaged it cannot be dismantled.
If you wish to install the continuous belay system arms differently to the description in this manual, it is your responsibility to ensure that these new configurations do not reduce the strength of the lifeline; and that they do not induce additional fatigue or new risks.
In case of doubt, we advise you to add a back-up.



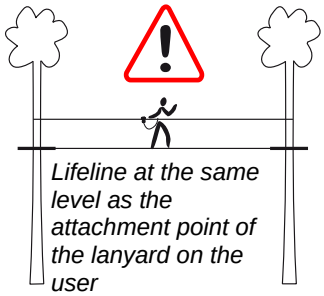
Lifeline above the attachment point of the lanyard on the user

The recommended height for the lifeline is 1.6m / 5'3" relative to the users' feet.
Recommended length of the lanyard for this height:
- Participants who weigh more than 35kg / 75 lbs with a sit harness = 75cm / 29,53 inches.
- Participants who weigh less than 40kg / 85 lbs with a full body harness = 92cm / 36,22 inches.

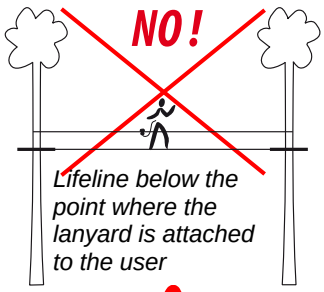
If you wish to place the lifeline at any other height or change the length of the lanyard, you must take the two following elements into consideration:

1°) The fall factor : the position of the lifeline relative to the lanyard's anchor point on the user. It determines the sustained efforts in case of a fall.
(Fall factor = height of the fall / length of the lanyard) The result must be as low as possible and never above 1.

2°) The air draft: the distance to the first obstacle a user could hit, from his lanyard anchor point, in case of a fall.
Air draft = length of the lanyard + height of the user from his lanyard's anchor point to his feet + distance due to the wire rope sag due to the elasticity of the supports + the safety margin.



Lifeline at the same level as the attachment point of the lanyard on the user



Lifeline below the point where the lanyard is attached to the user

For zip lines, it is your responsibility to match the wire rope slope, the user speed and the type of arrival area to ensure user safety.

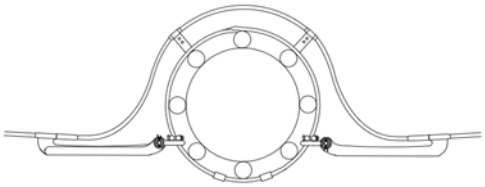
3.2 Installing arms

The arms can be attached to the supports with cable, chain, RingO anchor plates, etc.

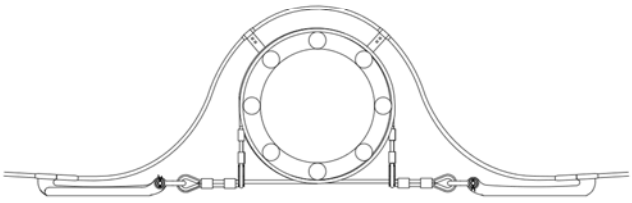
It is your responsibility to ensure that your devices have a strength greater than the strength of the arms, by referring to the standard in force for sizing. If in doubt, add a back up.

Here are some installation examples:

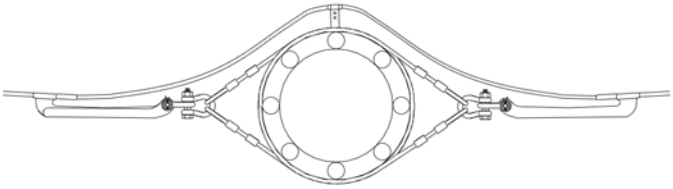
On RingO anchor plates (see technical sheet for screw selection and installation)



On a wire rope loop with the shackle blocker (see the installation video with the special tool on our YouTube channel: https://www.youtube.com/watch?v=rC6C76Z37UA)



On wire rope slings, lark's knot foot mounting

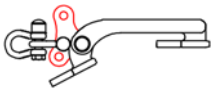


On wire rope slings, double sling assembly

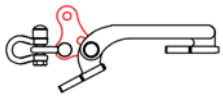
To adjust the tension of the zip lines, we recommend installing the adjustment plates.

Plate L for zip line arm (s)

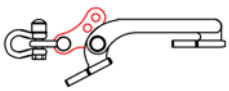
+ 5 cm



+ 7 cm



+ 9 cm



+ 11 cm

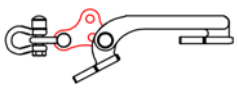


Plate XL for zip line big arm (t)

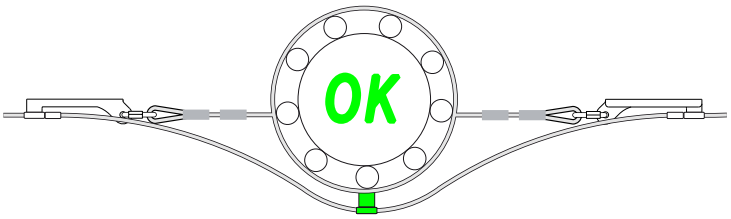
+ 6 cm

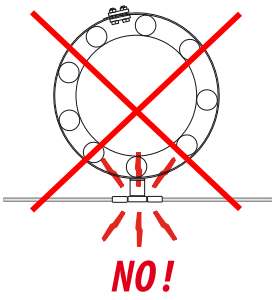
+ 10 cm

+ 14 cm

3.3 Installing metal brackets

The metal brackets (m) keep the wire rope away from the supports, allowing the pulley to pass more easily and reducing cable fatigue between the arms.

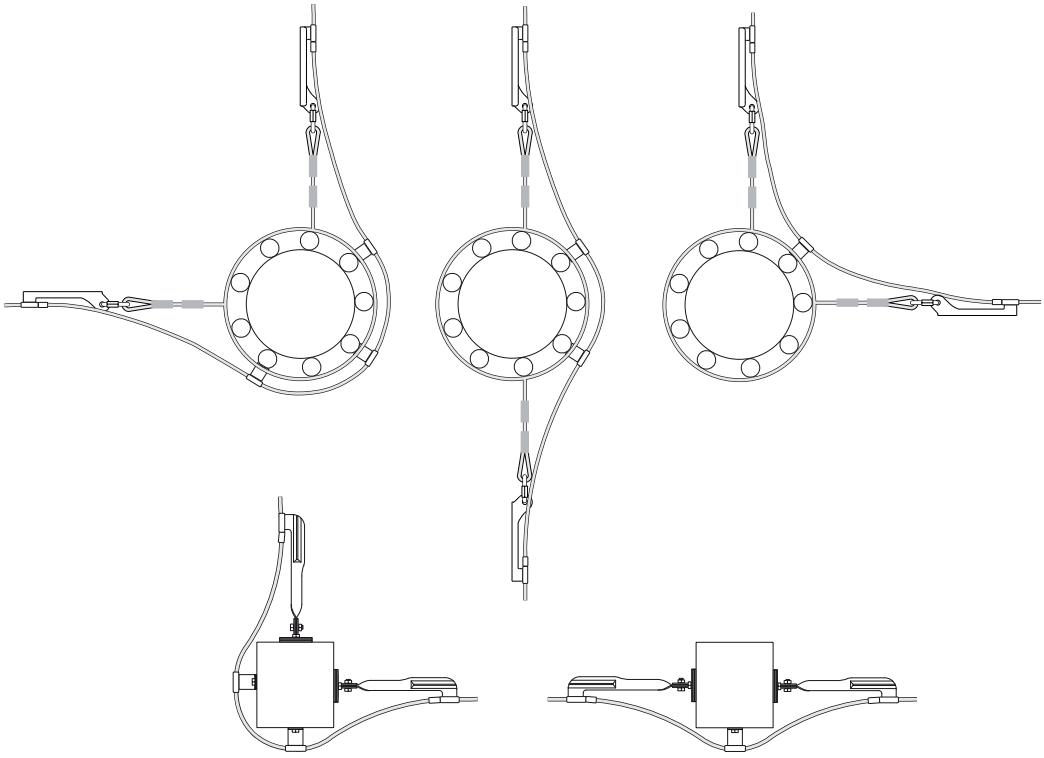


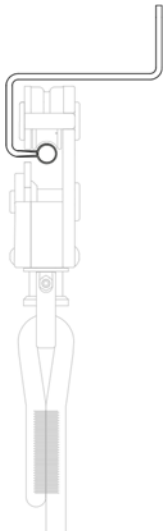


The metal brackets are not safety devices and cannot replace the arms, which is why it is essential that they are only fixed between the arms, where the cable is not under tension (see diagram above).

The number depends on the shape and diameter of the supports and the direction of the activities.

Some examples of good practice:



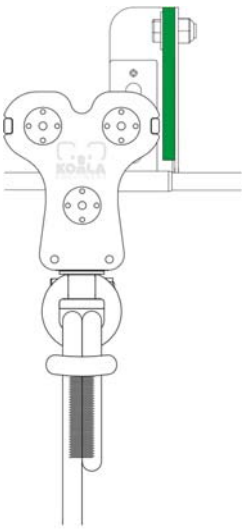


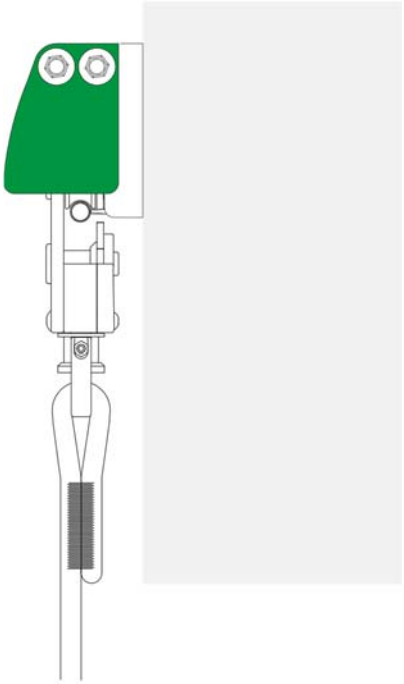
Depending on whether the lifeline runs on one side or the other of the support, the installer may need to fit the reverse brackets (g).

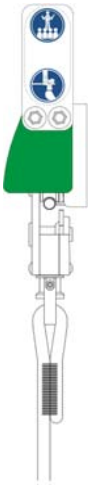
Back stops
are not fall arresters

3.4 Installing back stops

Combined with the metal brackets, the back stops prevent the pulleys from moving backwards on inclined activities such as stairs.





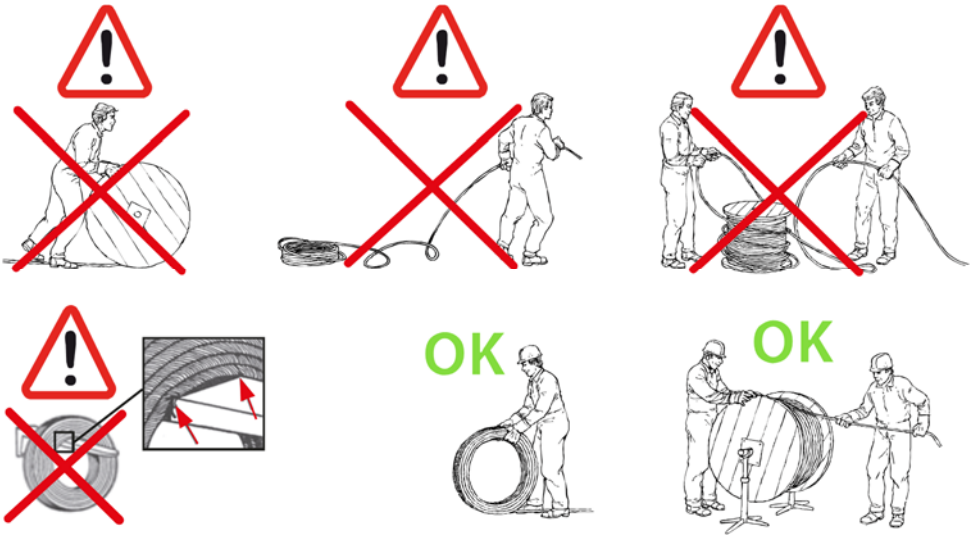


3.5 Installing entry plates

Combined with a back stop, the purpose of an entry plate is to indicate to users where and how to connect correctly to the start of the lifeline.
In addition, the shape of this plate forces users to place their pulley in the right direction.

3.6 Unwinding wire rope

The cable must be unwound carefully to avoid forming a shell.

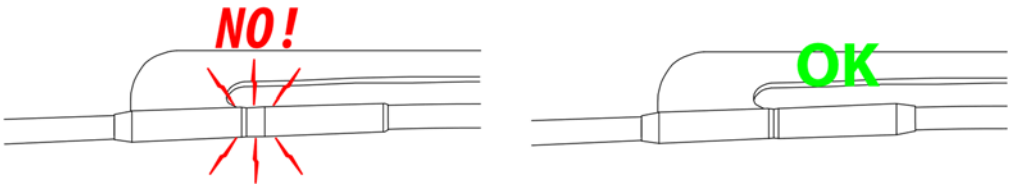


3.6.1 Installing wire rope

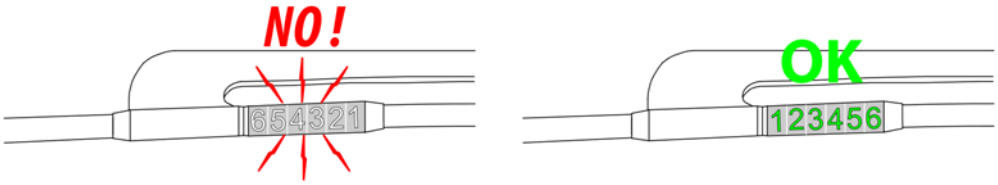
When passing the wire rope through, care must be taken not to stress it to avoid untwisting it. Caution: even minor untwisting could, under certain conditions, allow the pulley to come off the wire rope.

3.7 Crimping 85mm /3.35in ferrules

The ferrule must be installed with the small chamfer against the arm.



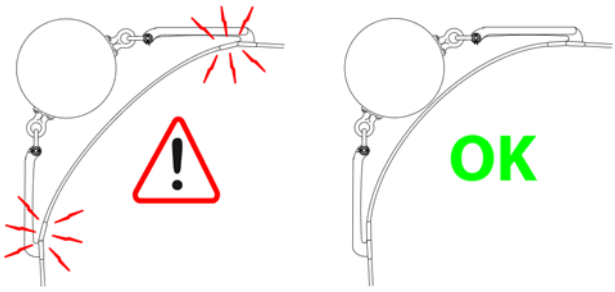
Once the wire rope is in place, you can start crimping. Each ferrule should be crimped 6 times, starting on the arm side, following the example below (from 1 to 6).



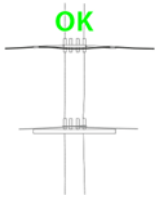
Only use those dies recommended by Koala Equipment with a crimping tool exerting a force of at least 120 kN.

Before crimping, we recommend that you place a Pouliz pulley on the lifeline in order to ensure that there are no obstacles on the lifeline.

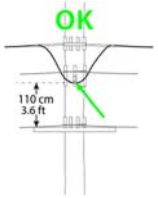
To avoid excessive fatigue, which could lead to premature wear and damage to the wire rope, avoid sharp curves in the wire rope.

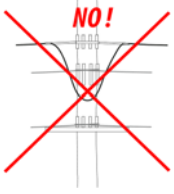


3.8 Wire rope position above the platforms (between 2 activities)



Keep the wire rope as close as possible to the height of the lifeline for 2 successive activities (before and after the platform) (see opposite).





To pass under handrail wire ropes, for example, it is possible to make lower loops. In this case, the height must be at least 110 cm (3.6ft) above the platform. However, this height can go down to 90cm (2,95ft) when 6x26 wire rope is used. It is also necessary to block the wire rope with metal brackets and small 18mm ferrules.

3.9 Tension of lifeline and zip line wire rope

The wire rope must be tightened so as to follow the angle of the obstacle.

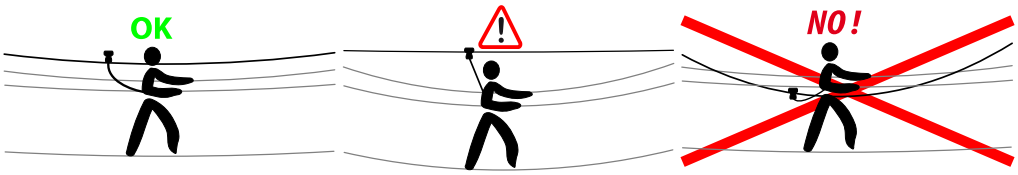


Table of maximal tensions when installing (wire rope free of load)		
Activity lifeline	All lengths	500 daN
Zip line	Less than 150m / 492,126 ft	1 500 daN
Zip line	More than 150m /492,126 ft	2 500 daN

Supports undergo considerable pressure due to the wind, which causes tension on the lifeline. For activities with no other wire rope than that of the lifeline, it is recommended to install zip line arms.

3.10 Installing removable connecting ferrules

Function of the device
The purpose of connecting ferrules is to join 2 lifeline wire ropes, or a lifeline wire rope to a zip line wire rope.

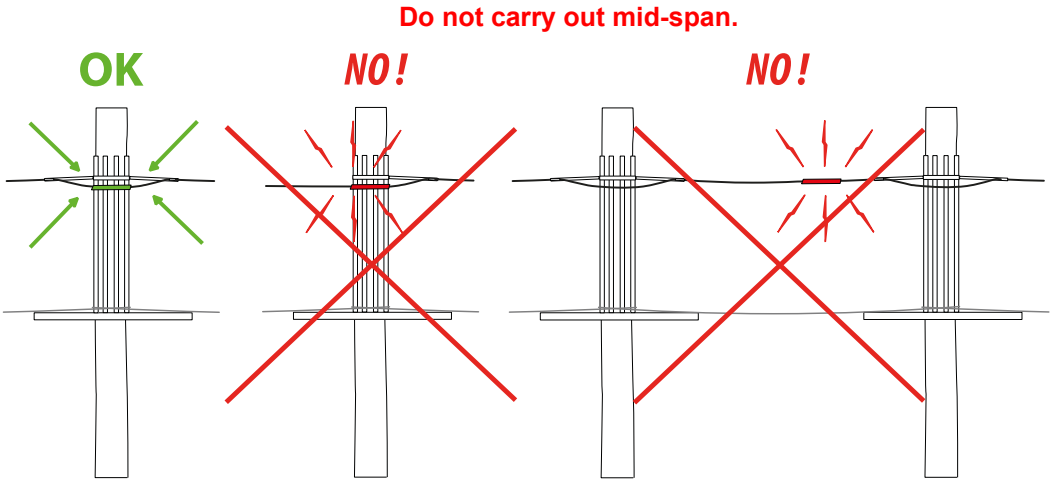
Assembling and installing
The connecting ferrule is designed to be installed with the following wire ropes:
- Galvanized steel wire ropes, 6x7, textile core, Lang Forming,
- Galvanized steel wire ropes, 19x7 metallic core, anti-rotating,
- Swaged galvanized steel wire ropes, 6x26, metallic core.

It can be installed with Ø12 mm wire rope or ½'' depending on the materials you have chosen.

NO !

Never install material designed for Ø ½'' wire rope on Ø12 mm wire rope and vice versa.

Warning: The connections can only be made between 2 arms above a platform where the wire rope is slack (see diagram below).



Instructions

1 - Assemble the male and female ferrules, then screw in the 2 STHC Ø5 screws.

2 - Cut the wire rope with a clean cut.

3 - Insert the 1st wire rope into the male ferrule and the 2nd wire rope into the female ferrule until they stop. Crimp each ferrule 6 times following the order as indicated below. Only use those dies recommended by Koala Equipment with a crimping tool exerting a force of at least 120 kN.

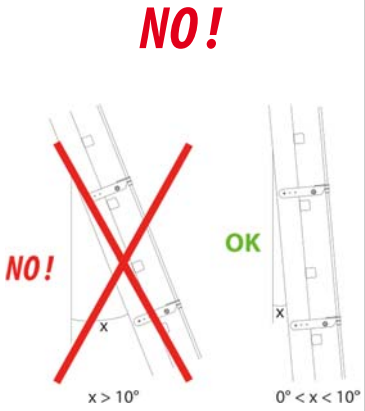
3.11 Installation and operation of the Climb-up

Function of the device
The Climb-up is a device for climbing a vertical activity while remaining connected to the continuous lifeline. It is designed for rigid vertical activities such as wooden ladders. It requires a rigid structure, which either already exists and if not must be installed, all the way up the activity. In the event of a fall, an energy absorber installed at the top of the activity absorbs the impact force.

Installing the Climb-up
The Climb-up is designed to be installed with the following wire ropes:
- Galvanized steel wire ropes, 6x7, textile core, Lang Forming,
- Galvanized steel wire ropes, 19x7 metallic core, anti-rotating,
- Swaged galvanized steel wire ropes, 6x26, metallic core.

It can be installed with Ø12 mm wire rope or ½" depending on the materials you have chosen

Never install material adapted to Ø ½'' wire rope on Ø12 mm wire rope and vice versa



Installation

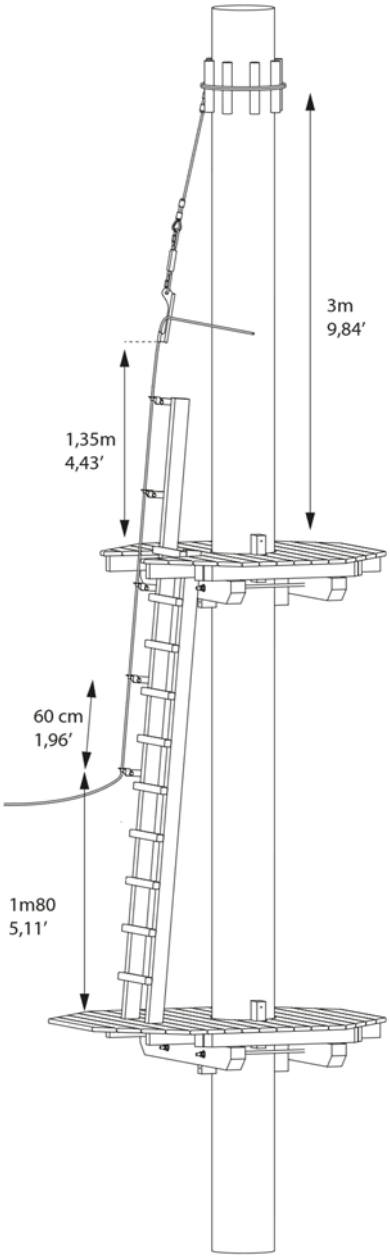
1 - Tightly install the ladder and avoid a slope beyond 10 °.

2 - Position a sling at the top of the obstacle about 3m/9,84' above the arrival platform. To limit wire rope fatigue, it is important to maintain the same inclination as that of the wire rope attached to the ladder.

3 - Install in this order on the sling (from top to bottom): a steel connector, the energy absorber, a steel connector, an activity arm.

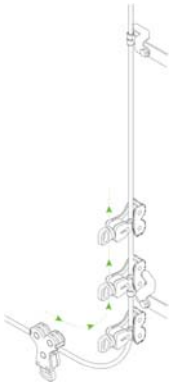
4 - Screw the Climb-up onto the ladder stile every 60 cm, starting 1,80 m from the foot of the ladder. Fix each Climb-up to a horizontal plane with an inclination between 0 and 10°.

5 - Pass the wire rope into the activity arm and the Climb-ups with a small 18mm /0.7in ferrule under each Climb-up and a 85mm /3.35in ferrule at the extremity of the arm. Crimp all ferrules once the wire rope is under tension.

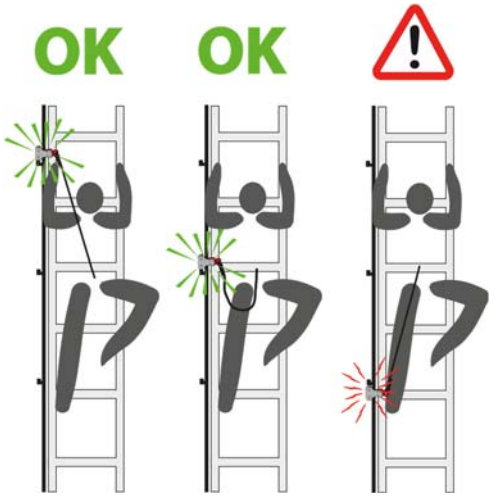


Operation

User evolves vertically on the activity by passing the pulley via the Climb-ups.



With a lanyard length of 60 cm and Climb-up installed 60 cm apart, the maximum fall factor is 3. Tests were carried out under these conditions with a maximum user weight (130kg / *286lbs* / *20,4stones*) and a minimum weight (30 kg / *66lbs* / *4,7stones*) to ensure that the maximum deceleration was well below 6 G.



However, for more comfort and in order to preserve the material, we recommend that users pass their pulley through the Climb-up flaps as soon as possible, and to always keep their pulley above the level of their harness attachment point.

3.12 Installation and operation of the Switch

Function of the device

The Switch is a device composed of stations and a shuttle which guarantee Koala continuous belay system continuity on:

- Vertical obstacles such as ladders, climbing walls, jumps into the void ... requiring the use of fall arresters or descenders.
- Swinging activities or pendulum jumps such as Tarzan swing.
- Any other obstacles requiring the use of a mobile anchor point.

Installing the Switch

The Switch is designed to be installed with the following wire ropes:

- Galvanized steel wire rope, 6x7, textile core, Lang Forming
- Galvanized steel wire rope, 19x7 metallic core, anti-rotating
- Swaged galvanized steel wire rope, 6x26, metallic core.

It can be installed with Ø12 mm wire rope or ½" depending on the materials you have chosen.

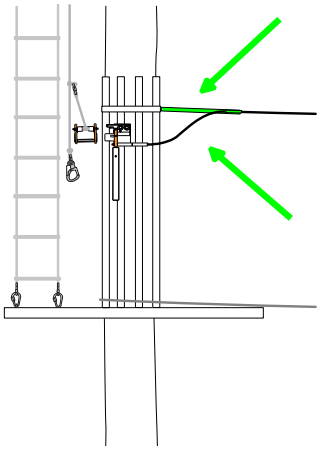
NO !

Never install material adapted to Ø ½'' wire rope on Ø12 mm wire rope and vice versa.

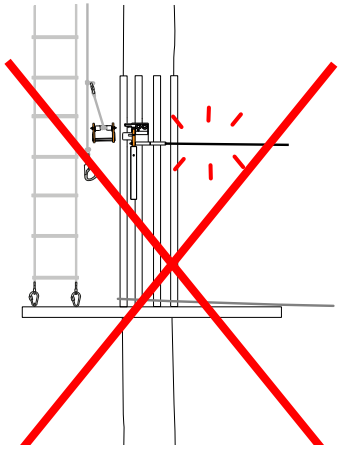
The Switch station should only be positioned close to an arm above a platform, where the cable is not under tension.

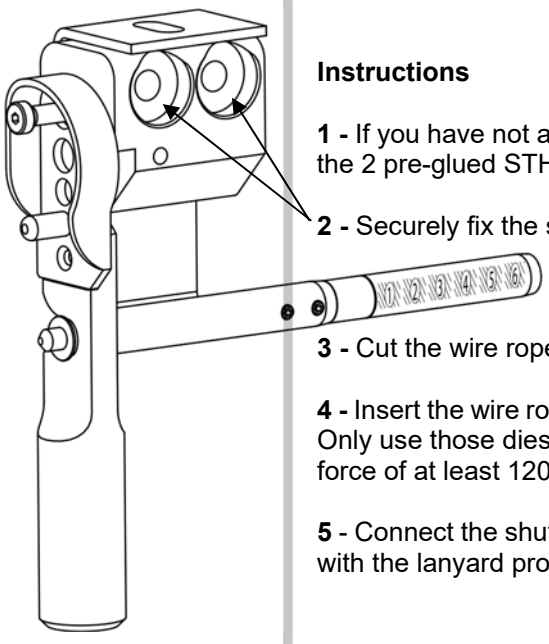
Never install directly on an obstacle's life line.

OK



NO !





Instructions

1 - If you have not already done so, assemble the male and female ferrules, and screw the 2 pre-glued STHC Ø5 screws into the male and female ferrules.

2 - Securely fix the station body to the support using screws or bolts..

3 - Cut the wire rope with a clean cut.

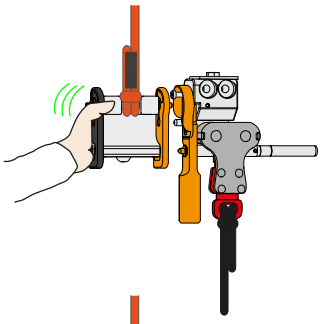
4 - Insert the wire rope into the ferrule until it stops and crimp as per the indicated order. Only use those dies recommended by Koala Equipment with a crimping tool exerting a force of at least 120kN.

5 - Connect the shuttle to the mobile anchor point (e.g.: fall arrester, jump rope, ...) only with the lanyard provided.

Operation
Entering the pulley into the shuttle from the right.

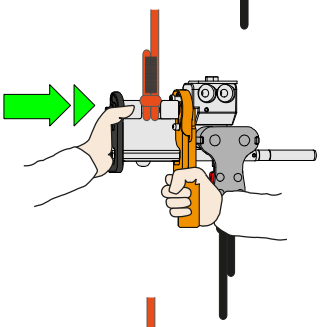
1

Place the shuttle against the station



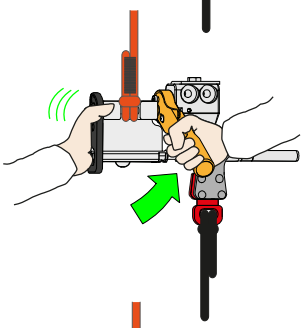
2

Press hard on the shuttle against the station to release the handle



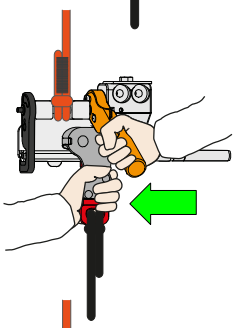
3

Hold the shuttle in place and lift the handle



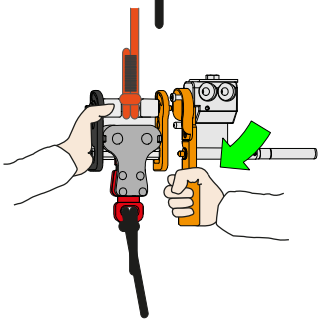
4

While lifting the handle slide the pulley into the shuttle



5

Lower the handle and hold the shuttle



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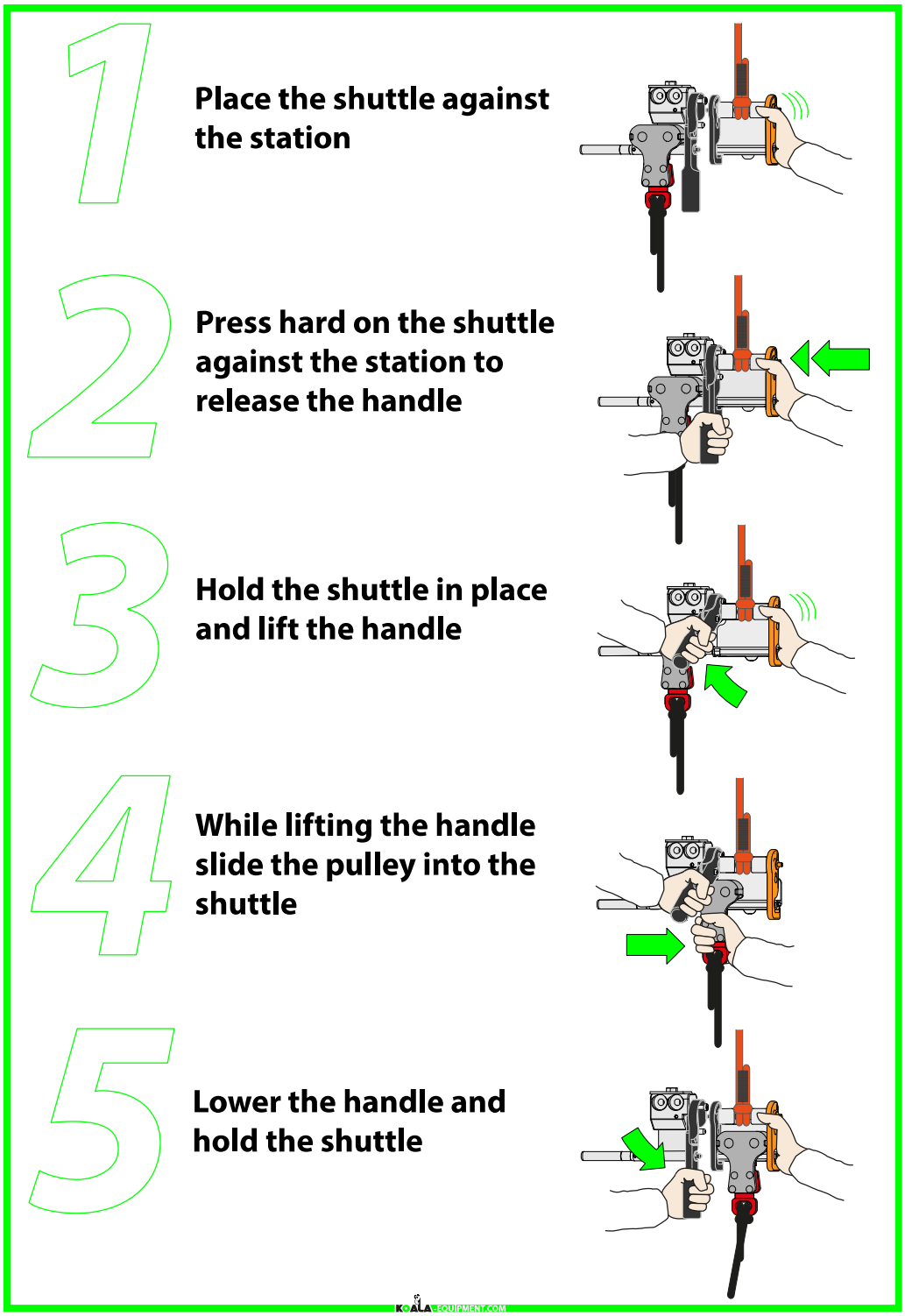
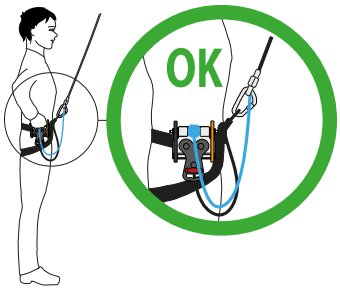
Operating the switch
Entering the pulley into the shuttle from the left.



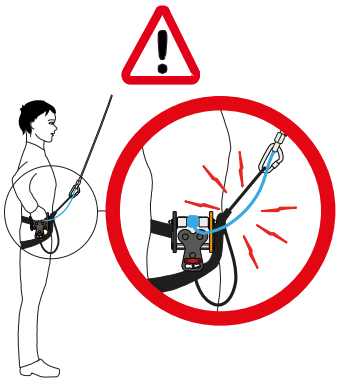
Use

There must be at least a 2nd connector, in addition to the shuttle, to enable the user to fix the shuttle to his/her harness as per the diagram.



Ideal solution:

Connect the mobile anchor point directly to the harness attachment point in addition to the shuttle.



Make sure the lanyard is short enough so that it cannot remove the shuttle from the harness when the system is taut.

Never use the shuttle as the only attachment point to the mobile anchor point.

3.13 Installation and operation of the mechanical swapper

Function of the device
The mechanical swapper allows user to choose between 2 directions without disconnecting from the continuous belay system. This device is exclusively compatible with Koala Equipment Pouliz pulleys.

Installing the swapper
The swapper is designed to be installed on the following wire ropes:
- Galvanized steel wire rope, 6x7, textile core, Lang Forming,
- Galvanized steel wire rope, 19x7 metallic core, anti-rotating,
- Swaged galvanized steel wire rope, 6x26, metallic core.

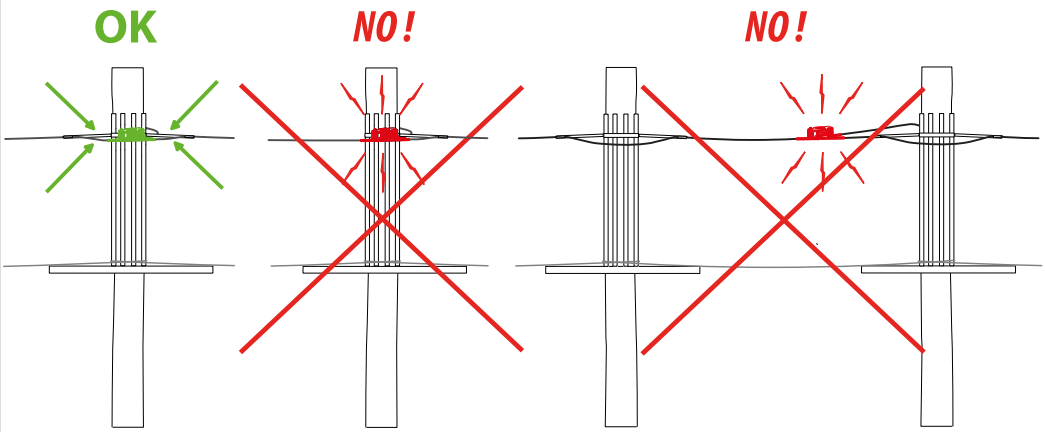
It can be installed with Ø12 mm wire rope or ½" depending on the materials you have chosen.

NO !

Never install material adapted to Ø ½'' wire rope on Ø12 mm wire rope and vice versa.

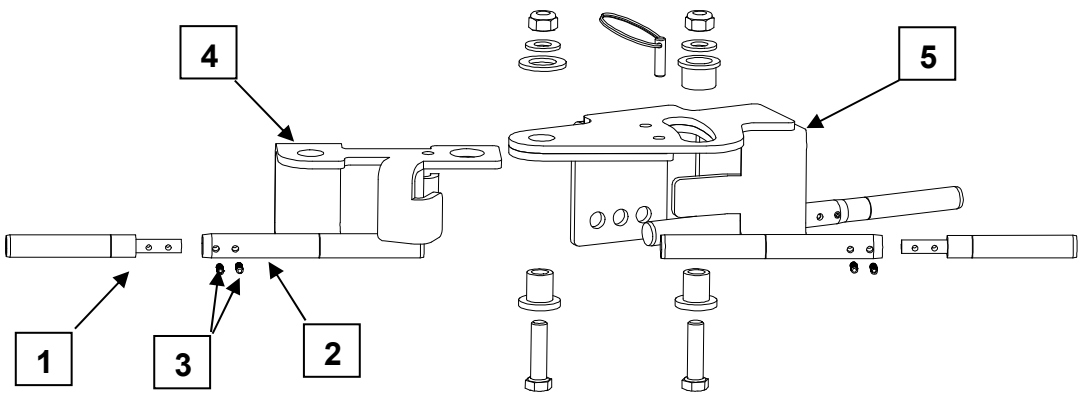
Mechanical swapper must be only be positioned between 2 arms above a platform, where the wire rope is not taut.

Must never be installed mid-range of an activity.

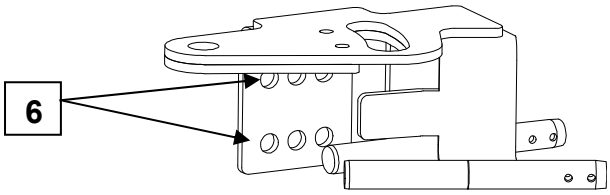


Instructions

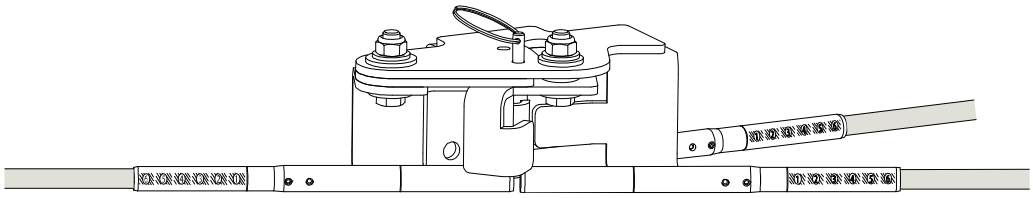
1 – If you have not already done so, insert the 3 male ferrules (1) into the female ends of the swapper (2) and screw in the 2 pre-glued STHC Ø5 screws (3) for each ferrule. Then remove the moving part (4) from the fixed part of the swapper (5).



2 - Securely install the fixed part onto the support, using screws, bolts or counter plates, using the holes (6) provided.



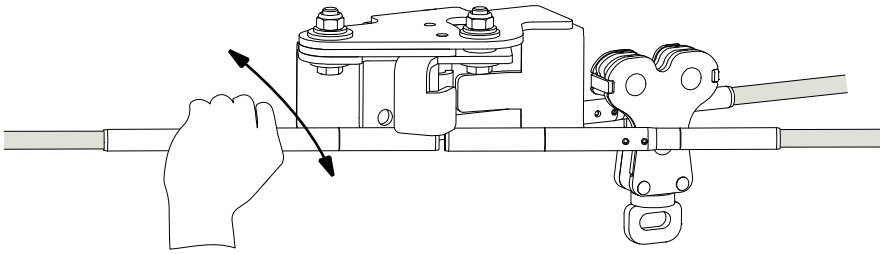
3 - Fit the mobile part onto the swapper, cut the wire ropes with clean cut and insert them into each ferrule until they stop. Account for some slack in the wire ropes to ensure fluid movement of the mobile part and then test it.



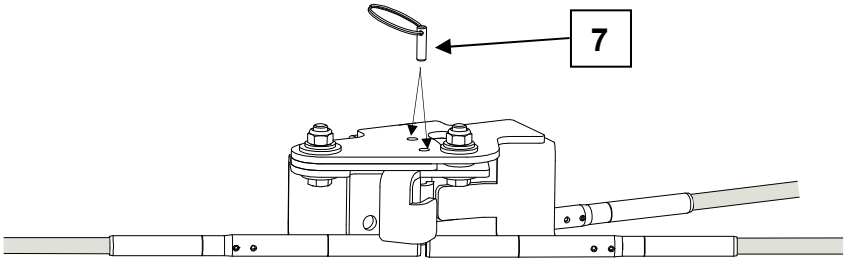
4 - Ensure that the wire ropes are inserted all the way to the end, then crimp the 3 male ferrules as per the indicated order (from 1 to 6). Only use those dies recommended by Koala Equipment with a crimping tool exerting a force of at least 120kN.

Operation

The user selects his/her preferred activity by activating the mobile part of the swapper.



The instructor can condemn a crossing (or oblige users to use a chosen crossing) by blocking the mobile part with the pin (7). This can be replaced by a bolt.



3.14 Installation and operation of the Y swapper

Function of the device
The Y 2.0 swapper allows user to choose between 2 directions without disconnecting from the continuous belay system. This device is only compatible with versions 2 and 3 of Koala Pouliz pulleys.
This device is not compatible with version 1.0 of the Koala Pouliz pulleys, nor with any other connector.

Installation
The Y 2.0 swapper is designed to be installed on the following wire ropes:
- Galvanized steel wire rope, 6x7, textile core, Lang Forming,
- Galvanized steel wire rope, 19x7 metallic core, anti-rotating,
- Swaged galvanized steel wire rope, 6x26, metallic core.

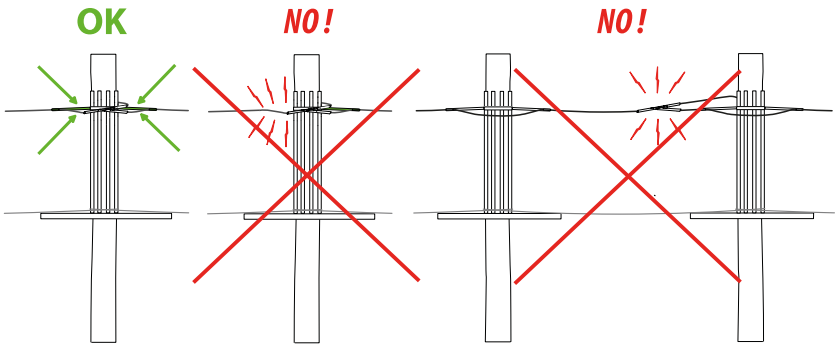
It can be installed with Ø12 mm wire rope or ½" depending on the materials you have chosen.

NO !

Never install materials adapted to Ø ½'' wire rope on Ø12 mm wire rope and vice versa.

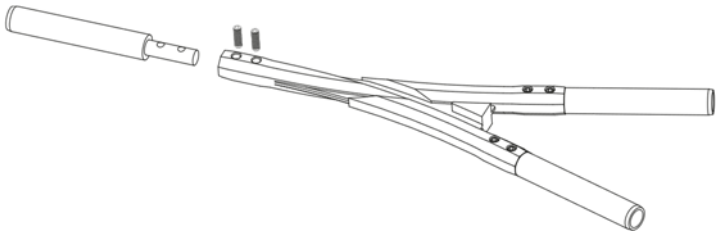
Y swapper must only be positioned between 2 arms above a platform, where the wire rope is not taut.

Must never be installed mid-range of an activity.



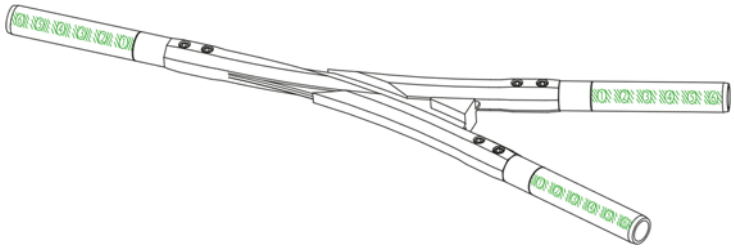
Instructions

1 - If you have not already done so, insert the 3 male ferrules into the female ends of the swapper, then screw in the 2 pre-glued STHC Ø5 screws for each ferrule.



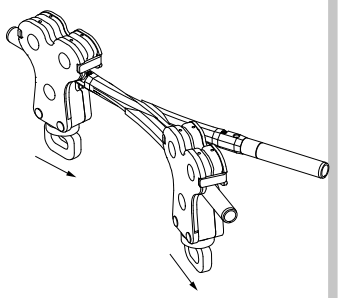
2 - Cut the wire ropes with clean cut and insert them into each ferrule until they stop. (account for some slack in the wire ropes), then crimp each of the 3 tubes as per the indicated order (from 1 to 6 as shown in the diagram below).

Only use those dies recommended by Koala Equipment with a crimping tool exerting a force of at least 120kN.

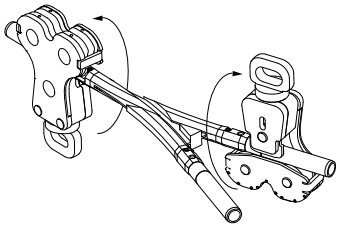


Operation

There are 2 ways of operating this type of swapper:



1- The user chooses to follow the way ahead in alignment with the Y swapper.
All he/she has to do is push his/her pulley normally (see diagram opposite).

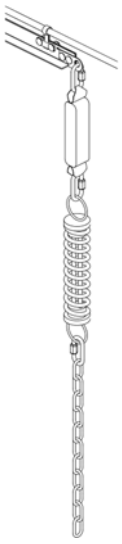


2- The user chooses to go the other way.
He/she must then rotate his/her pulley half a turn to the upside-down position, pass his/her pulley through the Y swapper in this position, then rotate it again once he/she has reached the chosen path (see diagram opposite).

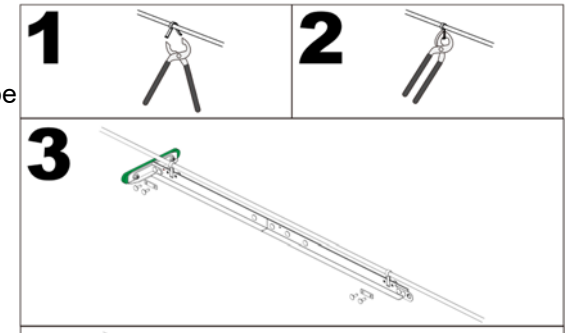
3.15 Installation and operation of the zip line brake with low attachment

Function of the device
The brake is used to stop a user at the end of the zip line. It can be used as a primary brake or a secondary brake.

Installation
The brake can be installed with Ø12 mm wire rope or ½" depending on the materials you have chosen.



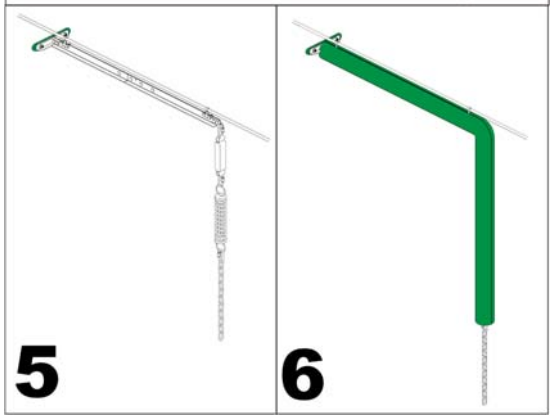
Instructions
1-2 - Install the bearing on the wire rope and tighten it using pliers.



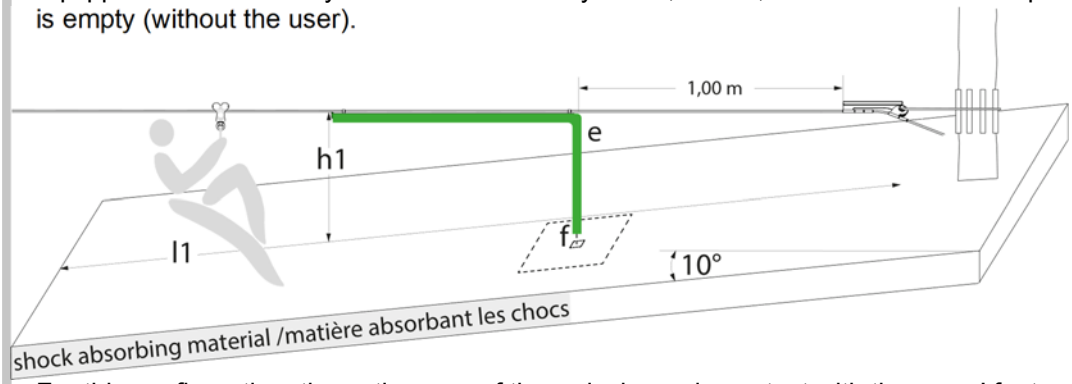
3-4 - Remove the 4 screws and the brake plates, then install the brake on the bearing and replace the plate and screws.

5 - Connect the brake to the chain, spring and absorber assembly.

6 – Install the mattress around the brake, absorber, spring and chain.



Attach the chain and energy absorber (e) to the arrival area, ensuring that your attachment point to the ground withstands at least 800daN.
The brake must be 1,00 m from the arm.
The height h1 must be calculated according to the length of the lanyards, the type of harness and the type of brake, primary or secondary. For example, with a sit harness equipped with 60 cm lanyards and a secondary brake, h1 = 1,40 m when the wire rope is empty (without the user).



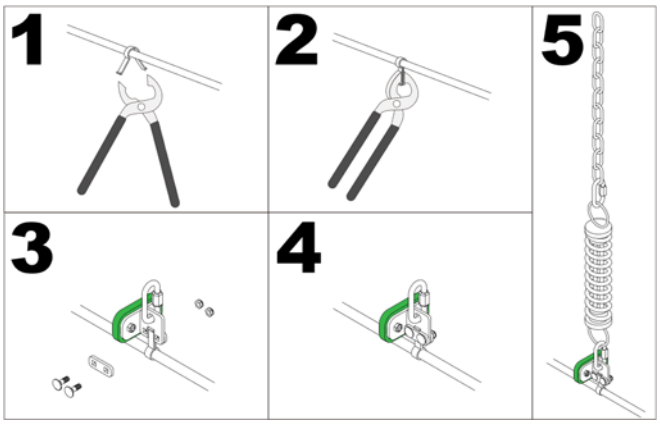
For this configuration, the entire area of the arrival area in contact with the users' feet must be able to absorb shocks (absorbent floor, mattress, etc.). The length l1 must be appropriate for the speed and weight of the users.

3.16 Installation and operation of the zip line brake with high attachment

Fonction of the device
The brake is used to stop a user on a tree-to-tree zip line arrival ramp. It can be used as a primary or secondary brake.

Installation
The brake can be installed with Ø12 mm wire rope or ½" depending on the materials you have chosen.

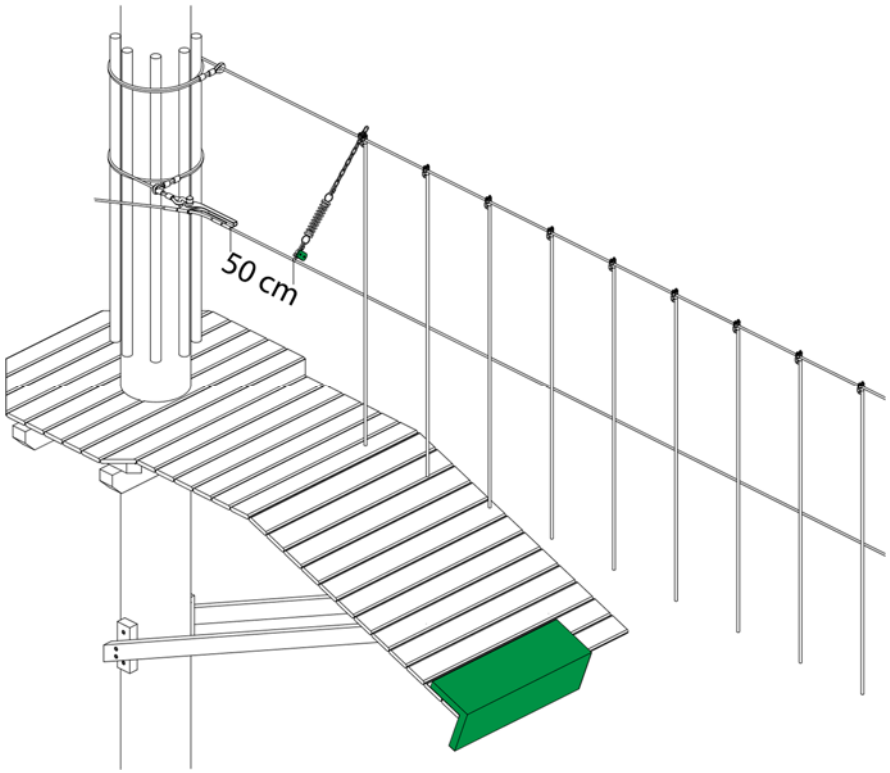
Instructions
1-2 - Install the bearing on the wire rope and tighten it using pliers.



3-4 - Remove the 2 screws and the brake plate, then install the brake on the bearing and replace the plate and screws.

5 - Secure the chain to the upper wire rope using two wire rope clips. Then connect the chain and spring to the brake.

The brake must be 50cm from the end of the zip line arm.



4. LIMITS OF USE OF THE LIFELINE

4.1 Number of people per activity

Adults should normally progress through the activities one by one but can accompany 1 child less than 1,40m /3,2ft tall.
Under exceptional circumstances (emergency manoeuvres) 3 people may be on one activity simultaneously (1 trained rescue instructor, 1 adult user, 1 child user less than 1,40m /3,2ft tall).

4.2 Number of people per platform

Normally, there should be no more than 3 people per platform.
Under exceptional circumstances (emergency manoeuvres) 4 people are tolerated simultaneously.

4.3 Maximum weight per user

Maximum weight = 140 kg / *309lbs* / *22 stones*

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5. INSPECTION CHECKS

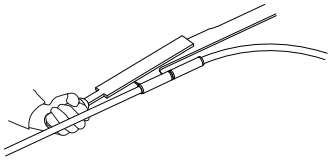
The point of these inspections is to detect any deterioration of the lifeline components which could cause dangerous situations for the users. In case of doubt, please refer to Koala Equipment or your fitter before opening the activity to the public.

5.1 Before each opening to the public

The instructor must do the course in order to carry out a visual inspection referring to the initial state of the course. The instructor must then record the findings on a daily log sheet.

The following points must be monitored:

a. Lifeline wire rope
- State (loose strands, breaks, etc.): pay particular attention to the wire rope around the arms and ferrules.
- Tension (visual check with reference to the original condition).
- Overload (ice, frost, branches, etc...).

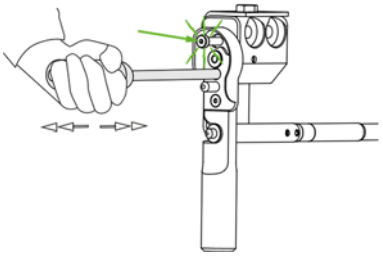


b. Arm sets : check the state of the arms, plates, and bolts. In case of any sharp edges, file them down.

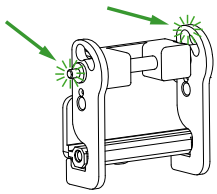
c. Arm supports: check the state of wire rope, shackle blockers, plates… and that the bolts are present and properly tightened.

d. Removable connecting ferrule: check the overall state, the state of the wire rope at the crimping point and ensure that the ferrule is not bent. Check that the screws are still in place and that they have not popped out.

e. Climb-up: check the inclination and ensure that they close automatically. Check the overall state of the wire rope and make sure the wire rope has not slipped. Make sure the energy absorber does not show any wear or tears.

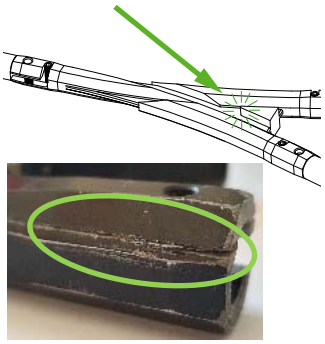


f. Switch Station
- Check the general state of the station and carry out a test run.
- Check that the station is securely fixed and that the fixing screws are in place.
- Inspect the state of the wire rope around the crimping area
- Ensure the screws are still in place on the removable ferrule and that they have not popped out.
- Check that the gate cannot open until the shuttle is not connected.
- Using a screwdriver or a pin, check that the lock works correctly (that there is no resistance when you push it and that it slides back).
- Check that the retaining screw (in green in the diagram) is not bended.



g. Switch Shuttle
- Check the general state of the shuttle and carry out a test run.
- Inspect the lanyard.
- Check that the gates cannot open without the shuttle being connected to the station.
- Check the state of wear on the shuttle gates as shown in the diagram opposite.

h. Mechanical swapper
- Check the general state of the swapper and carry out a test run to see if the pulley passes smoothly in both directions without being able to move out.
- Check that it is securely fixed and that the tube on the mobile part is aligned with those on the fixed body.
- Inspect the state of the wire rope around the crimping area, check the screws are still in place on the male ferrules and that they have not popped out.



i. Y Swapper

- Check the general state of the Y swapper and carry out a test run to ensure that the pulley passes smoothly in both directions without being able to move out (check the central ridge for wear and tear as shown in the diagram opposite).
- Check that the swapper is not bent
- Inspect the state of the wire rope around the crimping area, check the screws are still in place on the male ferrules and that they have not popped out.
- Check that the swapper is not cracked (as shown in the picture opposite).

j. Brake with high or low attachment

- Check that the rope /or chain that holds the brake is not damaged and correctly connected to the brake and to the arrival area.
- Check that the energy absorber has not become unstitched.
- Check that the rubber stop at the front of the brake and the protective foam are in a good condition and securely fastened.
- Check the half tubes for wear and tear and inspect the condition of the wire rope in the friction area.

Those sites showing damage or deterioration that could compromise user safety must be closed or sealed off until they have been repaired. Repairs must be noted in a maintenance task report.

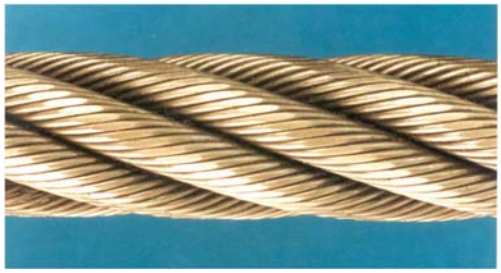
5.2 Functional inspection

Every 3 months a thorough inspection must be carried out covering all the points of the inspections carried out before each opening to the public, as well as an inspection of the entire wire rope.

Below are some examples of defects requiring wire rope replacement. All wire rope inspection and discarding criteria can be found in appendix C of the EN 15567-1 standard.

Localised increase in the wire rope diameter due to the core extruding

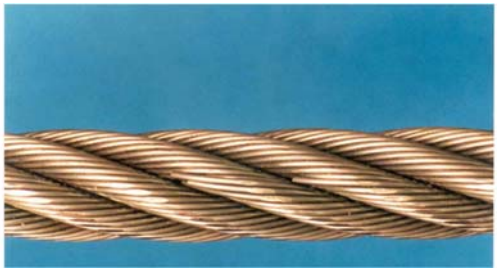
Twist in the wire rope



Outer wear

Broken wires on the surface

Localised reduction in the wire rope diameter (hollow strands)



Broken wires in the grooves

Those sites showing damage or deterioration that could compromise user safety must be closed or sealed off until they have been repaired. Repairs must be noted in a maintenance task report.

5.3 Detailed and annual inspection of installations

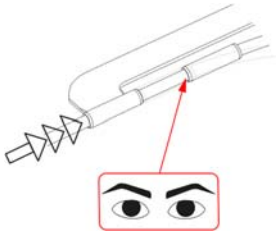
Every year, or in the event of severe weather, or when the forces exerted are too important, or in the event of misuse or vandalism, the course must be thoroughly checked.

The following points must be monitored:

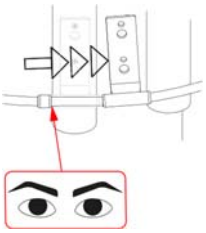
a. Lifeline wire rope: the wire rope must be inspected along its entire length. The criteria for inspecting and removing wire rope can be found in Appendix C of the EN 15567-1 standard.

Particular attention must be paid to the part of the wire rope where the ferrules are crimped:

- Slide the wire rope in the arms to inspect the inner part, and also inspect the wire rope at 2 ends of the crimped ferrules.



- If the wire rope doesn't slide smoothly into the metal brackets, dismantle the brackets to inspect the wire rope inside.



b. Arm sets: the arms must be inspected (deformation, condition of the welds)

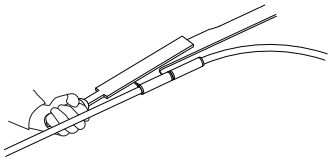
c. Arm supports: check the condition of the arm supports (wire rope, plates, maillons, bow shackles, etc.).

Those sites showing damage or deterioration that could compromise user safety must be closed or sealed off until they have been repaired.

Repairs must be noted in a maintenance task report.

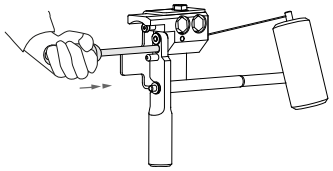
6. MAINTENANCE

6.1 Arm maintenance



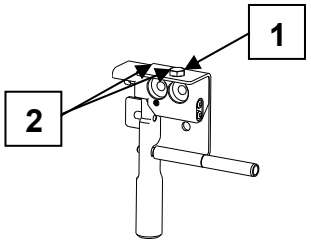
It is possible for a burr to form on the front of some arms, due to repeated shocks from the pulleys. This should be removed with a file, taking care not to damage the ferrule or the wire rope.

6.2 Switch station maintenance

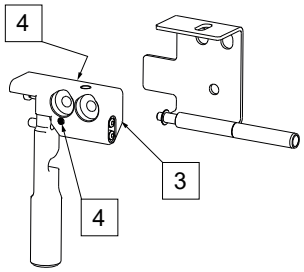


The stations must be greased regularly. To do so, press the lock with a screwdriver or a pin, and while you hold it pushed, inject white lithium grease onto the lock (as shown in the diagram opposite)

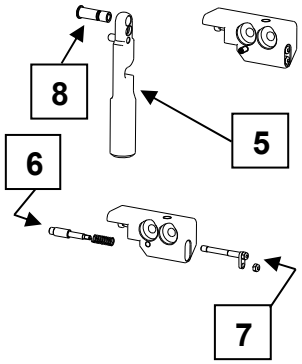
Once a year, or if the lubrication is no longer effective, you must completely dismantle the station to clean and grease it. To do this, follow the procedure below:



a - First dismantle the station cylinder by unscrewing the screw on top (1), and then unscrewing the 2 screws (2).



b - Remove the station cylinder (3), then loosen the 2 screws (4) on each side using a n°4 Allen key.

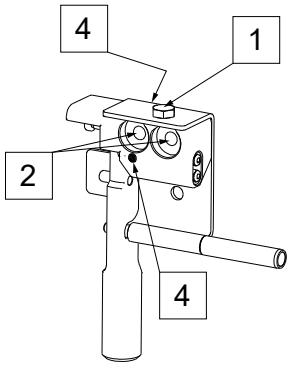


c - Remove the handle (5) and the handle axis (8).

d - Loosen the locking system by inserting a n°4 Allen key in the front (6) and a n°8 socket wrench 8 on the back (7).

e - Remove the axles, taking care not to lose the spring. Clean the 2 axles, the spring and the inside of the body bores with a clean cloth.

f - Regrease both axles and the bores and reassemble them.

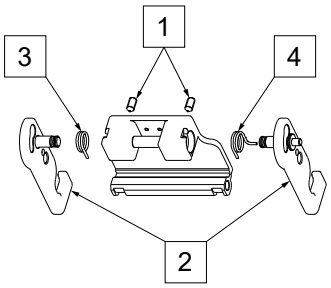


g - Clean, grease and reassemble the handle axis (8).

h - Reassemble the handle onto the station cylinder and tighten the 2 screws (4). These screws must be glued with Loctite threadlocker medium strength. Warning: these screws must come into contact with the handle axis without being tightened too tightly.

i - Reassemble the station cylinder on the body starting with the top screw (1) without tightening it. Then replace the 2 screws on the front face (2), tighten them, then tighten the top one.

j - Carry out an inspection as described in **5.1 – f.**



6.3 Switch shuttle maintenance

Once a year, or if they are broken, it is necessary to replace the springs and shuttle gates. To do so, first remove the screws (1) using a N°4 Allen key, take out the gates (2) and the springs (3 and 4). Be careful, there are left-hand and right-hand springs. Install the new springs and gates, and tighten the screws (1) using Loctite threadlocker medium strength.
Carry out an inspection as described in **5.1 – g.**

6.4 Maintenance of zip line brakes with high or low attachment

In case of wear or damage, you can change the bearings and/or rubber stops.

7. USER SAFETY BRIEF

The continuous belay system considerably improves user safety, especially with regard to the risk of falling from height. However, many other risks related to this activity remain. It is therefore essential that users are informed, before going on the course, on the proper use of the equipment and installations and the safety instructions that must be complied with during the activity.

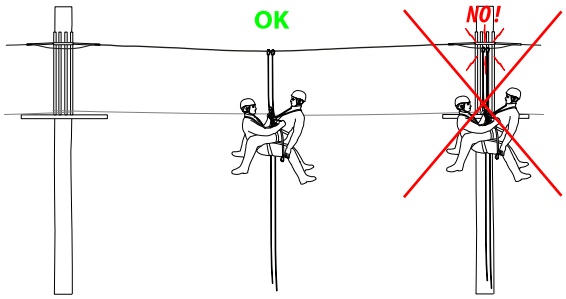
8. EVACUATION

Emergency manoeuvres, which imply disconnecting a user from the continuous belay system to evacuate them from the course, must be only carried out in serious cases of life-threatening distress. It is your responsibility to implement a specific evacuation procedure using suitable equipment to guarantee the safety of users and staff.

The system used must only be connected to the lifeline cable located above the activity.

NO !

Never connect the evacuation system between 2 arms, above platforms. Connect only above activities (see opposite).



9. WIRE ROPE LIFECYCLE

The continuous belay wire rope lifecycle is 4 years on average. This duration is an indication only, as numerous points must be taken into consideration such as: the number of users, the different types of installations and their condition, vandalism, wire rope fatigue depending on the activities and also weather conditions...Only regular inspections allow to detect signs of wear and tear or fatigue which may require replacing the wire rope. In some cases, the wire rope lifecycle can be as short as 1 day!
Wire rope inspection and discarding criteria can be found in appendix C of the EN15567-1 standard.

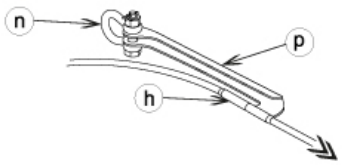
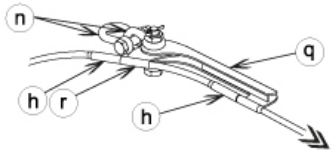
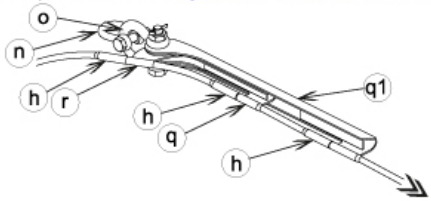
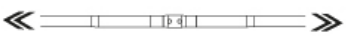
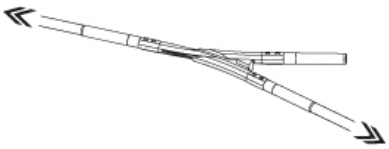
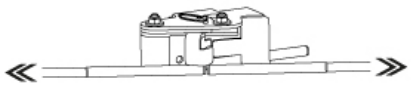
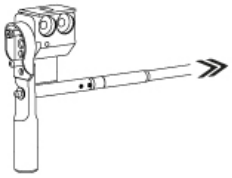
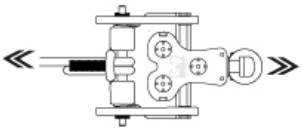
10. COMPLIANCY WITH THE EN 15567-1 STANDARD

For a course to be compliant with the EN 15567-1 standard, it is the owner's responsibility to have it checked by an independent control agency.

11. PPE INSPECTION AND FOLLOW-UP

All P.P.E. must be checked regularly to detect any deterioration of equipment likely to be a source of dangerous situations. Please therefore refer to the notices or leaflets provided by the manufacturers. If you require further information or have any doubts, please contact the equipment manufacturer.

12. TEST REPORT

Assemblages testés / ***Assembled parts tested***	Résultats / ***Results***
Bras d'activité / ***Activity arm*** 	**6 000 daN**
Bras de tyrolienne inférieure à 150 m / ***Zip line arm - under 150 m (500 feet)*** 	**10 000 daN**
Bras de tyrolienne supérieure à 150 m / ***Zip line arm - over 150 m (500 feet)*** 	**12 600 daN**
Olive de jonction / ***Connecting ferrule*** 	**2 970 daN**
Aiguillage Y / ***Y swapper*** 	**2 980 daN**
Aguillage mécanique / ***Mechanical swapper*** 	**1 400 daN**
Gare de Switch / ***Switch station*** 	**2 980 daN**
Navette de Switch / ***Switch shuttle*** 	**2 500 daN**