NIVIUK

TAKOO 4

User's manual

TAKOO 4

Tandem like never before

WELCOME

We wish to welcome you to our team and thank you for your confidence in our glider product line.

We would like to share the enthusiasm with which we created this wing and the importance and care we took in the design and manufacture of this new model in order to offer maximum pleasure on every flight with a Niviuk glider.

The one thing better than a good flight it is having someone to share it with.

The Takoo 4 is not only better than its predecessor, it is the most complete tandem ever created.
The fourth version of the model, the first of a new generation. Performance, accessibility and comfort are combined in a wing that adapts perfectly to the needs of each pilot.

We are confident that you will enjoy flying this wing and will soon understand the meaning of our name:
“The importance of small details”.

This is the user manual and we recommend you read it carefully.

The Nliviuk Team.

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USER MANUAL

This manual provides you with the necessary information on the main characteristics of your new TAKOO 4.

Whilst it provides information on the wing, it cannot be viewed as an instructional handbook and does not offer the training required to fly this type of paraglider.
Training can only be undertaken at a certified paragliding school and each country has its own system of licensing.
Only the aeronautical authorities of respective countries can determine pilot competence.

The information in this manual is provided in order to warn you against adverse flying situations and potential dangers.

Equally, we would like to remind you that it is important to carefully read all the contents of your new TAKOO 4 manual.

Misuse of this equipment could lead to severe injuries or death. The manufacturers and dealers cannot be held responsible for misuse of the paraglider. It is the responsibility of the pilot to ensure the equipment is used correctly.

SUMMARY

1. CHARACTERISTICS

1.1 WHO IS IT DESIGNED FOR?

A tandem researched and designed to offer the best experience for both professional and recreational flights.

A wing with performance at the highest professional level and at the same time, an accessibility and comfort that recreational pilots will fall in love with. The Takoo 4 is the first of a new generation where high performance for the professional and the comfort for the recreational pilot are combined to offer incredible adventures.

1.2 CERTIFICATION

The TAKOO 4 has been submitted for the European EN and LTF certification. All certification tests were performed at the Swiss testing house Air Turquoise. All sizes passed the mechanical stress, shock and flight tests without issues.

The mechanical stress test successfully passed the requirement to resits 8 g of force.

The shock test proved that he wing can resist 1000 daN of force.

The flight test resulted in the following certification for all TAKOO 4 sizes:

EN B
LTF B

The TAKOO 4 is a tandem wing and must only be flown/controlled by one of pilots at any time. The licence/qualification for tandem pilots is awarded by national associations and governing bodies.
We recommend that dual pilots have a great deal of experience and have completely mastered normal flight conditions.

We recommend that only pilots who are familiar with gliders of this certification or above fly this paraglider.

Only the aeronautical authorities of respective countries can determine pilot competence.

We recommend pilots read the flight test report carefully, especially the comments of the test pilot. The report contains all the necessary information on how the paraglider reacts during each of the tested manoeuvres.

It is important to note that different size wings will react differently during manoeuvres. Even within the same size, at maximum or minimum load, the behaviour and reactions of the wing may vary.

For further information on the flight test and the corresponding certification number, please see the final pages of this manual or see niviuk.com.

1.3 IN-FLIGHT BEHAVIOUR

Niviuk developed this wing by adopting very specific goals: to improve performance, excellent handling; to facilitate more control for the pilot.

To increase performance while maintaining the highest level of safety. To ensure that the wing transmits the maximum feedback in an understandable and comfortable way so that the pilot can focus on piloting and enjoying the flight. And, with smooth handling, take advantage of all favourable conditions.

In all aspects of flight, the wing is very solid and stable. The glide is smooth, even when fully accelerated. During glides, the wing maintains altitude and the wing remains stable. Improved turn precision means handling is less physical and provides better feedback. Inflating the wing is much easier and gentler, without overshooting.

Flying this wing is very intuitive, with clear and useful feedback about the airmass. It responds to the pilot's inputs effectively and even in turbulent conditions it remains stable and solid.

The TAKOO 4 flies efficiently. It enters thermals with sufficient speed to centre in the lift and climbs progressively. The handling is progressive and effective for even more flying pleasure under an exciting wing of extraordinary quality.

It is lightweight, even lighter in flight and easy to pilot, with outstanding turbulence buffering and a surprising range of speed for incredible glides.

A good start is as important as a happy ending. Its excellent loading and speed retention allow smooth and safe take offs and landings for both the pilot and the passenger.

1.4 CONSTRUCTION, MATERIALS

The TAKOO 4 has all the technological innovations used on other Niviuk gliders and is built with the most careful selection of current materials. It has all the current technology and accessories available to improve pilot comfort whilst increasing safety and performance.

In the design of all Niviuk products the team aims to ensure development and continuous improvement. The technologies developed in recent years have allowed us to develop greater, better wings. It is in this context that we would like to introduce the technologies included in this new model.

RAM Air Intake - this system is characterised by the arrangement of the air inlets, to ensure optimal maintenance of internal pressure. Thanks to this design, we were able to reduce their size, while maintaining the same air flow at all angles to improve laminar flow. More consistency across the whole speed range and better performance without compromising on safety.

Titanium Technology (TNT) – a revolutionary technique using titanium. Using Nitinol in the internal construction provides a more uniform profile and reduces the weight to gain efficiency in flight. Nitinol provides the highest level of protection against deformation, heat or breaks.

Structured Leading Edge (SLE) - provides more rigidity and stability along the span of leading edge but also allows full flexibility along the both the vertical and horizontal axis. A reduction in the amount of Mylar, in comparison to previous profiles, has resulted in less weight and easier launches.

3DP - an optimised process to cut the fabric panels to ensure the perfect form of the leading edge. Creating separate panels for each of the sections at the front of the wing means the sail fabric is more taut and crease-free. During the cutting, the optimal orientation of the fabric section is selected, depending on its final location. If the fabric pattern is properly aligned with the axes of load, it suffers less deformation after repeated use, to the long-term benefit of the leading edge.

3DL - adding an extra reinforced seam to the leading edge helps to ensure a more consistency and volume in the profile. Providing a more efficient 3D contour.

Structured Trailing Edge (STE) - optimises the profile without deforming it. The circulation of the air is more fluid, ensuring a cleaner airflow. When changing the angle of attack or when accelerated, the profile remains more uniform and the after braking, the wing returns to trim more progressively, faster and more actively.

Drag Reduction Structure (DRS) - the trailing edge has been reinforced with small ribs in order to distribute the pressure more evenly. This results in excellent manoeuvrability and greater control and precision.

Ear Lock System (ELS) - this improved big ear locking system provides a simple and effective solution for the tandem/dual pilot when quick

descents are required. ELS enables the pilot to pull and release big ears in one quick and simple action.

The use of these technologies is a big technological leap forward in building wings and a big improvement in flight comfort.

For the construction process of the TAKOO 4 we use the same criteria, quality controls and manufacturing processes as in the rest of our range. From Olivier Nef's computer to fabric cutting, the operation does not allow for even a millimetre of error. The cutting of each wing component is performed by a rigorous, extremely meticulous, automated computer laser-cutting robotic arm. This program also paints the guideline markers and numbers on each individual fabric piece, thus avoiding errors during this delicate process.

The jigsaw puzzle assembly is made easier using this method and optimises the operation while making the quality control more efficient. All Niviuk gliders go through an extremely thorough and detailed final inspection. The canopy is cut and assembled under strict quality control conditions facilitated by the automation of this process.

Every wing is individually checked with a final visual inspection.

The fabric used to manufacture the glider is light, resistant and durable. The fabric will not experience fading and is covered by our warranty.

By design it does not have a competition line set, which are much more vulnerable to premature wear, but durable lines which are also easier to sort.

All lines are made from Technora and Dyneema with a polyester sheathing.

The line diameter has been calculated depending on the workload and aims to achieve the required best performance with the least drag. The sheath protects the line cores from UV rays and abrasions.
The lines are semi-automatically cut to length and all the sewing is completed under the supervision of our specialists.
Every line is checked and measured once the final assembly is concluded.

Each glider is packed following specific maintenance instructions as recommended by the fabric manufacturer.

Niviuk gliders are made of premium materials that meet the requirements of performance, durability and certification that the current market demands.

Information about the various materials used to manufacture the wing can be viewed in the final pages of this manual.

1.5 ELEMENTS AND COMPONENTS

The TAKOO 4 is delivered with a series of accessories that will greatly assist you in the maintenance of your paraglider:

- A Kargo bag. This bag is large enough to hold all equipment comfortably and with plenty of space.

- An inner bag to protect the wing during storage and transport.

- An adjustable compression strap to compress the inner bag and reduce its volume.

- A repair kit with self-adhesive Ripstop tape in the same colour as the wing and spare parts to protect the maillons.

- Spreader-bars, soft or rigid 25cm/15cm.

2. UNPACKING AND ASSEMBLY

2.1 CHOOSING THE RIGHT LOCATION

We recommend unpacking and assembling the wing on a training hill or a flat clear area without too much wind and free of obstacles. It will help you to carry out all the recommended steps required to check and inflate the TAKOO 4.

We recommend that a qualified instructor is present to supervise the entire procedure, as only they can address any doubts in a safe and professional way.

2.2 PROCEDURE

We recommend unpacking and assembling the wing on a training hill or a flat clear area without too much wind and free of obstacles. It will help you to carry out all the recommended steps required to check and inflate the TAKOO 4.

We recommend that a qualified instructor is present to supervise the entire procedure, as only they can address any doubts in a safe and professional way.

2.3 CONNECTING THE HARNESS

The TAKOO 4 risers are colour-coded.

- right: green
- left: red

This colour-coding makes it easier to connect the wing to the correct side and helps prevent pre-flight errors.

Correctly connect the risers to the spreader bar attachment points so that the risers and lines are correctly ordered and free of twists. Check that the carabiners are properly fastened and securely locked.
Next, the pilot's harness and then the passenger's harness must be attached.

2.4 HARNESS TYPE

The TAKOO 4 was certified EN B when tested with harnesses which conformed to the following norms:

2. DV LuftGerPV §1, Nr. 7 c (LTF)
- European Standard EN926-2
- European Standard EN926-1

We recommend that both the pilot and passenger only use harness designed specifically for tandem flying.

2.5 TRIMMERS

The TAKOO 4 speed system is engaged when the trimmers are opened. The trimmers are situated on the D-riser. The efficiency of this new system provides a much wider range of speeds than was possible with the previous TAKOOs. To reduce speed, the trimmers must be

closed until they are adjusted to the desired speed. The travel of this acceleration system starts from the neutral position until the maximum speed, when it is fully opened and conversely, the same up to the neutral point when it is closed.

We recommend the trimmers are set in the neutral position during take off. However, sometimes the circumstances of the take off require releasing the trimmers to adjust the speed of the wing inflation. The greater distance the trimmers are released, the faster the wing will inflate and, consequently, the pilot will have to exert more control over the wing at this stage.

The whole TAKOO series stands out for allowing precise control in the launch phase and allowing the pilot to perform the launch run with complete control, either in nil-wind or without being “pulled” by the wind. Once in flight the pilot can adjust the trimmers to the required speed: slow = neutral trimmers / fast = trimmers open.

During landing, we recommend positioning trimmers in the first section of the travel.

However, the pilot must assess the conditions and adjust the trimmers for each landing. The TAKOO 4 always helps the pilot in this phase, allowing them to perform the landing manoeuvre with full control either using the neutral position or with the trimmers fully open.

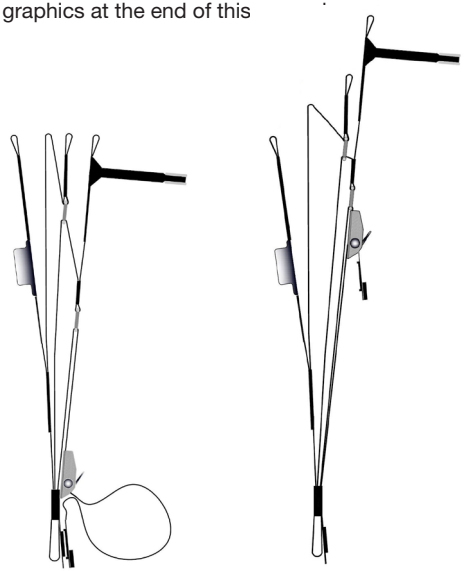
Using the trimmers:

The trimmers must be manually operated by the pilot. They are situated on both D-risers. To open the trimmers, press the trim tab inwards until the tape is released and them release the tab when the tape is in the chosen position. To close the trimmers, pull the tape down using the handle and release when you reach the required position.

The mechanisms of the trimmers are not visible, they covered in a protective neoprene sleeve. The neoprene sleeve is designed to avoid any tangles between lines and trimmers.
Once engaged, the trimmers must be set symmetrically. Along the travel of the tape there are 4 markings that allow the pilot to adjust the symmetry correctly and see the amount of travel used. A locking system is located at the end of the trim tape to ensure the surplus tape does not flap during flight.

The trimmers should not be used to steer the wing. The pilot should note that when releasing trimmers, the brake handle rises the same distance as the trimmers travel.

We recommend adjusting piloting during each flight according to the wing load and the travel of the trimmers used.
See also the graphics at the end of this



2.6 INSPECTION AND WING INFLATION ON THE GROUND

After your gear has been thoroughly checked and the weather conditions deemed favourable for flying, inflate your TAKOO 4 as many times as necessary to familiarise yourself with its behaviour. The TAKOO 4 inflates easily and smoothly. Excessive energy is not necessary and the wing will inflate with a little pressure from the body when you move forward. This may be assisted by using the A-lines. Do not pull on them; just accompany the natural rising movement of the wing. Once the wing is inflated to the overhead position, appropriate control with the brakes will be sufficient to hold it there.

2.7 ADJUSTING THE BRAKES

The length of the main brake lines are adjusted at the factory and conform to the length stipulated during certification. However, the length can be changed to adapt to the pilot's flying style.

The TAKOO 4 also has two additional connection points where you can set the height of the brake pulley. With 7 cm between them, this allows variation depending on the height of the pilot, type of harness or personal pilot preferences in terms of better handling, comfort and location of the brake handles. If necessary, move the attachment point from its location and fix it in the new one.

CAREFUL

To undertake this operation, the knot must be moved the same distance as the attachment point has been moved along the webbing. The two attachment points are marked at the factory.

If you then decide to change the length of the brake lines, untie the knot, slide the line through the brake pulley to the desired length, and re-tie the knot so that it is tight. Only qualified personnel should carry out this adjustment. You must ensure that the modification does not affect the trailing edge and slow the glider down without pilot input. Both brake lines should be symmetrical and of the same length. We recommend using a clove hitch or bowline knot.

3. THE FIRST FLIGHT

3.1 CHOOSING THE RIGHT LOCATION

For the first flight we recommend going to your usual flying area and that a qualified instructor is present and supervising the entire procedure.

3.2 PREPARATION

Repeat the procedures detailed in chapter 2 UNPACKING AND ASSEMBLY to prepare your equipment.

3.3 FLIGHT PLAN

Planning a flight before taking off to avoid possible problems later is always a good idea.

3.4 PRE-FLIGHT CHECK

Once ready, but before taking off, conduct another equipment inspection. Conduct a thorough visual check of your gear with the wing fully open, the lines untangled and properly laid out on the ground to ensure that all is in working order. Be certain the weather conditions are suited to your flying skill level.

3.5 WING INFLATION, CONTROL AND TAKEOFF

The TAKOO 4 comes up easily, without requiring additional energy, and does not overfly you. It is a straight-forward exercise, leaving enough time for you to decide whether to accelerate and take off or not.

Note that the wing will take the load immediately, facilitating an easy take off.

If the wind permits, we recommend a reverse launch, as this allows a better visual inspection of the wing during inflation. In “strong” winds, the TAKOO 4 is especially easy to control using this launch technique. Winds of 25 to 30 km/h are considered strong for paragliding.

Choose an appropriate location facing the wind. Position the TAKOO 4 in a crescent configuration to facilitate inflation. A clean wing layout will ensure a trouble-free take off.

3.6 LANDING

The TAKOO 4 lands excellently, it converts the wing speed into lift at your demand, allowing an enormous margin of error. Wrapping the brake lines around your hand to get greater braking efficiency is not necessary.

With the TAKOO 4, the final part of each flight, the landing, has been made as simple as possible. The TAKOO 4 absorbs the speed in order to allow you a perfect landing, even on days with nil wind.

3.7 PACKING

The TAKOO 4 has a complex leading edge, manufactured using a variety of different materials and it must be packed carefully. A correct folding method is very important to extend the useful life of your paraglider.

It should be concertina-packed, with the leading edge reinforcements flat and the flexible rods stacked one on top of the other. This method will keep the profile in its original shape and protect the integrity of the wing over time. Make sure the reinforcements are not bent or folded. It should not be folded too tightly to avoid damage to the cloth and/or lines.

At Niviuk we have designed the NKare Bag, a bag designed to assist you with rapid packing which helps maintain the integrity of the leading edge and its internal structures in perfect condition.

Or for safety and ease, you can use the Koli-PRO, for quick-packing and fast turn around with clients.

4. IN FLIGHT

We recommend that you read the certification test report. The report contains all the necessary information on how the TAKOO 4 reacts during each of the tested manoeuvres.

It is important to point out that the appropriate response to each adverse manoeuvre can vary from size to size; even within the same size at maximum or minimum load the behaviour and reactions of the wing may vary.

Having the knowledge that the testing house provides through the test report is fundamental to learning how to deal with possible situations.

To become familiar with the manoeuvres described below, we recommend practising within the auspices of a licensed training outfit.

4.1 FLYING IN TURBULENCE

The TAKOO 4 has an excellent profile to deal with incidents; it is very stable in all conditions and has a high degree of passive safety, even in turbulent conditions.

All paragliders must be piloted for the prevailing conditions and the pilot is the ultimate safety factor.

We recommend active flying in turbulent conditions, always taking measures to maintain control of the wing, preventing it from collapsing and restoring the speed required by the wing after each correction.

Do not correct the glider (braking) for too long in case this provokes a stall. Whenever necessary, control a situation, react to it and then re-establish the required speed.

4.2 POSSIBLE CONFIGURATIONS

To become familiar with the manoeuvres described below, we recommend practising within the environment of a competent training outfit. The pilot must adapt their use of the brakes depending on the wing-loading and avoiding over-steering.

It is important to note that the type of reaction to a manoeuvre can vary from one size of wing to another and even within the same size the behaviour and reactions may be different depending on the wing-loading.

In the test report, you will find all the necessary information on how to handle your new wing during each of the tested manoeuvres. Having this information is crucial to know how to react during these manoeuvres in real flight, so you can deal with these situations as safely as possible.

Asymmetric collapse
In spite of the TAKOO 4's profile stability, strong turbulent air may cause the wing to collapse asymmetrically in very strong turbulence, especially if the pilot is unable to fly actively and prevent the collapse. In this case the glider conveys a loss of pressure through the brake lines and the harness. To prevent the collapse from happening, pull the brake handle corresponding to the affected side of the wing. It will increase the incidence of the wing (angle of attack). If the collapse does happen, the TAKOO 4 will not react violently, the turning tendency is gradual and easily controlled. Weight-shift toward the open, flying side (the opposite side of the collapse) to keep the wing flying straight, while applying light brake pressure to that side if necessary. Normally, the collapsed side of the wing should then recover and reopen by itself. If it does not, then pull the brake handle on the collapsed side decisively and quickly all the way (100%) down. You may have to repeat this pumping action to provoke the re-opening of the deflated glider side. Do not over-brake or slow down the flying side of the wing (control the turn). Once the collapsed side is open make sure you return to the default flying speed.

Frontal collapse
Due to the TAKOO 4's design, in normal flying conditions frontal collapses are extremely unlikely. The wing's profile has great buffering abilities when dealing with extreme incidence changes. A frontal collapse may occur in strong turbulent conditions, entering or exiting powerful thermals or when lacking experience using the accelerator/ speed-bar without adapting to the prevailing conditions. Frontal collapses usually re-inflate without the glider turning, but a symmetrically applied quick braking action with a quick deep pump of both brakes will accelerate the re-inflation if necessary. Release the brake lines immediately to return to default glider air speed.

Negative spin
A negative spin does not conform to the TAKOO 4's, normal flight behaviour. Certain circumstances however, may provoke a negative spin (such as trying to turn when flying at very low air speed whilst applying a lot of brake). It is not easy to give any specific recommendation about this situation other than quickly restoring the wing's default air speed

and angle of attack by progressively reducing the tension on the brake lines. The normal wing reaction will be to have a lateral surge on the re-accelerated side with a rotation not greater than 360º before returning to default air speed and a straight flight path trajectory.

Parachutal stall
The possibility of entering or remaining in a parachutal stall have been eliminated from the TAKOO 4. A parachutal stall is virtually impossible with this wing. If it did enter into a parachutal stall, the wing loses forward motion, becomes unstable and there is a lack of pressure on the brake lines, although the canopy appears to be fully inflated. To regain normal air speed, release brake line tension symmetrically and manually push on the A-lines or weight-shift your body to any side WITHOUT PULLING ON THE BRAKE LINES.

Deep Stall
The possibility of the TAKOO 4 stalling during normal flight is very unlikely. It could only happen if you are flying at a very low air speed, whilst over-steering or performing dangerous manoeuvres in turbulent air.

To provoke a deep stall, the wing has to be slowed down to its minimum air speed by symmetrically pulling the brake lines all the way (100%) down until the stall point is reached and held there. The glider will first pitch rearward and then reposition itself overhead, rocking slightly, depending on how the manoeuvre was done.

When entering a stall, remain clear-headed and ease off the brake lines until reaching the half-way point of the total the brake travel. The wing will then surge violently forward and could reach a point below the pilot. It is most important to maintain brake pressure until the glider has returned to its default overhead flying position.

To resume normal flight conditions, progressively and symmetrically release the brake line tension to regain air speed. When the wing reaches the overhead position, the brakes must be fully released. The wing will then surge forward to regain full air speed. It is important not to use too much brake at that moment, since the paraglider needs to regain speed to exit the stall. If you have to control a possible frontal collapse, briefly pull both brake handles down to bring the wing back up and release them immediately while the glider is still in transition to reposition itself overhead.

Cravat
A cravat may happen after an asymmetric collapse, when the end of the wing is trapped between the lines. Depending on the nature of the tangle, this situation could rapidly cause the wing to spin. The corrective manoeuvres to use are the same as those applied in case of an asymmetric collapse: control the turn/spin by applying tension on the opposite brake and weight shift opposite to the turn. Then locate the stabilo line (attached to the wing tip) trapped between the other lines. This line has a different colour and is located on the outside position of the C-riser.

Pull on this line until it is taught, as it should help undo the cravat. If ineffective, fly down to the nearest possible landing spot, controlling the direction with both weight shift and the use of the brake opposite to the tangled side. Be cautious when attempting to undo a tangle while flying near terrain or other paragliders; it may not be possible to continue on the intended flight path.

Over-controlling
Most flying problems are caused by wrong pilot input, which then escalates into a cascade of unwanted and unpredicted incidents. We should note that the wrong inputs can lead to loss of control of the glider. The TAKOO 4 was designed to recover by itself in most cases. Do not try to over-correct it!
Generally speaking, the reactions of the wing, which are caused by too much input, are due to the length of time the pilot continues to over–control the wing. You have to allow the glider to re-establish normal flying speed and attitude after any type of incident.

4.3 ACELLERATED FLIGHT

The TAKOO 4 profile was designed for stable flight throughout its entire speed range. Open trimmers can be used in strong winds or significant sink.

When accelerating the wing, the profile becomes more sensitive to turbulence and closer to a possible frontal collapse. If a loss in internal wing pressure is felt, tension on the trimmers should be reduced to a minimum and a slight pull on the brake lines is recommended to increase the wing's incidence angle. Remember to re-establish the air speed after correcting the angle of attack.

It is NOT recommended to open the trimmers near obstacles or in very turbulent conditions. If necessary, constantly adjust the movements and pressure on the speed-bar whilst doing the same to the brake lines. This balance is considered to be 'active piloting'.

4.4 FLYING WITHOUT BRAKE LINES

If, for any reason at all, the TAKOO 4's brake lines become disabled in flight, it will become necessary to pilot the wing with the D-risers and weight shifting until landing. The D-lines steer easily because they are not under much tension, however you will need to be careful and not handle them too heavily in case this causes a stall or negative spin. The wing must be flown at full speed during the landing approach, and the D-risers will have to be pulled symmetrically all the way down shortly before contact with the ground. This braking method is not as effective as using the brake lines, and hence the wing will land with a higher ground speed.

4.5 LINE KNOT(S) IN FLIGHT

The best way to avoid knots and tangles is to thoroughly inspect the lines as part of a systematic pre-flight check. If a knot is spotted during the take off phase, immediately abort the launch sequence and stop.

If inadvertently taking off with a knotted line, the glider drift will need to be compensated by weight-shifting to the opposite side of the wing and applying a slight brake pull to that side. Gently pull the brake line to see if the knot can be undone or try to locate the problem line. Try pulling it to see if the knot can be undone. Beware of trying to clear a knotted line or untangle a line in flight when close to the terrain. If the knot is too tight and cannot be undone, carefully and safely fly to the nearest landing zone. Be careful: do not pull too hard on the brake handles because there will be an increased risk of stalling the wing or entering a negative spin. Before attempting to clear a knot, make sure there are no other pilots flying in the vicinity.

5. LOSING ALTITUDE

Knowledge of different descent techniques could become vital in certain situations. The most suitable descent method will depend on the particular situation.

To become familiar with the manoeuvres described below, we recommend practising within the environment of a competent training outfit.

5.1 EAR LOCK SYSTEM

Big ears is a moderate descent technique, with a normal descent rate of -3 a -4 m/s.

The angle of attack and effective wing-loading will also increase due to the smaller surface area of the wing. When ears are applied the ground speed will be reduced by 3 to 5 km/h and in order to maintain this descent technique, the pilot must physically hold in the ears.

On a solo glider, it is only possible to steer using weight-shift once ears have been pulled. On a tandem wing, although it is possible to steer with the help of the passenger, in most cases, when required, this

is insufficient. For this reason NIVIUK have improved the EAR LOCK SYSTEM, which we already used in the first TAKOO.

The TAKOO 4 comes with the EAR LOCK SYSTEM (ELS) as standard. In a simple and effective way, this improved system for pulling big ears assists the tandem pilot when performing this descent technique. This innovation makes pulling or releasing ears simple, fast and easy. ELS enables the pilot to pull and release the ears as desired.

ELS gives full steering control to the pilot with the ears applied.

ELS lets the pilot use the ears as long as necessary with no physical effort at all.

ELS allows the pilot to use the trimmers without concern or restriction.

ELS locks in the ears and prevents accidental opening.

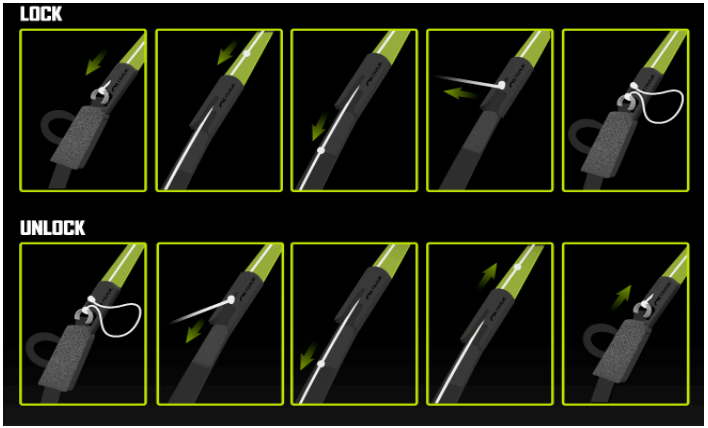
ELS does not impede the conventional application of ears.

The ELS system can easily be removed without affecting the rest of the equipment.

To use the EAR LOCK SYSTEM simply pull the ear lock line downward until the knot passes through the ELS (lock system); then move it slightly horizontally forward, locking the knot in the V groove. To release, pull the ear lock line down and release the knot from the V groove. Then guide it vertically as it goes upward and back through the ELS (Lock System) It is better to release the two ears separately (asymmetrically).

To perform big ears as a descent manoeuvre in the classic way, take the external A-line on both sides, as high as possible and pull them downward and outward. The wingtips will fold in. To release the ears, release the lines and they will reopen by without assistance. If this does not happen, brake progressively on one side and then the other.

Asymmetric reopening is recommended in order to avoid compromising the angle of attack, particularly flying near the ground.



5.2 B-LINE STALL

During this manoeuvre, the wing ceases to fly, it has no horizontal speed and the pilot has no control over the paraglider.

The airflow over the profile is interrupted and the wing enters a situation similar to a parachutal stall.

To enter this manoeuvre, the B-risers are gripped below the maillons and symmetrically pulled down together (approx. 20-30 cm) and maintained in that position.

Initiating the manoeuvre is physically demanding because it can take some strength to pull the risers down until the wing is deformed. After this, the physical effort is less. Continue to hold the risers in position. Once the wing is deformed, its horizontal speed will drop to 0 km/h;

vertical descending speed increases to –6 to –8 m/s, depending on the conditions and how the manoeuvre is performed.

To exit the manoeuvre, simultaneously release both risers. The wing will then slightly surge forward and automatically return to normal flight. It is better to let go of the lines quickly rather than slowly.

This is an easy descent technique to perform, but remember that the wing will stop flying, will lose all forward horizontal speed, and its reactions will change markedly when compared to a normal flight configuration.

Without the active collaboration of the passenger, this manoeuvre is difficult to execute on a tandem wing due to the force required.

5.3 SPIRAL DIVE

This is a more effective way to rapidly lose altitude. Beware that the wing will experience and be subjected to a tremendous amount of descending and rotating speed (g-force), which can cause a loss of orientation and consciousness (blackout). This manoeuvre must therefore be done gradually to increase one's capacity to resist the g-force exerted on the body. With practise, you will fully appreciate and understand it. Only practise this manoeuvre at high altitude and with enough ground clearance.

To start the manoeuvre, first weight shift and pull the brake handle located on the inner side of the turn. The intensity of the turn can be controlled by braking slightly using the outer brake handle.

A paraglider flying at its maximum rotating speed can reach –20 m/s, or the equivalent of a 70 km/h vertical descent, and will stabilise in a spiral dive from 15m/s onwards.
Good enough reasons to familiarise yourself with the manoeuvre and understand how to exit it.

To exit this manoeuvre, the inner brake handle (down side of the turn) must progressively be relaxed while momentarily applying tension to the outer brake handle opposite to the turn. The pilot must also weight shift and lean towards the opposite side of the turn at the same time.

The exit should be performed gradually and smoothly so that the changes in pressure and speed can be noted.

When exiting the spiral, the glider will briefly experience an asymmetrical acceleration and dive, depending on how the manoeuvre was carried out.

Perform these actions with sufficient height, moderately and with the consent of the passenger...

5.4 SLOW DESCENT TECHNIQUE

This technique allows descent without straining the wing or taxing the pilot. Glide normally while searching for descending air and begin to turn as if climbing in a thermal, but with the intention to sink.

Common sense has to be used to avoid dangerous areas of rotor when looking for descending air. Safety is the most important consideration.

6. SPECIAL METHODS

6.1 TOWING

The TAKOO 4 does not experience any problem whilst being towed. Only qualified winch personnel should handle the certified equipment to carry out this operation. The wing must be inflated similarly as during a normal takeoff.

It is important to use the brakes to correct the flight path alignment, especially if the glider begins to turn. Since the wing is subject to a slow airspeed and with a high positive angle of attack, we must make any

corrections with a high degree of feel and delicacy, in order to avoid a stall.

6.2 ACROBATIC FLIGHT

Although the TAKOO 4 was tested by expert acrobatic pilots in extreme situations, it was not designed for it. We do not recommend using this glider for acrobatic flying!!!

We consider acrobatic flights to be any form of piloting different than standard flights. Learning acrobatic manoeuvres should be conducted under the supervision of qualified instructors within a school environment and over water with all safety/rescue elements in place. Centrifugal forces as high as 4 to 5 g can be exerted on the body and wing during extreme manoeuvres.

7. CARE AND MAINTENANCE

7.1 MAINTENANCE

Careful maintenance of your equipment will ensure continued top performance. Apart from the general checks, we recommend actively maintaining your equipment.

A pre-flight check is obligatory before each flight.

If there is any damage to the equipment, you should inspect it and act accordingly.

Niviuk we are firmly committed to make technology accessible to all pilots. For this reason all our wings are fitted with the latest innovations. Thanks to our innovative technologies, the wing has more safety and performance, but this means being more careful with the material.

A hard impact of the leading edge against a hard surface can damage the sail cloth. All incidents involving the leading edge should be reviewed. If any Nitinol rod is damaged, they are easily replaceable.

The fabric and the lines do not need to be washed. If they become dirty, clean them with a soft damp cloth, using only water. Do not use detergents or other chemicals.

If your wing is wet from contact with water, place it in a dry area, air it and keep it away from direct sunlight.

Direct sunlight may damage the wing's materials and cause premature aging. After landing, do not leave the wing exposed to the sun. Pack it properly and stow it away in its backpack.

If flying in a sandy environment, and sand has accumulated inside the wing, remove it before packing it away. The apertures at the wingtips facilitate easy removal of objects from the trailing edge.

If your wing is wet from contact with salt water, immerse it in fresh water and dry it away from direct sunlight.

7.2 STORAGE

It is important for the wing to be correctly folded when stored. Keep it in the in a cool, dry place away from solvents, fuels, oils.

Do not leave the gear inside a car boot, as cars left in the sun can become very hot. A rucksack can reach temperatures up to 60ºC. Weight should not be laid on top of the equipment.

It is very important to pack the wing correctly before storage.

It is essential that the wing is properly folded and packed. In case of long-term storage it is advisable, if possible, that the wing is not compressed and it should be stored loosely without direct contact with

the ground. Humidity and heating can have an adverse effect on the equipment.

7.3 CHECKS AND INSPECTION

Inspections
The TAKOO 4 must be periodically serviced. An inspection must be scheduled every 100 flying hours or every two years whichever comes first (EN/LTF norm) from the first use date.

We strongly recommend that any repairs should be done in a specialist repair shop by qualified personnel. This will guarantee the airworthiness and continued certification of your TAKOO 4.

A thorough pre-flight check must be performed before every flight.

7.4 REPAIRS

If the case of small tears, you can temporarily repair these by using the Ripstop tape included in the repair kit, as long as no stitching is required to mend the fabric.

Any other tears or repairs should be done in a specialist repair shop by qualified personnel.

Damaged lines must be repaired or exchanged immediately.

Please refer to the line plan at the end of this manual.

Any repair should be done in a specialist repair shop by qualified personnel.

Niviuk can not be held responsible for any damage caused by incorrect repairs.

8. SAFETY AND RESPONSIBILITY

It is well known that free-flying with a paraglider is considered a high-risk sport, where safety depends on the person who is practicing it.

Incorrect use of this equipment may cause severe, life-changing injuries to the pilot, or even death. Manufacturers and dealers cannot be held responsible for your decisions, actions or accidents that may result from participating in this sport.

You must not use this equipment if you have not been properly trained to use it. Do not take advice or accept any informal training from anyone who is not properly qualified as a flight instructor.

9. GARANTEE

The equipment and components are covered by a 2-year warranty against any manufacturing defect.

The warranty does not cover misuse of the equipment.

10. TECHNICAL DATA

10.1 TECHNICAL DATA

TAKOO 4			**39**	**42**	**44**
CELLS	NUMBER		55	55	55
	CLOSED		6	6	6
	BOX		29	29	29
FLAT	AREA	M2	38,5	41	44
	SPAN	M	14,55	15,02	15,55
	ASPECT RATIO		5,5	5,5	5,5
PROJECTED	AREA	M2	32,65	34,77	37,32
	SPAN		11,62	11,98	12,42
	ASPECT RATIO		4,13	4,13	4,13
FLATTENING		%	15	15	15
CORD	MAXIMUM	M	3,31	3,41	3,54
	MINIMUM		0,83	0,85	0,88
	AVERAGE		2,65	2,73	2,83
LINES	TOTAL METERS	M	366	378	392
	HEIGHT	M	8,66	8,94	9,26
	NUMBER		266	266	266
	MAIN		3/3/3/2	3/3/3/2	3/3/3/2
RISERS	NUMBER	4	A/B/C/D	A/B/C/D	A/B/C/D
	TRIMS	M/M	100	100	100
	ACCELERATOR	M/M	NO	NO	NO
TOTAL WEIGHT	MINIMUM	KG	110	120	140
IN FLIGHT	MAXIMUM	KG	190	220	240
GLIDER WEIGHT		KG	7,1	7,4	7,8
CERTIFICATION	EN		B	B	B

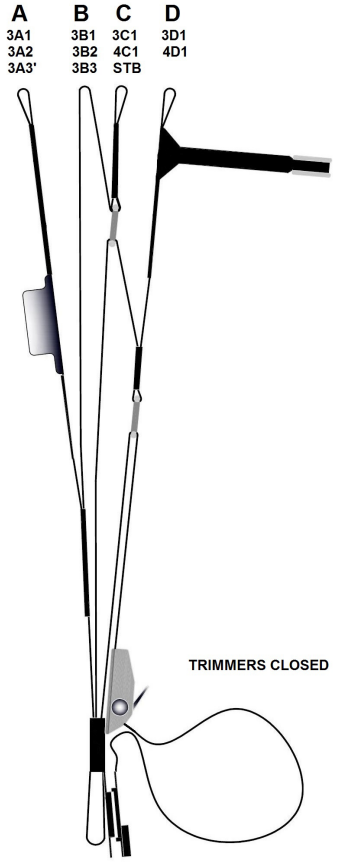
10.2 MATERIALS DESCRIPTION

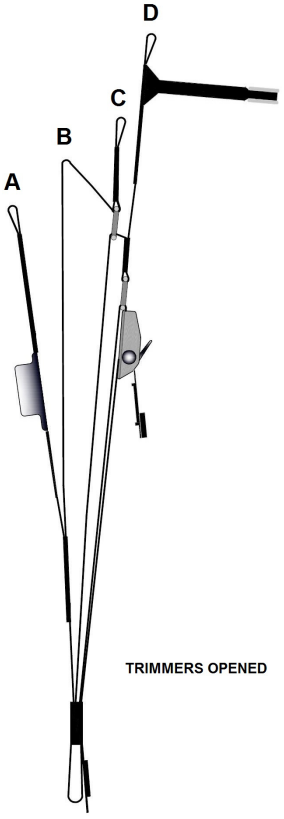
CANOPY	FABRIC CODE	SUPPLIER
UPPER SURFACE	9017 E25	PORCHER IND (FRANCE)
BOTTOM SURFACE	70032 E3W	PORCHER IND (FRANCE)
PROFILES	9017 E29	PORCHER IND (FRANCE)
DIAGONALS	9017 E29	PORCHER IND (FRANCE)
LOOPS	LKI - 10	KOLON IND. (KOREA)
REIFORCEMENT LOOPS	W-420	D-P (GERMANY)
TRAILING EDGE REIFORCEMENT	MYLAR	D-P (GERMANY)
RIBS REIFORCEMNET	LTN-0.8/1 STICK	SPORTWARE CO.CHINA
THREAD	SERAFIL 60	AMAN (GERMANY)

SUSPENSION LINES	FABRIC CODE	SUPPLIER
UPPER CASCADES	DC - 40	LIROS GMHB (GERMANY)
UPPER CASCADES	DC - 60	LIROS GMHB (GERMANY)
UPPER CASCADES	DC - 100	LIROS GMHB (GERMANY)
UPPER CASCADES	PPSL - 120	LIROS GMHB (GERMANY)
UPPER CASCADES	PPSL - 120	LIROS GMHB (GERMANY)
MIDDLE CASCADES	PPSL - 120	LIROS GMHB (GERMANY)
MAIN	TNL - 140	TEIJIM LIMITED (JAPAN)
MAIN	TNL - 220	TEIJIM LIMITED (JAPAN)
MAIN	TNL - 280	TEIJIM LIMITED (JAPAN)
MAIN	TNL - 400	TEIJIM LIMITED (JAPAN)
MAIN BREAK	TNL - 400	TEIJIM LIMITED (JAPAN)
THREAD	SERAFIL 60	AMAN (GERMANY)

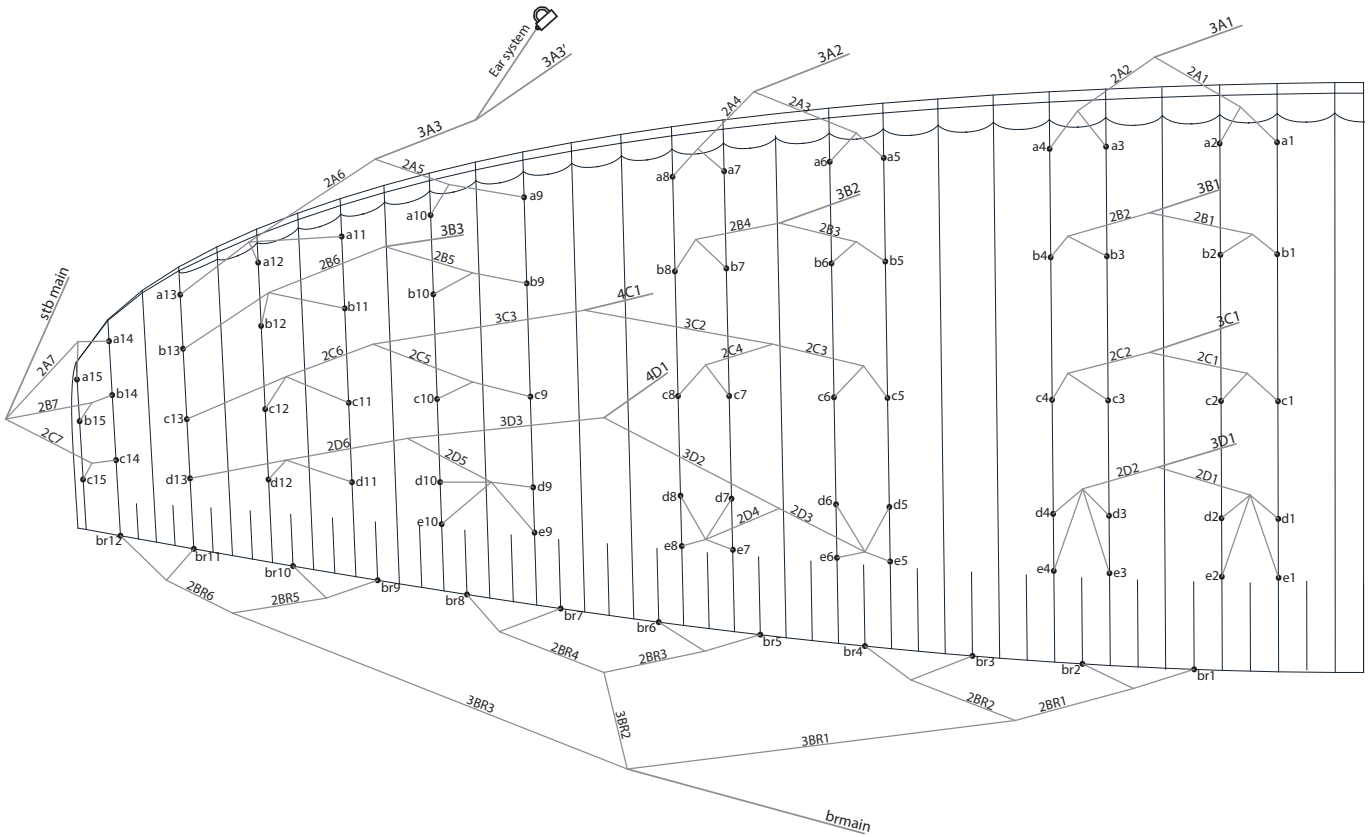
RISERS	FABRIC CODE	SUPPLIER
MATERIAL	G-R 22	TECNI SANGLES (FRANCE)
COLOR INDICATOR	PAD	TECNI SANGLES (FRANCE)
THREAD	V138	COATS (ENGLAND)
MAILLONS	MRI4	ANSUNG PRECISION (KOREA)

10.3 RISERS PLAN





10.4 SUSPENSION PLAN



10.5 DIMENSIONS TAKOO 4 39

LINES HEIGHT + RISER m/m

	A	B	C	D	E	br
1	8611	8503	8567	8699	8771	9044
2	8567	8460	8494	8612	8689	8840
3	8532	8428	8463	8579	8653	8694
4	8545	8442	8509	8640	8702	8758
5	8501	8402	8596	8692	8759	8482
6	8452	8354	8485	8571	8639	8266
7	8402	8313	8360	8438	8500	8197
8	8409	8326	8354	8447	8496	8288
9	8316	8235	8252	8328	8379	8139
10	8186	8112	8185	8280	8316	7983
11	8095	8033	8181	8332		7906
12	7989	7942	8193	8368		7960
13	7983	7954	8322	8531		
14	7659	7615	7676			
15	7578	7570	7653			

RISERS LENGHT m/m

	A	B	C	D	
	350	350	350	350	STANDARD
	480	375	400	450	TRIMMER OPENED

10.6 DIMENSIONS TAKOO 4 42

LINES HEIGHT + RISER m/m

	A	B	C	D	E	br
1	8887	8775	8842	8978	9051	9352
2	8842	8731	8766	8888	8967	9141
3	8807	8701	8736	8855	8932	8989
4	8821	8716	8784	8918	8983	9053
5	8778	8676	8875	8974	9043	8767
6	8727	8626	8762	8849	8919	8543
7	8676	8583	8632	8712	8777	8470
8	8684	8598	8626	8722	8773	8563
9	8582	8498	8521	8601	8654	8417
10	8448	8372	8452	8552	8589	8255
11	8355	8285	8436	8587		8174
12	8246	8192	8449	8624		8228
13	8240	8204	8582	8793		
14	7911	7866	7928			
15	7827	7819	7905			

RISERS LENGHT m/m

	A	B	C	D	
	350	350	350	350	STANDARD
	350	375	400	450	TRIMMER OPENED

10.7 DIMENSIONS TAKOO 4 44

LINES HEIGHT + RISER m/m

	A	B	C	D	E	br
1	9208	9091	9161	9301	9377	9672
2	9161	9046	9083	9208	9290	9456
3	9127	9016	9053	9175	9254	9301
4	9141	9032	9103	9241	9308	9371
5	9091	8982	9198	9302	9374	9053
6	9044	8939	9081	9173	9246	8824
7	8992	8895	8949	9032	9098	8752
8	8995	8901	8943	9042	9095	8851
9	8897	8811	8836	8917	8972	8728
10	8758	8680	8764	8866	8905	8562
11	8649	8576	8749	8905		8481
12	8550	8495	8763	8944		8539
13	8521	8483	8902	9119		
14	8203	8156	8221			
15	8117	8108	8197			

RISERS LENGHT m/m

	A	B	C	D	
	350	350	350	350	STANDARD
	350	375	400	450	TRIMMER OPENED

10.8 CERTIFICATION SPECIMEN TEST

TAKOO 4 39

AIR TURQUOISE SA | PARA-TEST.COM
Route du Pré-au-Comte 8 ▲ CH-1844 Villeneuve ▲ +41 (0)21 965 65 65

Test laboratory for paragliders, paraglider harnesses and paraglider reserve parachutes

paragliding by air turquoise

NIVIUK

Class: **B**

In accordance with standards
EN 926-2:2013, EN 926-1:2015 & LTF 91/09: PG_1259.2017

Date of issue (DMY): 12. 12. 2017

Manufacturer: Niviuk Gliders / Air Games S.L.

Model: Takoo 4 39

Serial number: Takoo 4 6-38 Pattern V2

Configuration during flight tests

Paraglider		**Accessories**	
Maximum weight in flight (kg)	**190**	Range of speed system (cm)	**0**
Minimum weight in flight (kg)	**110**	Speed range using brakes (km/h)	**15**
Glider's weight (kg)	**7.1**	Range of trimmers (cm)	**9**
Number of risers	**4**	Total speed range with accessories (km/h)	**21**
Projected area (m2)	**32.65**		

Harness used for testing (max weight)		**Inspections** (whichever happens first)
Harness type	**ABS**	every 24 months or every 100 flying hours
Harness brand	**Niviuk**	Warning! Before use refer to user's manual
Harness model	**Transat**	Person or company having presented the glider for testing: **None**
Harness to risers distance (cm)	**44**	
Distance between risers (cm)	**55**	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
A	A	B	A	0	0	A	A	B	A	A	A	A	B	A	A	A	A	A	B	0	A	0	□

TAKOO 4 42

AIR TURQUOISE SA | PARA-TEST.COM
Route du Pré-au-Comte 8 ▲ CH-1844 Villeneuve ▲ +41 (0)21 965 65 65

Test laboratory for paragliders, paraglider harnesses and paraglider reserve parachutes

paragliding by air turquoise

NIVIUK

Class: **B**

In accordance with standards
EN 926-2:2013, EN 926-1:2015 & LTF 91/09: PG_1236.2017

Date of issue (DMY): 12. 12. 2017

Manufacturer: Niviuk Gliders / Air Games S.L.

Model: Takoo 4 42

Serial number: Takoo 4 6-42 Pattern V1

Configuration during flight tests

Paraglider		**Accessories**	
Maximum weight in flight (kg)	**220**	Range of speed system (cm)	**0**
Minimum weight in flight (kg)	**120**	Speed range using brakes (km/h)	**15**
Glider's weight (kg)	**7.4**	Range of trimmers (cm)	**9**
Number of risers	**4**	Total speed range with accessories (km/h)	**21**
Projected area (m2)	**34.77**		

Harness used for testing (max weight)		**Inspections** (whichever happens first)
Harness type	**ABS**	every 24 months or every 100 flying hours
Harness brand	**Niviuk**	Warning! Before use refer to user's manual
Harness model	**Transat**	Person or company having presented the glider for testing: **Nef Olivier**
Harness to risers distance (cm)	**44**	
Distance between risers (cm)	**55**	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
B	A	B	A	0	0	A	A	A	B	A	A	A	B	A	A	A	B	A	B	B	A	0	□

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Test laboratory for paragliders, paraglider harnesses
and paraglider reserve parachutes

paragliding by air turquoise

NIVIUK

Class: **B**

In accordance with standards
EN 926-2:2013, EN 926-1:2015 & LTF 91/09: PG_1254.2017

Date of issue (DMY): 18. 01. 2018

Manufacturer: Niviuk Gliders / Air Games S.L.

Model: Takoo 4 44

Serial number: Takoo 4 6-44 Pattern V1

Configuration during flight tests

Paraglider		**Accessories**	
Maximum weight in flight (kg)	**240**	Range of speed system (cm)	**0**
Minimum weight in flight (kg)	**140**	Speed range using brakes (km/h)	**15**
Glider's weight (kg)	**7.8**	Range of trimmers (cm)	**9**
Number of risers	**4**	Total speed range with accessories (km/h)	**21**
Projected area (m2)	**37.32**		

Harness used for testing (max weight)		**Inspections** (whichever happens first)
Harness type	**ABS**	every 24 months or every 100 flying hours
Harness brand	**Niviuk**	Warning! Before use refer to user's manual
Harness model	**Transat**	Person or company having presented the glider for testing: **None**
Harness to risers distance (cm)	**44**	
Distance between risers (cm)	**55**	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
B	A	B	A	0	0	A	A	A	A	A	A	B	B	A	A	A	A	A	B	0	A	0	□


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