



# Contents

Welcome to Bruce Goldsmith Design .....	4
Introduction .....	5
Limitations .....	5
Warranty.....	5
Weight Range .....	6
Modifications .....	6
Harness .....	7
Preparation .....	8
Connecting and adjusting the speed bar .....	8
On launch .....	8
Pre-flight inspection.....	9
Flight Characteristics .....	10
Take-off .....	10
Straight Flight .....	10
Turning .....	11
Active piloting .....	11
Thermalling .....	11
Speed System .....	12
C-steering.....	13
Rapid descent procedures.....	15
Landing .....	16
Recovery Techniques .....	18
Stalls .....	18
Spins .....	19

Symmetric Front Collapse .....	19
Asymmetric Front Collapse .....	20
Releasing a trapped tip (cravat) .....	20
Loss of brakes .....	21
Maintenance .....	22
Storage .....	22
Small Repairs .....	22
Servicing / Inspection .....	23
Mounting Replacement Lines.....	24
Environmental protection and recycling .....	27
Technical Data .....	28
Materials.....	28
Specifications .....	29
Overview of glider parts .....	30
Risers .....	31
Accelerator and brake ranges .....	32
Line Plan.....	33
Line Lengths .....	34
Service Record.....	40
Owner Record .....	41
Pilot No 1.....	41
Closing Words.....	43
Appendix .....	44
EN line measurements .....	44

# ECHO 2 OWNER'S MANUAL

Solo paraglider | EN / LTF B

## Welcome to Bruce Goldsmith Design

BGD is a world leader in the design and production of paragliders. For many years Bruce Goldsmith and his team have been developing products with world-beating performance for pilots who want the best. We apply our knowledge to design top quality products that combine the highest performance with the safe handling our customers value and respect. BGD pilots appreciate our quality and reliability. BGD's world-class status is based on the skills and expertise we have developed in combining aerodynamic design with cloth and materials technology. All BGD products are developed and made with the same skill and attention to good design that are synonymous with the ultimate performance and precision required by paragliders.

### **Congratulations on your purchase of the BGD ECHO 2**

The ECHO 2 is a safe and accessible lightweight paraglider with good performance, excellent safety and fun handling. It is suitable for a wide range of pilots, from low airtimers who have completed their training to more experienced pilots looking for a safe and fun wing. It is made using high quality lightweight materials and offers good durability if properly looked after. As with all lightweight products, it must be treated with care.

This manual has been prepared to give you information and advice about your paraglider, and how to look after it so that it keeps its original characteristics for a long time. Please read it carefully to ensure you get the best out of your paraglider.

For further information or replacement parts, please contact your BGD dealer.

# Introduction

## Limitations

The ECHO 2 is a solo paraglider. It is not intended for tandem use.

It is suitable for winching. Both pilot and winch operator should have the necessary training and qualifications for winching, and the winch system should be certified for paraglider use. The tow line tension must not exceed 200kg.

We have not yet tested the suitability of the ECHO 2 for use with a paramotor.

Do not perform spiral dives with big ears or asymmetric collapses. The high G loading on fewer lines could overload and break the lines.

This paraglider must not:

1. Be flown outside the certified weight range
2. Have its trim speed adjusted by changing the length of risers or lines
3. Be flown in rain or snow
4. Be towed with a tow-line tension in excess of 200kg

## Warranty

Information about the BGD warranty can be found on the Warranty page of our website. In order to benefit from it, you must complete the warranty registration form on the website ([www.flybgd.com](http://www.flybgd.com))

It is your dealer's responsibility to test fly the paraglider before you receive it, to check the trim settings are correct. Please check that this has been completed. The warranty may be void if the test flight has not been completed by the dealer.

## Weight Range

Each wing size is certified for a certain weight range. The weight refers to the overall take-off weight. This means the weight of the pilot, the glider, the harness and all other equipment carried in flight. We generally recommend pilots to fly in the middle of the weight range.

If you mainly fly in weak conditions you might wish to fly towards the lower end of the weight range to benefit from a better sink rate. In the lower half of the weight range the turning agility will be lower and the glider will be more damped. In strong turbulence the wing will have a greater tendency to deform or collapse with a lower wing loading.

If you prefer dynamic flight characteristics, want more speed or often fly in strong conditions you might choose to fly higher in the weight range. If you fly in the upper half of the weight range agility and speed will be higher and you will have greater stability in turbulence, but there will be reduced self-damping in turns and after collapses.

## Modifications

Any modifications to your glider e.g. changing the line lengths, can cause a loss of airworthiness and certification. We recommend that you contact your dealer or BGD directly before performing any kind of modifications.

### Brake line lengths

The length of the brake lines is set at the factory so that the trailing edge is not deformed at all when brakes are not applied. There should be around 7cm slack in the brake lines, before they take effect on the canopy. It should not be necessary to shorten the brake lines. However, it is possible that shrinkage can occur. If necessary, the brake lines can be lengthened by adjusting the knots.

## Harness

The paraglider was tested with a 'GH' (without diagonal bracing) type harness. The GH category includes weight-shift harnesses as well as ABS style (semi-stable) harnesses.

The EN standard harness dimensions are a seat board width of 42cm.

The horizontal distance between the attachment points of the paraglider risers (measured from the centre line of the karabiners) should be:

- 38cm for pilots under 50kg
- 42cm for pilots from 50-80kg
- 46cm for pilots above 80kg

# Preparation

## Connecting and adjusting the speed bar

The ECHO 2 has accelerator risers, with Brummel hooks to attach the speed bar. The glider can be flown with or without a speed bar attached. The speed bar should be connected and adjusted following the instructions in your harness manual to ensure correct routing of the lines.

To adjust the speed bar lines to the correct length, sit in your harness and ask a helper to hold the risers up in their in-flight position. The speed bar line length can be adjusted by moving the knots, so that the bar sits just beneath your harness seat. You should be able to hook your heels into the bar, and to attain full bar extension (the two pulleys touching) when you push your legs out. Once you have set the bar up in this way on the ground, a test flight in calm air can be useful to fine-tune the length, ensuring it is even on both sides.

## On launch

1. Select a suitable take-off area determined by wind and terrain, clear of any obstacles that may catch in the lines or damage the canopy.
2. Take your paraglider to the top of the take-off area, and allow the canopy to unroll itself down the hill if on a slope. This should leave the paraglider with the bottom surface facing upwards, the openings at the downwind/uphill end of the take-off area, and the harness at the trailing edge at the upwind side.
3. Unroll the canopy to each side so that the leading edge openings form a semicircular shape, with the trailing edge drawn together to form an arc. The harness should be drawn away from the canopy until the suspension lines are just tight.



## Pre-flight inspection

Your paraglider is designed to be simple to inspect and maintain but a thorough pre-flight procedure is mandatory on all aircraft. The following pre-flight inspection procedure should be carried out before each flight.

1. Whilst opening the paraglider check the outside of the canopy for any tears where it could have been caught on a sharp object or even have been damaged whilst in its bag. Visually inspect the risers for any signs of damage.
2. Check the lines for signs of damage, twists or knots. Divide the suspension lines into groups, each group coming from one riser. By starting from the harness and running towards the canopy remove any tangles or twists in the lines. Partially inflating the canopy in the wind will help to sort out the lines.
3. Ensure the brakes are clear and free to move. Check the knot which attaches the brake handles to the brake lines. Avoid having too many knots, as there is a risk the knots could become stuck in the brake pulleys. Both brakes should be the same length and this can be checked by having an assistant hold the upper end of the brake lines together whilst you hold the brake handles. The brake lines should be just slack with the wing inflated when the brakes are not applied.
4. Always check the buckles and attachments on the harness. Ensure the two main attachment maillons/karabiners from the harness to the main risers, and the individual shackles which attach the risers to the lines, are tightly done up.
5. Before getting in to the harness you should be wearing a good helmet. Check the parachute container is correctly closed and the handle is secure. Put on the harness ensuring all the buckles are fastened and that it is well adjusted for comfort.

Your paraglider is now ready for flight.

# Flight Characteristics

This manual is not intended as an instruction book on how to fly your paraglider. You should be a qualified pilot, but the following comments describe how to get the best from your wing.

## Take-off

The wing is easy to inflate in light or stronger winds and will quickly rise overhead to the flying position. It will launch easily using either the forward launch technique (best for light winds) or reverse launch (best for stronger winds).

### Forward Launch

Stand facing into wind with your back to the canopy and all the A-lines taut behind you, then take one or two steps back (do not walk all the way back to the canopy). Take an A-riser in each hand (the A-risers are marked with red cloth to make them easier to find) and begin your launch run pulling gently and smoothly on the A-risers. As soon as the canopy starts to rise off the ground stop pulling so hard on the A-risers but put pressure on all the risers evenly through the harness. Maintaining gentle pressure on the A-risers helps in very calm conditions. Have your hands ready to slow up the canopy with the brakes if it starts to accelerate past you.

### Reverse Launch

In winds over 10km/h it is recommended to do a reverse launch and inflate the canopy whilst facing it, using the A-risers. Releasing pressure on the A-risers when it is at about 45° will help to stop it overshooting. The stronger the wind and the greater the pressure on the A-risers, the more quickly the canopy will rise. In stronger winds taking a step towards the glider as it rises can take some of the energy out of the glider and it will be less likely to overshoot.

## Straight Flight

Your paraglider will fly smoothly in a straight line without any input. At the maximum in-flight weight, without the accelerator it will fly at approximately the trim speed shown in the Specifications table.

## Turning

Your wing does not require a strong-handed approach to manoeuvring. For a fast turn smoothly apply the brake on the side to which the turn is intended. The speed with which the brake is applied is very important. If a brake is applied fairly quickly the canopy will do a faster banking turn, but care must be taken not to bank too severely. To attain a more efficient turn at minimum sink, apply some brake to the outside wing to slow the turn and prevent excessive banking. The glider flies very well like this, but care must be taken not to over-apply the brakes, as this could result in a spin. The wing will turn far more efficiently if you weightshift into the turn in the harness. Remember that violent brake application is dangerous and should be avoided.

## Active piloting

The objective of active piloting is to get the glider to fly smoothly through the air with a stable position above your head, and controlled angle of incidence. Active piloting means flying in empathy with your paraglider, guiding it through the air and being aware of feedback from the wing. If the air is smooth the feedback can be minimal but in turbulence feedback is continuous and needs to be constantly checked.

In order to get the best performance from your wing, it is best to control it through small brake inputs and weightshift rather than constantly being present on the brakes. A small brake movement early is more efficient than a big input later. The more you let the glider fly at trim speed, the better performance you will get out of it.

Your paraglider is resistant to collapse without any pilot action, but flying actively will increase the safety margin. Active piloting can make your flying experience safer and more enjoyable, and it becomes instinctive in good pilots.

## Thermalling

To attain the best climb rate your wing should be thermalled using a mild turn, as described above, keeping banking to a minimum. In strong thermals a tighter banking turn can be used to stay closer to the thermal's core. Remember

that weightshifting in the harness will make the turn more efficient and reduce the amount of brake required.

Care must be taken not to apply so much brake as to stall. This is easy to avoid as the brake pressure increases greatly as you approach the stall point. Only fly near the stall point if you have enough height to recover (at least 100m).

## Speed System

Launching and general flying is normally done without using the accelerator. A pilot flying at the maximum in-flight weight should be able to reach the top speed noted in the specifications table when using the accelerator system.

Full speed is achieved when the two pulleys on each A-riser touch. Do not go beyond this point by using excessive force to attempt to make the glider go faster as this may result in the glider collapsing.

When you come off the bar it is also important to do so smoothly and progressively, to manage the pitch. It is possible for paragliders to front-collapse if the bar is released too quickly.

We recommend you only fly in conditions where you can progress into wind with no speed bar applied, so that you have extra airspeed in reserve should you need it.

### IMPORTANT:

1. Practise using the speed system in normal flying and get fully used to using half speed bar before you use full bar.
2. The speed increase is achieved by reducing the angle of attack, which means the canopy has slightly more collapse tendency. Take care when flying fast in rough or turbulent conditions as deflations are more likely to occur at speed.

3. Remember that your glide deteriorates at higher speeds. Best glide is achieved when the risers are level and the brakes are off, or with a little accelerator applied (up to 25% speed).

The Dyneema line that connects the speed system in the risers is designed to have a small amount of slack in it in order to obtain the correct riser lengths when accelerated. The amount of slack in this line varies with wing size and determines the B riser length when fully accelerated. The length of this line can be adjusted where it is looped on the maillon of the B-riser. It can also be replaced if necessary.

The component parts of the speed system should be regularly checked for signs of wear, and to ensure the system works smoothly.

## C-steering

The ECHO 2 has an effective and light C-steering system that allows you to actively pilot the wing without using the brakes, which is particularly useful when flying accelerated.

The risers are equipped with a 'speed riser'. This is an extra riser that is attached to the back of the speed system. This speed riser is also attached to the front of the C steering handle. The idea is to balance the load on the C steering handle giving you more control over the glider when using the C-steering.

To fly with the C-steering system, keep hold of the brakes, and grasp the C-steering handle with your fingers as shown in FIG. 1.

The C-steering system allows you to make small pitch adjustments when gliding, especially on speed. The C-steering can also be used to control direction, but you must take care not to accidentally stall the glider as the range is much less than on the brakes.

## C-steering



FIG. 1: Keeping the brake in your hand, grasp the C-steering handle with your fingers

## Rapid descent procedures

### Big Ears

The wingtips of your paraglider can be folded in to increase its sink rate. The Big Ear facility allows you to descend quickly without substantially reducing the forward speed of your glider. (B-line stalls also allow for fast descent, but they result in greatly reduced forward speed).

To engage Big Ears, lean forward in the harness and grasp the outer A-lines, or the maillons of the 'Baby-A' risers, keeping hold of both brake handles if possible. Pull the outer A-lines or Baby-A risers out and down at least 30cm so as to collapse the tips of the glider. It is very important that the other A-lines are not affected when you do this as pulling these could cause the leading edge to collapse. Steering with Big Ears in is possible by weight-shifting. When you let go of the outer A-lines or the Baby A risers, the Big Ears may come out on their own. If not, a pump on the brakes is all that is necessary.

Before using Big Ears in earnest you should practise with plenty of ground clearance in case a leading-edge collapse occurs. Always keep hold of both brakes in order to retain control. Putting your hands through the brake handles so they remain on your wrists is a good method of doing this.

### B-Line Stall

This is a fast descent method and is a useful emergency procedure. With both hands through the brake handles, take hold of the top of the B-risers, one in each hand, and pull them down by 10-15cm. This will stall the canopy and its forward speed will drop to zero. Make sure you have plenty of ground clearance because the descent rate can be over 10m/sec.

To increase the descent rate pull harder on the B-risers. When you release the B-risers the canopy will automatically start flying again, normally within two seconds. Sometimes the canopy will turn gently when it exits from the B-line stall. It is normally better to release the B-risers fairly quickly rather than slowly, as the latter may result in the canopy entering deep stall. Always release the risers symmetrically, as an asymmetric release from a B-line stall may result in the glider entering a spin.

B-line stalls are useful if you need to lose a lot of height quickly, perhaps to escape from a thunderstorm. They should not be performed with less than 100m of ground clearance (see also Chapter 5).

### **Spiral Dive**

A normal turn can be converted into a spiral dive by continuing to apply one brake. The bank angle and speed of the turn will increase as the spiral is entered. Be careful to enter the spiral gradually and with control, as too quick a brake application can cause a spin or a high G spiral.

Spiral dives are one of the most dangerous manoeuvres in paragliding and the high G-force and quick loss of altitude can easily catch pilots out. A mistake in judging these factors can lead to a very serious accident, so spirals must be treated with great respect. Pilots are advised to practise spiral dives under close supervision or during an SIV course.

Do not perform spiral dives with big ears or asymmetric collapses. The high G loading on fewer lines could overload and break the lines.

To pull out of a steep spiral dive, release the applied brake gradually and/or apply opposite brake gradually. A sharp release of the brake can cause the glider to surge and dive as the wing converts speed to lift. Always be ready to damp out any dive with the brakes. Also be ready to encounter turbulence when you exit from a spiral because you may fly through your own wake, which can cause a collapse.

CAUTION: Spiral dives can cause loss of orientation or black-out and they take some time to exit from. This manoeuvre must be exited with plenty of height.

## **Landing**

Landing is very straightforward. When landing in light winds, flare in the normal way from an altitude of around 2m. It may sometimes help to take wraps on the brakes to make the flare more effective.



Strong-wind landings require a different technique. If you use the brakes to flare in a strong wind the wing tends to convert this energy to height, which can be a problem. The best method is to take hold of the rear-risers at the maillons just before landing, and collapse the canopy using these when you have landed. The glider will collapse very quickly using this method.

After landing, the B-risers can also be used to collapse the canopy, although it is more difficult to control the collapsed canopy on the ground with the B-risers.

# Recovery Techniques

## Stalls

Stalls are dangerous and should not be practised in the course of normal flying. Stalls are caused by flying too slowly. Airspeed is lost as brake pressure increases and as the canopy approaches the stall point it will start to descend vertically and finally begin to collapse. Should this occur it is important that the pilot releases the brakes at the correct moment. The brakes should never be released when the wing has fallen behind the pilot; the brakes should be released fairly slowly, to prevent the forward dive of the canopy from being too strong. A pre-release of the brakes and the reconstruction of the full span is recommended to avoid the tips getting cravatted during the recovery. Pilots are advised never to attempt this manoeuvre unless under SIV instruction. This manual is not intended to give instruction in this or any other area.

### Deep Stall (or Parachutal Stall)

Your paraglider has been designed so that it will not easily remain in a deep stall. However, if it is incorrectly rigged or its flying characteristics have been adversely affected by some other cause, it is possible that it could enter this situation. In the interests of safety all pilots should be aware of this problem, and know how to recover from it. The most common way to enter deep stall is from a flying too slowly, from a B-line stall or even from big ears. When in deep stall the pilot will notice the following:

1. Very low airspeed.
2. Almost-vertical descent (like a round canopy), typically around 5m/s.
3. The paraglider appears quite well inflated but does not have full internal pressure. It looks and feels a bit limp.

Recovery from deep stall is quite simple: The normal method is to simply initiate a mild turn. As the canopy starts to turn it will automatically revert to normal flight, but it is very important not to turn too fast as this could induce a spin. The second method is to pull gently on the A-risers. This helps the airflow to re-attach to the leading edge, but be

careful not to pull down too hard as this will induce a front collapse.

If the deep stall is particularly stubborn and the previous methods do not work then a full stall will solve the problem. To do this apply both brakes fairly quickly, as if to do a strong stall, then immediately release both brakes and damp out the forward surge in the normal way. The canopy will swing behind you then automatically reinflate and surge forward in front of you before returning to normal flight. It is the surge forward that exits the canopy from deep stall.

## Spins

Spins are dangerous and should not be practised in the course of normal flying. Spins occur when the pilot tries to turn too fast. In a spin the pilot, lines and canopy basically stay vertical and rotate around a vertical axis. Your glider will resist spinning, but if a spin is inadvertently induced you should release the brake pressure but always be ready to damp out any dive as the glider exits the spin. Failure to damp the dive on exiting the spin may result in an asymmetric deflation.

## Symmetric Front Collapse

It is possible that turbulence can cause the front of the wing to symmetrically collapse, though active piloting can largely prevent this from occurring accidentally.

During the early stages of a front collapse the pilot should apply brake symmetrically on both sides for a maximum of one second. This will push the air from the back of the canopy towards the front, stopping the collapse from becoming deep. Make sure the brakes are fully released during the later stages of the collapse, or this may induce a full stall. The glider will normally recover on its own as long as the pilot keeps the brakes up. If the glider does not recover on its own it may be necessary to make a second pump on the brakes.

A pilot can reproduce the effect during an SIV course by taking hold of both the A-risers and pulling down sharply on them, then immediately releasing. Make sure that you pull all four A-risers at the same time, two risers in each hand

(make sure to include the baby-A risers). The glider will automatically recover on its own from this situation in around three seconds. During this recovery period it is advisable not to apply the brakes as this could stall the wing.

## Asymmetric Front Collapse

Your paraglider is very resistant to deflations; however if the canopy collapses on one side due to turbulence, you should first of all control the direction of flight by countering on the opposite brake. Most normal collapses will immediately reinflate on their own and you will hardly have time to react before the wing reinflates automatically. The act of controlling the direction will tend to reinflate the wing. However, with more persistent collapses it may be necessary to pump the brake on the collapsed side using a long, strong, smooth and firm action. Normally one or two pumps of around 80cm will be sufficient. Each pump should be applied in about one second and smoothly released. In severe cases it can be more effective to pump both brakes together to get the canopy to reinflate. Be careful not to stall the wing completely if this technique is used.

## Releasing a trapped tip (cravat)

Following a severe deflation it is possible for a wingtip to become trapped in the glider's lines (cravat). If this occurs then first of all use the standard method of recovery from a tip deflation as described in Asymmetric Front Collapse above. If the canopy still does not recover then pull the rear risers to help the canopy to reinflate. Pulling the stabilo line is also a good way to remove cravats, but remember to control your flight direction as your number-one priority. If you are very low then it is much more important to steer the canopy into a safe landing place or even throw your reserve.

NOTE: Test pilots have tested the model well beyond the normal flight envelope, but such tests are carried out in a very precise manner by trained test pilots with a back-up parachute, and over water. Stalls and spins on any paragliders are dangerous manoeuvres and are not recommended.

## Loss of brakes

In the unlikely event of a brake line snapping in flight, or a handle becoming detached, the glider can be flown by gently pulling the rear risers for directional control.

# Maintenance

## Storage

If you have to pack your canopy away wet, do not leave it for more than a few hours in that condition. As soon as possible dry it out, but do not use direct heat sources as it is inflammable!

Always store the canopy in a dry, warm place. Ideally this should be in the temperature range of 5°C to 13°C. Never let your canopy freeze, particularly if it is damp.

Your paraglider is made from high quality nylon which is treated against weakening from ultraviolet radiation. However, UV exposure will still weaken the fabric and prolonged exposure to harsh sunlight can severely compromise the safety of your canopy. Therefore once you have finished flying, put your wing away. Do not leave it laying in strong sunshine unnecessarily. If you are concerned about any aspect of the integrity of your paraglider please contact your nearest BGD dealer or talk to BGD directly.

Do not treat your canopy with chemical cleaners or solvents. If you must wash the fabric, use warm water and a little soap. If your canopy gets wet in sea water, wash it with warm water and carefully dry it.

## Small Repairs

Small tears in the top or bottom surface (not normally the ribs) of a canopy can be repaired with a patch of self-adhesive ripstop nylon. Tears no longer than 100mm can be repaired in this way providing they are not in high-stress areas. If you have any doubt about the airworthiness of your canopy please contact your dealer or BGD directly.

## Servicing / Inspection

It is important to have your glider regularly serviced. Your wing should have a thorough check / inspection every 24 months or every 150 flight hours, whichever occurs first. This check must be made by the manufacturer, importer, distributor or other authorised persons.

### Releasing loops on the rear lines



*Left: loops on maillons; Right: loops released*

All BGD gliders are rigged from new with loops on the maillons of the C lines (and D lines if any) plus the stabi line. The loops are there so that they can be released to compensate for any shrinkage of the back lines as the glider gets older.

BGD recommends releasing the loops after 100 hours or one year, whichever comes first, or earlier if the pilot feels the glider does not come up as easily on launch.

When the first line check is done, normally at 2 years, the loops should already have been released, and this should be verified and fine-tuned by the check centre.

Please print out the service pages from this manual, fill in the number of flights and hours flown in the Service Record, and send together with your glider when it goes for inspection or servicing. The manufacturer will only accept responsibility for lines and repairs which we have produced and fitted or repaired by an approved service centre.

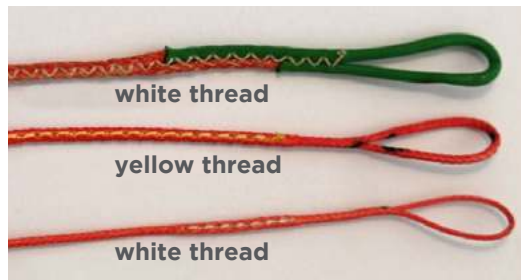
## Mounting Replacement Lines

If you need to replace lines on your glider, we recommended that a professional should mount the new lines. The airworthiness of your glider, and your safety, depends on it being done correctly.

You can identify the line(s) you need to replace from the line layout diagram for your wing. Download the latest version here: <https://tinyurl.com/BGDlines>

Replacement lines can be ordered from the Accessories section of [www.flybgd.com](http://www.flybgd.com).

1. Check that the lines you have received correspond with the latest update of the linesheet from the dropdown. Also check the line layout on the glider corresponds with the line layout in the manual.
2. The quickest way to remove the old lines is to cut them off. However, don't cut the old lines off if you have not received the new ones or you may end up not being able to fly! Sometimes only a part lineset is needed (eg excluding top lines or brakes) so take care not to cut any lines that need to be retained.
3. Line junction: Microlines have an internal reinforcing in them, marked by yellow thread. This must be put on the end where there is a line junction. Sheathed lines have no additional reinforcing.



**white thread**

External Reinforcing

**yellow thread**

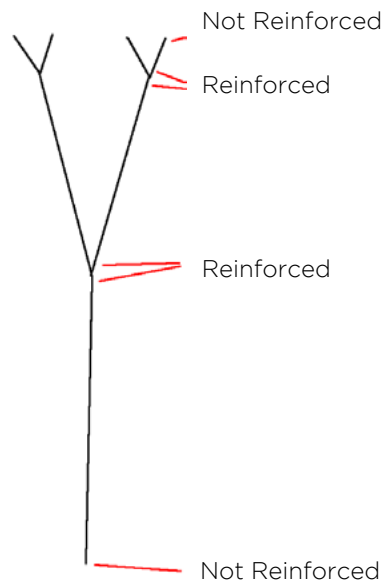
Internal Reinforcing

**white thread**

No Reinforcing



- The non-reinforced end is marked with white thread and should be attached to the glider tab or the maillon.



**Lark's Foot.**

All the lines are connected to other lines or to tabs with lark's foot junctions. Make sure that these are joined correctly with an interlocked junction and not a looped junction.



Interlocked junction - correct



Looped junction - incorrect



Interlocked junction - correct



Looped junction - incorrect

Lines should be symmetrically placed on the tab, except where the tab is inclined. The tab is inclined backwards on the A tabs of all BGD gliders to align it with the direction of pull of the line. So when assembling the lines, the A tab should be angled back, and the B, C and D tabs should be perpendicular.

## **Environmental protection and recycling**

Our sport takes place in the natural environment, and we should do everything to preserve our environment. A glider is basically made of nylon, synthetic fibres and metal. At the end of your paraglider's life, please remove all metal parts and put the different materials in an appropriate waste/recycling plant.

# Technical Data

## Materials

The ECHO 2 is made from the following quality materials.

It is supplied as standard with maillons, but softlinks can be supplied instead on request.

### Sail

Top surface	Porcher Skytex 27 multicolour
Top surface CCB area	Porcher Skytex 38 multicolour
Bottom surface LE	Porcher Skytex 27 multicolour
Bottom surface	Porcher Skytex 27 white
All ribs incl. diagonal and TE mini ribs	Porcher Skytex 32 hard white
CS straps	Porcher Skytex 27 hard white

### Risers

Webbing	Rivori 12mm nylon
Maillons	Maillon Rapide 3.5D Delta shackles + inserts
Pulleys	Spenger Allen

### Lines

Top lines	Edelrid 8000U series (unsheathed)
Middle lines	Edelrid 8000U series (unsheathed)
Lower lines	Edelrid PPSL and TSL (sheathed)
Brakes	Liros DSL and PPSL
Brake line KL1	Liros DSL350

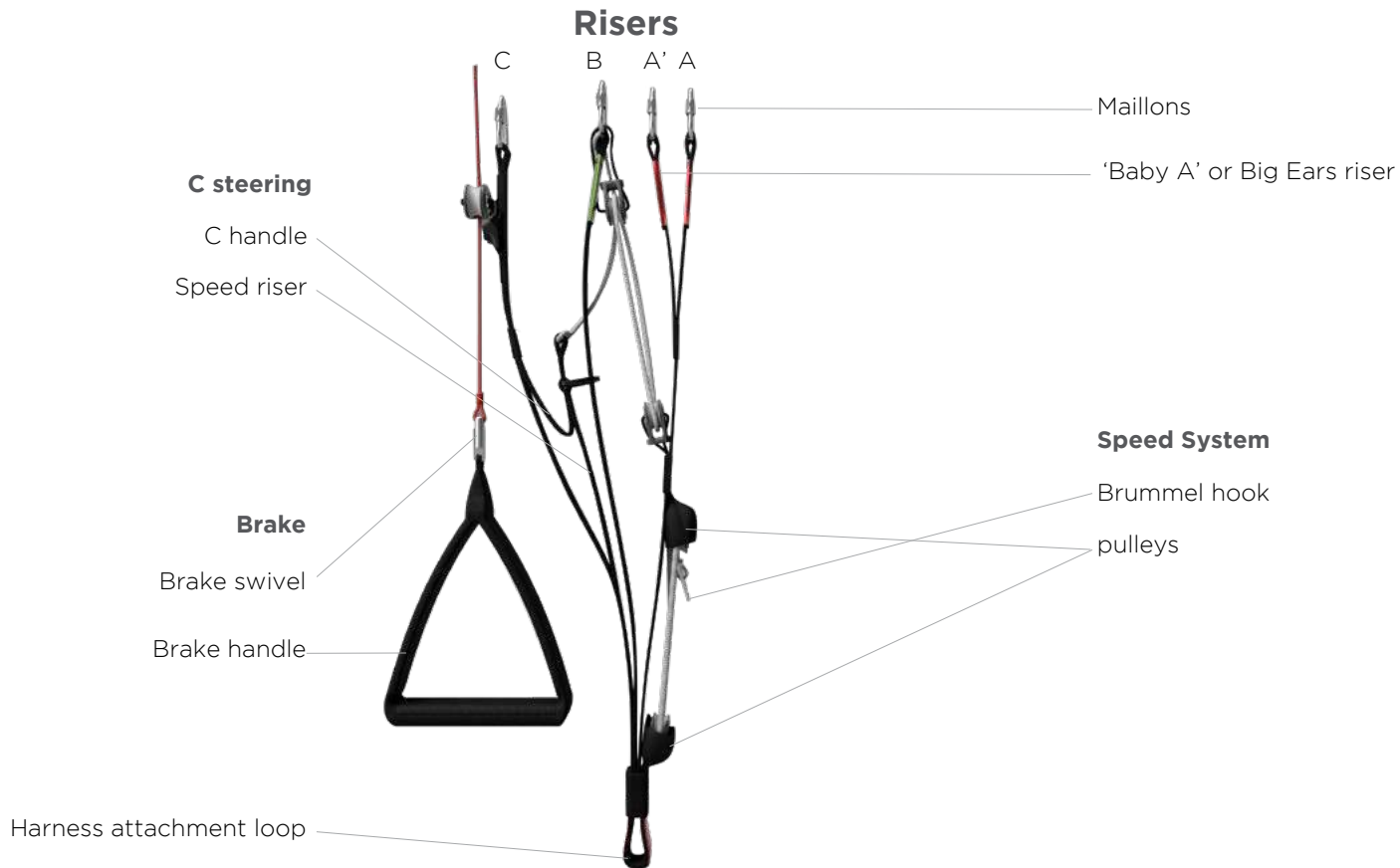
Spare parts can be obtained directly from BGD or through our network of registered BGD repair shops. For a full list check [www.flybgd.com](http://www.flybgd.com).

## Specifications

	<b>XS</b>	<b>S</b>	<b>M</b>	<b>ML</b>	<b>L</b>
Linear scaling factor	0.92	0.96	1.00	1.04	1.08
Projected area (m <sup>2</sup> )	17.7	19.6	21.0	22.7	24.5
Flat area (m <sup>2</sup> )	21	23	25	27	29
Glider weight with softlinks (kg)	3.4	3.6	3.9	4.1	4.4
Total line length (m)	227	233	244	254	263
Height (m)	6.4	7.0	7.1	7.3	7.5
Number of main lines	3/4/3				
Cells	45				
Flat aspect ratio	5.2				
Projected aspect ratio	3.6				
Root chord (m)	2.5	2.6	2.7	2.8	3.0
Flat span (m)	10.4	10.9	11.4	11.8	12.3
Projected span (m)	8.2	8.5	8.9	9.3	9.6
Certified weight range (kg)	55 - 75	65 - 85	75 - 95	85 - 110	100 - 125
Trim speed (km/h)	39				
Top speed (km/h)	53				
Min. sink (m/s)	1				
Best glide	9				
Certification (free flight)	EN+LTF: B	EN+LTF: B	EN+LTF: B	EN+LTF: B	EN+LTF: B
Certification (paramotor)	Not yet tested				
Suitable for towing	Yes				

## Overview of glider parts





The riser set does not have trimmers, or any other adjustable or removable device.

## Accelerator and brake ranges

### Riser lengths

Length are in millimetres. The actual measured riser length must be no more than 5mm different to the value in the table.

<b>S, M, ML, L</b>	<b>A</b>	<b>Baby A</b>	<b>B</b>	<b>C</b>
Trim slow	500	500	500	500
Accelerated	380	380	420	500
Accelerator Length	120 between end of pulleys			

<b>XS</b>				
Trim slow	460	460	460	460
Accelerated	340	340	380	460
Accelerator Length	120 between end of pulleys			

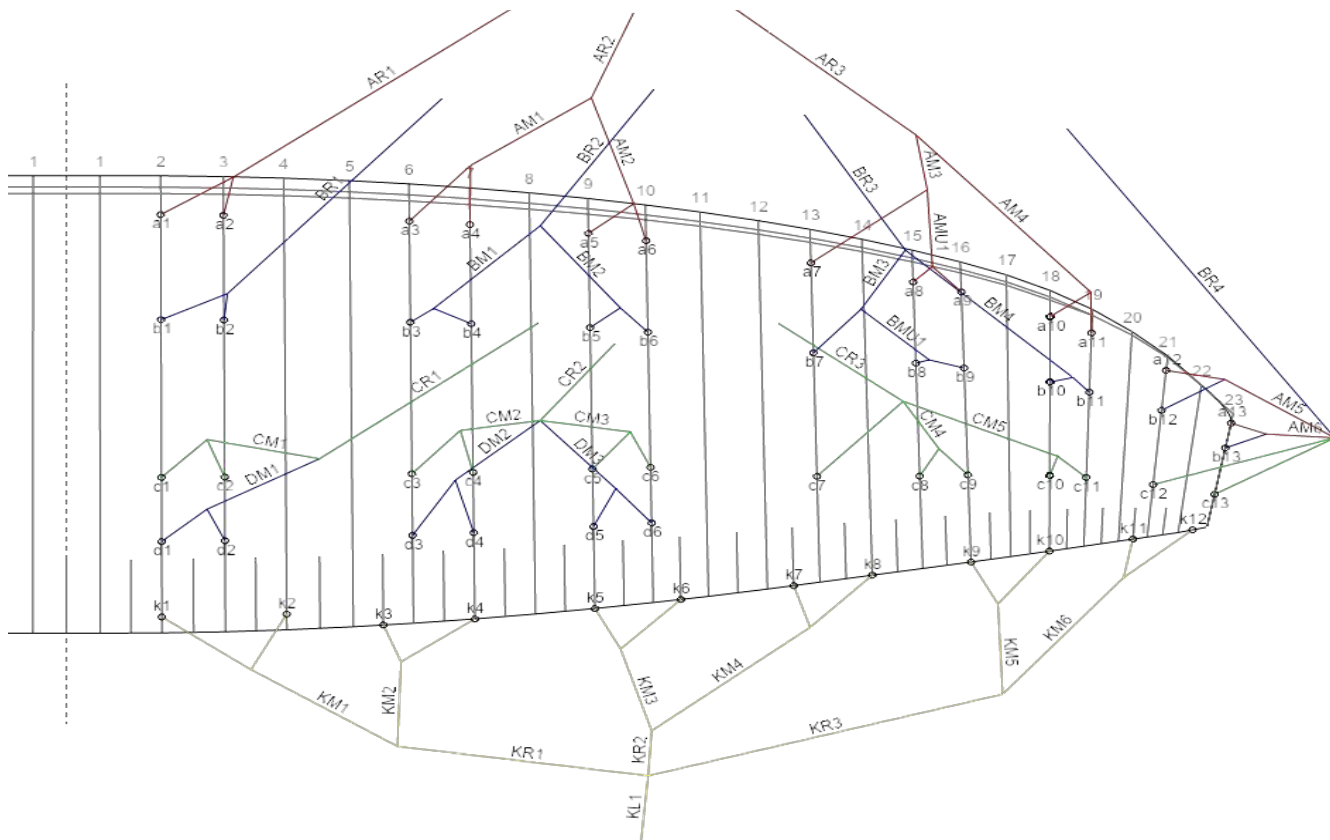
### Brake range

In millimetres, at maximum all-up weight.

<b>XS</b>	<b>S</b>	<b>M</b>	<b>ML</b>	<b>L</b>
660	680	700	720	740



# Line Plan



## Line Lengths

All measures are in mm, with 50N line tension, the tension being slowly and gradually applied before taking the measurement. The lengths are measured from the lower surface of the canopy and include the risers.

Compliance of the test sample's suspension lines, control lines and risers with the dimensions given in the user's manual are checked by the testing laboratory after the test flights have been completed

The difference in line lengths between the manual and the sample may be no more than 10mm. The measured lengths are in the appendix.

## Size XS

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>
1	6462	6358	6420	6530	6789
2	6451	6347	6409	6518	6521
3	6422	6324	6398	6491	6485
4	6409	6310	6375	6471	6534
5	6380	6289	6378	6458	6312
6	6377	6298	6412	6491	6228
7	6277	6196	6261		6170
8	6178	6108	6145		6181
9	6150	6090	6115		6029
10	6022	6004	6099		5978
11	5972	5973	6098		5900
12	5752	5766	5908		5889
13	5557	5621	5785		

Bridle check ▲  
Single line lengths ►

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>					
a1	363	b1	368	c1	344	d1	407	k1	671
a2	352	b2	357	c2	333	d2	395	k2	403
a3	385	b3	382	c3	375	d3	397	k3	372
a4	372	b4	367	c4	352	d4	377	k4	421
a5	365	b5	353	c5	326	d5	348	k5	418
a6	362	b6	362	c6	360	d6	381	k6	344
a7	1956	b7	1680	c7	1608			k7	360
a8	392	b8	400	c8	408			k8	361
a9	364	b9	382	c9	378			k9	375
a10	389	b10	340	c10	296			k10	314
a11	339	b11	309	c11	295			k11	297
a12	382	b12	394	c12	1172			k12	286
a13	178	b13	240	c13	1049				
AR1	5610	BR1	5502	CM1	711	DM1	753	KM1	804
AM1	2404	BM1	1995	CM2	1349	DM2	1415	KM2	754
AM2	2381	BM2	1987	CM3	1378	DM3	1431	KM3	1197
AMU1	1471	BMU1	1198	CM4	1089			KM4	1123
AM4	2441	BM4	2096	CM5	1155			KM5	868
AM5	640	BR4	4263	CR1	4898			KM6	807
AM6	648	BR2	3469	CR2	4207			KR1	2754
AR2	3154	BR3	3085	CR3	4180			KR2	2082
AM3	1131	BM3	949					KR3	2181
AR3	2710							KL1	2567

Size S

	A	B	C	D	K
1	6799	6693	6762	6874	7147
2	6789	6682	6750	6862	6877
3	6761	6659	6740	6833	6841
4	6748	6645	6718	6815	6891
5	6719	6624	6720	6801	6650
6	6715	6634	6757	6837	6572
7	6612	6536	6618		6515
8	6510	6445	6496		6519
9	6476	6426	6466		6369
10	6340	6327	6430		6304
11	6289	6295	6429		6224
12	6065	6080	6230		6213
13	5887	5953	6101		

A		B		C		D		K	
a1	379	b1	386	c1	361	d1	427	k1	715
a2	369	b2	375	c2	349	d2	415	k2	445
a3	403	b3	400	c3	392	d3	415	k3	390
a4	390	b4	385	c4	370	d4	397	k4	440
a5	383	b5	369	c5	341	d5	364	k5	438
a6	379	b6	379	c6	378	d6	400	k6	360
a7	2046	b7	1766	c7	1701			k7	375
a8	411	b8	419	c8	427			k8	379
a9	382	b9	400	c9	397			k9	393
a10	406	b10	356	c10	310			k10	328
a11	355	b11	324	c11	309			k11	311
a12	400	b12	413	c12	1227			k12	300
a13	187	b13	251	c13	1098				
AR1	5891	BR1	5779	CM1	742	DM1	787	KM1	909
AM1	2514	BM1	2086	CM2	1411	DM2	1480	KM2	873
AM2	2491	BM2	2080	CM3	1442	DM3	1499	KM3	1250
AMU1	1539	BMU1	1262	CM4	1157			KM4	1178
AM4	2554	BM4	2193	CM5	1208			KM5	908
AM5	670	BR4	4488	CR1	5148			KM6	845
AM6	704	BR2	3655	CR2	4426			KR1	2810
AR2	3325	BR3	3255	CR3	4400			KR2	2194
AM3	1183	BM3	993					KR3	2300
AR3	2863							KL1	2720

Bridle check ▲  
Single line lengths ►

## Size M

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>
1	7095	6979	7059	7182	7486
2	7084	6969	7048	7170	7267
3	7052	6946	7039	7140	7118
4	7041	6932	7015	7120	7171
5	7010	6911	7017	7107	6920
6	7007	6923	7053	7138	6798
7	6896	6823	6917		6740
8	6782	6722	6779		6789
9	6753	6702	6744		6633
10	6612	6592	6691		6534
11	6561	6560	6690		6479
12	6331	6354	6510		6466
13	6148	6220	6374		

Bridle check ▲  
Single line lengths ►

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>					
a1	396	b1	402	c1	376	d1	445	k1	551
a2	385	b2	392	c2	365	d2	433	k2	332
a3	419	b3	417	c3	410	d3	434	k3	407
a4	408	b4	402	c4	386	d4	414	k4	460
a5	399	b5	385	c5	358	d5	385	k5	457
a6	396	b6	397	c6	394	d6	416	k6	335
a7	2124	b7	1855	c7	1790			k7	348
a8	428	b8	437	c8	447			k8	397
a9	399	b9	417	c9	412			k9	411
a10	424	b10	371	c10	324			k10	312
a11	373	b11	339	c11	323			k11	326
a12	413	b12	434	c12	1305			k12	313
a13	191	b13	261	c13	1169				
AR1	6161	BR1	6044	CM1	766	DM1	819	KM1	1136
AM1	2620	BM1	2166	CM2	1472	DM2	1548	KM2	912
AM2	2597	BM2	2161	CM3	1502	DM3	1564	KM3	1301
AMU1	1596	BMU1	1323	CM4	1210			KM4	1230
AM4	2652	BM4	2269	CM5	1245			KM5	948
AM5	721	BR4	4680	CR1	5398			KM6	879
AM6	759	BR2	3840	CR2	4638			KR1	2940
AR2	3486	BR3	3424	CR3	4602			KR2	2303
AM3	1230	BM3	1017					KR3	2415
AR3	3014							KL1	2846

Size ML

	A	B	C	D	K
1	7361	7242	7322	7444	7751
2	7351	7232	7311	7432	7461
3	7321	7213	7302	7404	7420
4	7309	7199	7278	7384	7477
5	7276	7177	7282	7371	7217
6	7273	7188	7322	7410	7131
7	7164	7089	7192		7070
8	7053	6990	7059		7079
9	7017	6969	7026		6913
10	6872	6857	6971		6840
11	6817	6822	6970		6757
12	6575	6591	6755		6744
13	6382	6454	6614		

Bridle check ▲  
Single line lengths ►

A		B		C		D		K	
a1	411	b1	418	c1	391	d1	463	k1	775
a2	401	b2	408	c2	380	d2	451	k2	485
a3	436	b3	434	c3	426	d3	451	k3	422
a4	424	b4	419	c4	402	d4	431	k4	479
a5	415	b5	401	c5	370	d5	396	k5	475
a6	412	b6	412	c6	410	d6	435	k6	389
a7	2217	b7	1922	c7	1862			k7	403
a8	446	b8	455	c8	464			k8	412
a9	415	b9	434	c9	431			k9	427
a10	441	b10	387	c10	337			k10	354
a11	386	b11	352	c11	336			k11	339
a12	434	b12	448	c12	1331			k12	326
a13	203	b13	273	c13	1190				
AR1	6421	BR1	6296	CM1	804	DM1	853	KM1	983
AM1	2721	BM1	2257	CM2	1526	DM2	1602	KM2	950
AM2	2696	BM2	2252	CM3	1562	DM3	1624	KM3	1353
AMU1	1666	BMU1	1374	CM4	1270			KM4	1278
AM4	2766	BM4	2375	CM5	1309			KM5	983
AM5	725	BR4	4909	CR1	5616			KM6	915
AM6	762	BR2	4004	CR2	4839			KR1	3064
AR2	3645	BR3	3572	CR3	4813			KR2	2405
AM3	1279	BM3	1073					KR3	2519
AR3	3148							KL1	2936

## Size L

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>
1	7633	7502	7590	7715	8019
2	7622	7492	7578	7703	7711
3	7592	7479	7571	7675	7669
4	7579	7465	7546	7655	7728
5	7546	7443	7551	7643	7469
6	7542	7455	7593	7683	7369
7	7424	7354	7464	0	7307
8	7311	7251	7326	0	7327
9	7279	7230	7292	0	7147
10	7130	7112	7235	0	7080
11	7072	7076	7233	0	6995
12	6821	6837	7007	0	6981
13	6620	6695	6861	0	0

Bridle check ▲  
Single line lengths ►

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>					
a1	427	b1	433	c1	406	d1	480	k1	823
a2	416	b2	423	c2	394	d2	468	k2	515
a3	453	b3	450	c3	442	d3	467	k3	438
a4	440	b4	435	c4	417	d4	447	k4	497
a5	430	b5	416	c5	384	d5	411	k5	492
a6	426	b6	428	c6	426	d6	451	k6	402
a7	2296	b7	1993	c7	1930			k7	417
a8	462	b8	472	c8	481			k8	427
a9	430	b9	451	c9	447			k9	443
a10	458	b10	401	c10	350			k10	366
a11	400	b11	365	c11	348			k11	352
a12	451	b12	465	c12	1380			k12	338
a13	211	b13	284	c13	1234				
AR1	6672	BR1	6541	CM1	833	DM1	883	KM1	907
AM1	2818	BM1	2337	CM2	1581	DM2	1659	KM2	898
AM2	2794	BM2	2333	CM3	1619	DM3	1683	KM3	1402
AMU1	1727	BMU1	1424	CM4	1316			KM4	1325
AM4	2867	BM4	2461	CM5	1356			KM5	1019
AM5	751	BR4	5107	CR1	5837			KM6	948
AM6	789	BR2	4169	CR2	5034			KR1	3273
AR2	3797	BR3	3722	CR3	5009			KR2	2504
AM3	1325	BM3	1112					KR3	2624
AR3	3283							KL1	3053

# Service Record

**Service No 1**Date  Stamp / SignatureN° flights Type of Service Notes **Service No 2**Date  Stamp / SignatureN° flights Type of Service Notes **Service No 3**Date  Stamp / SignatureN° flights Type of Service Notes **Service No 4**Date  Stamp / SignatureN° flights Type of Service Notes **Service No 5**Date  Stamp / SignatureN° flights Type of Service Notes **Service No 6**Date  Stamp / SignatureN° flights Type of Service Notes



# Owner Record

## Pilot No 1

First name

Family name

Street

City

Post code

Country

Telephone

Email:

## Pilot No 2

First name

Family name

Street

City

Post code

Country

Telephone

Email:

# Closing Words

Your paraglider is an advanced, stable wing that promises many hours of safe and enjoyable flying, provided you treat it with care and always respect the potential dangers of aviation.

Please always remember that flying can be dangerous and your safety depends on you. With careful treatment your wing should last for many years. It has been tested to current international airworthiness standards, and these represent the current knowledge concerning the safety of a paraglider. However, there are still many unknowns, for example the effective lifespan of the current generation of gliders and how much material material ageing is acceptable without affecting the airworthiness. There are natural forces that can seriously threaten your safety, regardless of the quality of construction or the condition of your glider. Your security is ultimately your responsibility. We strongly recommend that you fly carefully, adapt to the weather conditions and keep your safety in mind.

Flying in a club or a school with experienced pilots is highly recommended.

We recommend that you fly with a standard harness with back protection and a reserve parachute. Always use good equipment and an approved helmet.

See you in the sky!

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# Appendix

## EN line measurements

The tables below show the line measurements for the test wings, as measured by the test house during the certification procedure. These figures relate to the Bridle Check Tables in section 7.

### Size XS

	A	B	C	D	K
1	6462	6358	6420	6530	6789
2	6451	6347	6409	6518	6521
3	6422	6324	6398	6491	6485
4	6409	6310	6375	6471	6534
5	6380	6289	6378	6458	6312
6	6377	6298	6412	6491	6228
7	6277	6196	6261		6170
8	6178	6108	6145		6181
9	6150	6090	6115		6029
10	6022	6004	6099		5978
11	5972	5973	6098		5900
12	5752	5766	5908		5889
13	5557	5621	5785		

### Size S

	A	B	C	D	K
1	6791	6688	6762	6878	7141
2	6781	6678	6751	6864	6880
3	6763	6660	6733	6828	6834
4	6746	6646	6710	6810	6890
5	6718	6621	6715	6794	6661
6	6715	6629	6748	6829	6565
7	6612	6533	6620		6507
8	6506	6441	6499		6524
9	6477	6423	6468		6363
10	6342	6326	6431		6313
11	6293	6292	6429		6229
12	6063	6078	6230		6218
13	5885	5945	6100		

## Size M

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>
1	7085	6977	7060	7183	7479
2	7083	6971	7049	7172	7259
3	7049	6947	7040	7142	7116
4	7039	6933	7017	7124	7168
5	7007	6910	7017	7109	6931
6	7006	6924	7051	7137	6792
7	6897	6823	6920		6728
8	6791	6718	6770		6799
9	6760	6695	6735		6627
10	6613	6587	6687		6544
11	6564	6551	6686		6488
12	6324	6347	6508		6477
13	6140	6211	6372		

## Size ML

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>
1	7360	7239	7318	7442	7749
2	7351	7228	7310	7430	7455
3	7319	7211	7301	7405	7410
4	7308	7198	7276	7386	7470
5	7276	7175	7281	7370	7223
6	7272	7183	7320	7411	7122
7	7167	7091	7194		7064
8	7051	6987	7056		7086
9	7016	6967	7022		6905
10	6878	6855	6970		6847
11	6821	6819	6968		6766
12	6577	6590	6753		6754
13	6380	6450	6610		

## Size L

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>K</b>
1	7633	7502	7590	7715	8019
2	7622	7492	7578	7703	7711
3	7592	7479	7571	7675	7669
4	7579	7465	7546	7655	7728
5	7546	7443	7551	7643	7469
6	7542	7455	7593	7683	7369
7	7424	7354	7464	0	7307
8	7311	7251	7326	0	7327
9	7279	7230	7292	0	7147
10	7130	7112	7235	0	7080
11	7072	7076	7233	0	6995
12	6821	6837	7007	0	6981
13	6620	6695	6861	0	0