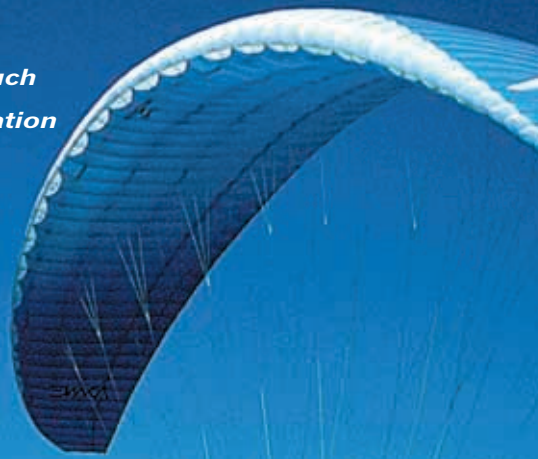
Σ 5

*Betriebshandbuch*

*Manuel d'utilisation*

*User manual*



Carving The Sky

ADVANCE

PARAGLIDERS & KITES

Sigma 5

e n g l i s h

***CONTENTS***


| | |
|---|---|
| *Thank you* | *36* |
| *ADVANCE* | *37* |
| *Production* | *37* |
| *Environmental protection and recycling* | *37* |
| *SIGMA 5 : Carving The Sky* | *38* |
| *A technology in advance* | *38* |
| *Technical details* | *40* |
| *The materials* | *41* |
| *Pre-delivery inspection* | *42* |
| *Familiarisation* | *42* |
| *Care and maintenance* | *46* |
| *Repairs* | *47* |
| *Guarantee* | *47* |
| *The ADVANCE harness* | *48* |
| *Certification* | *49* |
| *Line diagram* | *50* |
| *Speedsystem* | *51* |
| *Detailed description* | *52* |
| *Addresses* | *54* |

***THANK YOU...***

*Thank you for choosing an ADVANCE paraglider - we are certain that you will be most satisfied with your purchase.*

*Your SIGMA 5 is a paraglider of the most modern design and is manufactured with the highest precision. This new glider is an excellent compromise between pleasure, performance and safety. In order to feel completely at ease with your new glider from the outset we recommend that you carefully read this manual. The information provided will enable you to get to know the SIGMA 5 quickly and completely.*

*Apart from flight related information this manual also gives you important safety information in the areas of maintenance and usage as well as tips on how to keep your new glider looking good. If you have any further questions please contact your dealer, flying school or the importer in your country.*

*When selling your glider later on please pass this manual on to the new owner.*
*This booklet is an important part of the glider and belongs with it. We also recommend that you keep a log book - this makes reselling easier and conclusively indicates the amount of use the glider has had.*

*We wish you a great deal of enjoyment with your ADVANCE paraglider and many* ***«happy landings»****.*

*Your ADVANCE Team*

## *ADVANCE*

*A Swiss brand renowned for its high standard of construction and flying qualities of its gliders, ADVANCE has been active on the world market for over 10 years and is amongst the present market leaders. The management team has not changed since ADVANCE was founded, which may explain the stability of the company and the trust shown by its customers : ROBERT GRAHAM (Design and Development), ROLF ZELTNER (Administration and Production) and VALÉRY CHAPUIS (Sales and Marketing). A strong team with many years of experience, able to react quickly to the evolution of the market and sport. The principal team is complemented by international test pilots. ADVANCE is also no stranger to success in competition, with numerous titles including those of world champion, european champion and winner of the World Cup, not forgetting several world distance records. The SIGMA 5 is the 20th model marketed by ADVANCE.*

*The unique philosophy with the development of the gliders has made ADVANCE a brand recognised for its individual character, right up to date technology, utilising the latest performance and security.*

*The actual range is particularly consistent and in tune with the expectations of the market : with no fewer than 5 models, there is truly something for everyone, from the beginner to the competition pilot : ALPHA / EPSILON / SIGMA / OMEGA / BI BETA.*

*In addition ADVANCE offers a full range of harnesses.*

## *PRODUCTION*

*We use the latest production techniques at our own facilities. The plant operators skills are continually updated and the entire production line is regularly checked. This guarantees our customers superbly finished gliders with the greatest safety and performance features.*

## *ENVIRONMENTAL PROTECTION AND RECYCLING*

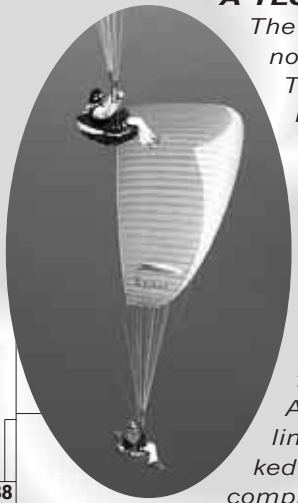
*The protection of the environment is a decisive consideration when we develop, choose materials for and produce a new ADVANCE product. We exclusively use raw materials that stand up to these qualities and use environmentally friendly practises. When one day your glider has come to the end of its useful life please be sure to separate the metal parts from the lines, risers and canopy and dispose of it with the environment in mind.*

## *SIGMA 5 : CARVING THE SKY*

*The name of the SIGMA evokes by itself all the history and philosophy of ADVANCE. A glider light in the brakes, dynamic, and intuitive to pilot. It really is a case of either you love it or you don't. For pilots only ! The SIGMA 1 was the first glider marketed by ADVANCE, in summer of 1989. With Xavier REMOND as pilot, it was also the glider of the first distance world records. Some years later, the SIGMA 4 leaves the market through the «front door» as it won the 2001 Paramotor World Championship.*

*The SIGMA is now in its 5th generation. It happily carries on the «SIGMA spirit» : as always it has a lot of character. It inherits all the knowledge ADVANCE has acquired over more than 15 years. The SIGMA 5 is a totally new ADVANCE, with a brilliant and safe behaviour ; it will allow the advanced and regular pilots to (re)discover a playful and dynamic dimension of flying : pleasure, precision and efficiency.*

## *A TECHNOLOGY IN ADVANCE*



*The SIGMA 5 is a up-market glider, built with a very precise and sophisticated technology that gives it an exceptional, dynamic and «comfortable» behaviour.*

*The SIGMA 5 is the glider for thermal «par excellence».*

*Its profile gives the SIGMA 5 a good stability in pitch, while retaining the necessary energy to make a clean entrance into strong thermals : the glider «bites» into the air and is very efficient in rough conditions.*

*Every cell wall receives a diagonal reinforcement from the lines attachment points. This reduces the deformations of the wing, takes out the rippling movements, increases stability and solidity.*

*The closed cells on the leading edge are between the cells that are not connected to the same group of lines. They make the leading edge more solid, and the air movements and pressures in the glider are more uniform. On the wing tips, the first 3 cells are closed, the next 3 have a small opening with a mesh covering.*

*A compression strap is sewn between each profile/line attachment point on the D lines. Thus the space between each cell remains the same, whether the wing is braked or not, making turning performance uniform and consistent. There are also some compression straps between some A, B and C lines, between the cells that are not connected to the same group of lines.*

*The cell width is scaled, it gets smaller as you go from the center to the wing tip (the last ten being closed off) giving a beautifully clean aerodynamic shape.*
*The three-level suspension lines have been optimized to reduce drag, making it easier to untangle and giving more efficiency to the speed-system. The main lines levels are :*
*3 A, 3 B, 3 C + Stabilo, 2 D.*

***The passion for perfection***
*The smallest details were important to us. A glider that gives you pleasure even before you fly with it !*

- *all of the sewing and stitching is internal*
- *the leading and trailing edges are reinforced with a Mylar border*
- *the winglets on the wing tips are aerodynamic elements, improving turn precision and also an ADVANCE signature*
- *the lines remain in correct position on their small quick links thanks to a well designed plastic clip*
- *the breaking is optimized by utilising a system with rings creating braking action on the wing tip first*
- *reinforced comfortable brake handles with a magnetic snaplock*
- *4 risers with speed sytem*
- *the wing tips have a velcro easy to open to remove the twigs and gravels that could enter in the glider*

## *TECHNICAL DETAILS*

| ***SIGMA 5*** | ***23*** | ***26*** | ***28*** | ***31*** |
|---|---|---|---|---|
| *Surface - $m^2$* | *23,76* | *26,04* | *27,62* | *31,04* |
| *Projected surface - $m^2$* | *20,75* | *22,75* | *24,12* | *27,11* |
| *Span - m* | *11,18* | *11,64* | *11,99* | *12,71* |
| *Projected span - m* | *9,12* | *9,49* | *9,78* | *10,37* |
| *Aspect ratio* | *5,26* | *5,20* | *5,20* | *5,20* |
| *Projected aspect ratio* | *4,00* | *3,96* | *3,96* | *3,96* |
| *Max chord - m* | *2,67* | *2,82* | *2,90* | *3,02* |
| *Min chord - m* | *0,53* | *0,55* | *0,56* | *0,59* |
| *Cells* | *58* | *58* | *58* | *58* |
| *Take off weight - kg (pilot, wing, equipment)* | *60/75* | *70/90* | *85/107* | *102/127* |
| *Weight of the glider - kg* | *6,2* | *6,8* | *7,2* | *7,6* |
| *Maxi length of the lines with the risers - cm* | *753* | *781* | *799* | *828* |
| *Minimum speed - km/h* | *22* | *22* | *22* | *22* |
| *Max speed without speed-system - km/h* | *37* | *37* | *37* | *37* |
| *Max speed with speed-system - km/h* | *48* | *48* | *48* | *48* |
| *Min. sink rate m/s* | *1,0* | *1,0* | *1,0* | *1,0* |
| *Glide* | *8,5* | *8,5* | *8,5* | *8,5* |

*Surface, span and aspect ratio are calculated from the computer and are measured on the axis of the profile.*

## *THE MATERIALS*

*The SIGMA 5, like all ADVANCE products, is produced as the result of the latest developments and experience in the sport. All the materials used for the paraglider have been carefully selected in order to allow our products an excellent longevity. The materials are systematically tested and all canopies undergo quality control testing. The life of a wing may vary in big proportion according to the care given to the utilisation and maintenance.*

***Upper and lower surfaces, cell ribs :***
*Nylon Porcher Marine New Skytex 6.6, 44 gr/m²*
***Reinforcement of the leading edge and trailing edge :***
*Polyester/Mylar 20 mm*
***Reinforcement of the leading edge lower surface :***
*Polyamid 16 mm*
***Suspension lines :***
*Betech Dyneema + Technora, sheathed Polyester*
*DSL : 0,95 mm (70 kg) / 1,20 mm (110 kg) / 1,85 mm (275 kg)*
*TSL : 1,25 mm (115 kg) / 1,80 mm (280 kg)*
***Risers :***
*Polyester 22 mm, 1100 kg*
***Quick links :***
*Inox 3,5 mm, 750 kg*
***Stiching thread :***
*Polyester*

## *PRE-DELIVERY INSPECTION*

*Before supplying your canopy your sales agent should make a general test flight and set the brakes and speed system controls.*

***Brakes :***

*There should be a minimum 10 cm free play between the brakes released position and the start of action on the canopy. This will prevent the trailing edge from being deformed when using the speed system. It is better to have long brake line and to fly with a turn around the hand.*

***Speed System :***

*This is foot operated. The A, B and C risers are pulled down with a differential, which protects the profilefrom deformation. Using the accelerator to its full travel will give an increase of around 11 km/h in speed. In all cases keep a light pressure on the brakes so as to be able to feel movements of the canopy and to be able to anticipate and counter potential closures.*

## *FAMILIARISATION*

*We advise you to gradually become familiar with your canopy by initially flying in calm conditions on a site that you are experienced with. Before each flight make a thorough pre-flight inspection, checking for any tears, tangling of the suspension lines, risers, all quick links and the harness.*

*A few practise inflations in easy conditions will strengthen your trust in the handling of the SIGMA 5 from the outset. This glider is not certified for powered acrobatic flight. Please fly the glider within its limits and avoid extreme situations.*

***Start Check :***

- *Lines free*
- *Canopy open*
- *Harness and helmet buckles properly closed (reserve parachute OK)*
- *Wind direction and strength observed and evaluated.*
- *Airspace and visibility OK*

***Take off :***
*The SIGMA 5 is suited to forward and reverse inflations. Lay the canopy out so as to maintain its elliptical form at the leading edge. Hold the A risers below the large quick link then advance until all the A suspension lines are under light tension. Position yourself in a central position relative to the canopy. At the start of take off, gently accelerate and guide the risers until the canopy is above the head, without either pulling down or pushing the risers exessively forward. The canopy rises progressively without any «hard point». The canopy will cease to rise if not guided by the risers. The SIGMA 5 inflates easily and rises without any overshooting.*

***Normal flight :***
*The SIGMA 5 achieves «best glide» with brakes in the hands up position. Lightly applying brakes will reduce the sink rate. When flying through turbulence the application of a small amount of brake will increase stability.*

***Turns :***
*The SIGMA 5 possesses very comfortable brake pressure. It will respond to brake application in an immediate and proportional manner to the amount of brake applied.*
*To familiarise with this make your first turns in a gradual and progressive manner. To make the most efficient turns in thermal conditions, having found the core of the thermal we advise you to fly with approx 30% brakes and to control the radius of your circle with the outside brake, that gives more speed.*

***Flying with the speed system :***
*The SIGMA 5 has an exceptionally flat polar curve. This gives very good glide performance at high speeds. Remember though that the accelerated glider is more unstable. Collapses during accelerated flight occur with more energy and impulse. When flying through turbulent air with the speed bar on, first release the speed bar then apply the required amount of brake to keep the glider under control.*

***Symmetrical or assymmetrical collapses :***

*The SIGMA 5 conveys a highly satisfying solid feel. An active flying style will virtually eliminate collapses. Larger collapses (over 50%) are characterised by a reasonably dynamic turn which is easily controlled. For these situations we recommend the following :*

*Weight shift to the open side. Try to rotate with any ensuing turn so as to reduce the potential for a twist. This also maintains airspeed and internal pressure promoting a fast reopening. Depending on the severity of the turn apply brake on the open side so as not to enter a spiral dive but be aware of creating a potential stall. The object is to fly the glider in a desirable direction (avoiding obstacles) and then reopen the collapsed side using a generous pumping action.*

***Fast descents :***

*To quickly lose height the ADVANCE test team recommends, depending on the situation, a spiral dive or big ears. It is a good idea that you practise these in smooth air. Even flares and landings with big ears should be practised in smooth conditions so that a serious scenario doesn't turn into an emergency.*

***Spiral dive (360) :***

*The spiral dive is entered into by gradually applying brake on one side. The desired bank angle is controlled by the amount of brake applied. We advise no weight shifting and to adjust the harness chest strap width at around 40-45 cm between the karabiners. At the same time the pilot's head and field of view should be oriented in the direction of the turn. To exit the spiral raise the inside brake gradually. Depending on the steepness of the spiral it is possible that the glider could do another rotation even after releasing the brake. Be aware that a collapse may occur in case the glider passes through its own trail.*

***Big ears :***

*Take the outer suspension line of each A riser and pull them firmly and simultaneously downwards. Be careful not to pull down on the risers themselves. The wing tips will fold down and back. Use the brakes to reopen.*

*NB : do not attempt spiral dives with big ears as this manoeuvre results in extremly high loads and can unduly stress the glider.*

***Using speed system with big ears :***
*In order to quickly reduce height and fly away from danger we recommend the following : place your feet on the speed system. Apply big ears. This will symmetrically collapse 1/3 of the leading edge and reduce the angle of attack. Apply speed bar to the desired point and steer using weight shift.*

***B line stall :***
*Our experience indicates that a B line stall is not currently the most efficient manoeuvre. It presents some risks with the high aspect ratio gliders if it is not perfectly and symmetrically entered into and exited from. This has to be considered as a emergency manœvre. In addition to this it can also damage the glider.*

***Parachutal stall/full stall :***
*The progressive application of both brakes reduces forward speed as is evidenced by the reduction in the presence of wind noise. After minimum speed the glider goes into a momentary phase of parachutal stall which, if the brakes are pulled further down, is followed by a full stall with the glider falling behind the pilot. The SIGMA 5 does not possess a stable parachutal (or deep) stall.*

***Landings :***
*We recommend you to select a landing site that you are familiar with, as well as having no obstacle. Beware of your first landings with the SIGMA 5 as its performance will almost certainly be superior to your previous canopy.*
*Remember to build up speed prior to landing but do not let the brakes up completely ; flare the glider by progressively applying the brakes before landing. Avoid brutal braking after allowing the canopy to accelerate as this will convert into lift of several metres above the ground.*

***Launching by winch :***
*The SIGMA 5 is suited to tow or winch launch. The glider does not require any modification or particular manoeuvre for this type of launch.*
*Winch launch is only permitted if :*
- *The pilot has a winch / tow endorsement.*
- *The winch system is certified for use with paragliders.*
- *The operator has fully learnt how to winch paragliders.*

## *CARE & MAINTENANCE*

### *Folding :*

*We recommend that the canopy be packed by folding cell to cell in order to lay the mylar reinforcements of the leading edge flat and on top of each other.*
*Do not pack the canopy very tightly.*

### *Maintenance advice :*

*The lifetime of the canopy can vary considerably depending upon the care that you take with its use and maintenance. Other than ultra violet rays the principal causes of wear are transport and storage.*

- *avoid violent shocks to the upper surface (eg. when the canopy falls to the ground whilst groundhandling) or any rubbing against the ground as these wear the stitches and the coating.*
- *do not leave the canopy folded for several days if it is either damp or tightly packed.*
- *immediately remove any salt or sand that enters the cells, as this enters the stitches and causes wear during each successive folding.*
- *only clean the canopy with soft water and a neutral soap. Allow the canopy to dry in a place that is dry and airy but not in direct sunlight.*
- *remove the twigs and gravels that could have entered into the glider by opening the velcros on the wing tips.*
- *following a crash or violent landing on the leading edge, always have the canopychecked •*
- *by your sales agent. The canopy should be checked in a similar fashion if you note a deterioration of performance or behaviour.*
- *avoid moving your glider too quickly from a cold to a warm location without giving it some air - water can condense on the glider as a result.*
- *Allow us to conduct a general check annually (as per AFNOR).*

### *Longevity :*

*The longevity of your glider can be increased through proper maintenance. We suggest you abide by the legal maintenance requirements or at least perform an annual check. Have your glider checked regularly by an ADVANCE authorised service agent. Either way we suggest you have your glider checked prior to on-selling it. This way you save any problems which may arise.*

## *REPAIRS*

*Your canopy is an aeronautic device and for obvious safety reasons we advise you not to undertake your own repairs. The various stitches and cut of the suspension lines are made under precise tensions ; do not replace damaged suspension lines except with identical ones supplied by ADVANCE. Your sales agent will be able to repair damages that do not necessitate the replacement of panels. He will be able to advise you how to have larger repairs carried out.*

## *GUARANTEE*

*Your SIGMA 5 is guaranteed against any manufacturing fault for a period of one year from and including the day of delivery. This date should be written on the card accompanying this manual and posted within 10 days of delivery.*

***The guarantee will not cover :***

- *Damages due to: lack of cleaning or care, poor use, accidents, overloading, use in extreme conditions (intense heat or cold) or the inexperience of the pilot.*
- *Normal wear from regular use.*

- *The advice given in this manual regarding folding, storage and care will allow you to increase the lifetime of your canopy.*

## *THE ADVANCE HARNESS*

*The SIGMA 5 can be flown with any harness. We recommend, however the use of ADVANCE harnesses (WINNER and MASTER models). Just like ADVANCE paragliders, ADVANCE harnesses are unique products, manufactured exclusively from quality materials. All models were developed by ROBERT GRAHAM as a result of countless flying hours and belong to the latest generation of paraglider harnesses.*

*The ADVANCE harnesses are the only paraglider harnesses so far developed for ADVANCE paragliders. It goes without saying that they can be used when flying any other paraglider.*

*The positioning of the attachment points, the arrangement of the straps, the quick-buckles, the easily adjustable harness position, the free-sliding shoulder straps as well as the simplicity of the design, all contribute to ADVANCE harnesses being amongst the leading products on the market today.*

*All ADVANCE harnesses are designed with both an active and passive safety concept :*

***Active :***

*Every movement, impression and item of information transmitted by the paraglider is absorbed by the special design of the attachment points and passed on to the pilot without loss of equilibrium or balance.*

***Passive :***

*The ergonomically-shaped back, completely padded with foam rubber, acts as a shock absorber and protects the pilot from hard impacts. Both the space and the fittings for installing an airbag internally are included as standard.*

## *CERTIFICATION*

*26 and 28 : AFNOR Performance and DHV 2 with the speed-system.*

*23 and 31 : DHV 2 with the speed-system.*

*The SIGMA 5 is certified according to AFNOR Performance and DHV 2 with the speed system. The models are 100 % the same for both certifications.*

*These classifications correspond without ambiguity to the categories of pilot the SIGMA 5 is made for.*

*The certification test are, with ADVANCE, the final step in the development of a new wing. We make them only when we are satisfied with the wing, aeronautically speaking.*

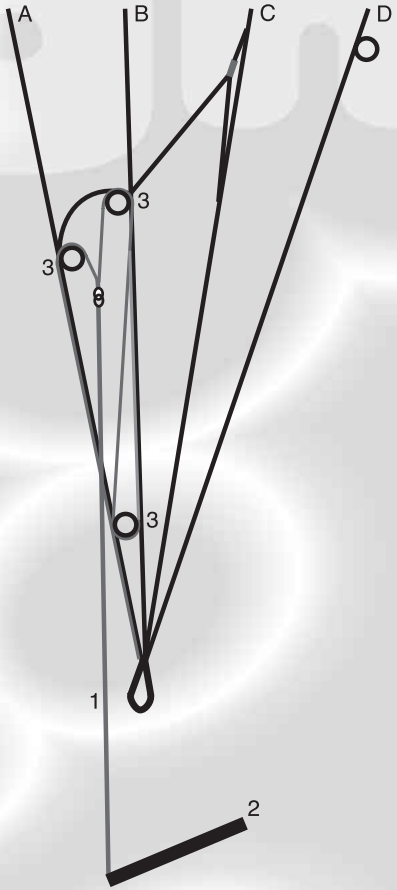
*We remind you that the behaviour of a glider is very different whether it is in thermic conditions, as with real flying conditions, or smooth air, as for test conditions. However the result of certification will not be used as an advertising / marketing. ADVANCE believes real security lies with the pilot, and more importantly the behaviour of the glider in real flying conditions with an active pilot. The pilot must accept that a paraglider is a aircraft that needs to be piloted whatever the conditions are.*

*The user manual does not contain certification reports. If pilots are interested in them they are available on the ADVANCE web site :*

***www.advance.ch***

***SIGMA 5***
***23 / 26 / 28 / 31***

## *BESCHLEUNIGER / ACCELERATEUR / SPEEDSYSTEM*

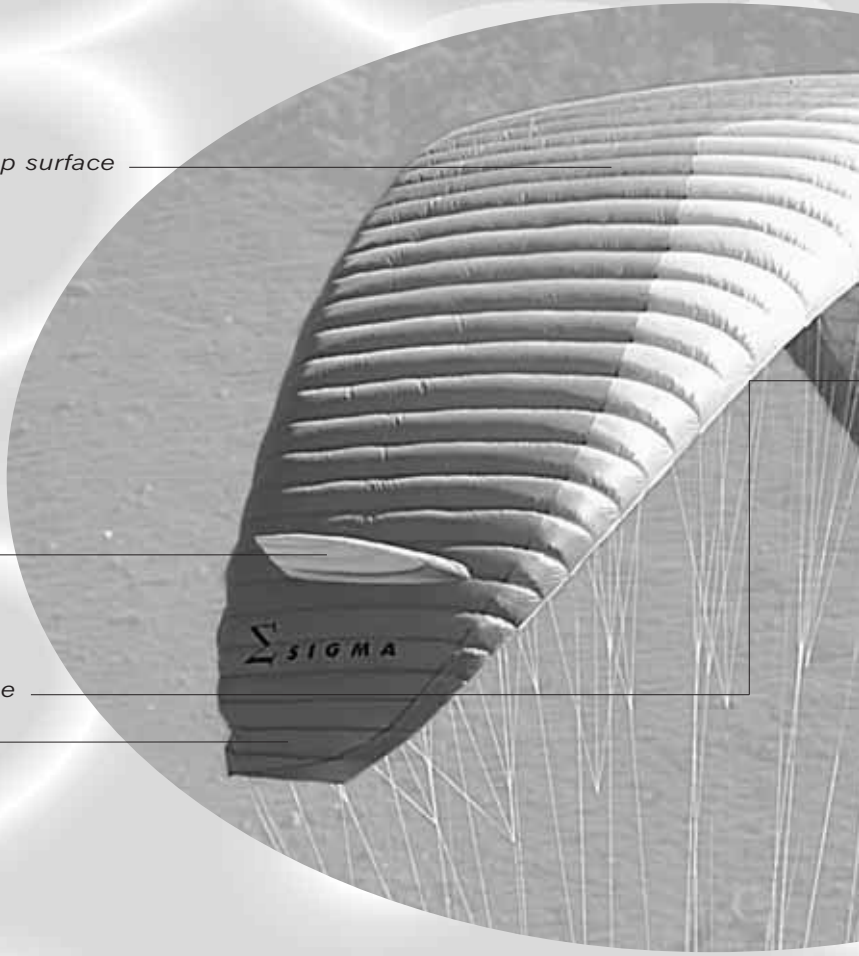



*1 Beschleunigungsleine*
*2 Beschleunigungsstange*
*3 Umlenkrolle*

*1 Ficelle principale*
*2 Barre d'accélérateur*
*3 Poulie de renvoi*

*1 Accelerator line*
*2 Speed bar*
*3 Pulley*

## *ÜBERSICHT BAUTEILE*
## *DESCRIPTION DETAILLEE*
## *DETAILED DESCRIPTION*

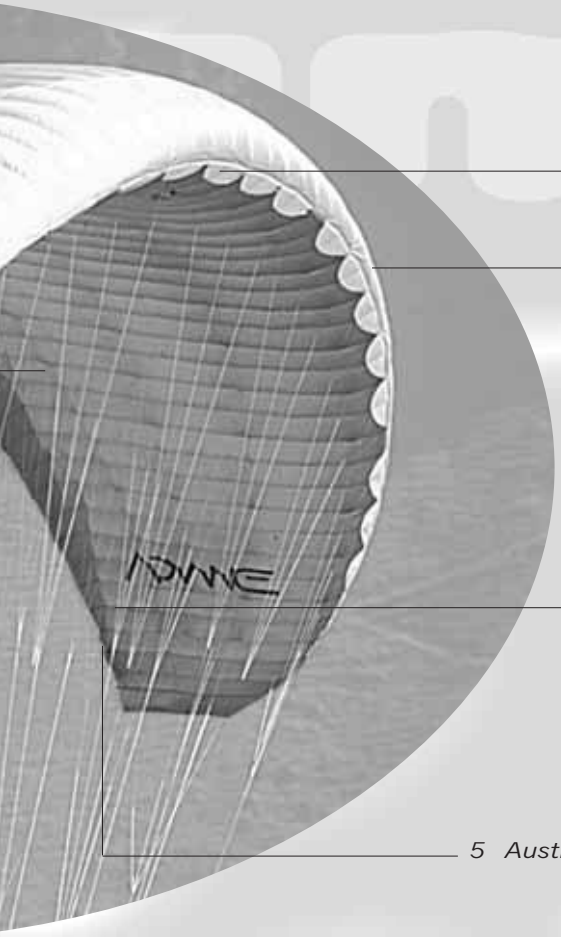



*1 Obersegel / Extrados / Top surface*

*2 Winglet*

*4 Untersegel / Intrados / Bottom surface*

*3 Stabilo / Stabiliser*



6 *Staudrucköffnung*
*Ouverture des caissons*
*Cell openings*

7 *Eintrittskante*
*Bord d'attaque*
*Leading edge*

8 *Zugband*
*Sangle de compression*
*Copmpression strap*

5 *Austrittskante / Bord de fuite / Trailing edge*

D

F

E

## *ADRESSEN / ADRESSES / ADDRESSES*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fly different!

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