



# Reserve Packing Technical Manual

## TM51

This Reserve Parachute technical manual has been written as a guide. It is not a replacement for learning from experienced pilots and following best practice described by the Reserve Parachute manufacturers recommendations.

The content of this manual has been put together to be used by the members of the NZHGPA. Some content has been sourced with permission from the Flybubble.com and the BHPA (British Hang Gliding and Paragliding Association), The rest has been collaborated from members of the NZHGPA.

A Reserve Parachute gives you a second chance, perhaps a final chance, when some catastrophe occurs. This technical manual details the important points about buying, installing, maintaining, and using a reserve parachute. Hopefully this will increase the chances of the reserve parachute system working successfully if it is ever needed.

The basic reserve parachute system comprises the canopy and its lines, its bridle, and the attachment to the harness. The system is completed by the deployment bag or diaper, which holds the packed canopy and lines, stowed inside a container which is fitted securely to the pilot's harness.

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## Choosing a parachute

Any reserve parachute used in NZ must conform to the either testing standard EN12491 or LTF 35/03 or a CAA approved manufacturers type certificate. This is a requirement under CAA Rules Part 91, Appendix A.

Such parachutes will have passed rigorous tests on speed of opening, descent rate, stability and strength. In the strength test the manufacturer has the choice of two test speeds, and the successfully certified parachutes therefore carry on the certification label the warning: 'not suitable for speeds more than 32m/s (115km/h)' OR 'not suitable for speeds more than 49m/s (176km/h)'. Other than checking the certification label and deciding whether you will be happy with the lower speed certification or whether you want the added strength of the higher speed tested alternatives, the final very important thing you need to do is check that it is available in a size suitable for your total weight in flight (this figure includes the weight of all your flying equipment; glider, harness etc.).

If you buy a parachute not certified to EN12491, the earlier DHV and AFNOR standards give some measure of quality assurance. However, you must be careful to ensure that the parachute you select will provide an acceptable descent rate at your total weight in flight.

It is not recommended to have a higher sink rate than 5.5m/s as the chance of injury on landing is high. This is the limit for certification under the EN 12491 system.

### **Descent rates / equivalent fall height.**

An EN12491 certified reserve parachute must theoretically have a maximum payload touch-down speed, equal or better than a descent of 5,5 m/s, which corresponds to a 1.8 metre jump off a wall.

A LTF or DHV certified reserve parachute must theoretically have a maximum payload touch-down speed, equal or better than a descent of 6.8 m/s.

You should also bear in mind that in an actual emergency, factors such as lift, sink, altitude, pendulum, a semi-inflated paraglider, or a damaged hang glider may all conspire to increase or decrease your descent rate and landing position. Imagine the difference between landing on your feet from a 1.8 metre jump from a wall and executing a successful Parachute Landing Fall (PLF), versus landing on your back, side or head.

To lessen the chance of injury when landing under a Reserve Parachute, choose a Reserve Parachute with a descent rate below 5.5 m/s at your expected maximum all up weight and prepare for a hard landing by adopting the Parachute Landing Fall position (PLF).

## Types of Reserve Parachutes

Although there are technical differences between modern Reserve Parachutes, all styles work. But not all Reserve Parachutes are created equal! From experience, their build-quality, design, materials, and effectiveness can vary significantly. We recommend sticking with trusted brands that have a proven track record. Choosing the right type from within this selection depends on your needs as a pilot.

The early emergency parachutes produced for hang gliding used round or 'conical' shaped canopies. Since the late 1980's most emergency parachutes produced for hang gliding and paragliding are of the pull down- apex design (or variations on it). A central line holds the middle of the open canopy more or less level with the skirt. The air pressure forces the skirt out ensuring the canopy provides the maximum drag area for the smallest amount of material. The pull-down apex design also allows for very rapid openings. The possible downside of a pull-down apex is that some designs can be very unstable.



### Round, Pulled-down Apex (PDA)

A simple design that works if it's big enough to give a decent descent. This is the 'traditional' design and can be the most affordable option. Pay particular attention to the size (area in m<sup>2</sup>) as one of the main factors which determines the 'sink rate' of a reserve is the load per square meter. It is very important that round reserves are the right size. It is recommended that the all up pilot weight sits at around 80% of the recommended EN loading. (EG for a reserve rated EN 100kg the pilot wants to be all up 80kg or slightly less.)

Pros: Cheaper; simpler to pack; little tracking sideways

Cons: no steering; heavier; bulkier. Depending on the type of pull down apex, they can be more prone to instability (oscillations) during descent.

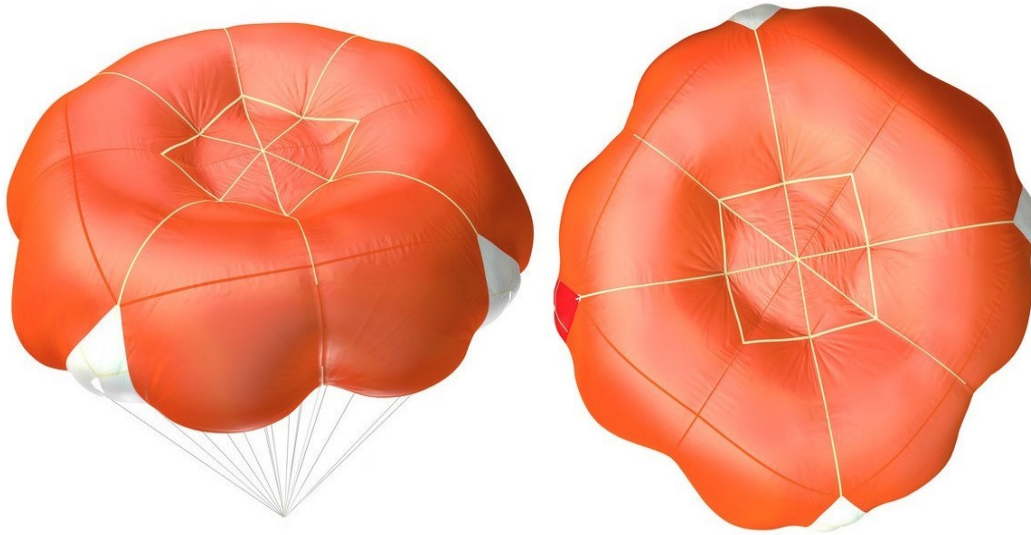


### Cruciform (Square)

A mid-priced option that uses a square design with corner vents to offer the same descent rate (in a certification test) from a smaller canopy and thus a more compact package. Many cruciform reserves use increased pendular stability and lift generation by tracking sideways, but you have no control over the direction. Sometimes this glide could be useful, sometimes not: for an unplanned deployment it's no worse than a Round which will drop you on whatever happens to be beneath you. However, if you're doing SIV/acro over a safe landing zone, you will require more space because you can't reasonably estimate where you'll track to under a square reserve, and you'll track even further if you disconnect (or pull in) your paraglider.

Pros: Faster opening; more stable descent; lighter weight and lower volume (compared to PDA)

Cons: No steering and some models track sideways



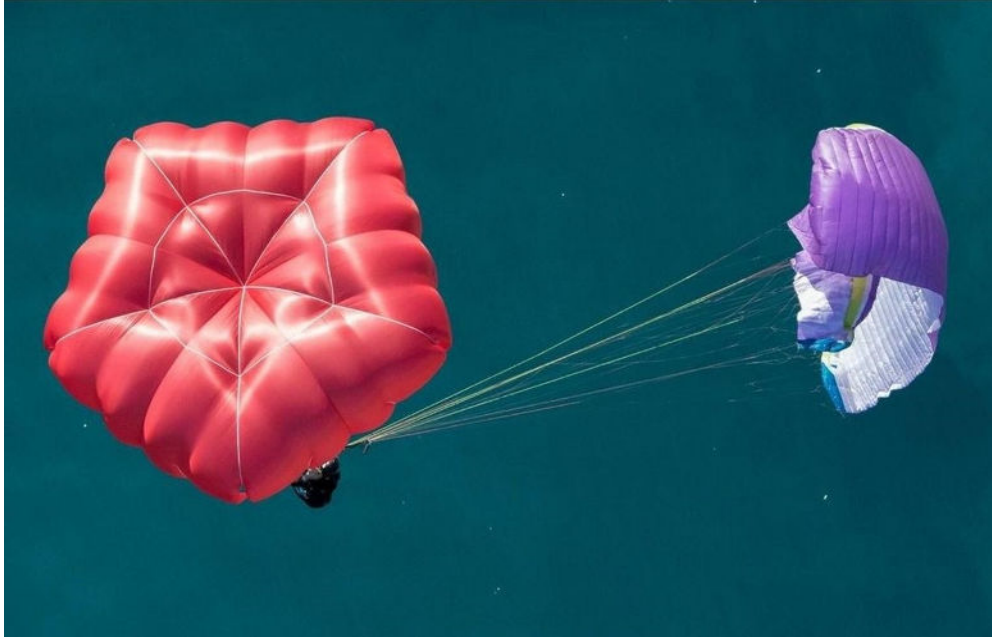
## Square-round (SQR)

At the time of writing (July2022), there is one SQR available. This is the companion SQR, made by advance.

The Companion SQR incorporates features of the PDA and Cruciform styles combined with other design innovations to offer a 'best of the class' approach in the non-steerable category. Due to the stepped skirt and packing technique, it has a fast opening. The channels for air to escape help provide extra pendular stability, but it is not designed to glide. This reduces the risk of mirror-effects (down planning) when compared to squares or Rogallos. Certification tests show only what reserves do with no paraglider attached to the pilot. The design team used their experience and real-life testing to optimize the behavior so that it deploys reliably in various situations and resists the interference of the paraglider with the least impact on the sink rate. Overall, it presents the lowest demands on the pilot, with the simplest operation.

Pros: Faster opening; more stable descent; lighter weight; lower volume (compared to PDA); little tracking sideways; simplest to pack; also greater surface area due to design.

Cons: No steering



## Pentagon

The five-sided shape is self-stabilizing: if the PENTAGON experiences a pendular impulse towards a corner, the restoring force will automatically act in the opposite direction. Opposite a corner is an edge, where the airflow is significantly different, and this counteracts unwelcome oscillations. The resulting pendular stability is excellent.

Pros: Faster opening; more stable descent; lighter weight; lower volume (compared to PDA) and less tracking sideways than Cruciform (Square)

Cons: No steering



## Rogallo

After having thrown a non-steerable reserve and contemplating the many horrors below, pilots often decide to buy a Rogallo style reserve. Many acro and test pilots swear by them, because if you deploy high enough and control or cutaway the main, you can choose where you land. They offer the best descent rate (due to having an aero foil), fastest opening speed and the most landing options due to being steerable. All reserves present a risk of down-planning if you do not disable the paraglider. Some Rogallos have an increased risk of down-planning due to their gliding tendency, but this is mitigated by having a very large surface area (some deploy in a slowed state with brake lines stowed). If you can get control of your main paraglider (B-stall, C-stall, wrapped brakes or pulled in wing) it is not necessary to cut-away, but you can do so if your harness is equipped with quick-out carabiners and speed bar pins (or a hook knife). That produces increased gliding ability, removes twists, and reduces the risk of the wing tangling with the reserve. You can steer yourself into clear airflow and land into wind, reducing ground speed and landing impact.

Pros: Fastest opening time; lowest sink rate; steerable; reduced oscillations and reduced landing speed into wind

Cons: Not suitable for HG; tracking sideways (but possibility to steer); might not be able to steer due to twists or not getting control of your main paraglider; more complicated to pack





### Ram-air (Paragliders Only)

A cut-away system designed for acro professionals, the deployment releases your main glider and uses it to pull out a standard steerable parachute, giving you freedom to reach a safe landing zone.

Pros: Fastest deployment time (but not least height loss); reduced risk of glider tangling in reserve; no need to control a flailing main wing; fully steerable; reduced landing speed into wind; safest touchdown in strong winds

Cons: Expensive; heavy dedicated harness; more complicated to pack; requires a minimum height of 100 meters above any obstacle to be considered safe; will not work if you are tangled in your wing; you must remove your hands from controls when jettisoning; could open facing the hill or significantly increase downwind landing speed (but can steer); due to limitations it is required that a second reserve is carried and ... you might lose your main wing!

## Buying second-hand

There is nothing intrinsically wrong with buying a second-hand parachute, but you are strongly advised to have it inspected by a pilot with experience in reserve parachutes and packing.

During the 1990's it was common that reserves being used were way too small compared to today's standards leading to fearsome descent rates if ever used at typical hang glider payloads, assuming the opening shock did not burst them. These should be avoided. A licensed packer will check that the parachute is the right size for you, is in good, serviceable condition and is not too old. Reserve Parachutes degrade over time so the older your reserve the more likely it is to be porous which will increase the certified descent rate and make the reserve very dangerous. Most manufacturers recommend replacing a reserve parachute after **10 years**. Some manufactures may extend this to 12 years after a manufacturer's reinspection. Always check the manufacturer's handbook for frequency of reserve parachute repacking and lifespan of the reserve parachute.

Be cautious of buying any secondhand reserve parachute that has been in salt water or deployed, without first having it checked thoroughly. This is especially relevant for lightweight reserves.

**Note:** Parachutes without the manufacturer's name, a serial number and/or the date of manufacture should be avoided.

## Reserve Parachute Harness Compatibility

Reserves which are too bulky for the reserve compartment of the harness can be relatively difficult or even impossible to deploy, especially under high G force circumstances. Therefore it's especially important to ensure that the packed volume of the reserve is not too big for the reserve compartment of the harness. This can be easily checked by completing a hang pull test.

For some harness models the size (volume) of the harness reserve compartment varies by harness size, which means that each size of harness is compatible with reserves of different packed volumes. For example, for the Advance IMPRESS 4 harness Advance gives the volume of the reserve compartment for the S size as 3–5.5 (min–max) litres, whilst for the M size it's 3–6 liters, and for the L size it's 3–6.5 liters.

Tip: For a broad approximation for reserve volume in litres a factor of 2.7 can be applied to the reserve weight in kgs. For example, if the reserve weighs 2 kg then, as a rough guide, the reserve volume is approximately  $2 \times 2.7 = 5.4$  litres (or 5400 cm<sup>3</sup>).

**Note:** this depends on the packing method and is only an estimate of volume.

In every case a suspended and loaded test pull check can be carried out by the pilot in realistic conditions are the only way to prove that a particular reserve, as it has been packed, will reliably deploy from the harness. When newly packed, the volume of the reserve can be enlarged by 30%. Compatibility checks are strongly recommended after each repack.

## Suspended and loaded test pull

A test pull should be done with all straps done up as if you were preparing for takeoff and be fully suspended from the main carabineers.

**Note:** The harness should be fully loaded with whatever a pilot normally flies with. E.g. Rucksack, vol biv gear.

Once in this position:

1. Locate the reserve handle and pull out the reserve (do not throw).
2. Confirm the reserve comes out of the harness easily whilst staying in the deployment container.
3. Check there is enough bridle free to allow the pilot to throw before the reserve will be released from the container.
4. Fit the reserve back into the harness in the same way it was before the test.

## Reserve User manual

Ensure you receive a user manual with your parachute or source one online: this should contain instructions for installing it, using it and re-packing it, as well as data on performance, size, and recommended load. Before packing a reserve parachute, you should always reference the manual for the specific reserve being packed if unfamiliar with the reserve.

## Choosing a Bridle

Make sure that the parachute has the correct bridle for your glider/harness type:

- Hang-glider parachutes require a six-metre bridle to keep the parachute clear of the wreckage.
- Single-riser paraglider reserve parachutes require a short bridle with an additional Y-bridle to connect it to the two harness-attachment points (some harnesses come with this Y bridle).
- Multi-riser paraglider parachutes connect the appropriate risers directly to the left and right harness-attachment points.
- Steerable reserves mounted to main carabineers can require extenders.
- Paraglider reserve lines and bridle should ideally be the same length as the glider's line set. This avoids the reserve flying inside the wing line set on deployment, or the wing flying inside the reserve lines.

## Repacking

Ideally every pilot should learn how to repack his or her own parachute and be completely familiar with the reserve system. If you prefer to not repack your own equipment, find someone familiar with your equipment that you trust.

Regular repacking should be carried out at the intervals recommended in the parachute's manual, check, and repack your parachute at a minimum every twelve months as specified in the NZHGPA OPM. Using a checklist like [appendix 1](#) can be a good idea. Some manufacturers provide a similar checklist.

Parachutes must be repacked to the manufacturer's specifications the only acceptable deviations are listed below and the reserves manual must be referenced.

If your parachute has become wet or damp it must be aired immediately and repacked when completely dry. Repacking provides a regular opportunity for a close examination of the entire parachute system. The system is checked for general viability, wear and tear and allows replacement of rubber bands which perish. When replacing rubber bands, ensure you replace them with bands of the correct specification.

By fitting a reserve parachute your chances of surviving an in-flight catastrophe have been greatly increased.

## Deviations to a reserve's manual whilst repacking

### Acceptable Deviations:

- Packing a reserve into a harness specific deployment inner container provided it is not prohibited in the reserve manual.
- Using Harnesses with integrated inner rescue container:  
A lot of modern harnesses have an integrated rescue container in which a rescue system can be placed. For the correct mounting of the rescue system in such a container you must refer to the harness manual.

### Un Acceptable deviations:

- Packing a reserve into a reserve specific deployment inner container different to recommendations in the reserve's manual.

## Reserve parachute care

Apart from regular repacking and inspections, pay special attention to the following:

- Do not leave the reserve out in the sun (UV radiation) unnecessarily.
- A wet or damp reserve should be completely unpacked and allowed to dry inside at room temperature, or outside in the shade.
- Do not expose a packed reserve to extreme temperature changes and make sure it gets enough air circulation in cars and buildings so that condensation does not form.
- Do not expose your reserve to the extreme heat that can build up in a vehicle, this can negatively affect rubber bands and cause the reserve to deploy in a compromised way.
- Deal with the reserve carefully on the ground after an opening, or during SIV training.
- After contact with seawater the reserve must be thoroughly rinsed with fresh water.
- Only clean the reserve with fresh water, and a little neutral soap if required. Never use solvents. Chemicals, cleaning agents etc.
- A thorough inspection of a reserve parachute should take place after every deployment.

## Installing

Always unpack and inspect a parachute before fitting it to your harness. It is not unusual to find faults in brand-new equipment, so be sure to check carefully. Be aware that many parachutes are shipped 'packed for transit' and look ready for use but are not!

The parachute's outer container must be mounted in a suitable place on the harness (although in many cases it is built into the harness). It may be on the front or on either side; with paraglider harnesses it could also be on the back or even under the seat.

All these positions have advantages and disadvantages:

- Does the pack get in the way during take-off, flight, or landing?
- Does the pack location involve extra connections when putting the harness on for flight (which might be forgotten)?
- Is the mounting secure, so that the deployment bag can be extracted easily?
- Can you see the handle?
- Can you easily reach the handle with either hand? If you can only reach it with one hand, you have only half the chance of a successful deployment!
- Is the handle likely to get accidentally caught and cause accidental deployment?

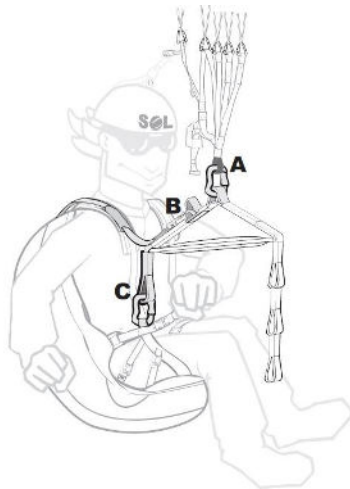
Make sure that the parachute fits properly in the harness. See section on [Reserve Parachute Harness Compatibility](#). Make sure your emergency-parachute riser is correctly attached to your harness. Modern certified paraglider harnesses are supplied with tested loops on the shoulders: You must attach the parachute to both, so the load is spread equally. With hang-glider harnesses the emergency parachute is connected to the main harness suspension point, using a separate steel maillon connector. The bridle(s) must be carefully routed to ensure that no twists will occur as your emergency parachute deploys. You must also ensure that the bridle(s) will not get tangled with your risers, hang-strap – or with you! You do not want the bridle ending up around your neck!

**NOTE:** Unless the manufacturer of either the reserve or harness states otherwise the reserve in most circumstances should be installed with the closing stow away from you, and the clean side of the bag towards you (if you were to be hanging in the harness).

## Installing Tandem Reserve

When installing a tandem reserve it is important as always to check and follow the guidance of the tandem harness manual. Most manufacturers state the reserve must be attached at the riser attachment point of the spreaders. This may be to the main carabiners however this is discouraged, preferably maillions independent to the main carabiners should be used. Some spreader bars have attachment points specifically for the reserve to be attached to.

**Note:** A tandem reserve must not be attached to only the pilot harness, If attached to the shoulders of the pilot harness then it must also be attached to the shoulders of the passenger harness.



- A – Paraglider risers attachment
- B - Reserve parachute attachment
- C - Separator –harness attachment

*Image from: 'Independence' showing spreaders with specific reserve attachment points.*

## Routing and securing tandem bridles

Be cautious using Velcro loops or electrical tape. Velcro can lock firmly and electrical tape can bunch up and become extremely strong.

Any tape used should be tested that it tears with minimal force and doesn't bunch up.

Bridles need to be kept tidy but whatever method used they must deploy easily and without undue force or fouling.

## Paraglider Harness - With No Shoulder Points?

Some harnesses (usually the ultralight ones) don't come with shoulder attachment points for the reserve bridles. It is unsafe to connect a reserve onto the shoulders if the harness doesn't have specially reinforced support loops there! Use the main hang points instead. You could simply loop the bridles onto the main karabiners, but this offers no safety should your karabiner fail. Dedicated soft links can be run through the main attachment points to connect the reserve bridle instead. Steerable reserves also require short extenders (for optimal steering) when connected on the main hang points.

**Note:** Having a reserve connected to your main karabiners can limit your ability to get out of the harness and PLF when coming down under reserve.

## Webbing To Webbing?

If you connect the reserve bridle without using a maillon (by passing it through the loop and itself, then pulling tight) you have a webbing-to-webbing connection, and there is a risk of shearing due to heat from friction during shock deployments. This can be mitigated if the attachment points are designed to withstand heat shear if the same material is used on both sides if the connection is secured in position, it is not recommended to connect Nylon and Dyneema in this way. Most manufacturers recommend connecting reserves using only maillons or soft links.

Maillon connection (Recommended by Gin Gliders)



## Which Maillons (Or Soft Links)?

You will need to decide which shape, type and size of maillon you require, to suit your equipment and the intended use. Maillons come in stainless steel which are recommended to be used they also come in steel which are either zinc or cadmium coated. Steel maillons have a lower rating than the stainless steel maillions of the same size.

**NOTE:** Only use maillons stamped with their rated specs.



## Which Shape of Maillon?

Measure the width of the webbing on both sides of each connection to ensure you get the right style of maillon. For normal wide webbing to wide webbing: square maillon. Wide to narrow delta maillon. Narrow to narrow standard (oval) maillions. Extra wide to wide: trapeze.

## Which Size of Maillon?

In a standard setup at the single connection point at the base of the reserve riser to the split bridle, a Maillon Rapide Stainless Steel rated to: 625kg WLL 3125kg BL would be recommended for solo (for tandem maillons used in a reserve system must be rated 625kg WLL, 3125kg BL or higher) unless stated otherwise by the reserve manufacturer. For solo depending on the AUW (all up weight) of the pilot and the equipment being used, other sizes or shapes may be more appropriate.

**NOTE:** be careful of cheap copy products which have questionable strength.

### What is Breaking Load (BL) and Working Load Limit (WLL)?

These are technical terms describing the strength of maillons. For instance, the Peguet Maillon Rapide Square Stainless Steel 7.0mm has a breaking load of 3125 kg (the point at which this maillon consistently breaks when overloaded). To be safe, they define a working load limit for recommended daily use based on a safety factor of 5 as a prudent suggestion: dividing 3125kg (BL) by 5 yields 625kg (WLL). If your all up flying weight is around 100kg, this means you could comfortably sustain a 6G load on this maillon, but it would probably hold up to 30G when new, which is way beyond what you or other elements of your equipment could survive.

## Soft Links

Alternatively, if saving every gram is of primary importance to you, suitable soft links can be used at all points. They must be rated and suitable for use in a reserve system.

### Soft Shackle User Manual

**1** Make a small loop

**2** Place the elastic onto the rescue bridle. Pass the soft shackle through the connectors.

**3** Pass the soft shackle through the connectors a second time. Place rubber-band on knotted end.

**4** Pass the knotted end through the small loop.

**5** Pull tight to close the loop around the knot.

**6** Make one twist in the rubber-band and pass it over the knotted end.

**7** Tape the connectors and slide on the elastic.

**WARNING:** If not connected correctly the Soft Shackle may fail.

**IMPORTANT:** The Soft Shackle must be held in place to prevent excess friction.

**NOTE:** It is the pilot's responsibility to check compatibility and proper installation.

**Max Breaking Load:** 26,700 N (2722kg)

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## Securing The Maillons (Or Soft Links)

Using 40mm O rings, a maillon cover or rubber bands, fix the maillons so that they cannot rotate from their strongest position (lengthwise loading).

The maillon should be properly screwed shut to avoid any possibility of it opening accidentally. Finger tight is generally not enough to be sure they won't open over time. Tighten a little using a spanner but be careful not to over-tighten as this could damage the thread and greatly weaken the maillon!

## Paraswivels

Some hang-glider emergency parachutes are supplied with a swivel fitted into the bridle. It is not unusual for a broken hang glider to spin considerably as it descends under an emergency parachute. The swivel is intended to prevent the parachute suspension lines being twisted together if this happens. Such twisting can ultimately result in the canopy mouth being closed, with obvious dangers.

Important: A thorough inspection of a Reserve Parachute should take place after a deployment



## Check the whole system

### Once it is put together, with you suspended in the harness in full flying kit:

- Is the strop on the deployment handle strong enough to withstand the force of the pull?
- Is the strop on the deployment handle the right length? It must pull the outer-cover closure pins completely clear before starting to drag the deployment bag out. If not, it will be impossible to extract the parachute no matter how hard you pull!
- Can you easily deploy with either hand?
- Is there 1.5-2m of line and bridle between the harness and the closing stow on the reserve bag? This does not include any length that is stowed between the reserve compartment/container and the attachment points to the harness.

If you are not 100% confident that you fully understand the whole list of items that must be matched and checked to create an effective emergency parachute system, you should have an experienced packer install it for you. The packer can explain the system to you and ensure that the reserve is installed correctly.

It is recommended that you have an experienced packer check your gear, even if you are confident, to ensure you have installed it correctly. Pilots of all abilities have been responsible for many packing and installation errors discovered over the years.

## Pre-flight Checks

You must now ensure you include checking your reserve as part of your pre-flight check! Make sure you do not expose yourself to an in-flight emergency in the form of an unintentional deployment. Approximately one in three deployments are unintentional! An accidental deployment is usually caused by pilots failing to check and maintain their equipment adequately. As part of your preflight actions:

1. Check that your parachute container is properly closed and that any closure pins are secure and free to release.
2. Check that the deployment handle is accessible.
3. Check that no slack loops of riser have slipped out of your parachute container.
4. Check that you have easy access to your hook knife.

Be particularly careful with Velcro closure systems. As Velcro gets old, it can get clogged. It can also lock together over time, so a pull that is easy when the parachute is first assembled can become almost impossible after six months. Pin closures are generally much better, but still need constant vigilance.

## Using Your Emergency Parachute

Once you've got your system properly installed, the next job is to learn how to use it. Your emergency parachute's user manual should advise you how to deploy correctly, and how to practice (on the ground). Make full use of any simulator to which you have access. It is important to practice the process so that if you need to do it during an emergency your actions are automatic. Pilots should regularly practice looking, grabbing, and activating your parachute handle. This should be practiced with both hands! Courses are available where you can practice a full deployment over water. You must ensure that a boat is ready to pick you up and a life jacket is worn. Make sure you know whether the container requires you to pull in a certain direction.

The slowest elements in deploying the emergency parachute are invariably:

- Making the decision to throw
- Extracting the parachute from the harness and throwing it.

Time and effort spent practicing these essential actions will reduce delays and improve these critical parts of the system. This effort will pay the biggest dividends if you are required to throw your parachute.

## When To Deploy

With situations such as a structural failure of your hang glider or paraglider, the appropriate action is clear: Deploy the parachute!

With paragliders there is a range of less clear situations where control of the canopy has been lost but may be regained. The decision whether to deploy will depend on the height that will be lost during your attempts at recovery, your proximity to the ground and pilot skill level. Many pilots have been killed or injured impacting the ground while trying to recover control of their paragliders. Making the decision to throw their parachutes earlier would almost certainly have saved them. Any effort to regain control of the paraglider must ALWAYS be secondary to monitoring your height. Recovering from an out-of-control situation completely can be very satisfying if you have sufficient height to do so.; Do not attempt to recover your canopy if you do not have sufficient height or the piloting skill to do so. Be aware that descent rates can be extremely fast when a canopy is spinning out of control. Do not leave deployment to the last minute! The decision to throw your parachute can save your life. **If in doubt, throw it out!**

## Cumulonimbus

Do not deploy your parachute as a method of escaping from a cumulonimbus, keeping in mind that you should never allow yourself to get close to one in the first place. Throwing your parachute will most likely cause you to be swept up into the thundercloud while dangling powerlessly underneath your parachute.

In such an emergency situation hang-glider pilots are probably best advised to try to fly away from the danger. A paraglider pilot's best option is to use the spiral dive rapid-descent technique. This will give a much higher descent rate than a parachute – perhaps 15m/s (50ft/s). Of course, if you have suffered catastrophic structural failure in the cloud your outlook is bleaker – you can throw the parachute and risk being swept up or delay the throw and risk your parachute and/or harness being shredded by the opening shock. Whilst the latest CEN certified parachutes will survive an opening after a very few seconds of free-fall, most will not.

## Deploying Your Parachute

1. LOOK for the deployment-bag handle. Harnesses can have several adjustment straps that may easily be confused with the parachute deployment handle in an emergency. Be sure to look for and identify the correct handle! You don't want to waste precious time tugging on the wrong strap in an emergency. – GRAB the handle securely. If your right hand is not available, use your left!
2. Get the parachute out. Some container systems require you to pull the handle in a certain direction to release the curved pins (safety locks) before you can extract your parachute. Some Velcro configurations require you to peel the opening flap downward to extract the parachute. It may even be that you need to use both hands to get the parachute out! Make sure that you know your equipment.
3. Look for clear air and THROW the parachute towards it. Throw hard. If it is possible, throw the parachute upwards and out.
  - a. You may be able to throw more effectively if you grab the whole parachute deployment bag using both hands.
  - b. Your riser(s) should come to full extension followed by your lines and canopy. If you get a good throw away from you, your system will open faster, with less loss of height. If you drop your emergency parachute below you, you risk entanglement and falling a greater distance before the parachute inflates.
  - c. You want to avoid throwing the parachute down between your legs.
  - d. Hang glider pilots may wish to avoid throwing the parachute through the control frame as this could result in the glider inverting, which usually limits the pilot's ability to adopt a sensible landing position. HG should throw the chute behind them. Once deployed, the pilot should try to climb into the A-frame if still intact. If the hang glider is intact, the pilot can steer the glider down with the limited airflow over the wing by angling the nose of the glider down and 'flare' the glider 20-30 feet above the ground to slow the impact speed by pushing the corners of the A-frame out with their feet.

4. Look to make sure your parachute has opened. The deployment bag should release, and the canopy starts to deploy as soon as the bridle is at full stretch. If it does not, try yanking the bridle several times very hard. Hopefully, the parachute will inflate, and the bridle will be yanked out of your hand. If this does not release the deployment bag, pull the parachute back in, hand over hand. Throw the parachute again.
  - a. If the deployment bag has released but your canopy has not yet inflated, yank vigorously on the bridle. This will help to spread the suspension lines and open an air channel.
  - b. If you are pulling on a parachute bridle, **never** wrap the line around your hand and ensure to let it go immediately when the parachute starts inflating. The parachute will inflate with tremendous energy.
5. Prepare for impact. Paraglider pilots should assume the PLF position. Pilots should regularly practice PLFs!'. Hang-glider pilots should unzip their harness and climb into the control frame, keeping their weight distributed towards both corners of the base bar. If this is not possible, concentrate on getting into a foot down/ head-up position with your feet together and your knees slightly bent. Keep your arms and head tucked in. Try to use your legs as shock-absorbers by allowing them to flex as you impact. Allow your body to roll in the direction of the impact. After you impact, disconnect from the glider immediately to avoid being dragged by the parachute. Do whatever you need to do to get away from the glider and parachute. Cutting the bridle or your harness with your hook knife may be necessary. Deflate the parachute by grabbing the hem at one side and taking it forward into the wind.
6. Radio your friends to let them know your position and condition. You should also contact the local police, who may be launching a full-scale search if a member of the public has seen your descent and reported it.

## Preventing Paraglider Re-inflation

With paraglider emergency-parachute systems it is possible for a paraglider to re-inflate after the emergency parachute has been deployed. This can cause the two canopies to 'fight' during the descent, sometimes with disastrous results. There are various methods of disabling your paraglider to prevent this from happening; however, this problem is far less likely to occur in the first place if your reserve parachute is the correct size for you. The lower your rate of descent under parachute, the less likely it is that your paraglider will want to continue 'flying'.

If you find yourself under emergency parachute and need to disable a re-inflated paraglider, **you must avoid any asymmetric action** which can result in a free wingtip thrashing around uncontrollably.

Pulling both 'C'-risers (to create a 'C'-line stall) has been recommended by European test pilots, and may provide additional drag, further reducing your descent rate.

Appendix1:

## Reserve Packing Record/Checklist

|           |  |               |  |
|-----------|--|---------------|--|
| Serial #: |  | Manufacturer: |  |
| Date:     |  | Model:        |  |
| Packer:   |  | Owner:        |  |

Prepack extraction test result:

Test throw/Slow pull deployment result:

## Check

1.  File fingernails, remove rings, watch etc....
2.  Suspended and loaded test extraction
3.  Throw or slow pull for deployment sequence check
4.  Bag and handle inspection
5.  Replace rubber bands
6.  Canopy inspection
7.  Line and bridle inspection
8.  Pack reserve in accordance with parachute manual
9.  Packing tool count
10.  Harness install, pin loop, pin window and bridle check
11.  Suspended and loaded test pull
12.  Final install
13.  Would I be happy to go up right now and throw this reserve? If not, why not? Fix what is not right.