FLUIDWINGS

GENERAL PARACHUTE OWNER'S MANUAL

Covering assembly, inspection, packing, in-flight operation, emergency procedures, maintenance, and care common to Fluidwings ram-air main and reserve canopies.

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This manual is a General Manual. It must be used together with the wing-Specific Addendum for the exact model, size, and configuration in service (see Section 2.1). Where the two documents differ, the wing-Specific Addendum governs.

1. Notice, Warnings, and Limitations of Liability

WARNING — PARACHUTING IS AN INHERENTLY HAZARDOUS ACTIVITY

Skydiving, BASE jumping, and any activity involving the deployment of a parachute carry a meaningful risk of serious injury or death, even when every component functions exactly as designed and every procedure in this manual is followed correctly.

No parachute system — main, reserve, or emergency — can be guaranteed to open, fly, or land without malfunction on every use. This manual reduces risk through informed practice; it cannot eliminate risk.

Do not use this equipment, and do not allow it to be used, by anyone who has not received training from a qualified instructor or rigger appropriate to the activity and jurisdiction.

This is a General Manual. It describes practices, terminology, and procedures that are common across Fluidwings ram-air canopies as a class of product. It is not, by itself, sufficient authority to assemble, pack, jump, or maintain a specific Fluidwings wing.

Fluidwings publishes this manual as guidance for owners, pilots, and certificated riggers. It does not replace formal training, does not substitute for the judgment of a qualified rigger, and does not relieve the user of responsibility for inspecting equipment and making sound decisions before every jump. Fluidwings disclaims liability for injury, death, or property damage arising from the use, misuse, alteration, or improper maintenance of its products, to the fullest extent permitted by applicable law.

Nothing in this manual authorizes packing of a reserve parachute by anyone other than a certificated parachute rigger (or the equivalent qualification in the operator's jurisdiction) or the person using the parachute. Nothing in this manual authorizes alteration or repair of load-bearing components outside of facilities and personnel approved by Fluidwings.

2. How to Use This Manual

This manual is organized the way an owner actually encounters a wing over its service life: receiving and inspecting it, assembling it to a harness/container, packing it, jumping it, handling an in-flight problem, maintaining it between jumps, storing it, and eventually retiring it. Read it once in full before putting a Fluidwings wing into service, then return to individual sections as needed.

2.1 Manual Set

A complete Fluidwings technical library for a given wing consists of three documents, used together:

1. This General Manual (FW-OM-GEN-001) — practices common to the product family.
2. The wing-Specific Addendum for the exact model and size in service — certified limitations, dimensions, performance data, and any model-specific procedure.
3. The harness/container and, where applicable, automatic activation device (AAD) manufacturer's own manual — since a wing is only one component of an assembled system.

2.2 Conventions Used in This Manual

Label	Meaning
WARNING	A procedure or condition that, if ignored, presents a direct risk of serious injury or death.
CAUTION	A procedure or condition that, if ignored, presents a risk of equipment damage or a malfunction.
NOTE	Additional information that helps the reader understand or perform a step correctly.

Directional references (left/right, up/down) are given from the perspective of a pilot in the harness facing forward unless stated otherwise. “Line group” refers to the A, B, C, D (and, on some designs, E) suspension line groups from nose to tail; exact group naming for a given model is defined in that model's wing-Specific Addendum.

3. General Description of Ram-Air Canopies

Fluidwings canopies are ram-air, zero-porosity fabric wings comprising a top skin and bottom skin joined by internal ribs that form a series of cells. Air entering the cell mouths at the leading edge pressurizes the wing, giving it a semi-rigid airfoil shape in flight. The wing is connected to the harness through suspension lines, which are gathered into risers, which in turn connect to the harness through connector links or soft links.

3.1 Major Components

- Wing (top skin, bottom skin, ribs, nose, tail) — the fabric wing itself.
- Suspension lines — cascaded lines organized into line groups (commonly A through D, sometimes E) running from the wing to the risers.
- Slider — a fabric panel with a grommet at each corner that rides down the four line groups during deployment, controlling the rate at which the wing is allowed to open and inflate.
- Risers — webbing straps connecting the line groups to the harness, incorporating the toggles (control handles), guide rings, and (on many designs) riser inserts for front-riser input.
- Toggles and brake lines — the pilot's primary flight controls, used to steer, flare, and adjust airspeed.
- Connector links (soft links or metal links) — the hardware joining risers to harness.
- Deployment device — a deployment bag, diaper, or freebag, depending on system type, which controls the order in which lines and fabric leave the container.

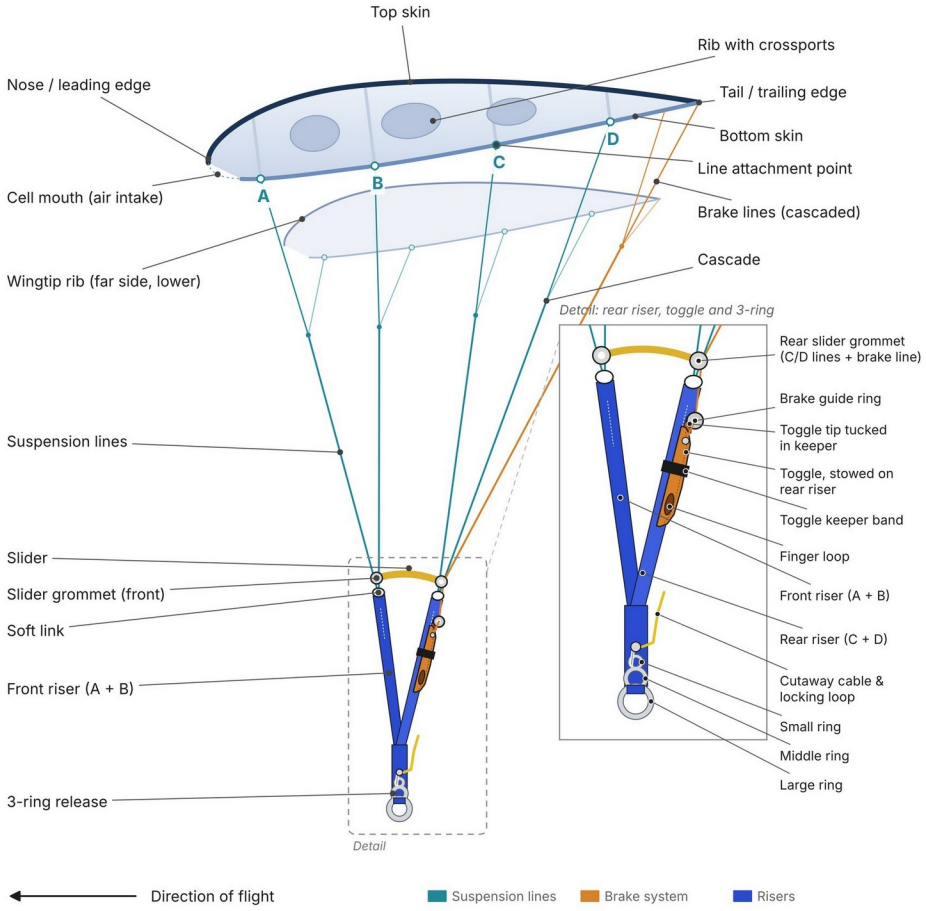


Figure 1 — Major components of a ram-air wing, side view (nose left). The A and B line groups run to the front riser; the C and D groups and the brake line pass through the rear slider grommet to the rear riser. The risers join above the 3-ring release; the detail shows the toggle stowed on the rear riser. Generic illustration; line count, cascade layout and group naming vary by model — see the wing-Specific Addendum.

3.2 Materials

The wing fabric is typically a coated nylon. Suspension lines may be made from any of several materials depending on the model and intended performance — Dacron (polyester), Spectra/Dyneema (ultra-high-molecular-weight polyethylene), Vectran, or Technora (HMA) — each with different stretch, shrinkage, sunlight resistance, and service-life characteristics. The exact line material, diameter, and cascade for a given wing are specified in its wing-Specific Addendum, and matter directly to trim, flight characteristics, and replacement interval.

CAUTION: Never substitute line material, riser webbing, or hardware without written approval from Fluidwings or a rigger acting within their certification. Substitutions change trim, stretch behavior, and load ratings in ways that are not visually obvious.

4. Certification, Airworthiness, and Recordkeeping

Each Fluidwings wing is delivered with a data/identification label recording its model, serial number, manufacture date, and (where applicable) certification basis (such as an ETSO/TSO approval for reserve canopies).

4.1 Reserve Canopies

Reserve canopies must be inspected and repacked only by an appropriately certificated rigger, at the interval required by the operator's jurisdiction (commonly every 120–180 days, or per local regulation, whichever is more restrictive) or sooner if exposed to moisture, a hard opening, or any condition described in Section 9.

4.2 Main Canopies

Main canopies are not subject to a fixed repack cycle in most jurisdictions, but should be inspected before every jump (Section 5) and given a thorough maintenance inspection at the interval in Section 9.

4.3 Recommended Log Entries

Event	Recorded By
Jump number and date	Owner / pilot
Pre-jump inspection findings	Owner / pilot
Hard or abnormal opening	Owner / pilot, reviewed by rigger
Maintenance inspection	Certificated rigger
Reserve repack	Certificated rigger
Repair, alteration, or line replacement	Certificated rigger / Fluidwings

5. Pre-Jump Assembly and Inspection

A wing must be inspected before it is packed and again, briefly, before it is worn. The inspection below is the general baseline; the wing-Specific Addendum may add model-specific points (for example, additional checks around a cross-braced structure or a specific reinforcement tape layout).

5.1 Assembly to Harness/Container

1. Confirm the harness/container is the correct size and configuration for the wing being installed, per the container manufacturer's manual.
2. Attach each riser to its corresponding harness attachment point using the connector link or soft link specified for that system. Confirm correct left/right and front/rear orientation.
3. Route brake lines through the guide rings and set toggles at the length specified in the wing-Specific Addendum. Stow excess brake line neatly in the keeper loop.
4. Confirm that all line groups run free of twists from riser to wing before packing.
5. Have a second qualified person cross-check the assembly whenever practical, particularly the connector link attachment.

Riser brake assembly



Riser / connector link / brake setting

5.2 General Inspection Checklist

Complete before every pack job, and visually re-confirm before every jump:

Inspection Point	OK
Top and bottom skin — free of tears, abrasion, UV degradation, or seam separation	☐
Ribs and internal structure — free of tears; rib reinforcement tapes intact	☐
Nose and tail — free of fraying, no broken stitching at load points	☐
All suspension lines — free of fraying, burns, broken fibers, excessive fuzziness, or unequal stretch between lines in the same group	☐
Line attachment points on wing — stitching intact, no pulled or elongated grommets	☐
Slider — grommets free to move, no cracks, fabric not torn, slider stops (if fitted) present and functional	☐
Risers — webbing free of cuts, abrasion, or heat damage; stitching intact	☐
Connector links / soft links — correctly torqued or tied, no visible wear or deformation	☐
Toggles and brake lines — stitching and grommets intact, brake line not frayed at the guide ring	☐
Deployment device (bag/diaper/freebag) — fabric and closing loop intact; grommets and line stow elastics functional	☐
Pilot chute — fabric, bridle, and attachment intact; kill line (if fitted) functions smoothly	☐

WARNING

Do not pack or jump a wing that fails any inspection point above until it has been evaluated and, if necessary, repaired by a qualified rigger or returned to Fluidwings. Damage that looks minor at the fabric or stitching level can indicate a load path that will not perform as designed under the shock of deployment.

6. General Packing Procedure

The sequence below describes the general logic of packing a ram-air wing into a deployment bag. It is intentionally written at the level of principles rather than a single fixed sequence of hand positions, because exact folding technique varies by wing design, container brand, and packer preference. Anyone packing a Fluidwings wing for the first time should be walked through the process by a rigger or Fluidwings-trained packer familiar with that specific model, and should follow any packing addendum supplied with the wing.

6.1 Principles That Apply to Every Pack Job

- Lay the wing out on a clean surface, free of grit, moisture, and sharp edges, with the nose fully open and cells visible.
- Confirm the four (or five) line groups are separated and running straight and untwisted from the wing to the risers before doing anything else — a twist introduced at this stage is easy to build into the whole pack job without noticing.
- Bring the line groups together at the connector links and confirm control lines (brake lines) are not crossed with the line groups they will steer.
- Fold or roll the wing body into the width of the deployment bag, keeping the nose oriented correctly (center cell exposed and outer cells tucked flat) relative to the bag's mouth for the deployment method in use.
- Stow the lines in the line stows in the order specified for the container, maintaining even tension so that no single stow bears a disproportionate load on deployment, and finishing with the brake lines set and the toggles stowed last.
- Insert the bagged wing into the container and close it per the container manufacturer's procedure, checking closing-loop length and pin/cable seating before finishing.

Refer to the detailed packing instructions, available as an online seminar or a written summary, for specific packing recommendations.

6.2 Reserve-Specific Notes

Reserve canopies are packed only by a certificated rigger, using the reserve container manufacturer's packing data card for that specific container/wing/AAD combination. The rigger's data card and seal are the authoritative packing reference for a reserve; nothing in this General Manual overrides it.

CAUTION

A poorly packed wing is one of the more common contributing factors in a malfunction. If in doubt about any step, stop and consult a rigger before closing the container. It is always faster to re-open and re-pack than to jump a pack job you are not confident in.

7. In-Flight Operation

7.1 Deployment

Deploy at or above the minimum altitude required for the activity, the jurisdiction, and the specific wing in use (see the wing-Specific Addendum and, for students, the training organization's minimums). Maintain a stable, belly-to-earth body position with shoulders level through the deployment sequence — an asymmetric or unstable body position at deployment is a common cause of line twists and off-heading openings.

7.2 After Opening

1. Check that the wing is fully open, properly shaped, and free of line twists, and that both toggles or rear risers are accessible.
2. Look up and around for other traffic before initiating any turn.
3. If line twists are present but the wing is flying straight and responds to riser or leg input, continue flying straight while clearing the twists with riser or leg input; maintain awareness while clearing twists.
4. If the wing does not open, does not open square, or does not respond to a control input in the way described in Section 8, follow your emergency procedures without delay.
5. Once satisfied the wing is flying normally, proceed with the planned pattern to the landing area, taking care to avoid areas of turbulence during critical phases of flight.

7.3 General Flight Characteristics

Toggle and riser input change the shape and angle of attack of the wing and are the pilot's primary controls. Steep or aggressive control input at low altitude reduces the wing's ability to recover before reaching the ground. The exact stall point, dive recovery behavior, and trim of a given model should be explored at safe altitude, under appropriate supervision, before being relied upon close to the ground.

7.4 Landing

Plan an approach that allows a straight, into-wind final leg whenever conditions permit, complete with a stable descent and a flare (brake or riser input) into the sweet spot of the wing's flight envelope before touchdown. Avoid completing a significant turn — planned or unplanned — close to the ground: turning a wing converts altitude into airspeed and increases descent rate, and there is little room to recover from an aggressive turn made near the surface.

> **WARNING**
>
> Do not make a low turn to correct for a landing area you misjudged. It is safer to land off the intended target, into an obstacle at low speed, or downwind, than to bank a wing sharply close to the ground.

8. Emergency Procedures and Malfunctions

This section describes categories of malfunction in general terms. It does not replace the emergency procedures training required before jumping, and it does not replace the harness/container and AAD manufacturer's own emergency procedures, which govern the actual cutaway and reserve deployment sequence for the assembled system.

8.1 Decision Making

Every jumper should establish, before the jump, the altitude at which they will stop attempting to resolve a main wing problem and instead execute emergency procedures (typically cutting away the main and deploying the reserve, per the harness/container manufacturer's procedure), and should rehearse the physical actions on the ground regularly. A wing that is flying but not landable in a controlled way (for example, unresolved severe line twists or a badly damaged wing) should generally be treated the same as one that will not fly at all: address it with altitude to spare, rather than waiting to see if it improves.

> **WARNING**
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> Altitude is the one resource that cannot be recovered once spent. Make the go/no-go decision on a malfunction early, and execute your trained emergency procedure decisively. Do not continue troubleshooting a malfunction below your predetermined decision altitude.

8.2 After Any Malfunction or Hard Opening

Do not repack or return to service a wing that has malfunctioned, had a notably hard opening, or been involved in a cutaway until it has been inspected by a certificated rigger or by Fluidwings. Hidden line damage, stretched lines, or fabric stress from a hard opening are not always visible without a full line-trim check.

9. Maintenance, Cleaning, and Field Repair Limits

9.1 Routine Maintenance Inspection

In addition to the pre-jump inspection in Section 5, perform (or have a rigger perform) a more thorough maintenance inspection at whichever comes first: every 3 months of active use, every 50 jumps, or immediately after any hard opening, water landing, or exposure listed below.

Maintenance Inspection Point	OK
Full line-trim measurement against the wing-Specific Addendum trim specification	☐
Fabric porosity and UV degradation — no chalky texture, no loss of zero-porosity feel	☐
All stitching at load points (line attachment, riser attachment, slider stops)	☐
Slider grommets and stop condition; slider fabric integrity	☐
Connector links / soft links torque or wear	☐
Riser webbing, guide rings, and toggle attachment hardware	☐
Deployment bag or diaper grommets, closing loop, and pilot chute bridle/attachment	☐
Data card / logbook entries up to date and consistent with inspection	☐

9.2 Cleaning

- Brush off dirt and grit with a soft brush; avoid rubbing grit into the fabric weave.
- Rinse light saltwater or dirt exposure promptly with fresh water and dry fully out of direct sunlight before storage or packing.
- Do not machine wash, dry clean, or apply solvents, waterproofing sprays, or fabric treatments not explicitly approved by Fluidwings — many common chemicals (fuels, insect repellents containing DEET, some adhesives and solvents) attack nylon fabric and coatings.
- Do not iron, tumble dry, or apply direct heat to any part of the system.

9.3 Field Repair Limits

Minor field repairs (small non-structural fabric patches away from seams and load paths) may be performed only by a certificated rigger using materials and methods consistent with the original construction, and must be logged. Any repair involving a suspension line, riser, seam, reinforcement tape, or any load-bearing structure must be referred to Fluidwings or a rigger specifically authorized for that repair category. Do not attempt to repair a reserve wing in the field under any circumstances — return it through a certificated rigger.

10. Storage and Environmental Care

Factor	Guidance
Temperature	Store between roughly 5°C and 30°C (41°F–86°F). Avoid hot car trunks, direct sun through glass, and attics.
Humidity	Keep low to moderate (roughly 15%–70% RH). Dry thoroughly before long-term storage; never store wet or damp.
Light	Store out of direct sunlight and away from UV light sources; UV degrades both fabric coating and synthetic line materials.
Chemicals	Keep away from fuel, solvents, battery acid, insect repellent, and aerosol sprays.
Pests	Store in a sealed bag or container; rodents and insects can damage fabric and webbing.
Chlorine	Rinse immediately after any exposure to chlorinated water; residual chlorine attacks nylon fibers over time.
Compression	Avoid long-term storage under heavy compression where avoidable; loosen container closing where practical for extended storage.

For storage longer than a few months, open the container, allow the wing to breathe, and re-inspect before returning it to service.

11. Service Life, Line Replacement, and Retirement

Fluidwings does not assign a single fixed calendar life to wing fabric; service life is governed primarily by use, care, and inspection findings against the limits in the wing-Specific Addendum. Suspension lines, by contrast, do have practical replacement intervals driven by material type and use, because line shrinkage and strength loss affect trim and structural margin even when damage is not visible.

Line Material	Typical Consideration
Polyester (Dacron-type)	Low shrinkage, forgiving trim behavior, generally longer practical service life; monitor fraying and diameter.
Spectra / Dyneema	Prone to shrinkage over time and UV exposure; monitor trim closely and replace on a shorter interval than polyester.
Vectran	Low stretch but more sensitive to flex fatigue; monitor for fuzzing and color change.
Technora (HMA)	High strength-to-weight; monitor closely for fraying. Does not change color with wear the way Vectran does.

Line replacement must be performed by a certificated rigger, matched to the exact line specification, and logged with the date, jump/hour count, and rigger identity. A wing should be retired from service — not merely repaired — when structural repairs would exceed what Fluidwings recommends for that model, when trim cannot be brought back within specification, or when an inspection concludes the item is no longer airworthy.

12. Wing Loading and Wing Selection

Wing loading — exit weight (jumper, gear, and container all included) divided by wing area — is one of the most important factors in how a wing will fly and how much it will punish a mistake. Higher wing loading generally means faster flight, quicker response to input, and less margin for error; lower wing loading generally means a more forgiving, slower-flying wing. Wing loading alone does not fully describe a wing's performance — planform, line length, and design intent (a lightly loaded high-performance design can still fly aggressively) also matter — but it remains a useful, conservative starting filter.

Fluidwings recommends choosing conservatively: when a jumper is deciding between two sizes or models, the lower-performance, larger-wing option is the safer default until logged experience, currency, and training on that specific class of wing justify moving up. Refer to the wing-Specific Addendum for the exact wing-loading guidance table for a given model, and treat any published table as a general guideline, not a target.

- New jumper skill and currency matter as much as total jump numbers — a gap in currency should reset the conservative side of any wing-loading decision.
- Downsizing or moving to a higher-performance model is a training decision, not just an equipment purchase; budget for coaching and wing-specific training alongside the equipment change.
- When in doubt, choose the larger, more forgiving option.

13. Continuing Education

Parachute piloting is a skill that continues to develop well past initial certification, and most wing-related incidents involve a wing that opened and flew as designed but was flown into a bad outcome. Fluidwings encourages every pilot, at every experience level, to pursue structured wing-piloting education — a wing course, coached jumps, and video debrief — on a recurring basis, and to treat any extended layoff from the sport as a reason to fly a more conservative wing and pattern until currency is rebuilt.

Maintain awareness of other traffic in the landing pattern at all times, plan an intended flight path and a set of alternates before boarding, and set a personal hard-deck altitude below which no experimentation or maneuvering occurs.

14. Glossary of Terms

Term	Meaning
Brake lines	Control lines running from the trailing edge of the wing to the toggles, used to flare and steer.
Cascade	The point where individual line segments join into a single line group.
Cutaway	Releasing the main wing from the harness, typically before deploying the reserve.
Line group	A bundle of suspension lines (commonly labeled A–D or A–E) running from a section of the wing to a riser.
Off-heading opening	A wing that opens facing a direction other than the jumper's direction of travel at deployment.
Pack volume	The physical space a packed wing occupies inside its container.
Riser	Webbing strap connecting a set of line groups to the harness.
Slider	A fabric-and-grommet component that controls the rate of wing inflation during deployment.
Toggle	The handle at the end of a brake line used for steering and flaring.
Trim	The relative length/tension relationship among line groups that determines the wing's flight attitude.
Wing loading	Exit weight divided by wing area, typically expressed in lb/ft² or kg/m².

References and Acknowledgments

This General Manual was developed by reviewing the general structure and topic coverage typical of ram-air parachute owner's and packing manuals published in the sport parachuting industry, in order to ensure Fluidwings' manual addresses the same breadth of topics that owners and riggers expect from this class of document.

Owners and riggers are encouraged to also consult current guidance from their national aeronautical authority and skydiving governing body (for example, the USPA Skydiver's Information Manual in the United States, or the equivalent body in other jurisdictions), which is updated more frequently than any single manufacturer's manual and reflects fleet-wide incident data.

Revision Log

Revision	Date	Description
A	August 2026	Initial release of the Fluidwings General Parachute Owner's Manual.