



CIVL 2018 PLENARY – ANNEXE 29A
SAFEPRO DELTA

Issue and Discussion:

Last year, a Working Group revised SafePro Para and the Plenary approved their work. This year, a new Working Group was implemented, led again by Raymond Caux, to revise SafePro Delta.

Proposal:

Approve the new SafePro Delta.



CIVL SafePro Delta

*Fédération
Aéronautique
Internationale*

RECOMMENDED SAFETY PROFICIENCY STANDARDS FOR HANG GLIDING

2017 Edition

FEDERATION AERONAUTIQUE INTERNATIONALE

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Authors

- Stein Arne Fossum wrote the original 'SafePro'.
- This edition renamed 'SafePro Delta' received modifications from Raymond Caux, Dennis Pagen, Maxime Bellemin, Manu Bonte, Stéphane Malbos.
- It was revised by members of the CIVL, USHPA, FFVL and APPI.

Notes

- SafePro stands for 'safe progression' according to a program based on professional training principles.
- Hang Gliding is a sport in which both men and women participate. Throughout this document the words 'he', 'him' or 'his' are intended to apply equally to either sex unless it is specifically stated otherwise.

Errors/Corrections

- You can send corrections to CIVL by email at: civil-president@fai.org

SAFEPRO DELTA AND THE IPPI CARD SCHEME

The CIVL International Pilot Proficiency Information (IPPI) Card was introduced in 1992. Since then, associations and pilots throughout the world have benefited from its internationally recognized standards. The IPPI Card is based on safety and training standards defined in the SafePro Delta and SafePro Para programs.

The IPPI Card provides a standard reference by which all national rating programs may be compared. The SafePro Delta (for hang gliding) and SafePro Para (for paragliding) stage on the IPPI Card reflects the pilot proficiency. For the pilot who flies outside of his known or local area, it is a quick and easy method of providing proof of flying experience and proficiency.

When a pilot travels abroad, the IPPI Card – together with the national rating card – will identify the pilot skills. It gives flying site managers, instructors and others responsible for hang gliding and/or paragliding flight operations an easy way of verifying the pilot experience level prior to approval of flight activities.

The IPPI Card is valid only together with a current national licence or rating card. Since October 2015, the IPPI Card is available in two ways:

1 – Per IPPI level.

The IPPI Card is physically bought and sold by the approved association to pilots who ask for it. It is not necessary to renew the IPPI Card except when a change in the pilot national licence invalidates the IPPI Card. For example, if the pilot receive a higher national ranking which corresponds to a higher stage in the SafePro Delta or SafePro Para system, a new IPPI Card should be issued.

2 – Per year.

The IPPI Card is a logo on the pilot national licence. The approved association has agreed to issue the IPPI Card to all its licensed pilots for a small yearly fee. Licences are renewed every year, so your IPPI level can be adjusted accordingly. Since 2015 a number of countries have been using this method.

Please note that:

- The IPPI Card does not provide any insurance coverage.
- Flight safety is ultimately the pilot's own responsibility.
- CIVL encourages all pilots to use the IPPI Card.
- CIVL also encourage all NAC, federation or associated associations to promote and issue the IPPI Card. A guide to administering this program can be found here:

<http://www.fai.org/component/phocadownload/category/?download=10786:ippi-card-informationpack>

SAFEPRO DELTA

A HANG GLIDING SAFETY AND TRAINING PROGRAM

Hang gliding developed rapidly in the early years with new barriers broken nearly every day. It has developed into a mature activity comparable to any form of aviation in its complexity, requirement for training and attention to safety. While many pilots seek to progress to more efficient gliders and more challenges (cross-country, aerobatics...), we must not forget that humans need time to learn new tasks in a safe manner. Most often, guided training takes place in the early stages while more advanced skills are learned more haphazardly.

To be very clear, there is no reason today to learn alone. All the previous experience would be useless in this case, and the chance of accident very high. In the early days, some accidents were unavoidable because of the pioneering nature of the sport (Lilienthal was the first one), while others could have been avoided simply by proper training.

Analysing 'pilot error' accidents, many studies show they are mainly caused by a wrong mental attitude. Better knowledge or skills do not necessarily lower the risk of accident (risk homeostasis), but lowering one's level of acceptable risk does. Of course knowledge is fundamental to anticipate and measure the dangers, better skills may save the pilot from a delicate situation. But above all, it is important for the pilot to adopt the right attitude by lowering his level of acceptable risk. That is why he should learn to know himself, his mental strength and weakness, and to control his stress and emotions.

Accidents also happen when the pilot takes the step up to a higher stage. A training system should be designed to smooth out these steps with a natural progression to higher pilot ability. A classic learning curve is predictable, meaning that basic steps lead to big progression in the beginning, while later on, a lot of practice leads to small gains. It is highly recommended that the initial progression be under the supervision of an instructor who will educate the student to get a correct attitude for future development of his autonomy.

The SafePro program should be seen as a guide (hence the title: A program) for federations wanting to develop their own program. The countries with a long practice already have their culture and methods which may differ from the SafePro. The point here is that all organizations (national federations, associations and CIVL) agree on a general level for each stage, so that equivalences can be found between the different systems.

SAFEPRO DELTA

A GENERAL DESCRIPTION

OBJECTIVE

This program assists the participants to progress safely and become true airmen. They must be able to enjoy the beauty and freedom of the sport without risking injury or restriction. The students need time to develop until they can operate alone within the objective above. This is developed most efficiently, enjoyably and safely through a motivating program. The students' operational freedom is expanded gradually, without jeopardizing safety, by breaking down the learning into easily identifiable blocks.

PROGRAM

The learning progression consists of 5 natural stages, from the easy to the more difficult, from low to high, from basic to advanced, being careful not to leave any gap on the way. It also divides the participants into students and pilots, indicating whether they are autonomous or not.

1. **Ground Skimming** (not flying higher than you would care to fall)
2. **Altitude Gliding** (altitude and space to do manoeuvres, no soaring)
3. **Basic Soaring** (soaring in non-turbulent conditions, both ridge and thermal lift)
4. **Soaring** (soaring in turbulent conditions, both ridge and thermal lift)
5. **Senior pilot** (mastering one or more advanced practices)

Each stage is followed by a more complex one requiring new knowledge and skills. It is a natural 'ladder', where a student should climb to progress safely in his hang gliding career. There are other steps, such as changing to another harness, or learning to fly a new site or a new glider that may be added to a country's training program.

Additional ratings are Distance, Racing and Aerobatics.

PARTICIPANTS

Student

The trainee is a student during the first 4 stages. He is considered to have limited ability to take care of his own and other people's safety. He is not yet able to evaluate all safety elements, make sound decisions and act accordingly without supervision. A student should (allowing local adaptation) always fly under supervision of an instructor, and before all ratings are reached, under direct supervision of an instructor. He shall use only hang gliders and harnesses suitable for him and on which he has been checked out by an instructor. Repairs shall be made only when approved by an instructor.

Pilot

Once the fourth stage is completed, the trainee becomes a pilot, understood as having a significant amount of autonomy. He can take care of his own and other people's safety within applicable rules, regulations and code of good practice. He can evaluate all safety elements, make safe and sound decisions and act accordingly on his own, or obtain further instruction, information and assistance at his own discretion.

A pilot is expected to be familiar with and to follow all applicable national aeronautical regulations and local flying site rules. He shall not participate in a demonstration, competition or other organized flying requiring higher standards than he is rated for.

Minimum age

The minimum recommended age is 13 years old, with a written permission of a parent or guardian and a medical certificate if the student is below 18 years.

The medical agreement should have as minimum requirements: height of 1,50 m, weight of 45 kg, no spinal problem.

PILOT'S ABILITY

It can be broken down to 4 elements:

- Skills
- Knowledge
- Experience
- Attitude

Skills are the techniques of control in all the flying situations and can best measure a pilot's ability, since hang gliding is a practical activity. These techniques are mainly acquired through practice and repetition with corrections being added by the instructor. Knowledge and experience are 'tools' of good value used in the learning process to improve the pilot's ability. Attitude allows the decision-making required to remain within safe limits is developed through constant feedback from the instructor and applying the knowledge and experience to the current mental state and the real and varied flying situations.

In the end, these 4 combined qualities result in good airmanship, the total awareness and ability to fly an aircraft safely through all the demands of terrain, conditions, air traffic and changing environment that a pilot encounters in flight. Good airmanship results in repeatable safe and enjoyable flights, while poor airmanship leads to accidents. It is the instructor's duty to leave a student with good airmanship for the level of the particular course, but more importantly to leave the student with an understanding and attitude that continues to foster good airmanship as the pilot continues to develop.

During his progression, the pilot shall have:

- either a student book, when he lacks the necessary airmanship during the first 4 stages,
- or a pilot licence, showing he is mature enough to take care of his own flying, seeking further instruction when needed.

Students in stages 1 to 4 shall be given the necessary instruction in each practical skill, once the basic theory, aim, normal procedure, mistakes, dangers and their corrections, and safety aspects are known. Each skill shall be practiced until the instructor is convinced that it is mastered. The skills may be signed off progressively as the criteria are met, hence a special flight test may not be necessary. They shall also be given the lectures, briefings, discussions and tests to ensure the knowledge required at the current stage is acquired. The requirements should not restrict from giving more instruction, the pedagogy being left to the instructor. However one must not forget that beginners especially have limited capacity to 'absorb' a lot of advice, which should then be limited to those necessary for the proposed task.

Pilots in stage 5 may at their own discretion, within acceptable safe methods, acquire the necessary instruction for each skill. Before the skills are signed off, they shall be demonstrated to an instructor, who shall be convinced they are mastered. Pilots may at their own discretion acquire the required knowledge, either attending lectures, briefings or through oral discussions and group or personal study.

Before a student or pilot is signed off at an applicable stage, the instructor or observer must be convinced that he meets the required standard of knowledge. Before a completed stage 3, the student shall pass a theoretical test on air law, applicable regulations and code of good practice, ensuring he has the necessary knowledge to operate alone, safely and correctly at sites and in the air.

Experience shall ensure that the knowledge, skills and airmanship have been practiced a minimum of times in various situations. Exercise, drill and practice are important to meet the objective of all true learning, which is to achieve behavioural changes. The experience requirements shall be documented by a logbook or reliable witnesses.

The instructor should help the student to measure his mental strength in any way possible and be able to take it into account in his decision-making process. He should help him have a critical view on his operating, find the self-analysis weak points and the in depth reasons of his mistakes. He should teach the student how to measure the probability and consequences of an accident and include this risk analysis in his decision process.

COLOUR CODES

The stages are colour coded from yellow to brown for easy identification. The student can wear visible markings that identify him and his stage. Apart from being a good site control system, it gives the students and pilots insight in what they are up to.

The following is suggested: helmet badges with colour trim, matching the colour of the stage. The badges currently used in Norway are shown for each stage.

STAGE 1 – GROUND SKIMMING (YELLOW)

Ground skimming is gliding near the ground over smooth terrain, below a few metres (not higher than you would care to fall).

INSTRUCTIONAL AND SAFETY RECOMMENDATIONS

Objective

This stage introduces the student to hang gliding and enables him to discover the first feelings of flying within safe limits.

This stage is probably the most important in the whole progression, since here is founded the basis for good (or bad) decisions and habits. The student shall, in safe proximity to the ground, fly easy equipment in easy environment and conditions, to gain confidence in flying, the equipment, and himself. Here he practices and learns the basic skills.

Methods

Teaching has been traditionally on training slopes. However, flying close to the ground asks for a precise control with little time to react and makes hang gliding one of the most demanding air sports. To follow pedagogical principles and teach the easiest practice first (controlling a straight flying line before taking off and landing), alternate methods are available today and can be preferred when the school environment allows it: static flying (on a driven platform or in the wind, with assistants or links holding the glider in a defined volume), winch towing with low tensions close to the ground, aerotowing with a complete method including tandem first flights and an student-adapted wing/pilot release system, tandem first flights, weightshift ultralight tandem flights as an introduction... Only minutes of in-flight control, or even just displaying a film from an on-board camera can dramatically ease the student's first steps.

Proper environment

It is smooth terrain, preferably snow, sand, grass or gravel, with a profile that allows for ground skimming with the hang glider used. The take-off and landing areas and the space between should be free of obstacles and other hazards with a good margin to any side. It should be possible to do the whole flight close to a straight line.

Warning

It is warned against attempts to take off and fly in unstable conditions, cross, down, strong or gusty wind. The student shall not practice stalls (except for the landings) or more than gentle turns with only small diversions from the flight path. Trying to work any type of lift can be especially dangerous. The reason is the closeness to ground gives little time or altitude for corrections. The student shall also avoid flying alone.

When all rating requirements have been met...

The student shall, when flying without direct supervision of the instructor, only fly in beginner environment in stable conditions with light and smooth headwinds.

Before progressing to the next stage

It is of vital importance that the student knows the basic theory and master all skills, since weaknesses here may lead to the most serious consequences when he gets higher and flies in more difficult conditions. It is especially important that he demonstrates correct procedures, routines and checks in his preparation before flight, to ensure nothing is forgotten, overseen, wrongly assembled or adjusted. Equipment failures, malfunctions or omission errors are best avoided by developing proper habits from the very beginning. He should begin to understand the judgement required to choose safe flying conditions for his skills level.

SKILL REQUIREMENTS

- Transport, care: Of hang glider and equipment
- Equipment routines: Assembly (as much as equipment allows it, hook in harness before putting it on), daily check, adjustment, disassembly (as much as equipment allows it, remove harness before unhooking it)
- Ground handling: Carrying, moving and parking hang glider
- Preflight check: Connections, conditions, visualizing run or flight, glider attitude, clear area
- Running (including aborting take-off): Using glider as a brake, on flat ground and on slope
- Take-off: Sight forward, smooth acceleration and trajectory control, feeling glider lift-off
- Flight control: Correct airspeed and directional control, smooth corrections
- Landing: Directly into wind, sight forward, ready to run, using glider as a brake

KNOWLEDGE REQUIREMENTS

Aircraft

- Terminology: Material and parts
- Safety equipment: Helmet, quality sunglasses, boots, gloves, clothing, harness

Aerodynamics

- Nature of flying: Dependent on continuous forward airspeed
- Airspeed, groundspeed: Why take off and land into the wind
- Control inputs: Weight shift, banking, turning, airspeed control

Meteorology

- Wind: Wind meters, natural indicators and signs
 - Velocity: m/s, km/h, knots or mph
 - Direction: Compass and quadrants (head or up, tail or down, crosswinds)
 - Force: Increases with the square of the wind velocity, effects, dangers
- Conditions: Recognition of safe and dangerous conditions

Safety

- Preparation: Standard routines and checks, double-check of critical factors (consider hang glider + harness as a complete aircraft)
- Exercises: Description, intention, procedures, execution, errors and dangers

EXPERIENCE REQUIREMENTS

- At least 2 practice days

ATTITUDE REQUIREMENTS

- The instructor shall be convinced that the student can take care of his own and others' safety while ground skimming, within the instructional and safety recommendations given.

STAGE 2 – ALTITUDE GLIDING (ORANGE)

Altitude gliding is gliding with enough height and distance from the terrain to be able to manoeuvre relatively freely.

INSTRUCTIONAL AND SAFETY RECOMMENDATIONS

Objective

This stage introduces the student to gliding with height and distance to the terrain, enables him to enjoy flying within safe limits.

At this stage, the student gradually becomes accustomed to flying well clear of the ground, and should begin to lose height anxiety. He finds that he is actually safer with altitude, time and space to manoeuvre and correct for possible mistakes. He has been taught how and when to use an emergency parachute when mandatory in the country.

Proper environment

The take-off, landing area and flight path between them are easy and with good margins to any obstacle or other hazards. The take-off area shall be smooth and allowing for acceleration to flying speed before getting airborne (no cliff launch). The landing area shall be large and easy to reach by normal manoeuvring with a good margin of height. If the landing cannot be seen from take-off, there shall be two instructors, one on take-off and one on landing with an established two-way communication between them.

Planning is the key word. The student must now plan and prepare for each flight. He learns and practices the basic manoeuvres, such as speed control, coordinated turns and combinations of them, correction for wind drift and precision approaches and landings. The planning and decision-making (judgement) starts even before take-off and continues all the time. He must be ahead of the events, observe, evaluate, decide and act accordingly, like in all aviation.

Drift and margins: All manoeuvres shall be done close to the landing field and into the wind to avoid drifting out of reach of the landing area. Advanced manoeuvres like 360° turns and slow flying shall be performed with extra caution and enough height and distance to the terrain to allow for corrections or recovery upon loss of control. Turns, downwind flying and slow speeds close to the ground shall be strictly avoided. Approach shall be planned in good time and with a good height. The student shall also avoid flying alone.

Warning

It is warned against attempts to take off in cross, down, gusty or strong winds and to fly in unstable or turbulent conditions or in lift. Poor planning, preparation and take-off techniques may result in equipment failures or malfunctions, or failure to hook in/close leg loops, which may have the most serious consequences.

When all rating requirements have been met...

The student shall, when flying without the direct supervision of an instructor, only fly in beginner or intermediate environment with light to moderate smooth winds. Take-off shall only be done in approximately headwind. Lift or turbulence shall be avoided, or if not possible, flown straight through to calmer conditions in order to land in the ordinary landing area.

Before progressing to the next stage

It is of vital importance that the student knows the applicable theory, masters airspeed control in the lower speed range and is able to recognize and correct for stalls. He can identify his stress level and manage it.

SKILL REQUIREMENTS

- Planning: Insight, evaluations and decisions, flight plan, axes, drift, height, land marks
- Pre-flight check
- Mental state and stress level awareness, techniques to lower stress
- Take-off: Start position, decision, even acceleration, liftoff, clearing terrain, correct speed, transition to lying position
- Speed control: Hands in piloting position (low on downtubes), holding speed
- Shallow turns: Visual check, gentle to medium bank, drift correction
- Approach: Setting relative to terrain and wind, types of approach, standing up and hands in piloting position (low), straight final, overcoming gradient with speed
- Landing: Aiming towards a preset area, speed bleed-off and feeling trim speed, raising hands in push out position, slow flight and mushing are not allowed
- After landing: Checking traffic, leaving landing for next pilots

KNOWLEDGE REQUIREMENTS

Pilot

- Physical factors: fitness and exhaustion, hydration, food, skin and eye protection, alcohol and drugs
- Psychological factors: Identify and lower stress, identify and express emotions
- Pilot in command: Responsibilities, abilities, necessity to complete any started flight

Aircraft

- Glider handling: Axes, speed control, slow flight
- Harness tuning: Fixing harness position and comfort
- Safety equipment: Emergency parachute, hook knife
- Equipment care

Aerodynamics

- Drift: Head or tail wind, crabbing, corrections in turns, penetration
- Stall: Description, in wind and lift gradients, dangers, recognition, avoidance and recovery
- Driving forces: On the ground: by running, in the air: weight (gravity)
- Lift: Axes, difference in pressure from aerofoil, airspeed, angle of attack
- Drag: Increasing with airspeed and angle of attack

Meteorology

- Wind: Meteorological wind, at take-off, in landing and along the flight path, indicators, gradient
- Local conditions: Terrain effects, valley, Venturi effect, obstructions, corners, rotors
- Turbulence, gusts
 - Mechanical: Wind speed gradient, wake of glider or obstacle, lee, rotor
 - Shear: Mountain shape, gradient, inversion layer, catabatic flow
 - Thermal: Mixing of air zones, gradient, combination with wind

Rules

- Local and site(s)
- Right of way rules: Crossing, slope, thermals, aircraft categories priorities
- National Hang Gliding and Paragliding Association

Safety

- Flight planning: Process, information, observation, evaluation, decision, execution
- Flying exercises: Description, aim, procedures, execution, errors and dangers

EXPERIENCE REQUIREMENTS

- At least 4 practice days
- At least 10 flights

ATTITUDE REQUIREMENTS

- The instructor shall be convinced that the student is able to take care of his own and others' safety, while altitude gliding within the recommendations given.

STAGE 3 – BASIC SOARING (GREEN)

Basic soaring is soaring in easy ridge or thermal conditions, without gusts or turbulence, well clear of the terrain, obstacles and other traffic.

INSTRUCTIONAL AND SAFETY RECOMMENDATIONS

Objective

This stage introduces the student to soaring flight and makes him able to practice and enjoy soaring within safe limitations.

Soaring has many stages, from easy conditions and manoeuvres with large margins to extreme conditions with minimal margins. When a pilot "masters the art", it seems quite simple and in a sense it is. However, this should not mislead anyone into believing that it is easily mastered. Lack of knowledge, misjudgement, poor manoeuvring, ignorance or taking risks may easily result in a serious accident.

At this stage, the student gets more airtime and the flying can become self-controlled, but there is less room for mistakes and errors. His experience is still low, any setback needs to be avoided. A carefully planned progression is therefore important. Exercises shall be simple in the beginning, with large safety margins. Soaring requires preparation and a good ability to do precise and fast manoeuvres. The launch and lower speed range control must be mastered, like coordinated turns with a minimum height loss, while calculating drift, keeping an eye on traffic and respecting traffic rules. He is also able to recognize all kinds of stalls and execute prompt and proper recovery.

Proper environment

It is basically the same as in stage 2, plus mild conditions with a good spacing from other traffic and the terrain. In ridge soaring with a wide lift band, the student shall not return to the lift he has flown out of. Flying in wind above moderate, turbulence, cliff or crosswind launches, top or fly on the wall landings are not allowed. In flatland, he shall fly in smooth thermals (late afternoon or overcast sky). An instructor should be present. At first, there shall still be a communication between an instructor and the student, but he shall become autonomous during this stage.

Warning

It is warned against too fast progression, overconfidence, inattention, ignorance, risk taking, misjudgments and lack of skills. Poor technique or distractions leading to the loss of airspeed or wing control when launching can result in a turn back into the ridge. Strong wind and turbulence may easily lead him to the lee side, or let him drift over dangerous or unknown terrain. From now on, the student may fly on his own, but under supervision of an instructor.

He may experience the 'intermediate' or 'Icarus syndrome', which means believing he now knows and masters everything, and that neither he nor the equipment have limitations... Accidents can happen already in ground handling, and there is no such thing as a complete pilot as even experienced pilots keep learning during their whole career.

When all rating requirements have been met...

The student can fly freely within safe limitations, and as long as a higher stage is not required by regulation. He has the responsibility to seek further instruction when necessary. It is recommended in the beginning to use the rules above as guidance for safe flying.

Before progressing to the next stage

The student shall have a variety of experiences from different sites and conditions. The flying process shall be automated, so that reactions are fast and correct in the different situations/exercises he has to master. He is aware of his physical and emotional state and takes it in consideration when deciding to fly or not.

SKILL REQUIREMENTS

- Take-off: Control in wind, stop-line awareness, decision before accelerating for take-off
- Speed control: Minimum sink speed, best glide angle including with lift/sink or wind
- Turns: Ordinary speed and at minimum sink, coordinated, no sign of stall
- Pitch and roll control: stabilizing the glider
- Soaring: Figure 8 patterns, drift and gradient corrections, manoeuvring according to terrain and traffic, keeping a good lookout
- Precision approach and landing: Safe and inside an area decided by the instructor, figure 8 and standard aircraft patterns, traffic control, positioning according to wind strength, gradient corrections, ground handling

KNOWLEDGE REQUIREMENTS

Pilot

- Psychological factors: Mental strength factors, factors interacting with stress (motivation, emotions, concentration, personality), actions to lower stress, stress and self-confidence measurement
- Learning process: Description, objectives, individual progress, safety
- Judgement: Insight, evaluations, decisions, actions, being ahead of the game, awareness and tracking of other gliders

Aircraft

- Clothes: For endurance, altitude and cold
- Instruments: Variometers, altimeters, airspeed indicators, settings
- Performance: Minimum sink, maximum glide and speed, penetration, manoeuvrability
- Maintenance: Daily and periodical inspections and care, inspection after repairs

Aerodynamics

- Pitch and roll movements: Creation by outside influence (glider reaction), glider stability, control inputs
- Spin: At take-off, turning, spin recovery, wind gradient, in landing
- Spiral, skid and slip
- Stall: In turbulence, unexpected lift, turns, gradient, downwind, dangers
- Load: Weight, G-force, in turns, pull-outs, wind and lift gradients, gusts and turbulence
- Emergency parachute: Aerodynamic brake

Meteorology

- Turbulence, gusts
 - Mechanical: Behind or lee of obstructions, trees, buildings, hills, wind gradient
 - Wind shifts and shears: Description, dangers
 - Thermal: Tends to build as the day progresses until late afternoon
- Deteriorating weather as a source of turbulence: Fronts, cumulonimbus, high winds, gusts, strong lift
- Breeze: Difference from wind, creation, sea, mountain, valley, strength, effects

Rules

- Third part liability insurance, when available
- School and training
- Airspace: Local airspace limitations

Critical situations

- Preparation: Causes, recognition, avoidance, corrections, training (simulation)
- Poor take-off: Sight downward, poor A-frame control, overly aggressive or weak acceleration, wing overtaking (too low incidence), turn back into hill, getting into harness too soon
- Stall: In turbulence, unexpected lift, turns, gradient, downwind, dangers
- Unusual attitudes: Turbulence, pitch ups and downs
- Poor approach and landing: Unstructured, no clear plan, over landing field, low turns, slow flight close to terrain, poor control (hands in push-out position too soon)

First aid

- In accordance with appropriate authority's recommendations

EXPERIENCE REQUIREMENTS

- Emergency parachute opening exercises recommended
- At least 3 successful flights with the above-mentioned exercises: turns, pitch and roll control, soaring

ATTITUDE REQUIREMENTS

- The instructor shall be convinced that the student is able to take care of his own and others' safety within applicable rules and regulations, recommendations and code of good practice, while operating alone.

STAGE 4 – ADVANCED SOARING (BLUE)

Advanced soaring is flying in demanding lift, such as marginal, strong and/or turbulent ridge or thermal conditions, or even in wave.

INSTRUCTIONAL AND SAFETY RECOMMENDATIONS

Objective

This stage is to make sure the pilot can safely fly any type of soaring within safe limitations, also under pressure as in traffic, demonstrations and local/friendly competitions. He shall also become qualified as pilot, able to operate alone in a defined frame and be responsible for his further progression.

Turbulence causes shifts along and rotations around the three axes of the glider. The student must know and distinguish glider pitch, roll and yaw movements due to turbulence and control inputs. There will be situations with little time for balanced decisions and wrong reactions. The pilot plans carefully and is always well ahead of the situation, so that in critical situations he performs the correct reaction without delay. He must master all types of turns combined with low speeds, often close to the terrain and in turbulent conditions. He must also keep a close watch of terrain and other traffic.

At this stage, the student knows the performance curves, flying speeds (speed polar), design limitations and load factors of his glider. A thorough knowledge of emergency procedures, such as recovery from stalls, spins, spirals, sideslips or turbulence induced dives, of the use of parachute, is necessary. Later on, when there is enough height, he can study pitch and roll limits.

Proper environment

It is recommended in the beginning to use the rules for students above as guidance for safe flying: strong wind and turbulence, crosswind launches, fly on the wall landings shall be avoided, and an instructor should be present, in communication with the student.

Warning

It is warned against radical conditions, because of the enormous forces involved. The student will operate with smaller margins. Strong wind and turbulence may easily lead him to the lee side, or let him drift over dangerous/unknown terrain. When encountering strong turbulence, he does not increase the possibilities for structural failures with high speeds, but keeps medium speeds and a firm grip on the control bar at chest. He shall also avoid flying alone.

When all rating requirements have been met...

Students will become pilots once this stage is completed. Pilots must have a licence for this stage in order to soar (ridge and thermal) in demonstrations, local/friendly competitions or other situations where this stage is required. Students are not allowed to practice soaring unless under instructor control.

Before progressing to the next stage

The pilot must be able, with a great deal of accuracy, to assess himself and the equipment related to the conditions, and assess the conditions before deciding to launch, especially regarding wind and gusts. He shall have a variety of experiences from different sites and conditions, but has the responsibility to seek further instruction when necessary. The process of flying shall be automated, so that reactions are fast and correct in the different situations/exercises he has to master.

SKILL REQUIREMENTS

- Take-off in wind: Types, with assistance, instructions
- Manoeuvring in lift band: Figure 8 pattern, drift and gradient corrections, no sign of stall, manoeuvring according to terrain and traffic, keeping a good lookout
- Ridge soaring: Best lift zone, best speed along the ridge, managing priorities, crossing gaps and low areas, maintaining easy reach of landing options
- 360° turns: From minimum sink to steep bank, correcting drift
- Thermal soaring: Finding and following thermal cores, choosing exit direction
- Speed range: Exploring medium speeds
- Landing in wind: Positioning according to wind strength, traffic control, ground handling
- Emergency parachute deployment: Simulation (optional)

KNOWLEDGE REQUIREMENTS

Pilot

- Psychological factors: Confidence/overconfidence, group or self-pressure, approval, self-discipline, giving up (flight, remaining in a drifting thermal...)

Aircraft

- Harness selection and tuning: Types, rating, experience, comfort, organization, water, radio, all wires inside harness, emergency parachute handle access
- Glider selection: Size, handling, experience, type of flying, ambitions, for maximum performance in the prevailing conditions

Aerodynamics

- Stability: Positive pitch, reflex, wing twisting, sail distribution versus centre of gravity
- G-loads: Speed in turbulence, aerobatics, structural failures, loss of control
- Airworthiness: Design and certification standards, purpose and need, load, weight, speed and manoeuvring range, stability, stall characteristics, rating
- Design factors: Aerofoils, area, aspect ratio, sweep, wash-out, taper, effects
- Parasitic and induced drag: Wing tip vortices, ground effect

Meteorology

- Ridge lift
 - Factors: Shape and gradient of slope, wind direction and velocity
 - Components: Horizontal, vertical, gradient, acceleration
 - Zones: Strongest lift, strongest headwind, turbulence, lee, rotors
- Thermals
 - Factors: Uneven heating, instability, lapse rates, contrasts, light to medium winds
 - Types: Radius, strength, dry thermals, dangers
 - Signs: Temperature drop with altitude, lulls and gusts, clouds
- Weather: Heat and pressure differences, global circulation, Coriolis effect
 - Air masses, fronts: Stability/instability, signs, convergence
 - Measuring: Wind, pressure, humidity and stability
 - Clouds: Types, associated weather and conditions
 - Reports: Actuals (METAR), warnings (TAF), area (IGA), maps, interpretation

Rules

- Ridge and thermal soaring rules (priorities)
- VFR rules: Minimum visibility and distances from clouds
- Government or other official authorities

Critical situations

- Unfamiliar situations: With site, equipment, manoeuvres or tasks, priorities, conditions
- Poor Judgement: Overestimating own ability, underestimating site, conditions, equipment or task
- Ground handling in high wind: Turning glider after landing
- Critical manoeuvres: Flying close to terrain and obstructions, slow flight, 360° turns, returning to lift band, top landing, stall/spin recovery
- Emergency procedures: Unexpected wind or turbulence, tree/water landing, rough terrain, obstructions, power lines
- Reduced visibility: Flying close to clouds, reactions
- Accidents: Assistance and reports

First aid

- Regular updates

EXPERIENCE REQUIREMENTS

- At least 25 successful flights from 3 different sites
- At least 15 flying hours, including in thermal soaring

ATTITUDE REQUIREMENTS

- The pilot shall be considered to be able to take care of his own and others' safety while flying at this stage, also during displays, demonstrations, local/friendly competitions and wherever this stage is required.

STAGE 5 – SENIOR PILOT (BROWN)

The senior pilot is fully autonomous and shows good flying experience. He is able to take care of his own and others' safety while flying. He is able to operate his hang glider in a wide range of terrains and conditions.

INSTRUCTIONAL AND SAFETY RECOMMENDATIONS

Objective

This stage confirms that the pilot has an in depth experience in at least one practice of hang gliding. He is able to fly safely in that discipline, also under pressure as in demonstrations, displays and national/CIVL second category competitions. He is also ready to share his experience, for instance by becoming instructor.

Proper environment

This stage has nearly unlimited possibilities, from short and easy flights to really demanding flights, where if conditions permit, the pilot's ability and his determination will set the limits. Here is the pilot's ability put to the ultimate test.

Flying at this level requires to plan, administer and perform each flight within safe limitations. The pilot has a thorough knowledge of aerodynamics, meteorology, traffic and airspace rules. In accordance with the planned flight, existing and possible conditions, he chooses correct equipment, organizes the logistics (retrieve, communication and procedures to use in an emergency situation). He can judge the terrain and conditions to avoid causing injuries to himself or others.

Warning

It is warned against flying over areas with no possibilities for emergency landings and over water without rescue boat. The pilot always makes sure that someone knows where he intends to fly, and that a search is activated if necessary.

Pilots must have a licence on this stage in order to fly in exhibitions, national/CIVL second category competitions or wherever else this stage is required. Students are not allowed to fly at that level unless in a seminar with instructors.

SKILL REQUIREMENTS

- Special launches
 - Crosswind: Maximum 45°, weak side component
 - Cliff launch: In moderate to strong wind, assistance
 - Towing (if possible): Winch and aerotowing
- Adapting cruising speed to conditions
- Speed range: Exploring higher speeds in smooth air, use of the full polar curve extent
- Turbulence, gusts: Glider control
- Out landings: Selection of the landing field, control of speed and glide angle, precision approach to unknown landing area, use of drogue chute

KNOWLEDGE REQUIREMENTS

Pilot

- Adequate physical fitness
- Awareness: Analysing, staying ahead, giving up, keeping energy for landing
- Adaptation to changing conditions and terrain

Aircraft

- Maintenance: Recognition of cables/sail aging, trim and symmetry tuning

Aerodynamics

- Speed polar curves: Air and ground speed, minimum sink, best glide angle, influence of lift/sink, of head/tail wind, turns, wing loading, air density

Meteorology

- Frontal lift: Cold front description, thunderstorms
 - Signs: Towering clouds, squall lines, wind shift, temperature fall
 - Dangers: Cumulonimbus, high winds, gusts, strong lift, turbulence, escaping
- Lift lines
 - Cloud streets, blue streets
 - Convergence
- Wave
 - Signs: Terrain, wind direction and velocity, stability, lenticular clouds
 - Dangers: Rotors, low penetration, strong lift, high altitudes, hypoxia, cold

Planning

- Procedures: Signals, retrieval, warning, search after missing pilots

Rules

- Controlled airspace: Air corridors, terminal areas, control zones and airports, airways, Air Traffic Control, VFR/IFR traffic patterns, rules of operations
- Uncontrolled airspace: AFI, other airfields, dangers, restrictions, prohibited areas, information zones and services, VFR/IFR traffic patterns, rules of operations
- Military traffic: Training areas, photographing from the air
- Other airspace: Restricted, dangerous and prohibited areas
- Information sources: ICAO maps, publications, AIC, AIP, manuals, NOTAMs, information service, local airports and clubs, schools

First aid

- Regular updates

EXPERIENCE REQUIREMENTS

- At least 100 flights or 50 flying hours, on 5 different sites

ATTITUDE REQUIREMENTS

- The pilot is able to assess the risk in all situations, taking into account not only the probability of incident, but also the consequences for him and others (remote position, poor access, medical coverage...) and eliminates unnecessary risk. See here:

<http://www.fai.org/civil-our-sport/safety/40754-assessment>

STAGE 5B – CROSS-COUNTRY

This additional rating shows that the pilot masters the specific skills needed to fly cross-country (using updraughts to fly away from the local flying site).

SKILL REQUIREMENTS

- Bringing the required equipment: GPS, first aid/survival equipment, oxygen, live tracker
- Choosing the best launch with regard to the weather analysis
- Taking off with less than ideal conditions, both foot and tow launching, managing traffic
- Ease to turn both directions in a thermal, alone or in traffic
- Sustaining flight in very weak conditions while maintaining a good safety margin (close to terrain, with limited landing fields, in glider traffic, etc.)
- Thermalling in strong wind while maintaining safety with drift and elusive lift
- Using the MacCready theory, choosing thermal exit time and speed to fly
- Thermalling in gaggles: This practice should be acquired gradually, with first one, then more pilots at the learner's level, managing variable geometry
- Managing stall and spin
- Choosing the best landing field while in flight and setting up a precision approach for a short field with possible barriers
- Landing with other gliders at the same time

KNOWLEDGE REQUIREMENTS

- Analysis: Of competition rules, weather sounding
- Using maps: Airspace, desert areas, hazards, landing areas, alternative routes
- Strategies, techniques and dangers flying upwind, crosswind and downwind
- Knowing when to remain with a group and when to strike out on one's own
- Efficient use of radio with a team
- Equipment follow-up: Glider check, sprog setting, emergency parachute folding

EXPERIENCE REQUIREMENTS

- Experience with the equipment used
- At least 5 cross-country flights (flying only along the same ridge does not qualify)

ATTITUDE REQUIREMENTS

- Managing stress, emotions, concentration
- Assessing conditions before the flight
- Construction of flight plan and flight tactics
- Understanding when to change gears and flying style according to the day's progress and changing conditions, as well as on different days
- Crossing cloud streets, blue holes or other lift compromising areas
- Detouring around unlandable areas
- Remaining safe when the course line is not chosen with proper safety margins
- Stopping or detouring a flight when thunderstorms are along the course line
- Criticism about own awareness under competitive pressure (assessing group or own decisions with regard to threats)

STAGE 5C – RACING

This additional rating shows that the pilot masters the specific skills needed to fly racing competitions with a large number of pilots in challenging and directed tasks. This rating can be qualifying to enter CIVL first category competitions.

SKILL REQUIREMENTS

- Taking off with less than ideal conditions, both foot and tow launching, managing dense traffic
- Ease to turn both directions in a thermal, alone or in traffic
- Sustaining flight in very weak conditions while maintaining a good safety margin (close to terrain, with limited landing fields, in glider traffic, etc.)
- Thermalling in strong wind while maintaining safety with drift and elusive lift
- Using the MacCready theory, choosing thermal exit time and speed to fly
- Thermalling in gaggles of at least ten pilots in close proximity. This practice should be acquired gradually, with first one, then more pilots at the learner's level, managing variable geometry
- Managing stall and spin
- Choosing the best landing field while in flight and setting up a precision approach for a short field with possible barriers
- Launching and landing with multiple gliders at the same time

KNOWLEDGE REQUIREMENTS

- Analysis: Of competition rules, weather sounding, task briefing
- Strategies, techniques and dangers flying upwind, crosswind and downwind
- Achieving turnpoints without landing at them (strategies related to drift)
- Knowing when to remain with the gaggle and when to strike out on one's own
- Final glide matters: Safe altitudes and flying speeds (including maximum speed) with turbulence, sink and possibly limited landing options
- Efficient use of radio with the team
- Equipment follow-up: Glider check, sprog setting, emergency parachute folding

EXPERIENCE REQUIREMENTS

- Experience with competition equipment
- Making at least 3 goals in national/CIVL second category racing tasks

ATTITUDE REQUIREMENTS

- Managing stress, emotions, concentration
- Assessing conditions before the flight
- Construction of flight plan and flight tactics
- Understanding when to change gears and flying style according to the day's progress and changing conditions, as well as on different days
- Remaining safe when turnpoints are not chosen with proper safety margins
- Stop or detour of a flight when thunderstorms are along the course line
- Criticism about own awareness under competitive pressure (assessing group or own decisions with regard to threats)