Announcement of airworthiness requirements for hang gliders and paragliders[1]

LTF-HG/GS

of

1.2.2024

Below, the Federal Aviation Office
announces airworthiness requirements
for
hang gliders and
paragliders.

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[1] Notified in accordance with Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services (OJ L 241, 17.9.2015, p. 1)

Airworthiness requirements for hang gliders and paragliders

Contents

0 Register of amendments

The following amendments were made compared to the previous issue of the Airworthiness Requirements for hang gliders and paragliders of 31.8.2020 (NfL 2-565-20):

Old numbering	New numbering	Amendment
1.1.10	-	Deleted
1.1.11 – 1.1.14	1.1.10 – 1.1.13	Adjustment of numbering
3.2	3.2	DIN and EN standard citation
3.3.8	3.3.8	Update of standard reference
4.1.6	4.1.6	Supplement Protection against falling out of speedbag harnesses
4.2.2	4.2.2	Update of standard reference
5.1.1	5.1.1	Reference to standard inserted
5.1.3 – 5.3.5	-	Deleted
6.1.9	6.1.9	Update of standard reference
12	-	Deleted
13	12	Adjustment of numbering
13.1.10	-	Deleted
13.2.1	12.2.1	Requirements for information for checks Updating standard references
13.2.3	12.2.3	Requirements for information for checks Information about folding Lines
13.2.4	12.2.4	Addition to maintenance information

1 General

1.1 Scope and definitions

1.1.1 These airworthiness requirements apply to

Hang gliders with harness,
Paragliders with harnesses,
Paraglider harnesses with integrated rescue system inner container,
Harness protectors,
Hang gliders and paragliders rescue equipment,
Towing winches and jacks for hang gliders and paragliders,
Pulley systems for towing hang gliders and paragliders,
Launch trolleys for winch and UL towing for hang gliders and winch trawls for paragliders and
landing gears for paragliders.

1.1.2 A hang glider as defined by these airworthiness requirements is the aircraft including the attachment loops without harness. The airworthiness requirements must be met with all harnesses approved for the hang glider type.

1.1.3 Paragliders are gliders with no rigid primary construction which are launched and landed on foot and in which the pilot (and possibly a passenger) sits in one (two) harness(es) connected to the wing. Paraglider for the purposes of these airworthiness requirements means the entire aircraft including control lines with carrying straps and hand loops of the control lines without harness and in the case of double-seat sliding sails, including the connecting element between the carrying straps and the two suspension loops on the harness. If the harness is incorporated into the paraglider, the airworthiness requirements for paraglider harnesses apply. The airworthiness requirements must be met with all harnesses approved for the paraglider type.

1.1.4 A harness as defined by these airworthiness requirements is the harness system including connecting element to the hang glider or the connecting elements for the risers of the paraglider including the elements for impact damping (harness protector). The airworthiness requirements for rescue systems apply to all parts of the harness that affect the function of the rescue system, without referring to a specific rescue system.

1.1.5 The rescue parachute is a rescue device designed to slow down the pilot’s descent in the event of an incident in flight and which is deliberately triggered by the pilot by hand. It can be controllable or non-controllable. A rescue system as defined by these airworthiness requirements is the rescue parachute including bridle, inner container, connecting element to the harness and an outer container separate from the harness with the elements for fastening the outer container to the harness. If an outer container that can be used instead of the separate outer container is integrated in the harness, this is considered part of the harness.

1.1.6 Winches as defined by these airworthiness requirements are stationary and mobile winches as well as static line winch systems for towing hang gliders and/or paragliders, including cutting devices, towing ropes, recoil ropes, drogue chutes, weak links, spacers, fork lines and pulley system, but not including the winch release.

1.1.7 For the purposes of these airworthiness requirements, towing jack is the connecting element between the harness and the towing rope. The connection between the winch release and the towing microlight is part of the microlight.

1.1.8 Launch trolleys as defined by these airworthiness requirements are devices that replace the manual launch during winch or microlight towing with a moving base and remain on the ground after the launch process.

1.1.9 Landing gear as defined by these airworthiness requirements are devices that replace the manual launch and landing with a moving base and remain connected to the aircraft and/or the harness after the launch process.

1.1.10 The airworthiness requirements also apply to spare parts. Accessories and attachments not subject to sample testing shall not affect operational safety.

1.1.11 The annexes and explanatory notes form part of the airworthiness requirements and apply as interpretations, recommended procedures or additional information.

1.1.12 When applying for a sample test or supplementing/modifying the sample test, it is necessary to demonstrate compliance with the airworthiness requirements. Proof is made in accordance with the provisions of the Ordinance on Aircraft Testing (LuftGerPV). The airworthiness requirements to be applied are set out in the 2. DV LuftGerPV.

1.1.13 In addition to these airworthiness requirements, the inspection body may impose further requirements, request additional documents and evidence and carry out further tests if new materials, special designs, new experience or other circumstances require this for operational safety. It may replace technically impracticable tests with other evidence ensuring the same level of safety. If safety is not affected, some trials and documentation may not be required. If not specified in these airworthiness requirements, the inspection body will determine the test methods and limit values to be used.

1.2 Design and construction

1.2.1 The suitability and durability of all materials and manufacturing processes used must be proven on the basis of experience or tests. All materials must be specified.

1.2.2 All components must be adequately protected against weakening influences, in particular against corrosion, UV radiation, wear from bending and folding, mechanical wear and damage during transport, assembly and operation.

1.2.3 Incorrect assembly and dismantling should be prevented by structural measures. It must be ensured that, when the device is ready for operation, the functionality of all necessary components is guaranteed.

1.2.4 Couplings, links, locks and other connecting elements must be secured against unintentional opening. Load-bearing ropes must have a minimum of 10 cm beyond all knots and must be additionally secured.

1.2.5 All necessary labels and markings must be permanently and functionally affixed.

1.2.6 Adjustment options may only be present if they are necessary. Independent adjustment must be ruled out. Technical measures must be taken to ensure that the adjustment options are not exceeded.

1.2.7 All components must be accessible for inspections.

1.2.8 A risk of injury to the user and for third parties due to components must be largely excluded.

1.2.9 Safe operation must not be impeded by storage temperatures from −30 °C to +70 °C, operating temperatures from −30 °C to +50 °C and variations between 25 % and 100 % relative humidity.

1.2.10 The structural strength shall be designed in such a way that there are no positions with dangerous stress concentrations.

1.3 Stability

1.3.1 In principle, the breaking strength must be demonstrated by tests. The test

sample must withstand the test load without any structural damage. For hang gliders, no permanent, safety-relevant deformations of individual components may occur at two-thirds of the test load.

2 Hang gliders

2.1 Design and construction

2.1.1 Hang gliders must be able to be fitted with wheels on the steering bar to intercept landing shocks. Double-seat suspension glides must be equipped with wheels on the steering bracket or a chassis (wheels on the steering bar + spur wheel).

In conjunction with the respective hang glider type, landing gear must withstand a vertical landing at a sink rate of 2.0 m/s or a static load of 4 g without damage.

2.1.2 Rope locks shall be designed in such a way that loose attaching without locking is not possible.

2.1.3 The distance between the attachment point on the attachment loop and the trapeze base must be 120 cm. The inspection body may allow exceptions. A second attachment device (double attachment) that is independent of the main attachment must be present. The attachment loop and double attachment must be able to bear a load of at least 1,300 daN without breaking.

2.1.4 It must be possible to trim the hang glider at all allowable take-off weights to fly at a speed between the minimum sink rate and best glide speed.

2.2 Static longitudinal stability

2.2.1 The pitch moment of a hang glider must be sufficient to ensure static longitudinal stability with a sufficient safety margin at speeds up to 10 km/h above the maximum permitted speed. The maximum permitted speed for hang gliders is 90 km/h. The inspection body may allow exceptions if safety is not compromised.

2.2.2 Regardless of the maximum permissible speed, the pitch torque of the hang glider shall have static longitudinal stability with sufficient reserves at any speed that can be reached.

Explanations:
The static longitudinal stability is to be evaluated by measuring, among other things, the components of lift, drag and pitch moment.
The following measurement and evaluation procedures are suitable:
The glider is to be examined using a test vehicle at speeds of 40 km/h, 60 km/h, 80 km/h and 100 km/h. For gliders with a low top speed, the maximum test speed can be reduced. At each of these speeds, the angles of attack are measured corresponding to a device load of – 0.5 g to + 1 g of the mean launch weight (mean value of maximum and minimum starting weight). For each of these speeds, the measurement curves of the 3-component lift, drag and pitch moment are determined. The pitch moment shall be related to the common focus of glider and pilot, with the total pilot mass being assumed at the pilot's suspension point.
Static longitudinal stability with sufficient reserves can be assumed if at each speed to be tested

a) *the pitch moment between zero lift and a negative lift of 0.5 g does not become negative; and*
b) *between the angle of attack of the zero lift and an angle of attack corresponding to the mean value between the angle of attack of the zero lift and the angle of attack of the stationary straight flight (total air force = mean launch weight) at the speed to be tested (hereinafter referred to as the 'mean value') does not occur a moment smaller than a straight line reaching the following limits at the angle of attack of the zero lift.*
   - *at 40 km/h 50 Nm,*
   - *at 60 km/h 100 Nm,*

- *150 Nm at 80 km/h, and*
- *200 Nm at 100 km/h*

and assumes the value 0 at the point of the mean value

c) *and there is no positive slope of the moment curve (dM/dalfa > 0) between the angle of attack of the zero lift and the mean value. Such a positive gradient is permitted only if the values required for zero moment according to (b) are reached at any point of the positive gradient.*

Where the maximum test speed is reduced for devices with lower final speeds, the conditions set out in (a) – (c) shall be achieved at least up to 10 km/h above the maximum stationary speed determined in the test flight. Limits for intermediate values must be determined by linear interpolation (e.g. limit at 60 km/h = 100 Nm, limit at 80 km/h = 150 Nm, top speed = 70 km/h, limit for 70 km/h = (100+150) / 2 = 125 Nm). The requirement for a maximum permitted maximum speed of no more than 10 km/h below the maximum mechanically tested speed remains unaffected.
Proof of sufficient static longitudinal stability can also be provided in accordance with the corresponding requirements in the HGMA standard, 2009 edition or in the BHPA standard, 2002 edition.

2.3 Stability

2.3.1 The hang glider shall withstand the following load multiples without failure of the structural strength:

Positive test load: Mass x six times gravitational acceleration
Negative test load: Mass x three times gravitational acceleration

Explanations:
The strength verification must be performed by simulating the load occurring during the flight.
The maximum allowable launch mass minus half the mass of the hang glider can be assumed as mass.
In special cases, the strength can be verified through a static test ('sandbag test'). For static strength tests, an elliptical load distribution shall be assumed in the span direction for positive loads, a rectangular load distribution for negative loads. For positive and negative loads, the centre of gravity of the load must be at least 35% of the chord in the direction of the chord.
Proof of sufficient strength can also be provided in accordance with the corresponding requirements in the HGMA standard, 2009 edition or in the BHPA standard, 2002 edition.

2.4 Operating behaviour

2.4.1 It must be possible for the pilot to launch the hang glider without external assistance. For all launch methods approved for the type, the hang glider must be controllable by the pilot without extraordinary effort or skill. In towing, the hang glider must not have any tendency to break out and swing, which can only be controlled with extraordinary effort or skill of the pilot.

2.4.2 The hang glider must be landable by the pilot without exceptional effort or skill. The hang glider must be controllable and there may not be any excessive tendency to slide or pitch. The operation of landing aids or the change in the pilot position on landing shall not cause an excessive change in the steering forces or control sweeps or adversely affect the controllability of the hang glider.

2.4.3 It must be possible to fly the hang glider over its entire speed range in all approved operating conditions and in all configurations. The pilot must be able to execute all regular manoeuvres without extraordinary effort or skill. Throughout the

speed range, fixed components may not vibrate or oscillate and flexible components may not vibrate or oscillate excessively. There must be no shaking; Shaking as a stall warning is allowed. No undesired sudden wing deformations with aerodynamic effects, ambiguous flight behaviour (divergences) or adverse yaw may occur at any speed within the range.

2.4.4 The hang glider must maintain the trim speed during the straight flight. Every significant change in speed must be accompanied by a corresponding change in steering force. The airspeed must change appropriately and in an appropriate ratio to every constant steering action. In curve flight, the steering force must not become so large in the longitudinal or lateral direction that the control requires special skill or effort. In curve flight, the hang glider must not take on an inclined position on its own, the abortion of which requires extraordinary effort or skill of the pilot. All oscillations that cannot be corrected by the pilot without extraordinary effort or skill must be dampened over the entire speed range. There may be no tendency to spin. After a stall, the pilot must be able to return the hang glider to normal flight position without extraordinary effort or skill.

2.4.5 The speed must be kept constant over the entire permitted speed range without extraordinary effort or skill of the pilot. Reversing a turn may not require any special effort or skill from the pilot.

2.4.6 The operational behaviour is to be evaluated through test flights. As part of the flight tests (see Annex I), it is necessary to determine the requirements of the hang glider towards the pilot. The samples shall be classified according to the testing body of the verifier (see Annex I). The test flights must be documented based on the test flight record to be created by the testing body.

3 Paragliders

3.1 Design and construction

3.1.1 Full flying and steering ability must be ensured when used with a harness in accordance with Section 4 of these airworthiness requirements. Deviating constructions are permitted only when used with an associated paraglider harness. This must be indicated on the paraglider and in the operating instructions.

3.1.2 Components that are particularly likely to lead to irreversible tangling of lines are not permitted.

3.1.3 Should a control line fail, it must still be possible to fly the paraglider. Suspension and brake lines must have sufficient strength. Control lines and stabilo lines must be clearly distinguishable from the suspension lines by means of different, permanent colour markings.

3.1.4 Hand loops must be easily accessible at all times while flying. The height of the hand loops must be adjustable for each pilot. The adjustment range shall be marked on the suspension lines.

3.1.5 The guide rings of the carrying straps must be permanently closed.

3.1.6 Immediate pressure equalisation within the canopy must be ensured.

3.2 Stability

3.2.1 Shock loading test

The shock loading tests shall be carried out in accordance with the procedure described in DIN EN 926-1:2016-02 (EN 926-1:2015).

3.2.2 Sustained loading test

The sustained loading test shall be carried out in accordance with the procedure described in DIN EN 926-1:2016-02 (EN 926-1:2015).

3.2.3 Breaking strength of the lines

The breaking strength of the lines shall be carried out in accordance with the procedure described in DIN EN 926-1:2016-02 (EN 926-1:2015).

3.2.4 Connecting parts between carrying strap and harness for double-seat paragliders

For tandem paragliders, each individual connecting component between the riser and harness must have sufficient strength. Sufficient strength may be assumed if each individual connecting part withstands a breaking load of nine times the permissible launch weight, but at least 1350 daN at a load period of 10 sec.

3.3 Operating behaviour

3.3.1 It must be possible for the pilot to launch the paraglider without external assistance. For all launch methods approved for the type, the paraglider must be controllable by the pilot without extraordinary effort or skill. In the towing, the paraglider must not have an inclination to stall flight, which can only be controlled with extraordinary effort or skill of the pilot.

3.3.2 The paraglider must be able to be landed on foot without the pilot’s extraordinary effort or skill.

3.3.3 The paraglider must be able to flow over the entire speed range under all approved operating conditions and states. The pilot must be able to execute all regular manoeuvres without extraordinary effort or skill.

3.3.4 The paraglider must maintain the trim speed during straight flight. It must be possible to keep the constant over the entire permitted speed range without extraordinary effort or skill of the pilot. After increasing the angle of attack, the paraglider must return to normal flight without any extraordinary effort or skill from the pilot. Undamped oscillation may not occur with any manoeuvre. With minimum launch weight, the trim speed shall be at least 30 km/h.

3.3.5 From a narrow curve, it must be possible to switch quickly into a narrow curve of opposite direction, without the need for extraordinary effort or skill of the pilot. Flight speed and cornering must change appropriately and proportionately with each constant control line deflection.

3.3.6 It must be easy to recognise the beginning of a stall. The stable continuous stall flight must be able to be terminated immediately without any extraordinary effort or skill of the pilot and without initiating a curve. The paraglider must recover from a full stall automatically after the control lines are released without extraordinary effort or skill from the pilot. The paraglider must recover from a spin automatically after the control lines are released.

3.3.7 There must be a possibility to increase the sinking speed in a controlled and at any time interruptable manner.

3.3.8 The operational behaviour is to be evaluated through test flights. As part of the flight tests in accordance with DIN EN 926-2:2022-02 (EN 926-2:2013+A1:2021), it is necessary to determine which requirements the paraglider makes on the pilot. The sliding sails must be classified by the testing body in accordance with the requirements of DIN EN 926-2:2022-02 (EN 926-2:2013+A1:2021).

3.3.9 Two different test pilots from the test centre are each to perform a complete test programme, one with the minimum flying weight specified by the manufacturer and the other with the maximum specified flying weight. The maximum flying weight may not exceed the maximum flying weight up to which proof of strength has been provided in accordance with Section 3.2. In the exceptional case that the minimum flying weight specified by the manufacturer is less than 65 kg and the testing body does not have a sufficiently light test pilot, the test programme shall be replaced by a test programme with the lowest flying weight that the testing body can implement, at minimum flying weight. In this case, the manufacturer must also demonstrate a test programme with the intended minimum flight weight. This programme must be documented by the testing body in the same way as in all other flight tests.

4 Hang glider harnesses and paraglider harnesses

4.1 Design and construction

4.1.1 For seat boards, any continuous straps, ropes, etc. must be specially protected against mechanical damage. Structural strength must still be ensured even if the seat board fails.

4.1.2 In the case of standard harnesses for paragliders, the risers of the paraglider or the connecting components for tandem paragliders must be fastened to the harness on the left and right at an attachment point. These attachment points must be between 35 cm and 65 cm above the seat in flight. The attachment points must be between 35 cm and 55 cm apart. These attachment points must be clearly colour-coded and labelled with the maximum permitted load in daN. Deviating constructions are permitted together with an associated paraglider.

4.1.3 The harness must transfer all the loads that occur to the pilot's body in the most favorable way possible.

4.1.4 The pilot must be able to safely and quickly disconnect from the harness after landing on the ground or in the water.

4.1.5 The harness shall not hinder the pilot during take-off, landing or flight in such a way as to require exceptional effort or skill of the pilot.

4.1.6 Falling out of the harness may not be possible in any pilot position. Closing the chest strap must also close fall protection between the legs, or a load-bearing connection to the paraglider may only be created if the leg straps are closed. In the case of speedbag harnesses and in the case of harnesses with integrated front cockpit, an additional safety system shall be provided to establish a mandatory connection to the leg straps when the speedbag or front cockpit is closed.

Explanation:
Sufficient strength can be assumed if the securing system withstands a load of 450 daN.

4.1.7 It must be possible to mount the rescue system and the rescue system bridle on the harness such that the function of the aircraft, harness and rescue system is ensured. These attachment points must be clearly colour-coded and labelled with the maximum permitted load in daN.

4.1.8 The harness must be suitable for all types of towing. The inspection body may allow exceptions. The hang glider harness must be equipped with suitable attachment points for a winch release. These attachment points must be clearly colour-coded and labelled with the maximum permitted load in daN. The function of the rescue system must not be impaired by the properly attached winch release.

4.1.9 If the harness is equipped with a container for rescue equipment and if the rescue system is deployed by hand, the operating handle of the container can be connected to the packing sleeve of the rescue system by a detachable loop, so that the harness can also be combined with packing sleeves of other rescue systems. The minimum and maximum volume (cm^3) of the container for a harness must be specified to indicate compatibility with a rescue system. If the rescue system is not deployed by hand, the harness must be tested together with this rescue system. When the rescue has been deployed, the pilot must be in an almost upright position.

4.2 Stability

4.2.1 The harness shall have sufficient strength in all the positions to be expected during operation.

Explanations:

Sufficient strength can be assumed if the structure of the harness can be loaded for 10 seconds without damage at

a) *nine times the maximum permitted pilot weight, but at least 900 daN, in normal position on the pilot suspension,*
b) *six times the maximum permitted pilot weight, but at least 600 daN, in landing position on the pilot suspension for hang glider harnesses,*
c) *six times the maximum permitted pilot weight, but at least 600 daN, in an upside-down position on the pilot suspension,*
d) *three times the maximum permitted pilot weight, but at least 300 daN, in the direction of pull of the tow rope at the attachment points of the winch release.*

The loads a) to c) are also to be tested at separate attachment points for the rescue system bridle and at any attachment points that could be used for incorrect assembly.

4.2.2 The corresponding proof of sufficient strength in straps for paragliders can also be provided in accordance with the standard DIN EN 1651:2022-02 (EN 1651:2018+A1:2020).

4.2.3 For fasteners referred to in point 1.1.4 of these airworthiness requirements, durability shall be demonstrated by testing in a test laboratory with appropriate expertise.

4.3 Paraglider harnesses with integrated rescue system inner containers

4.3.1 Pursuant to point 6.1.8 of these airworthiness requirements, the structural strength between the release handle on the harness compartment and the inner container must be tested, and a minimum strength of 70 daN must be demonstrated.

4.3.2 In addition to the harness sample test, a trigger test shall be carried out with the inner container on the harness side, in which a rescue system is installed, the volume of which corresponds to the maximum volume of the inner container specified by the harness manufacturer. Among other things, it is necessary to check whether the inner container releases the rescue parachute without delay. A simplified activation test is explained at the end of this section using an example.

4.3.3 The air sports equipment data sheet of the harness is supplemented with the note
“belts with integrated inner container” and the indication of the minimum and maximum intake volume of the inner container in cm^3.

4.3.4 In the operating instructions of the harness, it shall be noted

that the permissible minimum volume and the maximum volume of the inner container on the harness side must be considered as the operating limit when installing a rescue system without a packing sleeve.

that the installation conditions for the inner container on the harness side, as specified in the operating instructions for the rescue system, must be observed.

4.3.5 Additional information in the operating instructions for the rescue system

The manufacturer of the rescue system specifies installation conditions for combination with other inner containers in the operating instructions (e.g. volume, container shape, type of packing).

4.3.6 Special feature for harnesses that have an integrated rescue system inner container in a narrow-sided opening design (pocket container).

Safe activation of special forms of rescue system (e.g. steerable rescue systems or cruciform parachutes), in combination with harness-side inner containers in an edge-opening design, is not sufficiently guaranteed by the procedure according to 4.3.2 – 4.3.5. For each individual variant of the above-mentioned design, separate activation tests according to 4.3.2 are to be defined and carried out by the type testing body as

part of the harness type test.

Explanations:
Example of a simplified trigger test:
A rescue system must be installed in the harness-side inner container to be tested according to the packing instructions of the rescue system manufacturer, the volume of which corresponds to the specified maximum volume of the inner container (maximum deviation - 10 %).
The trigger test described below must take place in a location that allows a sample opening to be carried out in freefall. For this, a clear height is required that enables the full extension of the suspension lines, the pulling off of the inner container and the deployment of the rescue system in the open air.

Test sequence
The end of the rescue system connecting line (connecting loop to the harness) is fixed at a fixed point.
The rescue system is held by the release handle in the open air, whereby the release handle must be at the level at which the rescue system connecting line is fixed.
Without force (e.g. spinning), the trigger handle is released.

Requirements for a positive test
The inner container must open without delay.
Suspension lines and cloth of the rescue system must be fully released without delay.
The inner container must completely separate from the rescue system.

5 Paraglider harness protectors

5.1 Design and construction

5.1.1 Paraglider harnesses shall be equipped with a protective device (harness protector, impact protection) that effectively dampens impacts on the spine during a hard landing. Proof of the damping properties must be provided by a delay test according to DIN EN 1651:2022-02 (EN 1651:2018+A1:2020). The limit values and properties set out therein must be fully respected.

Explanations:
Harness protectors are divided into three different groups, some of which can be combined:
Air bag protectors
The air flowing during flight forms an air cushion which is released in a controlled manner by means of a valve effect in the event of an impact and thus absorbs part of the energy applied.
Rigid foam protectors
A rigid foam area is destroyed in a controlled manner upon impact and thus absorbs some of the energy.
Foam/air protectors
Foam contained in a completely sealed air bag keeps a defined space open, which, in the event of compression, allows the air to flow out through the fabric and the seams and thus absorbs part of the energy applied, similar to an air bag.

5.1.2 The combination of harness, harness protector and rescue system must not result in any circumstances that call into question the proper functioning and safe operation of the paraglider. The harness protector shall be able to be fitted into the harness in such a way as to prevent any impairment of the proven damping effect.

6 Hang glider rescue systems and paraglider rescue systems

6.1 Design and construction

6.1.1 The design of the rescue system must allow the pilot to be rescued unharmed from as many emergencies as possible, even if the aircraft is not disconnected.

6.1.2 If the rescue system can be adjusted, it must be functional across the entire adjustment range.

6.1.3 In the event of a suspension line failure, the rescue system shall remain functional. The suspension lines must be bundled at the connecting elements.

6.1.4 The connection belt shall have a minimum strength of 2,400 daN. The exposed part of the connection belt must be protected against external influences.

6.1.5 The release of the rescue system shall be possible in any operating situation, including in the case of damaged aircraft, uncontrolled flight condition or failure of the connection between the harness and the aircraft. It must not be affected by the packing pressure, packing method, locking system or other factors. The release of the rescue system from the intake compartment of the harness must be possible with one hand in all non-obviously non-practice directions. This also applies if a technical device is used for deployment. If the rescue system is deployed by hand, the action and direction of deployment without any change of direction must allow controlled deployment of the rescue system in an unfolded state without extraordinary effort or skill of the pilot. Independent deployment during flight operations must largely be ruled out. If the release is carried out by a technical device, the testing body may require that the release must be possible by hand in the event of failure.

Explanations:
Deployment with one hand is considered guaranteed with regard to the effort required if a tensile force of 7 daN is not exceeded. Independent deployment is deemed to be ruled out if, for example, a weak link is installed with a minimum load capacity of 2 daN.

6.1.6 The opening of the rescue system must be ensured with every packing pressure and with every packing method specified by the manufacturer. When unfolding outside the pilot’s arm area, it must be ensured regardless of the pilot’s sinking speed and regardless of the spinning motion.

6.1.7 The pack sleeve of the rescue equipment shall have suitable fasteners for mounting.

6.1.8 The release handle on the harness compartment must be connected to the rescue parachute packaging so that safe operation of the paraglider and functionality of the rescue parachute are ensured. It must also be possible to combine the packing sleeve for the rescue parachute with other compartments. The inspection body may allow exceptions. The connection from the trigger handle to the packing sleeve must be sufficiently strong in all the positions expected during operation.

Sufficient strength can be assumed if the structure between the release handle and the inner container withstands a load of 70 daN.

6.1.9 The minimum and maximum packing volume in cm^3 of the rescue system with packing sleeve must be specified to indicate compatibility with a harness.

6.1.10 Hang glider rescue systems require an additional connecting element between the rescue system and harness. It must be designed so that the pilot can make a connection with sufficient strength independent of the main attachment. Sufficient strength is given at 2,400 daN.

6.1.11 The pilot must not suffer any major injuries upon touchdown.

Explanations:
At a sink rate of less than 6.8 m/sec, it can be assumed that there are generally no serious injuries.
Instead of a descent velocity test with a predetermined towable mass, the test can also be carried out by determining the towable mass at a predetermined sinking speed with a test vehicle.

6.1.12 The rescue system must also fulfil its purpose at a low altitude.

Explanations:
The low altitude requirement can be considered fulfilled if, starting from the falling speed of zero, the rescue system experiences the first opening impact in subsequent free fall with a load of 70 kg within a distance of 30 to 60 m, depending on the design and technical level of development.

6.1.13 The rescue system must be aerodynamically stable, in particular it must not be prone to excessive pendulum movements.

6.1.14 Components with a damping effect to reduce the opening shock are permitted if damage to the component by the damping process can be seen as an obvious irreversible change of the component.

6.1.15 The rescue system shall withstand the expected impact load with the maximum towable mass, but not less than 100 kg for paraglider rescue systems and 120 kg for hang glider rescue systems. Damping components may be changed between tests. Opening delay devices are only permitted if their delay cannot be changed.

Explanation:
A suitable test method is the execution of three test openings on the same sample system from a freefall height of 85 m.

6.1.16 In the case of a rescue system with separation from the aircraft, a free fall must be excluded during every phase of use.

6.1.17 A rescue system with propulsion must be steerable and have the flight characteristics of a paraglider within the scope of the special operating purpose. It must fly safely without operator intervention. The testing body may limit the permitted glide ratio and speed.

6.1.18 The rescue system should be usable with any harness. For safety reasons, the testing body may restrict its use to certain harnesses. This must be indicated on the rescue system and in the operating instructions.

6.1.19 An individual must be able to pack the rescue system using the packing instructions without special expertise and skill, and without special tools. A packing certificate booklet must be supplied with the delivery of any rescue system.

Explanation:
The proof of the requirements according to 6.1 can also be provided in accordance with DIN EN 12491:2022-02 (EN 12491:2015+A1:2021). The evidence relating to 6.1.4 and 6.1.9 shall be excluded from this.

7 Towing winches for hang gliders and paragliders

7.1 Design and construction

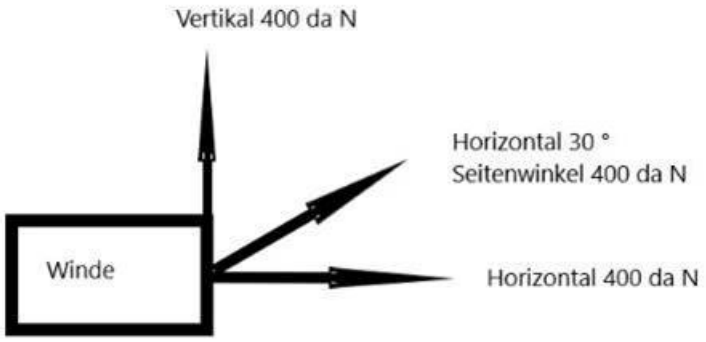
7.1.1 The winch must ensure safe towing of the aircraft in every approved operating mode. If electrical or electronic components or remote controls are used, they must comply with the current regulations and safety requirements and must be properly

installed. They must be adequately weatherproofed and the components must not pose any danger to the operator or the pilot. If remote controls are used to operate winches, automatic switching of the rope reel to free running is required in the event of operational failure of the remote control.

7.1.2 The winch must withstand the maximum expected load during towing without affecting its operational efficiency. The entire roller system for guiding the towing rope must be dimensioned in such a way that no unusual rope wear occurs. The lead in, tow rope, connecting parts and repair points must have a minimum strength of 300 daN, or for towing in excess of 100 daN traction, 400 daN. The testing body may prescribe weak links, allow exceptions and set limits.

7.1.3 The stability and strength of stationary and mobile winches must be guaranteed. Mobile winches and longitudinal towing systems must be safely mounted on the towing vehicle.

Explanations:
Sufficient stability and strength can be assumed if the winch can withstand a load of 400 daN in the following load directions:
Horizontal load directions in the normal towing direction
Vertical load directions
Horizontal load directions 30° to the side
Diagram:



Winde	Winch
Vertikal 400 da N	Vertical 400 da N
Horizontal 30 °	Horizontal 30°
Seitenwinkel 400 da N	Side angle 400 da N
Horizontal 400 da N	Horizontal 400 da N

7.1.4 If electrostatic and electromagnetic charges of the rope may occur during towing operation, appropriate grounding is required.

7.1.5 Appropriate protection shall be provided against injury in the event of rope tears; it must not hinder the sight of the winch operator. Exhaust gases from internal combustion engines shall be derived in such a way as not to affect or jeopardise the winch operator. In the case of mobile winches, the winch operator must have a safe seating position. Tailgates and similar vehicle parts must be secured.

7.1.6 The weak links must be designed in such a way that there is no risk of injury to the pilot if they break or a rope fails. Spacer and fork lines must be designed such that the weak link cannot recoil back towards the pilot.

7.1.7 Noise and exhaust emissions shall be kept as low as is possible according to the state of the art. Internal combustion engines and hydraulic units are to be equipped with an oil sump.

7.1.8 The winch shall be equipped with the operating and control devices necessary for safe operation within the sight and range of the winch operator. Commissioning may only be possible with a functional cutting device. The operating and display elements must be ergonomically arranged in stationary winches and easy to use and read by the winch operator. The drive/cutting lever must be pushed forward to cut and pulled back to tow.

7.1.9 The winch operator must be able to abort the towing process at any time, have the rope drum rewound and cut the tow rope. The inspection body may allow exceptions.

7.1.10 The tow rope must be unwound and rewound without any problems. Preliminary braking must be at least 2 daN and a maximum of 5 daN. The rope guidance system shall allow the towing rope to wind and unwind at an angle of up to 90° to the longitudinal axis of the towing winch. With steel tow ropes, the rollers must have an effective diameter of at least 100 mm. If proper winding and unwinding of the rope is not ensured, there shall be a winding device. It can be operated manually or automatically. The testing body may allow exceptions and set limits.

7.1.11 The towing speed must be adjustable to the aircraft. It must be possible to control the tension force of the tow rope smoothly and continuously during the towing process from 20 daN to the set maximum tension force. The maximum tensile force shall be at least 80 daN and shall not exceed 130 daN. It must be infinitely adjustable from 80 daN during the towing process and must be kept automatically constant. If the set maximum tension force is exceeded, the rope drum must release the rope by running backwards. When changing the running direction, the set maximum tensile force may be exceeded by a maximum of 20 daN for a short time. The tension force acting on the aircraft must be indicated to the winch operator. The testing body may allow exceptions and set limits.

7.1.12 The brake system must bring the rope drum to a standstill at all times. The brake must not block. If the traction force is regulated by the brake, it must not deviate from the set traction force by more than 10 daN. Towing winches, which are used for step-towing, require an automatic rope brake. This must not lead to increased rope wear and the winch operator must be able to release it at any time. The force required to release the brake must not exceed 5 daN. The testing body may allow exceptions and set limits.

7.1.13 The cutting device must cut through the thickest part of the tow rope with two independent mechanisms without any particular effort by the winch operator. The second release mechanism is not required if the tension force is automatically disengaged during an attempt to cut.

7.1.14 The winch must be equipped with a yellow rotating beacon.

8 Winch tow releases for hang gliders and paragliders

8.1 Design and construction

8.1.1 The winch tow release shall ensure safe towing of the aircraft in each approved mode of operation. It must be possible to attach the winch tow release to the aircraft or harness using simple means. The winch release must not cause changes in load distribution on the aircraft or the pilot in any flight situation which would require exceptional effort or skill on the part of the pilot. It must be possible to use the winch tow release in any flight situation with only one hand in a single direction of movement without visual contact. This must be possible in every load direction occurring during operation under a load of 150 daN. The release force may not exceed 7 daN. The winch release must not hinder the pilot in the climbing phase, in flight or during landing. The winch release shall not interfere with the operation of the rescue system.

8.1.2 Precautions must be taken to prevent the winch release from opening and unintentionally triggering. Paraglider winch releases must have recoil protection in the event of rope breaks.

8.1.3 The release device shall be such that no special parts for the connection to the towing rope are required for normal operation. If this is necessary for special operating procedures, these parts belong to the winch release and must be supplied by the manufacturer.

8.1.4 The release shall withstand a test load of 300 daN for winch towing and 200 daN for UL towing.

9 Pulley systems for towing hang gliders and paragliders

NB: Every type-tested pulley system can be used with all type-tested stationary winches.

9.1 Design and construction

9.1.1 The pulley system must ensure safe towing of the aircraft in every permitted operating mode. Points 7.1.2 and 7.1.3 are to be observed accordingly as well as point 7.1.13.

9.1.2 The pulley system shall be equipped with an operationally safe capping device,
which can be triggered at any time by the winch guide. It must trigger automatically if the radio contact between the winch and the pulley system is disrupted for more than 1 second. Commissioning may only be possible with a functional cutting device. Point 7.1.12 remains unaffected.

9.1.3 The winch operator must be warned with a safe signal when the rope angle of 60° to the horizontal pulley level is reached.

9.1.4 The fatigue strength must be verified by tests.

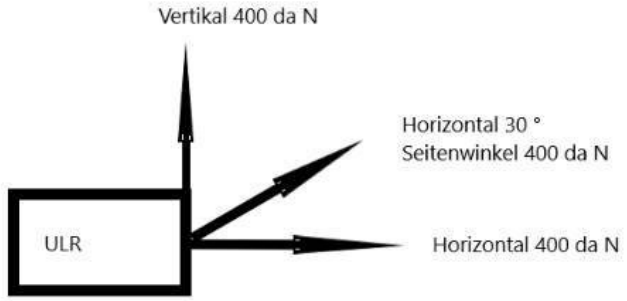
9.1.5 If the winch-related maximum permitted tow rope length is exceeded, identical

tow rope material must be used as an extension rope. The extension rope shall be connected to the winch towing rope in accordance with the operating instructions of the winch manufacturer in accordance with the splice instructions and removed from the winch towing rope after the end of towing operation.

9.1.6 The grounding of the pulley system can be dispensed with, as it is mandatory for the towing winch!

9.1.7 The requirements in the airworthiness requirements for hang gliders and paragliders according to 13.1 and 13.2 shall be applied mutatis mutandis.

Explanations:
Re point 9.1.1 (in the same way as 7.1.2): As with stationary towing winches, the rope entry system must be able to steer the tow rope as low as possible to a vertical angle of 90° on the pulley.
The pulley must be constructed in such a way that the tow rope is always guided and cannot fall out of the side of the pulley. The effective diameter may not exceed 100 mm.
NB: Pulleys with a larger diameter protect the towing rope and are recommended.
Re point 9.1.1 (in the same way as 7.1.3): The stability and strength (e.g. system is on the ground, on a trailer or attached to a trailer coupling) must be verified according to the same load directions as described under 7.1.3.



Für die Prüfung der Umlenkrolle werden beide Seilenden (Windenseil und Pilotenseil) durch das Azimutrollensystem in Zugrichtung Pilotenseil geführt und als ein Seil betrachtet.

URL	URL
Vertikal 400 da N	Vertical 400 da N
Horizontal 30 °	Horizontal 30°
Seitenwinkel 400 da N	Side angle 400 da N
Horizontal 400 da N	Horizontal 400 da N
Für die Prüfung der Umlenkrolle werden beide Seilenden (Windenseil und Pilotenseil) durch das Azimutrollensystem in Zugrichtung Pilotenseil geführt und als ein Seil betrachtet.	**To test the pulley, both rope ends (winch rope and pilot rope) are routed through the azimuth pulley system in the pulling direction of the pilot rope and viewed as one rope.**

Re point 9.1.1 (in the same way as 7.1.13): The rotating beacon must be tested to ensure that it can be switched on and off by the winch and that it is bright enough.
Re point 9.1.2, the cutting device must be checked for function and operational safety. At least three cuts must be performed, with at least one cut triggered by simulating radio failure. The impact plate must then be removed and checked for wear.
Re point 9.1.3: The rope angle warning must be checked for function and correct rope angle.

The rope angle warning shall transmit a clear acoustic or optical/acoustic signal to the winch operator at the latest at 60°, that he can perceive even in loud ambient noises.
Re point 9.1.4: Verification of this must be provided by the manufacturer. The manufacturer must carry out and document at least 500 winch tows with the tested pulley system.

10 Launch trolleys for winch and microlight towing for hang gliders and winch towing for paragliders

10.1 Design and construction

10.1.1 The trolley shall ensure safe towing of the aircraft in any permissible mode of operation. The loaded launch trolley must not be susceptible to breakage under traction. The wheels must not wobble until the glider has lifted off. It must be ensured that neither the glider nor any part of the pilot or his harness can get caught on the launch trolley during the launch process.

10.1.2 Resting blocks for hang glider keel posts must ensure no fouling can take place. Their height must be adjustable. The support for the control frame base must be adjustable in width. The launch trolley must be equipped with a grip rope for the pilot.

10.1.3 The harness damping function may not be impaired or modified for paragliders. The launch trolley must be equipped with a holding device for the pilot.

10.1.4 The launch trolley must have sufficient strength for safe operation.

Explanation:
The strength test shall be provided by simulating the load occurring during the towing process. Sufficient strength can be assumed if the launch trolley withstands a load of 1.5 times the permitted operating load (take-off weight of the aircraft). For this purpose, the test weight must be distributed in practice on the starter car, ¾ of the load on the main wheels and ¼ of the load on the tail landing-gear or nose wheel.

11 Suspensions for paraglider

11.1 Design and construction

11.1.1 The landing gear must ensure safe take-off and landing of the glider in every permitted operating mode. The loaded landing gear must not tend to veer during towing. The wheels must not wobble until the paraglider has lifted off.

11.2 Combination of paraglider (wing assembly), harness and landing gear

11.2.1 The airworthiness of the combination of the structure, harness and chassis must be ensured. The landing gear manufacturer must determine in the operating manual for the landing gear which individual type-tested components on the supporting structures and harnesses are airworthy when combined with its type-tested landing gear (proof of compatibility). For this purpose, proof of airworthiness check (handling) must be provided by the chassis manufacturer.

The following requirements must be taken into account when verifying compatibility:

- The operating limits, in particular the launch masses of the individually sample-tested components, must not be exceeded.
- The connection structure-harness must not be affected or altered.
- The harness damping function may not be impaired or modified.
- The function of the rescue system release of the harness must not be impaired or altered.

11.2.2 The labels and instructions of the manufacturers of supporting structures and harnesses shall be supplemented with landing gear in case of intended use.

11.3 Strength verification for paraglider landing gear

Proof of strength is to be provided by tests.

11.3.1 Proof of strength of suspension points

11.3.1.1 The test load is used as the basis for calculating the breaking loads. The test load corresponds to the total mass of all landing gear components.

Positive breaking load: Six times test load

11.3.1.2 The attachment points must be tested with the breaking loads calculated in point 11.3.1.1.

11.3.1.3 Proof of strength of the main landing gear

The main landing gear shall withstand a vertical landing shock with a sinking speed of 2.0 m/s without damage or absorb 4 g of static load without failure, withstand a horizontal landing shock in the direction of flight of 40 % of the energy of the vertical landing shock, a lateral landing shock of 30 % of the energy of the vertical landing shock.

11.3.1.4 Proof of strength of the nose landing gear

The nose landing gear shall meet the following conditions at the maximum launch mass: For rear, front and lateral force components on the axis, withstand a horizontal load twice the value of the stationary wheel load.

12 Labelling and instructions

12.1 Labelling

At least the following information in German must be visible and permanently affixed to the individually tested devices:

12.1.1 on all devices

a) Device type
b) Pattern of the device
c) Name and address of the testing body
d) Name and edition of the applied airworthiness requirements and, if applicable, standards
e) Model test number
f) Name of manufacturer
g) Serial number
h) Year and month of manufacture
i) Date of the individual test with the signature of the manufacturer
j) Intervals for regular checks
k) The following warning: 'Read operating instructions before use.'

12.1.2 additionally on hang gliders

a) Number of seats
b) Class of the device for pilot requirements
c) Minimum and maximum take-off weight in kg
d) Weight of the hang glider in kg (approx.)
e) Projected area (approx.)
f) maximum permitted speed (V_{Max})

12.1.3 Additionally, on paragliders

a) Number of seats
b) Class of the device for pilot requirements
c) Minimum and maximum launch weight in kg
d) Paraglider weight (canopy, lines, risers) in kg (approx.)
e) Projected area (approx.)
f) Number of risers
g) Accelerator (yes or no)
h) Trimmer (yes or no)

12.1.4 Additionally, on harnesses

a) Maximum suspension load in kg
b) Integrated rescue system container (yes or no)
c) On removable paraglider harness protectors, the name of the manufacturer and the serial number, as well as the name of the testing body and the type test number.

12.1.5 Additionally, on rescue systems

a) Maximum suspension load in kg
b) Wing area (approx.)
c) Construction (e.g. round cap, middle line, mattress)

12.1.6 Additionally, on towing winches

a) Maximum permitted tension force in kg
b) Permitted glider types (hang gliders, paragliders, gliders)
c) Step towing (yes or no)

12.1.7 additionally on towing jacks

a) Permitted glider types (hang gliders, paragliders, gliders)
b) Microlight towing (yes or no)
c) Step towing (yes or no)

12.1.8 Additionally, on launch trolleys

a) Mass of the launch trolley
b) Maximum permitted launch weight

12.1.9 Additionally, on landing gear for paragliders

a) Mass of the landing gear
b) Maximum permitted launch weight

12.2 Instructions in the Operations Manual

The manufacturer's instructions for the holder must contain the instructions required for safe operation in German, in particular:

12.2.1 For all devices

a) Version and date of the operating instructions on the title page
b) Intended use
c) Brief technical description and labelled overview drawing, in particular of the components important for operation
d) Limit positions for all adjustment options with functions and effects
e) Device-related procedures for single and tandem operation as well as for towing
f) Procedures for emergencies and specific flight conditions
g) Special features (e.g. training)
h) The necessary information in words and pictures for the commissioning, assembly and disassembly of the device
i) List of the necessary controls for assembly and functions (checklist)
j) Necessary information for transport and storage
k) For maintenance:
    - Lifespan and replacement times of components
    - Frequency, type and scope of maintenance work
    - References to repair procedures
    - Spare parts list
    - Recommendations for cleaning and care
l) Procedures for regular checks and their documentation at predetermined intervals with requirements for inspectors and operational requirements (e.g. premises, test equipment, documents and materials)
m) Operating limitations
n) Device data (data sheet)
o) Behaviour that is compatible with nature and the landscape
p) Environmentally sound disposal of the device

Explanations:
The instructions can also be executed according to DIN EN 1651:2022-02 (EN 1651:2018+A1:2020), DIN EN 12491:2022-02 (EN 12491:2015+A1:2021) and DIN EN 926-2:2022-02 (EN 926-2:2013+A1:2021).

12.2.2 Additionally, for hang gliders

a) Class of the device with regard to pilot requirements
b) Complete batten template over the whole wingspan

12.2.3 Additionally, for paragliders

a) Class of the device with regard to pilot requirements
b) Emergency procedures, especially rapid descent, exiting of a collapse and terminating of a deep stall

c) For tandem paragliders, description of the connecting parts between risers and the two harnesses
d) Assessment procedures for inspections shall include at least information for:
   - Visual and condition control of the device
   - Checking the air permeability (porosity) of the cloth
   - Checking the line tear resistance
   - Control of the further tear resistance of the cloth
   - Measurement of line lengths
   - Documentation of the results
e) Information on the use and fastening of folding lines, provided that they were used in the type examination

12.2.4 Additionally, for harnesses

a) Connection to the rescue system
b) Reference to integrated rescue system outer container or otherwise information on the attachment of a rescue system outer container
c) Information on the compatibility of the harness with rescue systems, in particular on the assembly, function and checks of the combination of the rescue system and harness and the rescue system activation mechanism
d) Checking arrangements for the combination of the rescue system and harness, procedure and documentation of the checks
e) Mounting of towing jacks and other special features for towing operations
f) Information on the paraglider harness protector about installation, function and control (especially for regular testing of the function and condition as well as the procedure in case of a deterioration or damage), in case of usability in different types of harness also a stand-alone operating instruction

12.2.5 additionally for rescue equipment

a) Connection to the harness
b) Reference to the inner container belonging to the rescue system
c) Information on the compatibility of the rescue system with harnesses, in particular on the assembly, function and checks of the combination of the rescue system and harness and the rescue system activation mechanism
d) Checking arrangements for the combination of the rescue system and harness, procedure and documentation of the checks
e) Information on functional checking of the rescue system after installing a harness protector
f) Special features for towing

12.2.6 Additionally, for towing winches

Tow rope details

Annex I – Test flight programme and classification of hang gliders

1. Scope of application

This document specifies requirements and test methods for the classification of the flight characteristics of hang gliders in relation to the demands made on the pilot.

2. Test flight programme

2.1. General

The hang glider is tested in all end positions of any existing trim systems (e.g. variable geometry). The pilot suspension point should be in a middle position.

2.2. Build

Each pilot must be able to build the device on the basis of the operating instructions. Special features and possibilities of incorrect assembly must be noted. If wheel mounting is not possible using commercially available parts (e.g. eccentric hubs), the manufacturer must provide information in the operating instructions.

2.3. Ground handling

Static load with an angle of attack suitable for the take-off run. This refers to how the device rests on the shoulder. Clearance of tension in centimetres.

2.4. Launch phase

Aerodynamic load with unloaded suspension. What is meant is whether the device tends to pitch-up or cut under at launch. This is checked upon launch. In addition, it is possible to accelerate the device without a suspended pilot on a flat surface in a normal starting position.
NB: It is noted in which trim position the device was launched, as well as other special features.

2.5. Speeds in steady straight flight. Measurements are performed using commercially available airspeed indicators.

2.6. Frame pressure distribution in steady straight flight

Frame wanting to move forward to mean that the device wants to lift its nose. Frame wanting to move back means that the device wants to push its nose down.

2.7. Turning characteristics

All handling is assessed with comments (nervous, coordination, direct or imprecise, etc.).
2.8. Directional stability (yaw)
The directional stability is checked over the entire speed range. If necessary, the test pilot will swing the device up.
2.9. Behaviour when stalling initiation type:
Straight flight, slowly: The frame is slowly pushed forward and held there. Straight flight whip stall: The frame is pushed forward moderately quickly and held there.
These two variants are also flown when turning at different inclinations. Provoked spinning: The test pilot tries to get the device to spin, for example by stalling in a curve with the weight shifted to the outside of the curve.
For all of these flight manoeuvres required under point 1.1.8, it is possible to ‘over test’ a device. This means that the test pilot is responsible for deciding how far he goes here, so no fixed, detailed rules can be established as to how to manoeuvre.
2.10. Other flight conditions tested
It is at the discretion of the test pilots to test other flight conditions, such as sliding flight, wet wing, towing suitability, non-stationary flight states.
2.11. Landing
Information on the landing characteristics can only be given to a limited extent, since it is generally not possible to make enough landings on the test flights. If there is reason to believe that there are peculiarities in the landing behaviour, further flights must be carried out.
3.Evaluation scheme

Behaviour during the test flight		Evaluation min.	Evaluation max.
3.1. Build			
Special features	none	1	
	Exercise required	1-2	Negative
	Force required	1-2	Negative
	Skill required	1-2	Negative
Possibility of incorrect assembly	Largely ruled out	1	
	Not largely ruled out	2	Negative
Possibility of mounting wheels	Using commercially available parts	1	
	Not using commercially available parts	Negative	
3.2. Ground handling			
Static loading	Very tail-heavy	3	Negative
	Slightly tail-heavy	1	2-3
	Neutral	1	
	Slightly top-heavy	1-2	2-3

	Very top-heavy	3	Negative
Tension clearance	No clearance	1	
	Clearance up to 5 cm	1	1-2
	Clearance 5 to 15 cm	1-2	2-3
	Clearance over 15 cm	2-3	3
3.3. Launch phase			
Aerodynamic load	Very tail-heavy	3	Negative
	Slightly tail-heavy	1-2	2-3
	Neutral	1	
	Slightly top-heavy	1-2	2-3
	Very top-heavy	3	Negative
3.4. Speed in steady straight flight			
	V_{max} < 55 km/h	Negative	
	Low V_{min}	1	
	High V_{min}	1-2	Negative
	V_{trim} very close to V_{min}	1-2	Negative
	V_{max} > 80 km/h	1-2	2-3
	V_{max} > 100 km/h	3	
3.5. Frame pressure gradient			
	With increasing speed, moderate to significant increase	1	2
	With increasing speed, moderate to very slight increase	2	3
3.6. Turning characteristics			
Exertion when initiating	High	2	Negative
	Moderate	1	2
	Low	1-2	3
Exertion when exiting	High	2	Negative
	Moderate	1	2
	Low	1	2

Roll time when initiating	Long	2	Negative
	Moderate	1	2
	Short	1-2	3
Roll time when exiting	Long	2	Negative
	Moderate	1	2
	Short	1	2
Inclination with minimal sink	Stays the same	1	
	Increases	2	Negative
	Decreases	1	2
General turn handling	Nervous, difficult to control	3	Negative
	Spongy, indirect, difficult to control	3	Negative
3.7. Directional stability			
	No tendency to yaw	1	
	Hardly any tendency to yaw, easy to control	1-2	2
	High tendency to yaw, easy to control	2	3
	High tendency to yaw, difficult to control	3	Negative
3.8. Behaviour when stalling			
Straight flight, frame slowly pushed forward	Clear warning due to frame pushing back	1	
	Little warning due to frame pushing back	2	3
	No warning due to frame pushing back	3	Negative
	Soft descent over the nose	1	2
	Hard descent with the nose	2-3	Negative
	Gentle descent with a	1-2	2-3

	wing		
	Hard descent with a wing	2-3	Negative
	Slipping backwards and then diving deeply over the nose (risk of tucking)	3	Negative
	Direct transition to spin	3	Negative
Whipstall in straight flight	Soft descent over the nose	1	2
	Hard descent with the nose	1-2	2-3
	Gentle descent with a wing	2-3	Negative
	Hard descent with a wing	2-3	Negative
	Slipping backwards and then diving deeply over the nose (risk of tucking)	3	Negative
	Direct transition to spin	3	Negative
Turning, frame slowly pushed forwards	Clear warning due to frame pushing back	1	
	Little warning due to frame pushing back	1-2	3
	No warning due to frame pushing back	Negative	
	Soft descent over the nose	1	
	Soft descent, inclination remains the same or increases	1	2
	Hard descent with the inner wing	2-3	Negative
	Spin with the inner wing	3	Negative
	Tilt to the outside of the curve and then descend	3	Negative
Whip stall when turning	Soft descent over the	1	

	nose		
	Soft descent, inclination remains the same or increases	1	2
	Hard descent with the inner wing	2-3	Negative
	Spin with the inner wing	2-3	Negative
	Tilt to the outside of the curve and then descend	3	Negative
Provoked spinning	not possible	1	
	A maximum of one revolution is possible	1	2
	Possible for any length of time	2-3	Negative
	Easy to recover	2	
	Difficult to recover	2-3	Negative
	Burden on the pilot slightly reduced when recovering (pitching movement around the transverse axis)	1	2
	Burden on the pilot significantly reduced when recovering	2-3	Negative
	Pilot falls into the device when recovering	Negative	
3.9. Landing			
Stall out moment	Easy to find	1	1-2
	Moderately difficult to find	2	2-3
	Difficult to find	3	
Speed range for unstalling	Large	1	1-2
	Moderate	1-2	2-3
	Small	3	Negative
Exertion when stalling out	Small	1	1-2

	Moderate	1-2	2-3
	Large	3	
3.10. Special features			
Characteristics that lie outside of normal training or normal operating behaviour and that require personal instruction on the equipment for safe operation		E	

4. Failure of the test procedure
The hang glider fails the test procedure if

a)either a part or a component fails as a result of the tests according to 2.1 to 2.11,
b) or any results of tests 2.1. to 2.11. are not classified as 1, 1-2, 2, 2-3 or 3.

5. Classification of flight characteristics
During the test according to 2.1. to 2.11. different aspects of the flight behaviour of the hang glider are measured. The measurement results are classified in accordance with 3.1 to 3.10. During classification, the model is assigned to one of the following classes based on the highest rating number found during the test flights:

1 = for pilots interested in simple flight behaviour, e.g. because they rarely fly.
2 = for pilots who have the training level of Limited Air Driver's Licence for Hang Glider Pilots and who prefer enjoyable flying.
3 = for pilots who have the training level of Unlimited Air Driver's Licence for Hang Gliders Pilots and who fly regularly and at short intervals.

e = Special instruction required, e.g. because of unusual controls.
g = Special harness required, otherwise there is no type examination certificate.

Intermediate values 1-2 and 2-3 are possible.
e and g are additional designations.

6. Test report
The test report must contain the following information:
a) Name and address of the manufacturer
b) Name and address of the person or company presenting the hang glider for inspection if it is not the manufacturer
c) Model designation and other information on the tested hang glider
d) Class of the tested hang glider
e) Results of each test program corresponding to 2.1. to 2.11.
f) Name and address of the testing body
g) Name of the test pilots
h) Unique identification number of the conformity test

The following must be attached to the test report and archived by the testing body:

i) Operating instructions
j) Construction documentation