

MINISTERO DELLA DIFESA

SEGRETERIATO GENERALE DELLA DIFESA E DIREZIONE NAZIONALE DEGLI ARMAMENTI

DIREZIONE degli ARMAMENTI AERONAUTICI e per l'AERONAVIGABILITÀ

1° REPARTO – 3ª DIVISIONE

CAPITOLATO TECNICO N° 133/GLWS/43/2022

EDIZIONE 2022

PER L'ACQUISIZIONE DI

N°2 LANCIATORI A VERRICELLO PER ALIANTI

TECHNICAL SPECIFICATION N° 133/GLWS/43/2022

EDIZIONE 2022

FOR THE PROCUREMENT OF

N°2 GLIDER LAUNCHING WINCH SYSTEMS

INDICE

1. Object and scope of the Technical Specification
2. Documentation
3. Acronimies and abbreviations
4. Description and use
5. Technical pubblication
6. Safety
7. Training
8. Qualification

1. Object and scope of the Technical Specification

This Technical Specification (T.S.) is an integral part of the contract stipulated between the Italian Administration of Defence (A.D.) and the Seller and defines the performance and technical characteristics of the type of glider launcher to winch the sailplane being procured for Italian Air Force.

2. Documentation

2.1. Civil norms

The civil norms recalled in this T.S. are:

- Italian traffic law and its implementing regulations,
- European Regulation n° (EU) 2018/858,
- European Regulation n° (UE) 2019/2144,
- Legislative decree 81/2008 (Workplace health and safety protection)
- European Regulation (CE) n. 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

2.2. Military norms

The military norms recalled in this T.S. are:

- AER.P-2 "Military Aircraft Type Qualification, Qualification and Suitability For Installation".
- TER 70 9905 7701 12 00B000 "Procedure to provide license plate for Armed Force vehicles".

3. Acronimies and abbreviations

A.D. Administration of Defence

T.S. Technical Specification

4. Description and use

The winch system should be as similar as possible to the winch system already in service to the ItAF (Skylaunch Evolution 2 launch premium model P/N SW-EV-XP-66D-ACS - S/N 107) to optimize utilization procedures and reduce in service support costs.

The winch system shall have the possibility to adjust the transmission system for wind and sailplane class category; the winch system shall have all the safety features to ensure easy and reliable operations.

The winch system shall be installed on a trailer qualified to transport the launching system.

4.1. Functional features

The winch system shall be used to launch a sailplane.

The winch system installed on its trailer shall be designed to be moved by road in Italy and in Europe. The winch system installed on its trailer shall be intended for road use.

It must be designed and built with all the essential equipment for its towing in safety conditions and to be moved by road as ruled by the Italian traffic law.

The winch system installed on its trailer must be designed and built to be moved on soft airfields and unpaved roads.

4.2. Design features

The winch system shall have the following design features:

- Designed to the highest possible standards of quality and workmanship, using adequate safety margins regarding the loads and the stresses expected during use and treated with processes and materials for corrosion prevention.
- The winch system shall be designed and manufactured specifically for sailplane winching; it shall have the ability to adjust (for wind and sailplane class category) the output torque and power.

4.2.1. Engine and transmission

The Engine and transmission system shall be compliant with the latest European regulations emissions controls.

The Engine and transmission system should have the following features:

- Engine providing adequate power, in any case not less than 250 KW, with, if necessary to adjust the output RPM and torque, automatic transmission system.
- In case of internal combustion engine, fuel tank capacity not less than 80 liters.
- In case of internal combustion engine, consumption per launch not more than 0,5 liters.
- In case of internal combustion engine, engine oil system and transmission oil system with cooler, thermostatic valve and visual and acoustic indication of overheating condition.
- In case of internal combustion engine, electric system at 12V fed by an alternator whose delivered power shall be not less of 70Ah.

4.2.2. Final drive system

The Final drive system shall have up to 2000m cables in length and an emergency system to cut the cables, easily adjustable and maintainable

The Final drive system should have the following features:

- High tensile steel drum shafts using standard metric bearings seals and fasteners; hardened high-grade steel male and female spline couplings.
- Steel or synthetic cables, easily installable, diameter up to 10mm.
- High strength steel, machined core and fully balanced cable drums.
- Automatic braking system for speed up to 60Km/h, with vented disc brakes and hydraulic twin pot calipers with standard brake pads.
- Pulleys and roller head usable with steel or synthetic cables.
- Drum covers, and engine cover made by All thick gauge sheet steel Panels with corrosion prevention coating/passivation system.

4.2.3. Operator cabin

The Operator cabin shall have

- the roof with opening ventilation hatches,
- an air condition system to maintain a temperature inside the cabin between 18°C and 24°C,

- a ventilation system to prevent demist of all the windows and to recirculate the air inside the cabin,
- athermic glasses.

The Operator cabin should have the following features:

- Fully enclosed steel box cabin, with 2 doors, made by heavy gauge steel panels, all round laminated safety glass bronze tint in doors and rear window, cushioned rubber floor.
- Two high back seats with head rests and arm rests.
- Control console with drive and drum brake levers, throttle levers and mechanisms, cable safety cut levers. Control panel lights, switches, warning buzzers and temperature gauges.

4.2.4.Communication

The winch system should be provided with an integrated VHF radio system and antenna.

4.2.5.Loose equipment and provisions

The The winch system should have the following loose equipment and provisions:

- Storage trays for parachutes, ropes.
- Storage container for parachutes, ropes, chocks.
- 2 sets of glider launching equipment (all pre-assembled with glider rings, quick release connections (including cable end buffers), weak links/housings, shackles, connectors and rings) including (quantities for the single set):
 - 2 parachutes,
 - 2 17m traces,
 - 5 3m strops,
 - 2 sets of spare cable accessory consumables including (quantities for the single set):
 - 10 Brown weak links,
 - 4 Bow shackles,
 - 2 Weak link housings with shackles and bolts,
 - 2 Triangle connections,
 - 2 cable end buffers,
 - 2 quick release rings,
 - 2 quick release hooks.
 - 2 sets of synthetic cable repair components and tools including:
 - cable cutters,
 - inspection pulley,
 - parts case,
 - repair needle.

4.2.6. Trailer/Chassis

The trailer/chassis should have the following design features:

- Shock absorber system with helical compression springs combined with hydraulic shock absorbers; the system shall ensure load capacity in relation to the total gross weight of the

whole assembly; the system shall ensure adequate shock-absorbing power in order to avoid stress to the whole assembly structures, systems and equipment.

- Inertial braking system and an automatic device for releasing the braking action in reverse.
- Parking brake acting on all wheels of the trailer; the trailer/chassis should, however, be equipped with wheel stop chocks for its parking in maximum safety even on slopes.
- Connection between the trailer and the tractor should be made by means of an eye or spherical cavity joint; the system should have a wear indicator and a device for verifying correct coupling with the ball.
- Lighting and visual signaling systems/devices compliant with applicable standards and designed and positioned in such a way as to ensure maximum safety during use.
- 12 volt electrical system with power supply from the tractor obtained with 13-pole electrical power connector.
- Wheels with road tires having service characteristics suitable for the total weight of the whole assembly; the trailer/chassis should be equipped with at least one spare wheel.

5. Technical publication

At least 60 days before the tender for acceptance, a complete set of manuals, one digital version and one hardcopy version, shall be sent to A.D. ; the set of manuals shall include:

- Operators manual,
- Repair and scheduled maintenance manual,
- Illustrated parts catalog manual.

The manuals shall be written in English or in Italian.

6. Safety

The winch system, its parts, its sub-assemblies and accessories shall comply with the Italian regulation on worker safety and environmental safety.

The winch system shall have the following safety features:

- A safety system to cut off the cable in case of emergency;
- Roof top rotating beacon and emergency siren;
- The winch system shall be painted in color to give the best recognition against typical airfield background;
- The winch system chocks shall be painted in yellow.

7. Training

Training on glider launcher shall be provided to Pilots and maintenance personnel of the Italian Air Force. The above training will be released only if the winch system that will be purchased will be a different model than the one already purchased and in use to Italian Air Force.

7.1. Training course types.

7.1.1. Training course for pilots on the glider launcher.

This course includes formal academic instruction on glider launcher systems, systems operation, emergencies and all the necessary activities to provide information and training for the utilisation of the winch system.

- Location: 60° Stormo (Guidonia)
- Number of students: 4

7.1.2. Training course for maintenance technicians on the glider launcher

This course includes formal academic instruction on glider launcher systems, systems operation, emergencies and all the necessary activities to provide information and training for the utilisation and the maintenance of the winch system; the level of the maintenance training is the deepest available.

- Location: 60° Stormo (Guidonia)
- Number of students: 10

7.2. Training programmes

All the education and training programmes shall be approved by A.D. .

The Practical Elements and the Training Tasks been part of the training programmes will be taken at the Italian Air Force Maintenance Organisation, providing specific agreement to be developed between the Italian Air force and the Company delivering the training (as Government Furnished Facilities).

7.3. Training course logistic

All the training courses will be held in English language.

All the training courses will be provided just after the delivery for tender of the first glider launching winch system.

All the comprehensive set of training materials in hard copy and/or electronic format (CBT, books, illustration, student material) will be provided by the Company delivering the training.

In case the Company delivering the training asks to deliver the courses in a different location than (Italy), costs for travel as well as ground transportation, hotels, and meals for students while attending the courses shall be borne by Seller.

8. Qualification

The winch system shall be qualified by the Italian Department of Infrastructure and Transport to allow ItAF to register the plate number in Italy. The winch system shall comply with Italian road traffic regulations and all its implementing regulations.

Furthermore, the winch system shall already have a System Qualification Certificate or shall be qualified by A.D. through the releasing of a System Qualification Certificate.

At least 60 days before the tender for acceptance, the following documentation shall be sent to A.D. to start the qualification process:

- The Certificate of Conformity;
- all the documentation necessary for its registration in accordance with the TER 70 9905 7701 12 00B000 standard "Procedures for the unified registration of vehicles of the Armed Forces";
- all the documentation pursuant to the AER.P-2 norm.

8.1. Certification Approach

The system shall be compliant with the set of requirement described in the following table in order to obtain the Military Type Qualification or equivalent certification document issued by A.D. Airworthiness Office.

To accomplish the tasks associated with the certification process:

- Compliance Matrix in Appendix 1 shall be completed and submitted to A.D. Military Certification Authority for approval;
- Evidence must be given through the appropriate systems documentation in accordance with the criteria outlined in Annex 2.

Par.	Description	Notes (corresponding DAeV BFST requirement)
1.	General	
1.1.	Applicability of the qualification requirements. These qualification requirements apply to the construction, maintenance and operation of launch winches for launching gliders, motor gliders and other aircraft suitable for winch launch. The following requirements to ensure maximum efficiency of winches are minimum requirements that are based on the experience gained in the operation of winches. They refer to winches, which can be powered either by petrol or diesel engines or by electric motors; whatever the case is specified in the notes.	
2.	Performance	
2.1.	General	(2000)
2.1.1.	The operation of the winch shall be possible for an experienced and trained winch operator without extraordinary effort and skill.	
2.2.	Performance, pull and line speed	(2100)
2.2.1.	The performance of the glider winch, the rope tensile force and the rope speed shall be coordinated in such a way that all possible winch launch operations with the aircraft for which the winch is to be approved, can be carried out safely. The winch shall be able to be controlled by the lever so that for each lever position, a continuous and uniform rope force is provided over the entire area of the rope speed. Initial acceleration and pulling power shall be controlled and estimated using the driving lever.	(2105)
2.2.2.	For the launch of glider at the maximum towing mass (specified in its Flight Manual) the following requirements apply:	(2110)
2.2.2.1.	Acceleration. In calm weather the aircraft to be launched shall be controllable around the longitudinal axis within an acceleration distance of 15 m and shall have reached the take-off speed after another 45 m acceleration section. The rolling friction of the landing gear, aerodynamic drag, and the rope friction on the ground shall be considered in analysis/calculation with an increase of 30%. With the use of synthetic ropes the increase can be reduced to 10%.	(2115)
2.2.2.2.	Speed.	(2120)

	The speed of the cable drum shall be such that at rated power of the motor to the drum core diameter, a cable speed in the amount of 1.2 times the take-off speed of the towed aircraft is achieved. When calculating the drum speed is a surcharge of 10% (for operating conditions and weathering) shall be taken into account. For operation in location at more than 1000 m AMSL another surcharge of 5% per thousand meters in altitude is required.	
2.2.2.3.	Power. The power of the winch shall be calculated such that the aircraft with no wind, within the range of minimum and maximum allowed winch speed, reaches a height of release at least 30% of the laid rope length. The required height of release shall allow flying through a safe go-around.	(2125)
2.2.2.4.	Practice suitability. It shall be demonstrated that at all wind speeds, from calm up to the highest permissible wind speed for the use of the winch, the velocity generated and the cable strength are sufficient for the weight of the airplane to be launched. There must be no hazardous conditions for pilots and winch operators.	(2130)
2.2.2.5.	For winches that are not structurally able to provide parts of the evidence required for all aircraft, the operating limitations must be entered in the certificate of airworthiness, or the entry during the inspection to check.	(2135)
2.3.	Operating and monitoring	(2200)
2.3.1.	The winch operator shall be able to control and monitor the cable force and line speed during operation. In particular, winch operation shall enable soft and smooth take-off without any special effort or exceptional skill. The use of a rope dynamometer is strongly recommended.	(2205)
2.4.	Cutting device (guillotine)	(2300)
2.4.1.	The cutting device, its operation and release mechanism shall ensure that the cable connection to the aircraft can be separated during each phase of the launch quickly and safely. When the release process is initiated by an electric or pneumatic actuator, a redundant trigger means should be provided. In the absence of a redundant triggering mechanism, the function of the trigger shall be tested every 3 months by means of a cut test. The implementation and outcome of the cut test shall be recorded in the Winch LogBook	(2305)
2.5.	Vibrations	(2400)
2.5.1.	Under all possible rope speeds and rope directions no hazardous vibrations for the aircraft or the winch shall occur. The smooth operation of the winch must not be hindered by vibrations.	(2405)
2.6.	Visibility	(2500)
2.6.1.	The view of the winch operator toward the launching aircraft must not be adversely affected by the structures protecting the operator against winch wire breaks or against adverse weather conditions.	(2505) (modified)

	The observation of the aircraft must be continuously possible throughout the launch process.	
2.7.	Cooling	(2600)
2.7.1.	The cooling system of the winch should be such that even in the worst possible start condition at maximum towing mass of the aircraft taking off and in hot weather, the maximum operating temperature of the engine, transmission and / or drive battery is not exceeded.	(2605)
2.8.	RPM	(2700)
2.8.1.	When using the winch inadmissible speeds should be avoided. This also applies to breakage exercises with sudden unhooking at large cable force (prevention of overturn). The use of a speed limiter for this case is strongly recommended.	(2705)
2.9.	Safeguarding against faulty launch	(2800)
2.9.1.	Make sure that regardless of the type of drive the winch launch can only be put into operation when a risk of the towed aircraft and third parties are excluded and a safe launch is possible with the available power reserves.	(2805)
2.9.2.	In winches equipped with a frictional coupling between the drive and the cable retraction device (internal combustion engines) it shall be ensured that the drive motor can only be started if there is no positive connection to the cable drum. Electric winches must be secured with a suitable device to prevent accidental towing.	(2810)
2.9.3.	When using electrical winches with battery backup in the link it has to be ensured that the drag operation can be enabled only when the batteries are charged after switching to at least 75%. A corresponding battery voltage indicator must provide information on the battery state of charge and the voltage stability even during towing. Falls below the absolute minimum limit voltage re tow release may after reaching at least 75% by weight charge state be only possible after a safety shutdown. On the battery voltage display a minimum operating voltage is to be marked, which is above the minimum voltage limit. Falls below the minimum voltage limit of the drag operation is to be interrupted by the winch operator until a sufficient recharge has taken place (reaching the selected final charge voltage).	(2815) (Applicable to electrical winches)
3.	Strength	
3.1.	Loads	(3000)
3.1.1.	All parts shall be designed in accordance with the rules of general engineering. The safety of 1.5 against deformation should be verified for all structural elements, the drive rope, as well as the rope drums. Here especially the compressive stress of the cable drums shall be verified by the number of wraps when using long ropes. The drums shall be so arranged and protected so that with a possibly break there is no risk of injury to the operator.	(3005)
3.1.2.	Sufficient strength for the case of maximum allowable cable and ground forces in unfavourable directions (see para.4.5.1.2) shall be verified by testing.	(3010)

3.1.3.	When using modules from the motor vehicle there is a sufficient proof of strength from the comparison of operating conditions.	(3015)
3.1.4.	If parts or components are taken from qualified winches, proof of equal or lesser loads during operation is sufficient.	(3020)
3.2.	Stability	(3100)
3.2.1.	For the launch process a sufficient stability at permissible cable force (breaking point) and unfavourable cable direction shall be demonstrated. (Assuming rope 90° above the Winch). The safety against lifting or tilting (Assuming rope 90° above the Winch) should at least be = 1,5.	(3105)
3.3.	Cable protection	(3200)
3.3.1.	The allowable size of the rope parachute is governed by the SBO (or equivalent spec)	(3205)
3.3.2.	Depending on the nature of the transmission, the fracture strength of the entire suspension lines must be at least as high as that of the winch cable.	(3210)
3.3.3.	An electrically conductive connection between the aircraft and winch over the cable shield shall not exist.	(3215)
4.	Design and construction	
4.1.	Materials and manufacturing processes	(4000)
4.1.1.	Suitability and durability of materials used in winch construction must be proven on the basis of calculations, experience or tests (e.g. EN, DIN). When using assemblies modules the standard mechanical engineering safety factor $F = 1.5$ shall be used.	(4005)
4.1.2.	The production method employed must give proper connections.	(4010)
4.1.3.	The electrical equipment of the winch must meet the standards for electrical wiring and the standards in automotive engineering	(4015)
4.1.4.	Fuel lines and electrical wiring installation shall be so that a fire hazard is excluded.	(4020)
4.1.5.	In the production of the winch, the accident prevention regulations and the dangerous goods regulations must be adhered to	(4025)
4.2.	Protection of components	(4100)
4.2.1.	All components of the winch must be adequately protected appropriately against excessive wear and corrosion phenomena.	(4105)
4.2.2.	All moving or hot parts of the winch shall be protected by appropriate devices so that injuries are excluded.	(4110)
4.2.3.	with electric drive winds the required shock protection (VDE 0100) is to ensure against live components and to indicate danger points particularly.	(4115) (electric winch)
4.2.4.	The operator room of the winch must be protected by devices such that the operator is protected from injury against a falling rope, even with a breakage. Protective frame can be equipped with wave gratings. The mesh size shall not be less than 40 x 40 mm, to avoid	(4120)

	visual obstructions. For fixed cabins a laminated or polycarbonate glazing is permitted. The use of Plexiglas is not allowed.	
4.2.5.	The winch must be secured against lightning and atmospheric electricity charges by grounding. The ground anchors and cables shall be designed in accordance with established electrical engineering.	(4125)
4.2.6.	Electric winches are starting to ground instead of the ground anchor through the protective conductor of the power cord. If an electric glider winch operated on a mobile generator, so this must be grounded with an appropriate ground anchors.	(4130) (electric winch)
4.3.	Cutting device (guillotine). The cutting device must be able to fulfil its function under all operating conditions. The average power should be such that at least three pieces of rope to use for the cable can be cut with a cap with a smooth cut. The design of the cutting device is matched to the cable version used.	(4200)
4.4.	Winch Ropes	(4300)
4.4.1.	The ultimate strength of a brand-new winch rope, including elements of the cable equipment for SBO (or equivalent Spec), shall be at least 1.5 times the maximum permissible towing mass of the aircraft.	(4305)
4.4.2.	Winch plastic ropes shall be made of UV resistant plastic fibre.	(4310)
4.4.3.	New developments shall have no less favourable properties than the Dyneema fibres used commonly.	(4315)
4.4.4.	Steel ropes may be used only if they meet the strength requirements of Section 4305 as an approved minimum standard.	(4320)
4.4.5.	The proof of the cable properties of the rope is determined by the manufacturer or supplier specification, which is included in the winch documents. The minimum tensile strength, the construction and suitability as a winch cable should result from it.	(4325)
4.4.6.	Cable connections may be made by shivers or clamp connections (Nicopress or Talurit) at steel ropes only with the crimping tools approved for the respective connection. Clamp connections are to be checked daily and replaced as needed. Cable connections on plastic parts are made in accordance with the splice example of the cable manufacturer.	(4330)
4.4.7.	The intermediate links, breaking point and arrangement of the rope must meet the requirements of SBO (or equivalent Spec).	(4335) (adapted)
4.5.	Rope guide and rope guiding device	(4400)
4.5.1.	Rope guide	(4405)
4.5.1.1.	The rope guide must be designed so that the winch cable is guided safely and reliably under all possible operating forces, rope speed and rope angles.	(4410)
4.5.1.2.	For the cable angle the following limits apply: Top: $\alpha = + 90^\circ$ (rope vertically upwards)	(4415)

	Down: $\alpha = -20^\circ$... at a lateral angle $\beta = 0^\circ$ Lateral: $\beta = 30^\circ$ to either side ...in the entire vertical angle range $\alpha = -20^\circ$ to $+90^\circ$	
4.5.1.3.	Before, over, under and near the rope guide no components may be located, which may hinder the winch rope in his movements or get stuck with the rope. Rollers which serve to guide or deflection of the rope must be adapted or be arranged in that the cable also in the most unfavourable direction of the cable cannot slip out of the rollers. All bearings shall be protected against contamination. Cable guide rollers shall not have sharp edges that can damage the cable.	(4420)
4.5.1.4.	Cable guide rollers should be modelled in outer diameter and material selection, taking into account the rope diameter and the wrap on proven knowledge. As a guide, the usual mechanical engineering factor applies: 18 times the rope diameter as the minimum bend and wheel radius.	(4425)
4.5.1.5.	The surface of a new pulley must be harder than the material of the winch rope. Sheaves with distinct rope marks should be replaced.	(4430)
4.5.2.	Rope guiding	(4435)
4.5.2.1.	If proper self-coils is not guaranteed an automatic device for winding the rope must be installed on the drum. In the usage of rope guiding, attention has to be paid to freedom of movement of the rope, as well as low wear of rope guide and winch rope. Note: A winding device is required when the ratio of drum width and the distance between the center of the drum and azimuth guide rollers is less than 1:18.	(4440)
4.5.2.2.	Cable drum	(4445)
4.5.2.3.	Cable drums must be built so that the winch cable length can be accommodated. It is recommended that appropriate reserves (> 20%) are provided.	(4450)
4.5.2.4.	The cable drum shall be static and if necessary also dynamically balanced.	(4455)
4.5.2.5.	In winches with more than one cable drum it shall be ensured that only one drum may be engaged. Each winch should have a monitoring device for the engaged cable drum. The facility should visually and audibly indicate which drum is positively connected. This applies „mutatis mutandis“ to winches with electric direct drive.	(4460)
4.5.2.6.	It is important to ensure that the drum speed can adjust uneven speeds of the running rope delay as possible without requiring a constant attention of the winch operator	(4465)
4.5.2.7.	Remarks that are to be considered in the winch Guide: Core diameter and width of the drum must be chosen so that the usable speed range, the power, traction and line speed requirements can be met. The permissible cable diameter and the maximum cable length are taken into account. When dealing with	(4470)

	ropes and drums, manufacturers' instructions must be observed (e.g. loose winding during long periods of downtime).	
4.6.	Drive Systems	(4500)
4.6.1.	Combustion engines	(4505)
4.6.1.1.	Combustion engines in winches must comply with a proven standard in the automotive or mechanical work and be elastically mounted. The maximum power shall not be less than 250 KW for Glider Aircraft Take-off winch.	(4510)
4.6.1.2.	A smooth power transmission from the drive motor to the cable drum should be ensured by a hydraulic device (liquid transmission or torque converter). Automatic transmissions shall be adapted so that dangerous shift shocks are avoided during start-up.	(4515)
4.6.1.3.	In the fuel supply an easy-to-controlling fine filter shall be installed with sight glass. The tank cover shall be lockable	(4517)
4.6.2.	Electric drives	(4520) (electric winch)
4.6.2.1.	The maximum output of the engine should not be less than 180 KW for electric winches. The control system must include an appropriate course for a harmonious drag torque limiter with a influenced by the winch operator set point.	(4525) (electric winch)
4.6.2.2.	Battery charging facilities and centers are to be arranged so that they are separated at least fire resistant by other operating areas (eg warehouses). These are the standards of the DIN VDE 0100 and DIN VDE 0510 must be observed.	(4530) (electric winch)
4.6.2.3.	A temperature monitoring device shall exist for each component (in particular the control) for which a maximum allowable temperature limit is specified. The winch shall be designed so that the dragging operation can be stopped without start interruption before reaching the maximum value. After that, the drive can be switched again until the corresponding temperature is fallen so far that the next tow can be carried out safely.	(4535)
4.6.2.4.	The safety instructions of the manufacturer of the drive systems are considered and incorporated into the relevant operating and maintenance manual.	(4540)
4.6.2.5.	For all drive shafts it must be ruled out that vibrations caused by imbalances occur. Where appropriate, the shafts must be balanced	(4550)
4.7.	Operation of the Winch	(4600)
4.7.1.	Seat of the winch operator and instructor	(4605)
4.7.1.1.	The seat of the winch operator and instructor is to be arranged so that the people are protected from dangerous items that can strike from outside (item 4120). The seat shall be physically connected with the winch and designed so that early fatigue is avoided. Controls for the launch of aircraft and for the cutting device shall always be accessible from the seat of the instructor.	(4610)
4.7.1.2.	The seats shall be reachable without risk. Ladders and steps must be made in accordance with the accident prevention regulations	(4615) (adapted)

4.7.1.3.	The view of the launch aircraft must not be unduly hampered.	(4620)
4.7.1.4.	Protective frame can be equipped with wave gratings. The mesh size shall not be less than 40 x 40 mm, to avoid visual obstructions. For fixed cabins a laminated or polycarbonate glazing is permitted.	(4625)
4.7.2.	Control lever	(4630)
4.7.2.1.	All controls and handles shall be arranged within reach of the winch operator. They must be easy to operate and shall be marked in accordance with the intended use. The lever or handle for actuating the cutting device shall be red marked and shall stand out from its surroundings in colour considerably. The triggering of the cutting device shall be done by hand operation. The operation of the cutting device can be carried electromechanical, if it is guaranteed by a note in the manual that the function before each use of the winch is checked.	(4635)
4.7.2.2.	All actuators shall be designed so that an automatic, unwanted change in any operating condition is possible. If necessary, must be prevented through specific means, for example switching positions of translation transmission that are not foreseen for winch launch.	(4640)
4.8.	Noise	(4700)
4.8.1.	The noise level at maximum power must ensure that on the winch driver's seat unimpeded bidirectional voice connection to the operations manager during start-up is available at all times.	(4705)
4.8.2.	Notwithstanding this for environmental reasons the lowest possible overall noise level should be sought.	(4710)
5.	Equipment	
5.1.	Installation and performance	(5000)
5.1.1.	Each piece of equipment that is necessary for the safe operation of the glider winch must be installed so that it meets the intended job correctly and properly. The proper function must not be affected by heavy rain, high humidity, and temperature extremes.	(5005)
5.2.	Monitoring and Display Devices	(5100)
5.2.1.	In all winches at least one instrument to read the rope speed and engine speed shall be installed. As an alternative to cable speed display, a display device for the drum speed may be used. Furthermore, each winch must be equipped with an hour meter (alternatively start or odometer) and a horn. A display of current power cable or telemetry airspeed is strongly recommended.	(5105)
5.2.2.	In addition, in winches with internal combustion engines the following shall be installed: - Fuel quantity indicator; - pressure gauge or warning indicator for engine and hydraulic drive; - Device for monitoring the operating temperature of the engine and transmission hydraulics; - electrical loading control.	(5110)

5.2.3.	In addition, in winches with electric drive the following shall be installed: • Battery voltage monitoring; • Temperature monitoring; • Indicating fault memory for intrusive noise.	(5115) applicable to electric winch
5.2.4.	Identification of operational areas Normal (permissible) operating ranges shall be marked on the display devices by green arcs; risk areas by yellow bows and limits by red dashes or spaces. In addition, the identification of operational areas by colour markings is recommended on the throttle.	(5120)
5.3.	Lights, paint, other	(5200)
5.3.1.	Signal light Each winch shall be equipped with one or more yellow signal lights (flashing or rotating lights) that are visible from all sides and not obscured.	(5205)
5.3.2.	In passive mode, the signal light must be turned on automatically at the latest with the engagement of the cable drum or loading the engine gearbox.	(5210)
5.3.3.	It may be (e.g. possibility of automatic commissioning further, remote signal lights) required by the provisions of the terrain approval, set up new interface for external signal lamps. These interfaces must be designed so that they are automatically activated as the signal light on the winch. The winch operator should the function of the external signal lamps are indicated by a warning light.	(5215)
5.3.4.	Coat of paint. The winch shall be provided with an eye-catching paint. This is to ensure that the winch is clearly seen as an obstacle from all sides and from above . Contrasting colours shall be applied. Recommended colour combinations are: signal white (RAL 9003) signal red (RAL 3001) signal white (RAL 9003) pure orange (RAL 2004) black - signal yellow (RAL 1003) to sulfur-yellow (RAL 1016). The RAL colours represent a recommendation and guidance. Variations are possible.	(5220)
5.3.5.	Flag. The registration number, with a font size of at least 10 cm, shall be in visible manner on the winch outside.	(5225)
6.	Documents.	
6.1.	Documents.	(6000)

6.1.1.	To operate the winch the following documents shall be prepared and shall be kept updated at all times: • Winch Manual; • Operating instructions; • Maintenance instructions; • Winch Logbook; • Syllabus for winch operator education and training	(6005)
6.2.	Winch Manual	(6100)
6.2.1.	The winch manual contains the technical data/ specifications of the winch, its components and the operating limits.	(6105)
6.2.2.	The list of features includes the construction of the winch, the technical design and implemented changes to industrial products. It includes at least: • a 3-view drawing of the winch with dimensions; • the description of the chassis, cab drivers and wind-stand; • the description of the drive concept (driving and wind power): ○ Engine (s) with technical data and characteristic (s); ○ Interpretation of switching, distribution and synchronization gear (s); ○ Limitations; ○ Cooling; ○ Resources; the description of the winch drive: • Cable drums, drum axes and their drive; • Approved winch cables; • Cable guide rollers and azimuth; • Cutting device; the description of the equipment (if any): • Fuel System; • Electrical system; • Hydraulic system; • Hydrostatic system; • Pneumatic system; Annexes to the operation manual are: • Drawings and specifications; • Safety instructions.	(6110)
6.2.3.	Appendix 1 drawings and specifications. Appendix 1 contains drawings (diagrams, flow charts) for facilities and systems of the glider winch, unless they are inserted under 6.2.2.	(6115)
6.2.4.	Appendix 2 Safety Instructions. Appendix 2 summarizes the provisions for the safe commissioning, the operation and handling of equipment and components. It is recommended to prepare the safety instructions in the form of a checklist.	(6120)

6.2.5.	Appendix 3 Operating Limitations. The following operating limitations are set according to the results of the calculations and tests of the winch: • The maximum permissible mass of the towed aircraft; • The maximum winch rope length as a function of the rope and drum diameter, and the drum flange height (The filling ratio shall be highest 60% of the maximum fill); • Type and design of the winch line, including any limitations in diameter; • The minimum tensile strength of the winch rope; • Use of the energy source (fuel, operating voltage); • Further construction-related limitations specified by the manufacturer; • End date of the inspection.	(6125)
6.3.	Operating Instructions	(6200)
6.3.1.	The applicant shall prepare an operating instruction containing the necessary information for maintaining full serviceability.	(6205)
6.3.2.	The operating instructions shall contain at least the following information: • Limitations; • Type and location of labels and markings; • Assembly, and preparation and putting into service; • Controls required before and during operation; • procedure for pulling out the winch cables; • Start-up; • Hazardous conditions / emergency procedures; Instructions after flight operations; • Provisions for charging the batteries of electric winches; • Short Checklist for the winch operator.	(6210)
6.4.	Maintenance Instructions	(6300)
6.4.1.	The maintenance instructions shall contain at least the following: • A brief description of the modules with instructions for installation and removal (e.g. cutting device, hydraulic and electrical systems, fuel system, rope harness, etc.), unless special skills are required; • Service instructions of Engine Manufacturers (these can be taken as notes); • Information on servicing the different loaded systems as a function of time periods or starting numbers; • A method for measuring and filling of operating supplies and their lifetimes; • Wear Parts list with indication of source of supply; • Where necessary, a list of the components with life time limitation; • Recommendation for cleaning and maintenance.	(6305)
6.4.2.	Each service shall be documented in the the winch manual.	(6310)

6.4.3.	Winch LogBook. Any modification, maintenance and inspection shall be documented with date and description of the work carried out in the winch logbook and signed by the responsible person.	(6400)
6.4.4.	In the Winch Logbook is recorded information about the use and operation of the winch.	(6405)
6.4.5.	The winch Logbook must contain at least the following items: • Date; • Name of the winch operator; • Confirmation of the performance of the daily inspection prior to flight operations; • Number of performed towing; • Defects and their elimination. • Status of the operating hours, start and km counter at the beginning and end of the use of winches.	(6410)

	Compliance Matrix	
Appendix 1	Appendix 1 provides the compliance matrix template that shall be used to summarize the status compliance of the winch to the specification requirements in the verification process.	
Appendix 2	Appendix 2 provides the list and description of the Means of Compliance (MoC) which can be used in the verification process	

Appendix 1: Compliance Matrix

The following compliance matrix template shall be used to summarize the status compliance of the winch to the specification requirements:

Spec. Requirement reference	Spec. Requirement description	Means of Compliance (MoC) (Note1)	Means of Evidence Ref.	Status of compliance	Notes

Appendix 2: The following Means of Compliance (MoC) codes can be used in the verification process:

Means of Compliance (MoC)	Description	Code
Statement of Compliance	Declaration certifying compliance with a requirement	0

Design	Description of the architecture and of the characteristics of a system that ensures compliance with the requirement	1
Analysis/Calculation	Demonstration of compliance with the requirement by analytical means (e.g. stress analysis, thermal analysis, analysis supporting the interpretation of an experimental test, etc). DAAA requires the usage of analytical tools that are commonly used and internationally recognized, or created, validated and approved before usage	2
Safety Analysis	Demonstration of requirement compliance by means of qualitative (e.g. Zonal Analysis, FMECA) or quantitative (Fault Tree Analysis) safety analysis.	3
Lab tests / Rig Tests	Demonstration of requirement compliance by means of experimental tests carried out in rigs/laboratories on a test configuration item that is representative of the design configuration undergoing the qualification process. The applicant shall demonstrate and declare the representativeness of the test configuration item used in the test procedure.	4
Ground Test on Aircraft	Demonstration of requirement compliance by means of experimental tests carried out on ground on the prototype aircraft on a configuration item that is representative of the design configuration undergoing the qualification process. The applicant shall demonstrate and declare the representativeness of the test configuration item used in the test procedure. DAAA may evaluate the test procedure. In the specific case of winch, this MoC is applicable to tests carried out on the ground with the glider for which serviceability/compatibility is to be demonstrated.	5
In flight test	Demonstration of requirement compliance by means of experimental flight tests carried out on the prototype aircraft on a configuration item that is representative of the design configuration undergoing the qualification process. The applicant shall demonstrate and declare the representativeness of the test configuration item used in the test procedure. DAAA may evaluate the test procedure. In the specific case of winch, this MoC is applicable to launch operation tests carried out with the glider for which serviceability/compatibility is to be demonstrated	6
Inspection	Demonstration of requirement compliance by examination of the drawings and physical inspections of the installation on the equipment.	7
Simulation	Demonstration of requirement compliance by simulation, to be conducted either at the computer or using lab equipment. The applicant shall demonstrate and formally declare the representativeness of the simulator with respect to the requirement to be verified. DAAA may evaluate the internal validation process of the simulator used for the test.	8
Equipment Declaration of Design and Performance (DDP)	Demonstration of requirement compliance through the evidence of fulfilling the requirement of the relevant Technical Specification of a lower level equipment installed on the system undergoing the qualification process. Using this MoC means transferring the compliance verification from the equipment level to the system	9

	level, in other words, once the equipment fulfils the requirements of its Technical Specification, the specific system requirements for which this MoC is used are automatically fulfilled. DAAA requires in any case that the applicant expands the MoC in the compliance matrix when the qualification activities are closed, indicating in parenthesis also the MoCs relative to the verification activities requested for the sub-supplier for issuing the equipment DDP. For example, MoC 9 (2,4) means that the specific system requirement was demonstrated through checks at equipment level (MoC 9) which includes analyses (MoC 2) and lab tests (MoC 4).	
Similarity	Demonstration of requirement compliance by similarity, with regard to specific requirements of the design configuration undergoing the qualification process with another configuration already qualified. The applicant shall demonstrate and formally declare the representativeness, limited to the specific requirement, of the already qualified similar system with the one undergoing the qualification process, highlighting both the similarities and the differences and declaring the applicability to the new variant of the technical documentation issued for the already qualified variant. If the similar system to be qualified by DAAA already has a certification issued by other government bodies or certification authorities, DAAA will consider the possibility of adopting the certification, considering both the certification basis and the processes and the regulations of the certifying Body/Authority comparing them with the requirements of the standard. DAAA may also request the technical evidence produced in support of the qualification of the similar system.	10