ASW 28

The ASW 28 is Schleicher's new high performance glider for the FAI-Standard Class incorporating the very latest technology, both in wing section and boundary layer control, and using the most advanced carbon, Aramid and polyethylene fibres in its construction. Moreover, this glider will be type-certified for cloud flying and semi-aerobatics.

Current modern design theory leads us to examine the climb portion of the performance as much as the run part. This leads to a sailplane which will climb a little better and run a little better than current design.
The ASW 28 will be a little lighter, more crashworthy and safer. Taken all together, this is a large step forward for AS.

A more detailed view of the ASW 28 shows the roomy safety cockpit offers all modern comforts and ease of operation, even for tall pilots. The cockpit, designed according to latest research results in the field of safety and accident protection, includes an (optional) glider rescue system. The rubber-shock-mounted, retractable landing gear with „crush zone" in the steel struts for overload and hydraulic disc brake, the adjustable back rest, the upwards hinging instrument panel and the speed trim, are only some of the many available conveniences.

The high performance wing airfoil with boundary layer control by means of turbulator holes or suitable trip devices like ZZ-tape, combined with an outstanding construction quality, imparts to the ASW 28 flight performances that are superior to those of the former „Racing Class" gliders. Due to the high construction quality of the wing and of the control surface gap sealing it has been possible to build a production wing with a laminar airflow of 85% along the profile underside. The sophisticated control linkage system gives high manoeuvrability and docile flight characteristics, even in landing approach.

The low-drag airfoil of the T-tail (elevator with stabiliser) was developed by the Delft University of Technology. Elevator and rudder are new-technology sandwiches of Aramid fibre / plastics with a hard foam core. All control surface hinges of the wing and of the horizontal tail unit use needle bearings or low-maintenance plastic bearings. The actuating levers and bellcranks are fitted with ball bearings or precise uniball-joints. While the desirable feedback from the air loads at the control surfaces can still just be felt at the stick, the hand forces for the pilot are comfortable, - a pre-condition for non-fatiguing flying.

A new FAI Standard Class Glider

The ASW 28 is a new high performance glider for the FAI-Standard-Class, incorporating the latest technology both in aerodynamic design and most advanced fibre hybrid technology, a clever mix of carbon, Aramid (Kevlar), polyethylene and glass fibres.

Successor of the ASW 19 and the ASW 24

There has been customer pressure for Schleicher to build a new Standard Class glider which would exceed current gliders in performance by combining the proven high speed performance with the outstanding climbing qualities and handling as has been achieved with the ASW 27 in turbulent thermals.
We took advantage of the well proven qualities of the upper side airfoil of the ASW sailplanes line in Open- and Racing Class, which have demonstrated continuous improvement in providing higher effective lift in circling flight - also in turbulent thermals. The larger camber similar to the ASW 27 airfoil is distinctly visible at the ASW 28 wing and illustrates this characteristic. Due to high construction quality of the wing and control surface gap sealing, it has been possible to build a production wing with a laminar airflow of 85% along the profile underside.
In addition aerodynamic research was intensively continued. Thus Schleicher accumulated important results with the design of winglets that are a standard feature with the ASW 28. For the wing tip the airfoil was modified in view of lower Reynolds-numbers and for the wing-to-fuselage transition the airfoil was upgraded.

Uncompromising

The ASW 28 has been designed uncompromisingly for highest flight performance and characteristics in the 15 m span configuration as we deliberately chose not to give any compromise to a possible span increase or engine retrofitting option.
Thus, owing to the systematic specification as a high performance glider with 15 m span, the wing has a high aspect ratio. Also an optimum wing plan form including the special requirements for a 0,5 meter high winglet could be verified.
A wing span extension to 18m, however, is possible when the outer wing spar is reinforced and the outboard wing area is modified.

New Fibre Composite Technology

In the field of fibre composite materials, great advances have taken place. This means that very strong, yet very lightweight structures can be made with high energy absorption. By using „hybrid (mixed) laminates“ of these new synthetic fibres together with carbon fibres it is possible to further improve the crashworthiness of the ASW 28 cockpit but reduce the structural weight.

Standard Features

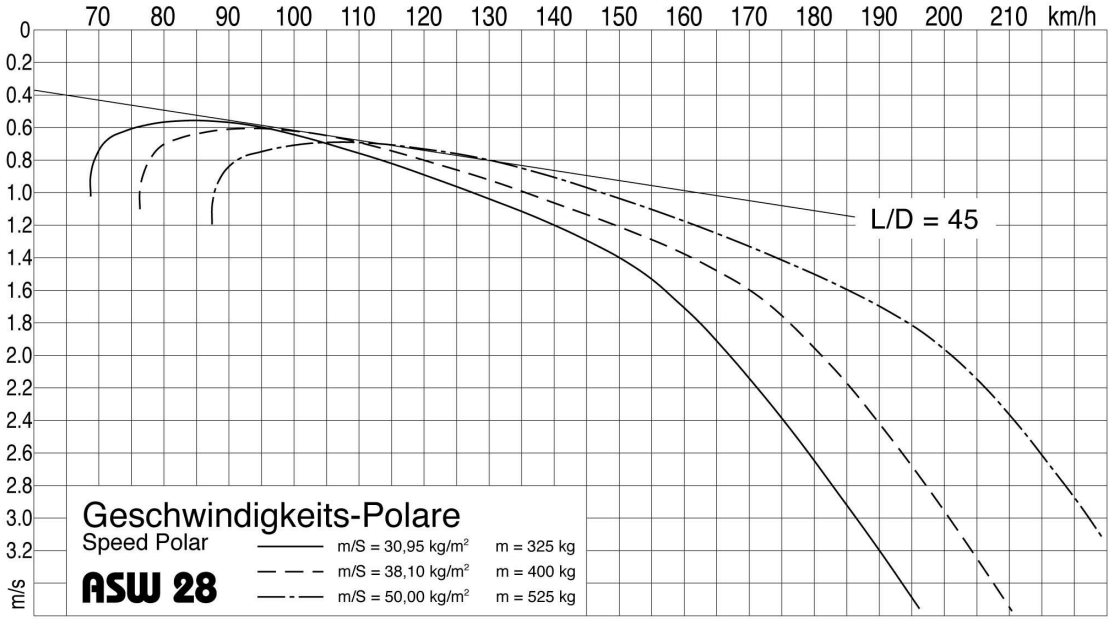
- Sprung landing gear with large 5" wheel and 10 cm normal stroke, for overload using crush zone of struts 14 cm
- Hydraulic disc brake
- Tail wheel with fender
- Instrument panel hinging upwards with the canopy
- Nose and C.G. tow release coupling
- Adjustable back rest with integrated head rest
- Safety harness with quick-release centre lock
- Battery storage space in the baggage compartment and in the fin
- 3-way-nozzle (multi-probe) in the fin.
- Directional air vent additionally to front canopy de-mist

Optional Glider Rescue System

As an option the ASW 28 can be fitted with a ballistic parachute system. There are two different systems under development. Streifeneder and the Russian firm MVEN are working with a mortar, which pushes the big parachute free from the sailplane. A second system uses a rocket to pull the rescue chute out of the sailplane. The removal of the conventional parachute from the cockpit means greater comfort for the taller pilot with the cockpit tightly tailored around him. An upholstered bucket seat and back rest with side support and an integrated head rest (similar to racing cars) will further improve safety and comfort.

The Polar

Given a wing area of 10,5 m² and a max. all-up weight of 525 kg, water-ballast included, it is possible to vary the wing loading in the range between about 30 kg/m² (75 kg cockpit load) and 50 kg/m² (with full water ballast on board).
To calculate theoretically the future performance of this new glider, the known, proven figures of the ASW 24 performance were used as a basis. By using computers, figures resulting from tests of individual components were exchanged with those of the ASW 28. The results were fantastic. And as all wing airfoils have been designed by the same computer programs and measured in the same wind tunnel, these results are quite accurate.



DESIGN SPECIFICATION and TECHNICAL DATA

Glider, higher mid wing configuration with T-tail. Automatic connections for all controls (aileron, airbrakes, and elevator) and water ballast actuation.

FUSELAGE

Monocoque fuselage of fibre hybrid composite structure (CRP, Aramid, Polyethylene and GRP) with roomy safety cockpit. In flight adjustable rudder pedals. TOST C.G. combi tow release coupling, covered in flight by the landing gear doors, and TOST aero tow release coupling in the fuselage nose. Rubber-shock mounted, retractable landing gear, using a large 5.00-5 wheel, installed in a box that is sealed and airtight from the fuselage interior. Drag strut with designed weak link in case of overload. Hydraulic disc brake that is connected to the airbrake lever. Pneumatic tail wheel 210 x 65. Optimum cockpit ventilation through intake in the fuselage nose with continuously adjustable outlets, one on the front canopy frame and the other through a directionally adjustable air nozzle on the right cockpit wall.

CANOPY

The full-vision, gas-spring assisted canopy (with sliding window on the left side) is hinged at the front. Tongue and groove type sealing for the canopy frame and a specially shaped rear frame section for the purpose of a safe emergency jettison.

INSTRUMENT PANEL

The instrument panel is made to hinge upwards with the canopy; even when the canopy is open, the instruments are still covered. When the canopy emergency jettison system is operated, the canopy together with the instrument panel coaming can be removed and the instruments are easily accessible.

WING

Cantilever, two-part quadruple-tapered wing planform with latest laminar airfoil; when flown high speed the laminar airflow at the wing underside goes back to the aileron gaps. Upon specific directions by SCHLEICHER, the airfoil was developed well-aimed at the ASW 28 design at the faculty of Aerospace Engineering of the TU Delft. Tolerance to small scale micro-turbulence was regarded. Planform and airfoil of the outer wing have been modified for detachable winglets using the latest airfoil design. The wing surface is a sandwich of carbon fibre / plastics with a hard foam core; wing spars with carbon flanges. Double-paneled airbrakes (of metal and CFRP) on the wing upper surface, in sealed compartments with spring cover plates. Push rods sealed by bellows. The wing assembly is straightforward with a conventional tongue and fork spar extension secured with cylindrical main pins. Extremely light-weight wing. Control surface gaps on the wing upper and under side sealed by plastic tape. Turbulators on the under side and in front of the ailerons.

WATER BALLAST

Water ballast in the wing leading edge is filled into so called „wet surface tanks“, separated in two compartments per wing for the purpose of facilitating take offs with partial water ballast. The mechanic valve actuators are connected automatically when rigging the sailplane. Owing to a special design of the spar and of the leading edge web, we achieved a small but favourable C.G. shift due to water load (therefore, a water tank in the fin is hardly necessary). However for fine tuning C.G. a fin water ballast tank is available as an option as well as for compensating different cockpit loads. To avoid water damage to the structure, extra inner linings of the tanks are installed as well as ventilation to the winglet area. Filling is done through two faired drain outlets on the wing underside left and right of the fuselage. Ballast capacity is approx. 2 x 100 kg.

TAILPLANE

T-tail (elevator with stabiliser) with low-drag airfoil, developed by the TU Delft. Control surface gaps on both sides sealed with plastic tape; and turbulators on both sides in front of the control surface hinge line. Stabiliser in CRP-sandwich-construction. Vertical fin in GRP-Aramid-construction because of the VHF-antenna radiation. Elevator and rudder are new-technology sandwiches of Aramid fibre / plastics with a hard foam core; ailerons are of CRP monocoque construction that gives extremely light and stiff control surfaces.

CONTROL CIRCUITS AND FITTINGS

Aileron, elevator and airbrakes are actuated by push rods running in anti-noise ball-bearings, and use automatic connections at the assembly joints. The rudder is actuated by stainless steel cables which run in Polyamid tubing. Infinitely variable trim, lockable by a stick-mounted key. All control surface hinges of the wing and of the horizontal tail unit use needle bearings or low-maintenance plastic bearings. The actuating levers and bellcranks are fitted with ball bearings and precise uniball-joints. This provides the lowest possible actuating forces for the pilot and guarantees comfortable, non-fatiguing flying. The fittings are welded steel and milled or turned aluminium alloy respectively.

ASW 28

BOARD EQUIPMENT AND ACCESSORIES

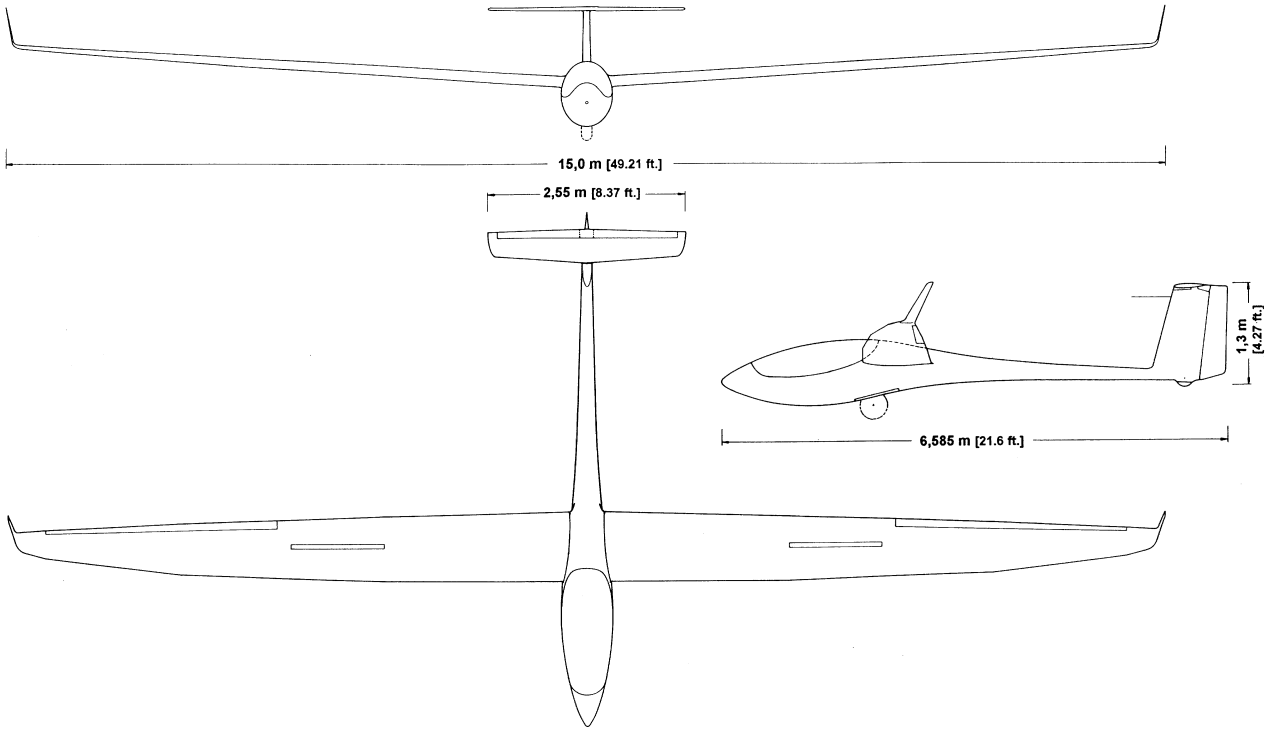
Static pressure vents (for the A.S.I.) in the fuselage tail boom left and right. Pitot, static pressure and TE-compensation through 3-way-nozzle (multi-probe) in the fin. VHF antenna in the fin.

OPTIONAL RESCUE SYSTEM

For the ASW 28 the installation of a „Sailplane Rescue System“ is planned. A large parachute is pulled out by a rocket or pushed out by a mortar which will be actuated either by the pilot or an automatic system after a major part breaks off from the sailplane. The whole sailplane including pilot is brought down slowly in a nose down attitude and the fuselage nose absorbs the impact energy, so that the pilot is not hurt. The rescue system saves time and altitude compared to a conventional back pack parachute and will allow save rescue from lower altitudes. A rescue system weighs some more than a back pack parachute. The latter however is no longer necessary, so that a more comfortable and crashworthy back rest can be installed. Also taller pilots can fit into the cockpit.

TECHNICAL DATA

Span incl. Winglets	15	m	49,21	ft	Mass of one wing	62	kg	136 lb
Wing area	10,5	m²	113,02	sqft	Max. wing loading	50	kg/m²	10,24 lb/sqft
Wing aspect ratio	21,43				Min. wing loading	≈30	kg/m²	6,14 lb/sqft
Fuselage length	6,585	m	21,6	ft	Water ballast, max.	200	l	52,8 US gal
Cockpit height	0,80	m	2,62	ft	Useful load, max.	130	kg	286,6 lb
Cockpit width	0,64	m	2,1	ft	Useful load in the pilot seat, max.	115	kg	253,5 lb
Height at tailplane	1,3	m	4,26	ft	Max. speed	about 270	km/h	145 kts
Winglet height	0,5	m	1,64	ft	Manoeuvring speed	about 200	km/h	108 kts
Wing airfoil: centre part	DU 99-147							
Aileron section	DU 99-147 M1				For 325 kg (716 lb) flight mass:			
Outer wing	DU 99-147 M2							
Winglet airfoil	DU 99-125				Min. speed	70	km/h	38 kts
Empty mass with min. equipment	240	kg	529	lb	Min. sink	0,55	m/s	108,3 ft/min
Max. take-off mass	525	kg	1157,4	lb	Best glide ratio (@ 92 km/h)	45		



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