ASW 27 B

The ASW 27 is a high performance glider for the FAI-15m-class (racing class), of the latest technology. This glider is moreover type-certificated for cloud flying and semi-aerobatics. The roomy safety cockpit of the ASW 27, designed according to latest research results in the field of safety and accident protection, offers all modern comforts and ease of operation, even for tall pilots. The rubber-shock-mounted, retractable landing gear with hydraulic disc brake, the in flight 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, combined with an outstanding construction quality, imparts to the ASW 27 flight performances that are comparable to those of the former Open 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 95% along the profile underside. The sophisticated control linkage system gives very good maneuverability and harmless flight characteristics, even in landing approach, to the ASW 27.

The low-drag airfoil of the T-tail (elevator with stabilizer) was developed specially for the ASW 27 design by the Delft University of Technology. Elevator and rudder are new-technology sandwiches of Aramid fiber / 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 airloads at the control surfaces can just still be felt at the stick, the hand forces for the pilot are comfortable, - a pre-condition for non-fatiguing flying.

A new Racing Class Glider

The ASW 27 is a high performance glider for the FAI-15m-class (racing class), of the latest technology. With the application of this technology, which we used already with our previous design, the ASW 24, we succeeded already in the FAI Standard Class to do a great step forward in development. At the same time we applied a new profile technology with turbulators for boundary layer control on wing and tail unit, and a fiber composite structure using advanced carbon and aramid fibers. By this performance increase in the Standard Class we almost reached the flight performance of the ASW 20 (racing class machine), which was still built in "conventional " glassfiber reinforced plastics technology.

Successor of the ASW 20

The numerous ASW 20 customers kept putting questions on us when the successor of the ASW 20 would be in the market, designed in relation to the ASW 24 as it had been before with the ASW 20 in relation to the ASW 19. For this aim we first had to see the performance measurement of the ASW 24 and - we also had to develop a modern airfoil, tailor-made for the requirements of the racing class. We took advantage of the well proven upper side airfoil of the ASW 22 / ASH 25, which has demonstrated to provide higher effective lift in circling flight than is known from ASW 17 or ASW 20. The larger camber of the ASW 27 airfoil is distinctly visible and illustrates this characteristic.
In addition the research was intensively continued. Thus Schleicher accumulated important results with the design of winglets that are a standard feature with the ASW 27. 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 by use of modern computer systems using the latest so-called "Panel" methods.

Uncompromisingly

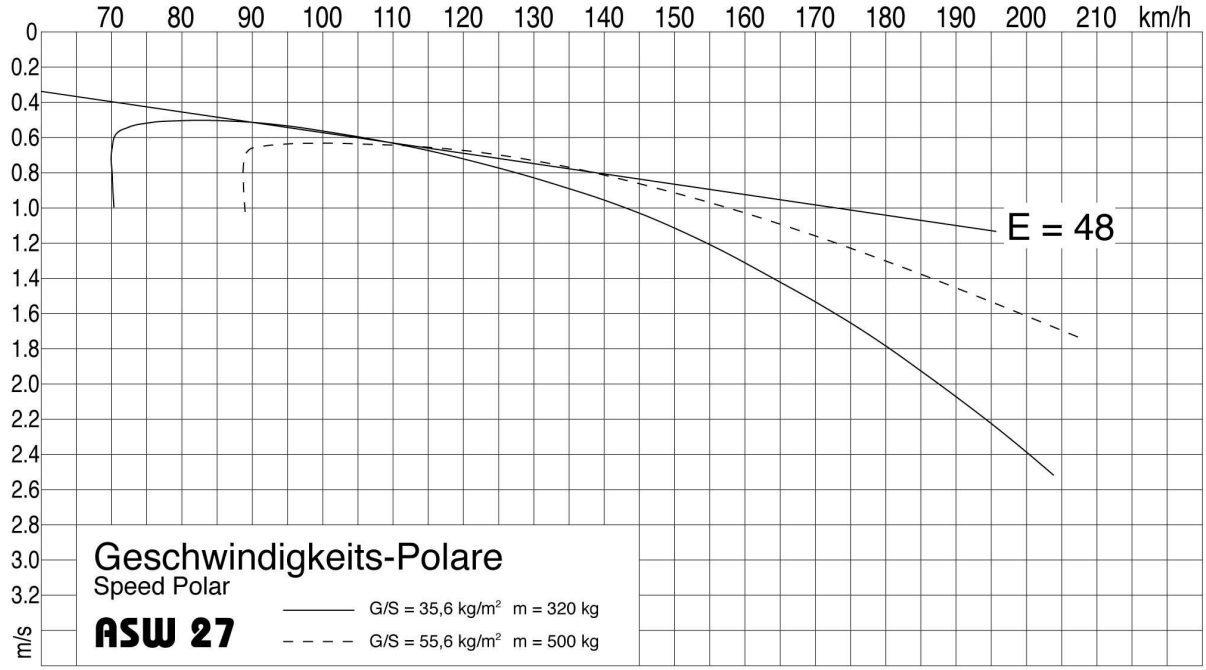
The ASW 27 has been designed uncompromisingly for highest flight performance and characteristics in the 15 m span configuration as we deliberately chose not to give any compromise to a possible span increase or engine retrofitting option. These aspects have already been covered by our latest series production type, the 18 m powered sailplane ASH 26 E.
New 0,45 m (1.5 ft) high winglets are offered following careful development in both, wind tunnel and flight tests.
Thus owing to the systematic specification as high performance glider with 15 m span, the wing has a high aspect ratio; and its low wing chord at the fuselage to wing transition allows a longer cockpit compared to the ASW 24, and to cut out the rear part of the canopy frame a little wider and further down.

New Fiber Composite Technology

The development in the field of fiber composite materials has advanced. The super-strength - yet at the same time very light - polyethylene fibers, which are used for the fuselage, have the quality to provide high energy absorption - in a mixed laminate together with carbon fibers. With the use of these fibers it is possible to further improve the crashworthiness of the ASW 27 cockpit and even with less structural weight.
At present the ASW 24 is built with an average empty mass of about 235 kg. As the ASW 27 has a smaller wing area and weight reduction in the fuselage by means of the polyethylene fibers, we got also an average empty mass of about 235 kg for the ASW 27 - despite her additional control circuits. A fully equipped ASW 27 weighs about 245 kg in serial production.
Given a wing area of 9 m² and a max. all-up weight of 500 kg, waterballast included, it is possible to vary the wing loading in the range between about 36 kg/m² (90 kg cockpit load) and 55,56 kg/m² (with full waterballast on board).
Only very light weight pilots may need an optional FRP fuselage tank additionally to the integrated (wet wing) tanks inside the wing.

The Polar

The flight performance resulting from the above, seems to be fantastic in the first moment, however, we make the point that this calculation must be rather precise, as the high flight performance of the ASW 24 has been demonstrated and the "exchange by way of calculation" of the wing and horizontal tail is just an easy exercise for the designer, the more since all airfoil sections have been measured in the same wind tunnel. Comparison flights between ASW 24 and ASW 27 have confirmed the calculation. To get this high performance the turbulator system was improved following flight tests as well as comparison measurements in TU Delft wind tunnel.



We have met our aim to transfer the good flight characteristics of the ASW 20 to the ASW 27. Therefore, the ASW 27 features again a flap landing configuration with aileron extended. Despite the narrow trailing edge control surfaces this gives the possibility to get steep and slow landing approaches which are easily controllable. Because of the thin air foil section the airbrakes have a "triple-panel" configuration. By this the resulting effective area is even larger than with the ASW 20.

As a result of the good cooperation with the aerodynamic and structure specialists, and with the healthy competition among the sailplane manufacturers we have succeeded in building a sailplane for the FAI-15 m-Class which easily exceeds the flight performance of the now 20 years old sailplanes of the "Open Class" as e.g. the ASW 17 (with 20 m span).
But the ASW 27 not only stands out for its excellent flight characteristics; also with respect to its comfortable features it hardly should leave open any wishes. It comes as standard with the following - in our opinion necessary - comforts:

- Sprung landing gear with large 5" wheel
- Hydraulic disc brake
- Tail wheel
- Instrument panel hinging upwards with the canopy
- Nose and C.G. tow release coupling
- Adjustable back rest with integrated head rest (inclination of the back adjustable in flight)
- Safety harness with quick-release center lock
- Battery storage space in the baggage compartment and in the fin
- 3-way-nozzle (multi-probe) in the fin)
- simple attachment of the winglets.

DESIGN SPECIFICATION

Glider, higher midwing configuration with T-tail. Automatic connections for all controls (aileron, flaps, airbrakes, and elevator). and waterballast actuation.

FUSELAGE

Monocoque fuselage of fiber-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 tailwheel 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 airnozzle on the right cockpit wall.

CANOPY

The full-vision, gas-spring assisted canopy (on the left side with sliding window) 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. Instrument panel, but no instruments included.

WING

Cantilever, two-part double-tapered wing planform with latest laminar airfoil; when high speed setting is selected the laminar airflow at the wing underside goes beyond the control surface gaps. Upon specific directions by SCHLEICHER, the airfoil was developed well-aimed at the ASW 27 and the ASH 26 E design at the faculty of Aerospace Engineering of the TU Delft and tested in their wind tunnel. The airfoil of the outer wing has been modified for detachable winglets using the latest airfoil design. The wing surface is a sandwich of carbon fiber / plastics with a hard foam core; wing spars with carbon flanges. Triple-paneled airbrakes (of metal and CFRP) on the wing upper surface, in sealed compartments with spring cover plates. Pushrods 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 (approx. 58 kg for each wing including integrated water ballast tank). Control surface gaps on the wing upper and under side sealed by plastic tape. Blow turbulators on the under side of the ailerons and flaps.

WATERBALLAST

Waterballast in the wing leading edge, separated in two compartments per wing for the purpose of facilitating take offs with partial waterballast. 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 favorable C.G. range with water loaded (therefore, a water tank in the fin is completely unnecessary). For simplified maintenance integrated (wet wing) water tanks have been developed and installed. Each wing tank is separated by internal ribs into two compartments and additionally baffle ribs are installed. Filling through two faired drain outlets on the wing underside left and right of the fuselage. Ballast capacity: 2 x 77,5 kg. An additional water tank of about 35 liters in the fuselage is optional extra on request.

TAILPLANE

T-tail (elevator with stabilizer) with low-drag airfoil, developed specially for the ASW 27 project 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 axis. Stabilizer 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 fiber / plastics with a hard foam core; ailerons and flaps are of CRP monocoque construction that gives extremely light and stiff control surfaces.

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CONTROL CIRCUITS AND FITTINGS

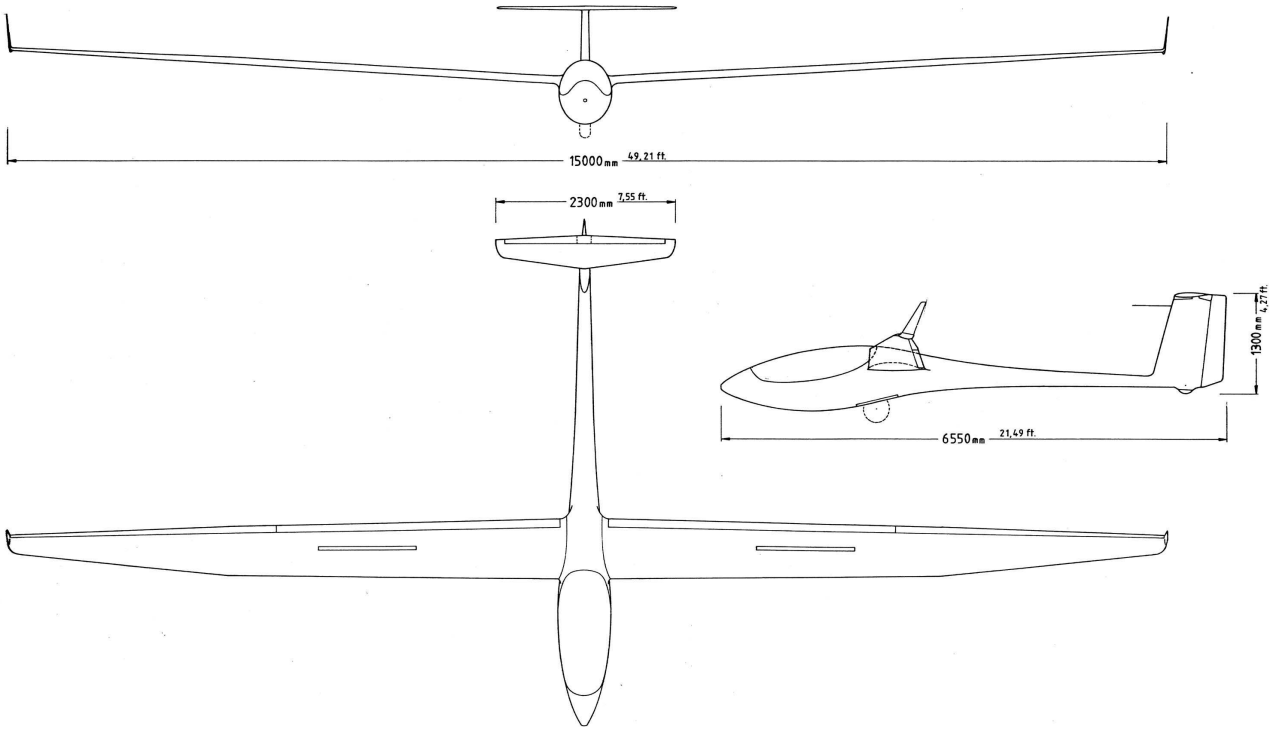
Aileron, elevator, flaps, and airbrakes are actuated by pushrods running in anti-noise ball-bearings, and use automatic connections at the assembly joints. The rudder is actuated by stainless steel cables which run in Polyamid tubing. Infinitely variable trim, lockable by a stick-mounted key. All control 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 Duraluminium respectively.

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.

TECHNICAL DATA

Span incl. Winglets	15	m	49,21	ft	Mass of one wing	58	kg	128	lb
Wing area	9	m²	96,88	sqft	Max. wing loading	55,56	kg/m²	11,38	lb/sqft
Wing aspect ratio	25				Min. wing loading	≈34	kg/m²	6,96	lb/sqft
Fuselage length	6,55	m	21,48	ft	Water ballast, max.	190	l	50,25	US gal
Cockpit height	0,80	m	2,62	ft	Useful load, max.	130	kg	286,7	lb
Cockpit width	0,64	m	2,1	ft	Useful load in the pilot seat, max.	115	kg	253,6	lb
Height at tailplane	1,3	m	4,26	ft	Max. speed	285	km/h	154	kts
Winglet height	0,45	m	1,50	ft	Maneuvering speed	215	km/h	116	kts
Wing airfoils root	DU 89-134/14 and								
tip	DU 89-134/14MOD				For m = 320 kg (705 lb) flight mass:				
Winglet airfoil	DU 94-086 M4				Min. speed	70	km/h	38	kts
Empty mass with min.equipment	235	kg	518	lb	Min. sink	0,52	m/s	102,4	ft/min
Max. take-off mass	500	kg	1102	lb	Best glide ratio (100 km/h)	48			



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