

Airlift Hovercraft

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DOCUMENT No:

GSS-P41 v3.9

Hovercraft Specification Sheet

December 2007

Customer: Sales generic document

Design: *Wildfire*

Hull No: P41-xxx

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General Description

The Wildfire series represent the latest advances in small amphibious hovercraft. The design is leading edge new technology and incorporates the latest commercially available and appropriate high technology materials and manufacturing techniques for advanced performance. It is easily operated and maintained by its owners. The Wildfire is adaptive to many different tasks. The large doors provide full access for large and difficult loads and full protection and comfort for passengers when closed. For extreme loads or open top duties the doors may be completely removed. The Wildfire is designed to operate and provide full comfort for it's passengers in a wide variety of climatic conditions ranging from the hottest tropics to the extreme cold of the polar arctic regions.

The Wildfire has an exceptionally good payload to size ratio allowing good load capability and remaining easily transportable. It can fit within a shipping container and is easily transported on a special quick launch trailer. The Wildfire is built to a very high standard and is capable of gaining classification with most survey societies.

There is nothing else like the Wildfire Hovercraft.

Technical Details Table

Dimensions	When Hovering	Hull Survey Measure	For Transporting
Length	7,078 mm (23.22 ft)	6,503 mm (21.34 ft)	6,556 mm (21.51 ft)
Width	2,726 mm (8.94 ft)	2,400 mm (7.87 ft)	2,411 mm (7.91 ft)
Height	2,234 mm (7.33 ft)	1,950 mm (6.40 ft)	1,950 mm (6.40 ft)
Cockpit length	3,573 mm (11.72 ft) @ floor level		
Cockpit width	1,532 mm (5.03 ft) @ floor level		
Cockpit side height	568 mm (1.86 ft) (floor to top of side-step)		

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Cabin Internal Height	1,316 mm (4.32 ft) floor to ceiling near doorway
Cushion height	377 mm (1.24 ft) @ front, 315mm (1.03 ft) @ rear
Isolated obstacle clearance	277 mm (0.91 ft)
Wave height clearance	750mm (2.5 ft) at a pitch of 10 metres (33 ft) or more
Maximum recommend speed (for safety)	65 km/hr (36 kts) on smooth water 50 km/hr (27 kts) on land 100 km/hr (54 kts) on smooth ice
Economical cruising speed	45 to 60 km/hr (25 to 30 kts)
Hump speed (Planing speed)	10 to 16 km/hr (5 to 9 kts) (load dependant)
Hump speed time	Lightweight 3 - 5 seconds Heavyweight, 5 - 8 seconds
Max wind speed (heavy)	37 km/hr gusting to 46 km/hr (20 kts gusting to 25 kts)
Max wind speed (light)	46km/hr gusting to 55 km/hr (25 kts gusting to 30 kts)
Seating (According to Survey)	Total = 1 crew plus 8 passengers. UES 'Tecnoseat' membrane type seating.
Cabin	The cabin incorporates a laminated glass windscreen and front quarter windows, front windscreen wipers and washers. The cabin doors are top hinged and may be removed easily by withdrawing spring loaded hinge pins. Windows on the doors are acrylic glazed.
Climate Control	A cabin heater or air-conditioner may be optionally fitted.
Payload (Normal) (for a water-start)	Without air-conditioning= 850 kg (1,874 lbs). With air conditioning = 800 kg (1,764 lbs)
Overload Payload	Up to 1000 kg (2,205 lbs) (reduced performance & good conditions) without rear cabin or air-conditioning.
Empty weight	950 kg (2094 lbs)
Engine	Subaru EJ25, DOHC, EFI, at 135kW (180hp).
Fuel consumption	From 9 to 16 l/hr (2.4 to 4.2 USGPH) average at cruise approx 13.5 l/hr (3.6 USGPH).
Fuel capacity	2 x 50 litres (100 litres total) (26.4 USG)
Endurance (5% reserve capacity)	Loiter = up to 9 hours. Cruise = 5 to 7 hours M.C.R. = approx 4 hours
Hull construction	RTM moulded using non-woven E-glass fabrics and Divinycell PVC foam core. Under-hull Urethane landing pads for abrasion protection.
Skirt type	Pressurised bag tapered from front to back with larger sections at the front for improved wave clearance. All fingers are separate and detachable.
Skirt Structure Options	Bag and fingers made from Urethane with RF welded seams. The fingers and fastened to the bag with nylon nuts & bolts.
Thrust system	An in-flight pitch adjustable 5-blade propeller runs in a close fitting duct at slow tip speed for minimum noise levels. The blades are made from Carbon fibre and Epoxy resin with Urethane coated leading edges. The hubs are CNC machined from high tensile aluminium.

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Thrust transmission	Industrial rated components of toothed belts, shafts and self-aligning bearings. An automatic clutch is incorporated for smooth engine starting and stopping and to allow engine idle without the prop turning for safety of bystanders.
Lift System	Mixed flow type fan direct coupled to a hydraulic motor. Very efficient and quiet.
Lift Transmission	Hydrostatic. Pump driven by engine providing oil to the lift fan motor. The lift fan speed is automatically controlled to a pre-set speed regardless of the changing speed of the main engine.
Steering	By rudders fitted behind the thrust duct.
Longitudinal pitch control	By elevators fitted behind the thrust duct.
Roll control	By differential action of rudders and elevators combined
Controls	Engine throttle by both a foot mounted pedal for quick response situations and a dashboard mounted vernier control for cruising and static conditions. Lift system control by dash mounted rotary control (on compensator valve).
Electrical System	Nominal 12-volt system. Battery charging by 14-volt, 65-amp alternator fitted to the thrust engine. All circuits wired and protected in compliance with codes.
Pumping	Double acting manual bilge pump with manifold to each compartment, strum boxes and non-return valves. One electric pump 3785 l/hr (1000 gph) in the cockpit. One electric pump 1893 l/hr (500 gph) in the engine room.
Fire Fighting	Fixed dry-powder type fire extinguisher to the engine room. Portable dry-powder type extinguisher recessed into the cockpit sidewall. Note that this may be varied according to survey classification requirements.
Navigation & Communications Options	Standard equipment includes a 75 mm compass, no electrical communication or navigation devices. Optional equipment includes; Marine scanning VHF transceiver and matching antenna. GPS systems (stand alone or integrated). Small radar.

Technical Details, Descriptions

Classification

Construction may be carried out according to:

1. Australian Uniform Shipping Laws, "Class 1E"
3. New Zealand Maritime Rules Part 40F, "Class 2 light hovercraft"
4. Canadian ACV Safety Certification Standard TP5579

Hull and Superstructure

The hull is resin infusion moulded with reinforcement from non-woven E-glass fibreglass reinforcements and Divinycell cores for increased panel stiffness. This method of construction is lightweight while retaining excellent strength and stiffness. Thermal and sound isolation properties are excellent for this construction system. All laminating is conducted with active quality control procedures to ensure the highest quality. The hull construction complies with or exceeds the Australian U.S.L. and other international survey society requirements. The hull is built in two parts and bonded together with separate sealed buoyancy compartments for

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maximum safety. Under-hull moulded Urethane landing pads are fitted for hull protection.

Four lifting 'U-bolts' are mounted through the deck and internally strengthened. A towing eye is fitted to the bow and to the stern. There are four cleats mounted to the deck.

Accommodation

Cockpit:

The cockpit sides are smooth finish fibreglass gel-coat and the floor is painted with a non-skid finish. There is a transverse beam across under the front seats to provide hull structure and a mounting for the front side-by-side seats. This cross beam incorporates three dry storage lockers. Lockers are located in each side and to the rear of the cockpit for dry storage (4 in total). The engine is accessed through a hatch at the rear of the cockpit. An external locker is fitted for storage of the anchor and dirty ropes.

Cabin:

The cabin is constructed of a front fixed part, a reinforced transverse frame (to provide rollover protection) and a longitudinal roof beam for further occupant protections and support for the large doors. The two large doors are top hinged and open 'gull-wing' style. They normally remain fixed but may be easily detached withdrawing the spring-loaded hinge pins. The longitudinal roof beam is normally left fixed but it may be unbolted to accommodate unusually large or awkward loads.

The standard interior trim is a good balance between comfort and practical marine type. Luxury or utility trims may be specified by the customer.

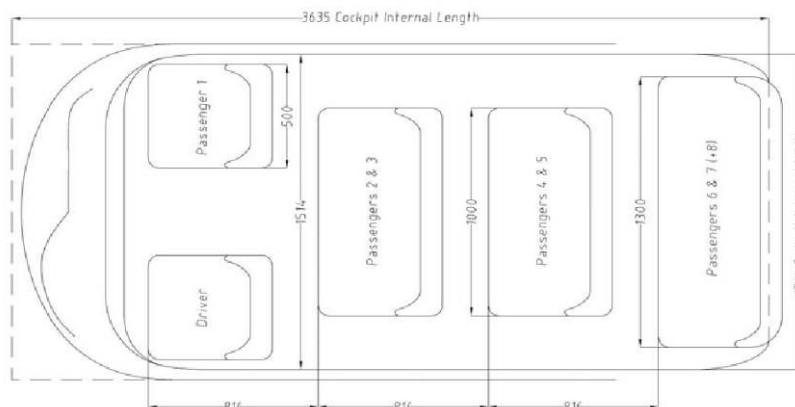
Glazing:

The front windscreen is custom laminated from chemically toughened glass and PVB laminate. Special attention has been paid to conform to the Lloyds class pressure loadings. The front screen has wipers and washers fitted. The side windows are also made from laminated safety glass and have windscreen wipers and washers fitted. Glazing to the doors is acrylic for light weight and toughness. All glazing is bonded with polyurethane adhesive sealant.

Seating:

Seating arrangements may optionally be varied but are normally;

1. Front row seating for the driver's and front passenger.
2. The second row of seats accommodates two passengers and is removable.
3. The third row of seats accommodates two passengers and is removable.
4. The fourth row (rear) of seats accommodates three passengers and is removable.



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Total seating capacity is variable, 1-crew plus 8-passengers. With seats removed the floor provides a flat work space.

A bilge pump is fitted into a recess at the rear of the cockpit for water removal. A large diameter (38mm) 'drain-bung' is also fitted which can be removed for quick water drainage while washing out when the hovercraft is on hard standing.

Engine

The thrust engine is a Subaru model EJ25 liquid cooled horizontally opposed four cylinder petrol engine of 2500cc with overhead camshafts, fuel injection, electric starting; stainless steel exhaust system; remote air and oil filter assemblies. This engine is normally rated at 135kW (180hp) at 6000 rpm but the rating is reduced to 112kW (150hp) at a maximum of 5100 rpm for longer engine life. The performance is very spirited at this rating. Cruising engine speed is between 3400 to 4400 rpm (30% to 65% of maximum power).

A coolant radiator and a lubricating-oil cooler keep the engine cool. The engine coolant circulates through a radiator mounted to the starboard side of the thrust ducting. The engine oil-cooler is incorporated in the radiator assembly. Cold air is drawn in from the outer side of the thrust ducting, passes through the radiator and cooler and is discharged into the negative pressure area near the propeller. When the engine is idling and the propeller is not turning the air is assisted to move by a thermostatically controlled electric fan. The oil cooler reduces the oil temperature, which greatly helps with increasing the engine life and extends time between oil changes.

The Subaru EJ25 engines are imported from Japan and are re-built to exacting specifications for use in the Wildfire hovercraft.

Exhaust Systems

The engine exhaust system is manufactured entirely from stainless steel. An exhaust-air ejector system is incorporated to remove excess heat from the exhaust ducting and to lower the exhaust gas temperature for safety of personnel.

Variable Pitch Propeller

The 'In-Flight-Adjustable' (IFA) propeller is custom made for the Wildfire and is fully (in-flight) pitch adjustable to provide optimal pitch setting for all operating conditions and additionally reverse thrust capability. There are 5 blades, precision moulded from Carbon-Fibre and Epoxy resin and post-cured at high temperature to obtain consistent high tensile strength. The abrading surfaces of the blades are protected with moulded on polyurethane for maximum service life. The hub is high tensile marine grade aluminium and the blade sockets are stainless steel. Dissimilar metals are electrically isolated to minimise corrosion. The pitch control actuator is operated from the driving position where there is a position feed back indicator. The propeller system is designed to provide a long life in a salt-water environment.

A stainless steel wire guard protects the propeller. The propeller guard is mounted to the ducting.

Propulsion Transmission System

An automatic clutch is fitted directly to the rear of the engine. The clutch automatically disengages the engine at idle speed to stop the propeller. This provides added safety for bystanders and also reduces shock loading on the transmission during engine starting and

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stopping. A toothed belt provides positive power transmission from the engine shaft to the propeller shaft. The propeller shaft is firmly supported on two self-aligning and sealed ball bearing units within the transmission housing. The engine and transmission assemblies are isolated for smooth and quiet operation.

Lift Fan

The lift fan is a mixed-flow type for maximum efficiency and minimum noise. Air is drawn in through the vents in the bonnet, passes through the fan and is expelled directly into the skirt bag. The fan is manufactured from carbon fibre and epoxy resin. A moulded bonnet provides protection, sound absorption and an attractive appearance.

Lift Transmission

The lift fan is directly mounted to the hydraulic motor. The hydraulic motor is provided by oil from a pump mounted to the engine. The pump is of the variable displacement type and is controlled automatically to keep the lift fan running at a constant speed largely independent of the engine speed. The fan speed may be easily changed at any time by the pilot to meet different lift air requirements during different operating modes. This is a unique system which is easily controlled and allows efficient use of available power by applying only what is necessary to meet lifting requirements and leaving all other available power for thrust. All filtration and cooling is suitable for tropical (+40°C) to arctic (-35°C) operation in salt water and dusty conditions.

Skirt

The skirt is a fully pressurised tapered bag and finger system. The bag pressure is higher than the cushion pressure and is regulated by control orifices in the bag inner membrane. This system has been used on the largest and fastest commercial and military hovercraft for many years and is well proven to be the most stable and dynamically efficient skirt system available for amphibious hovercraft today. The skirt is computer cut for consistent and exact fitting to the hull.

The skirt is manufactured from Urethane coated Nylon fabric. Urethane is extremely tough and provides considerably greater resistance to abrasion and tearing compared with other fabric types commonly used on other hovercraft. All joints are R.F. welded for exceptional strength. Urethanes have good low temperature flexibility (down to -35 °C) and are suitable for use in very cold areas. Normal colour is black with other colours available to special order.

Controls

The controls are simple and easily managed. A 'control mixed' is hand controlled in similar fashion to steering a car but with added movements for pitch and roll control. This is connected to the rudder and the elevators via control cables and hydraulic power assisted servos. A foot pedal and a dash mounted vernier control the thrust engine throttle according to the choice of the operator. The lift fan is controlled by a rotary knob mounted on the dash board.

Instrumentation

Hydraulic System

Main Loop Pressure	0 – 20 MPa (0 – 3000 PSI)
Charge Pressure	0 – 4 MPa (0 - 600 PSI)
Main Loop Temperature	0 °C to 120 °C (32 F to 250 F)

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Thrust Engine

Tachometer	0 – 6000 RPM
Oil Pressure	0 – 500 kPa (0 - 80 PSI)
Coolant Temperature	48 °C to 116 °C (120 F to 240 F)
Fuel Pressure	0 – 500 kPa (0 - 80 PSI)
Warning light	On low oil press or high engine temp.

Other Instrumentation

Fuel contents port side	Empty to Full
Fuel contents starboard side	Empty to Full
Volt Meter	0 – 18 Volts
Cab Bilge Pump	Indicator light
Engine Room Bilge Pump	Indicator light
Alternator	Charging indicator light
Compass	75 mm illuminated card

Electrical System

System voltage is nominally 12 volts DC. The normal voltage range is 10.5 volts to 14.6 volts. The engine normally has an 85-amp alternator but higher outputs are available.

Batteries

There is normally one battery of 65 Ah capacity fitted with a single pole isolator switch. It is optionally possible to have two batteries configured as a separate starting battery and a separate 'house' battery for operating electronics. The batteries are charged through a voltage sensitive relay thus ensuring full charge to both batteries and no accidental discharge of one battery from the other battery. In emergencies the batteries may be paralleled. Other configurations are possible with automatic charging protection.

Protection

The electrical system is based upon the 'EmpirBus' electrical control and protection system. Most switchable services (lights, pumps, fans, wiper synchronisation etc) are operated from programmable controllers which provide a multitude of functions and fault warnings. The system can be custom programmed to meet with special operator needs if required.

All electrical cable is marine type tinned copper multi-strand cable with V95°C (or better) PVC insulation. All terminations in exposed areas are crimped and covered with heat shrinking and hot-melt insulation for corrosion protection. Exposed cable runs are protected in conduits. All circuits are clearly marked with a matching circuit diagram in the operating manual.

The instruments are marine type and rated splash proof from the viewing side. Wherever possible all fittings are salt waterproof.

Lighting

All navigation lights are of 'Aquasignal' series 20 type and comply with IMO recommendations. In addition a flashing orange beacon is mounted atop the thrust duct according to the CAA requirements for hovercraft.

In addition to the navigation lights, there are optionally two 55-watt spot lights available. Inside

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the cabin are 4-LED work lights with dimmable white or red light output. Beside the cabin door is a 15 Amp power outlet suitable for connecting a high-powered spotlight or other auxiliary device.

Fuel System

There are two fuel tanks, each of approximately 50 litres and mounted to each side of the cockpit. The fuel tanks are constructed of welded aluminium and pressure tested according to class rules. All fuel piping (apart from short flexible elements near the engine) is of copper pipe. A safety shut off valve is mounted to each tank. An in-tank mounted electric fuel pump and filter assembly supplies fuel to the engine from each tank. The fuel gauge sender is incorporated into the in-tank pump/filter assembly. Preferred fuel type is standard unleaded automotive petrol.

Fire Safety

The thrust engine room 'hot zone' is fitted with a fixed dry powder type smothering system that can be activated from outside the engine room. An additional portable dry powder extinguisher is recessed into the cockpit side. The engine room is protected in hot areas by stainless steel heat shields. The stainless steel exhaust system is ceramic coated and fitted with heat shields to reduce heat radiation and increase safety. The engine air intake is flash-back protected.

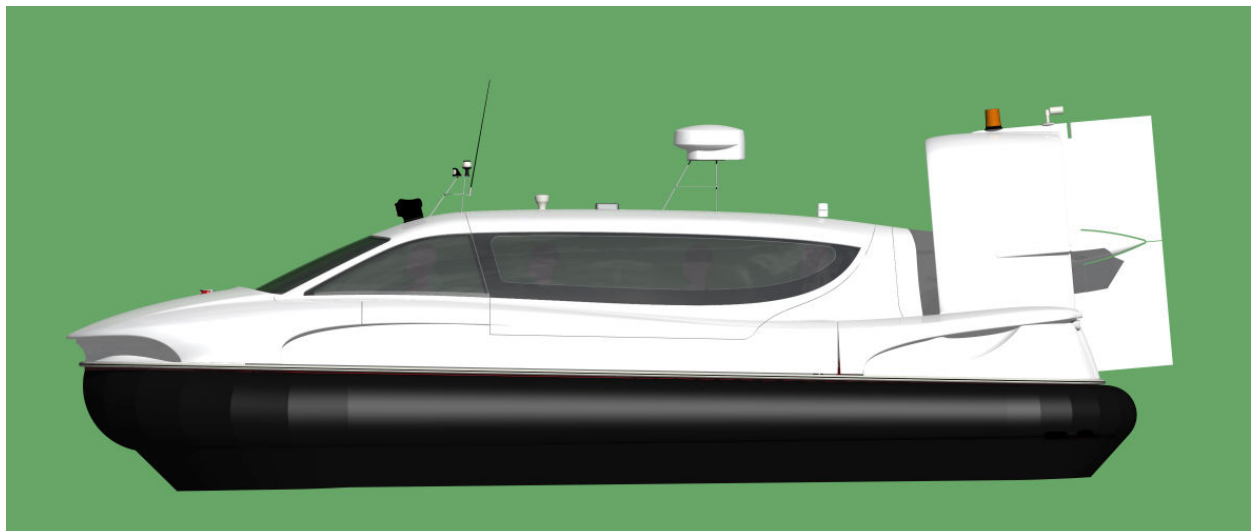
Storage

A vinyl cover is optionally available to protect the hovercraft topsides.

Transport

The Wildfire is road transportable on a suitable trailer within a total width of 2.5 metres. A custom built trailer is optionally available. The custom built trailer has a tilting deck, winch system and folding side barriers to facilitate loading and un-loading of the hovercraft without assistance from a second party. For additional information please request the separate trailer specification sheet.

For international shipping the Wildfire may be loaded into a standard 40ft shipping container or onto a 40ft flat rack with the trailer.



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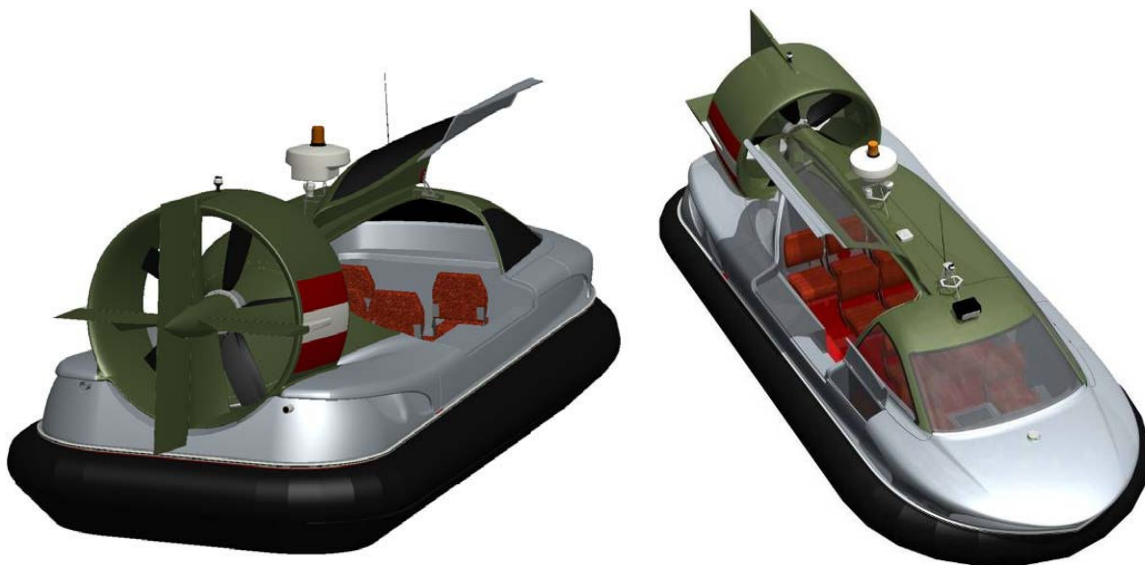
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Pre-production Prototype version in the colours of the Latvia Border Patrol

NB: The above specifications are based upon a properly trimmed and maintained craft with a competent operator. These specifications are subject to change as improvements are made and should be used as a guide only unless specifically annexed to a build contract and signed by all parties to that contract. Specifications may also be varied from time to time by agreement between the parties involved. This document is based upon pre-production specifications of December 2007.