

SKUD Buoyancy Update

August 2010

SKUD 18

To all SKUD Owners

Some months ago we acquired a list of weights of all SKUD 18 hulls. This is the weight of each boat with hull mounted fittings in place, the hull dry and ready to wrap for shipping. The weight shows the evolution of the laminate, the inclusion and increase in volume of styrene foam, and addition of the deck beam structure.

Background

The early boats were presumed to be as per several ISAF classes and only used in organised events and therefore exempt from complying with positive buoyancy requirements. Access Sailing Systems has never agreed with this concept and now, post Qingdao, we have been able to swamp test a new boat and do something about it.

The object of this communication is to advise owners of the probable volume of positive buoyancy foam in their hulls, and to help ascertain options to increase buoyancy foam volumes should they desire. There is a case for this as the older boats will increasingly be used as recreational and training craft in unsupervised scenarios, and possibly crewed by less experienced sailors. It could be argued though that accidents are more likely on a race course which are usually supervised.

PVC Foam Sandwich Laminate

As all the hulls are vacuum bagged foam sandwich they therefore have foam buoyancy in their skin laminates. The SKUD hull bulkheads, ribs, gussets and longitudinal backbone are 8mm PVC foam. The hull bottom is also 8mm PVC foam, as is the underside of the deck and cockpit. This totals approx 12sqm of 8mm PVC foam. This equates to .096 m³ or 96 litres of buoyancy.

The hull topsides and down into the bow is stiffened with 5mm PVC foam of approx 8sqm which is .04m³ or 40 litres of buoyancy. Total PVC foam buoyancy is therefore 136 litres, roughly speaking that's able to support say 130kg.

This remained constant through all boats, except #33 which was actually the first hull built at Batam and has 8mm plywood bulkheads. Another exception is the post Qingdao boats which have a full 8mm PVC bulkhead (partial bulkhead in previous boats) 2/3rds aft under deck and cockpit. This supports the aft end of the redesigned deck stringer and beam structure.

Hull Weights and Foam Volumes

The estimates of foam volume are approximate.

HULL#	COUNTRY	OWNER	KG	STYRENE	PVC	TOTAL	GROUP
0	AUS	Access Sailing	--	600	130	730	P
001	USA	Team Paradise	151	150	130	280	C
002	CAN	Rick Watters	144.4	100	130	230	B
003	USA	Mark Lewis	150	150	130	280	C
004	USA	Team Paradise	138	0 Foam	130	130	A
005	USA	Scott Whitman	146	100	130	230	B
006	USA	Scott Whitman	145	100	130	230	B
007	AUS	Pittwater owner	145	100	130	230	B
008	GBR	Michael Cogswell	147.5	100	130	230	B
009	GBR	Simon Harle	145.6	100	130	230	B
010	GBR	Rutland	150	150	130	280	C
011	GBR	Judi Figgures	149	150	130	280	C
012	GBR	Allan Smith	150	150	130	280	C
013	SWE	Gustaf Fresk	150	150	130	280	C
014	CAN	John McRoberts	152	150	130	280	C
015	CAN	David Cook	152	150	130	280	C
016	JPN	Takao Otani	150	150	130	280	C
017	CHN	CPC	153	150	130	280	C
018	CHN	CPC	154	150	130	280	C
019	CHN	CPC	160	225	130	355	D
020	FRA	CES	161	225	130	355	D
021	GER	Michael Honsel	163	225	130	355	D
022	USA	Team United Shores	160	225	130	355	D
023	SIN	SDSC	151	150	130	280	C
024	SIN	SDSC	150	150	130	280	C
025	AUS	YA	161	225	130	355	D
026	AUS	Dan Fitzgibbon	161	225	130	355	D
027	IRE	Amy Kelehan	165	225	130	355	D
028	POR	Bento Amaral	160	225	130	355	D
029	SWE	Gustaf Fresk	165	250	130	380	E
030	AUS	Yachting Victoria	165	250	130	380	E
031	NZL	Sailability Auckland	165	250	130	380	E
032	ESP	Valencia	160	250	130	380	E
033	AUS	Access Sailing	???	150	100	250	B/C
034	GBR	RYA	162	250	130	380	E
035	USA/CAN	Phil Smithies	165	250	130	380	E
036	NZL	Sailability Auckland	165	250	130	380	E
037	MAL	MPC	165	250	130	380	E
038	AUS	Craig Clark	165	250	130	380	E
039	ESP	Valencia	167	250	130	380	E
040	ESP	Valencia	168	250	130	380	E
041	ESP	Barcelona	166.6	340	130	470	F
042	IRE	IRE	168	340	130	470	F
043	GBR	Kelsey Trust	169	340	130	470	F
044	AUS	Ame Barnbrook		340	130	470	F
045	GBR	RYA		450	130	580	G
046	ITA	Eddey		450	130	580	G
047	AUS	Dan Fitzgibbon		450	130	580	G
048	NZL	Tim Dempsey		450	130	580	G
049				450	130	580	G

- Group A With a hull weight at below 138kg, this boat has little or no styrene foam buoyancy.
- Group B This group at approx 145kg has an increase in laminate and blocks of foam under the side decks.
- Group C The jump in hull weight up to 150kg is more foam and extra glass in the laminate along the gunwales as it was found this area was a bit soft. Group B boats may only have foam under the side decks.
- Group D The initial demand for boats was satisfied and when production resumed at boat 19 we have Group C at around 160kg. This increase in weight represents the introduction of the longitudinal deck stringer and beam structure, plus more styrene foam. Group C boats have a block of foam in the cavity in front of the mast step bulkhead.
- Group E 165kg represents another increase in foam and extra laminate.
- Group F These are the first post Qingdao boats with approx 5kg saved by removing the gunwale flange, but a full bulkhead aft, an increase in laminate and more foam means no change in hull weight.
- Group G At close to 170kg these are the new production boat standard with 450litres of foam.

SKUD 18 AUS 044 Swamp Test

We added 10kg ballast for the mast, 10kg for cowling, 10kg for sails, 10kg for batteries, 10kg for each seat and 10kg extra (total 70kg) and pumped the hull cavity full of water. Hull 044 was estimated to have 340 litres of styrene under the side desks and forward. The boat floated with good freeboard but sat low at the stern.

We then inserted 100 litres of swim noodles into the bow and 100 litres under the cockpit drain tubes aft. That is an estimated foam buoyancy of 540 litres plus 130 litres of PVC foam in the laminate totalling 670 litres. This floated the boat slightly higher but more level (see photo right).



Styrene Foam in Hulls commencing with 045



Retrofitting Buoyancy

We suggest the very minimum for older boats is what will keep them afloat with 100mm of freeboard with all air expelled and with 2 crew seated on the centreline in canting seats.. This is a minimum of 450 litres. In a boat with zero foam I would fit 150 litres in the bow and 300 in the stern, with 100 of that under the cockpit drain tubes and 100 under each aft deck. Keeping the boat level is one consideration, keeping the stern up with a severely disabled crewman strapped into the aft seat and probably someone on board helping them is another.

We feel that Swim Noodles are the best solution, and the better quality don't have a hole down the centre and are made in better quality polyethylene foam which is more likely to be closed cell. The noodles we used have no hole, they are 65mm in diameter and are 1.5m long. Each therefore is 5 litres in volume. We bought the Noodles from a wholesale swim industry supplier. They were AUD\$3 each.

The styrene foam built into the boats is suspended above the bottom so won't get waterlogged and take on weight. Styrene foam is very low density, being approx 16kg per cubic metre. Noodles are removable and if they did take on water can be removed and dried. Pouring urethane foam is hazardous as it isn't necessarily 100% closed cell and can't be removed, it can also shrink and pull the hull out of shape. Airbags are an option but it can't be guarantee they won't get punctured.

It's easy to get buoyancy under the aft deck but an inspection port must be fitted under the cowling. This must not be on the centreline or it will foul the spin pole as it retracts. We have added noodles to 4 boats so far and have found best place for the inspection port is found by fully retracting the spin pole and offset the inspection port to the starboard side to miss the central backbone and mast post step, its centre about 200mm forward of the cockpit.

When the boat is swamped it will go down first by the bow as there is little volume up there and it quickly fills with water. The foam in the bow is under the forward deck under the cowling so is therefore low in the hull and therefore is fully in play as the bow goes down. So the boat will start to level up and will settle about level. The advantage of being wide with foam under the side decks is its very stable when swamped.

For information about National buoyancy regulations, refer to the EU Recreational Craft Directive, US Coast Guard, or US Boat and Yacht Council.

Owners' Responsibility

It is the responsibility of each owner to prepare their boat and ensure there is sufficient buoyancy to satisfy themselves, their crew and any regulations that apply in their country. All future boats will have 450 litres of foam wrapped in plastic and distributed as follows - 150 litres under each side deck aft and 150 litres under the forward cockpit. We recommend that all existing boats have a minimum of 450kg of added buoyancy. If you have a combined crew weight over 150kg or carry heavy additional equipment aboard, you should increase buoyancy accordingly.



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