

KHAYA

DIMENSIONS

LOA 13.66m

Beam 4.0m

Draft 2.0m

Displ. 10.6 tonnes light ship

11.2 tonnes loaded with half tanks

Engine Beta Marine (Kubota base) 43 HP, new in 2021, 67 hours as of 10-25.

Propellor Max Prop, 2 bladed, 20 inch dia

Conventional shaft (32mm) with stuffing box and greaser

DOCUMENTATION

Khaya is registered with the Small Ships Registry of Great Britain, number 26501. She is also imported into French Polynesia which means that she can stay there for an unlimited period of time. Additionally she has a permanent berth in the much sought after Marina Vaiare in Moorrea .

Full construction drawings and photos are available as well as complete hydrostatics, flooding and stability curves, scantling calculations etc..

A reminder that the design is the property of Lyle Design and may not be sold or otherwise diffused to third parties.

CONSTRUCTION

Khaya is a custom design built of cold-molded (laminated) wood. She was built by the current owners with Tony Farrow and John Chambers of AP Farrow Boatbuilders, Grimsby, England. She was launched in 1988. The design is by Rupert Lyle, a qualified naval architect and principal of Lyle Design. The design brief called for a capable offshore-going yacht that was to be home for a couple with occasional guests. Performance was important but not at the cost of flimsy construction. Every effort was made to make the boat easily driven, especially in light airs where frictional resistance dominates. All through-hull fittings are flush (there are only 8 total including the depth/speed transducer) and the 2-bladed Max prop has minimal drag when feathered while showing good performance in both ahead and astern.

Construction: Ring frames, spaced at 1.06m, were laminated on full-sized lofting. Floors (structural members below cabin sole) were added through the middle $\frac{3}{4}$ of the hull with an I-beam assembly uniting all. The hull is built up of 4 layers of wood – from the inside 18mm x 30mm full length Sitka spruce strips, covered by 2 opposing diagonal layers of Western Red Cedar and a single 4mm transverse layer of mahogany. Total hull thickness is 37mm.

The deck is a sandwich of 6mm plywood separated by 25mm of end-grain balsa. Longitudinal members of solid wood run from stem to stern along the hull to deck join, at mid-side deck and at the side deck to cabin side intersection. Solid wood blocking was added at all deck penetrations. Wherever appropriate deck fittings were “potted” (bolts set in over-sized holes that do not fully penetrate the deck that are filled with epoxy). No leaks, and in 35 years no track, winch or cleat has moved.

All plywood used in the construction is Bruynzeel Marine hardwood.

Both hull and deck are covered with a light layer of twill weave glass fiber and multiple coats of epoxy.

The lead keel is a NACA 63-009 section, weighs 4250kg and is attached to the hull with 13 x 25mm bolts. The bolts are set in “galleries” in the lead casting and pass up through the false keel and hull center-line structure. Like much of the deck fittings these bolts are “potted” as they come up through the false keel and hull. They are set in pairs side to side. Because they are potted the bolts resist compression as well as the tension forces that traditionally nutted bolts resist. When the boat heels both bolts in each pair share the load of compression and tension.

West System epoxy was used throughout with a total of about 500 liters used in the hull, deck and interior construction.

Equipment:

Chain; 10mm x 75m, good condition, several lengths (5, 8m) of 10mm chain

Main Anchor: 30kg genuine Bruce

Windlass: Lofrans Tigres

Additional Anchors: Fortress FX44, 45lb genuine CQR, 20lb High Tensile Danforth

Cordage: 2x 150 ft 18mm multiplait mooring lines

Spare halyards and sheets

Numerous spare lines, 10 to 14mm

SPARS AND STANDING RIGGING

Custom aluminum mast by Atlantic Spars (UK), tapered top section, keel stepped. 2 x genoa and mainsail sheaves, 2 x spinnaker blocks. Mast head tricolor and anchor light, VHF/AIS antenna, B&G wind indicator wand. Inner forestay tang and sheave for staysail halyard. Running back stay tangs. Intermediate shroud tangs. Upper and lower spreaders. Baby stay tang. Spinnaker pole stowage on mast with track and roller-bearing car. Pole heel lift and lowering lines, pole topping lift. Custom goose neck. Lewmar 40 winches for main, stay sail and genoa halyards and for reef lines/cunningham/vang.

Boom: Rigid vang slides on underside of boom. 4 x rope clutches on underside of boom for reef lines, cunningham and vang downhaul. 2 x integral sheaves for reef lines, 2 x boom end sheaves.

Mast, boom and spinnaker pole repainted 2016.

Standing Rigging: All standing rigging replaced 2016, swage eyes (using rotary hammer) top ends by Sailing Services (Miami, FL), Staylocks installed by owner bottom end. 316 SS 1 x 19 x 10mm, except lower shrouds 10mm compact strand. Running backstays 6mm Dynema. Standing backstay adjusted by Lewmar hydraulic ram. Turnbuckles and toggles Lewmar silicon bronze.

Genoa roller furler Scheafer 3100.

Deck Winches: Staysail sheet 2 x Lewmar 46, Genoa sheet 2 x Lewmar 55, running backstay/main sheet 2 x Lewmar 40, furling line 1 x Lewmar 30.

Dodger with plexiglas wind shield.

Sun awning with funnels for rain water catchment

Main sail cover

Staysail cover
Foredeck and saloon hatch covers
Windscoops for saloon and aft cabin hatches.

SAILS

Mainsail: Hydranet fabric, radial cut with full length top batten, 3 additional tapered battens. 2 deep reefs reducing area by 25% and 50%. Shelf foot with outhaul. Low friction rings at leach, dog bones at luff with large Wichard hooks at goose neck. "Over the top" leach line. Like new. Made by Quantum Sails

Staysail: Cross cut by Doyle Sails. Good condition

Genoa: Radial cut by Doyle Sails. Very good condition

Asymmetrical Spinnaker: Tri radial cut by Doyle sails with ATM sock. Very good condition.

Storm Staysail: Crosscut by Relling Sails (UK).

Storm Trysail: Crosscut by Relling Sails. Trysail has its own track on mast. Can be stored in bag loaded on track at foot of mast for offshore passages.

RUNNING RIGGING

Main, genoa and staysail halyards are hybrid polyester/dyneema core, 12mm. SS Lewmar snap shackle ends.

2 x 11mm spinnaker halyards

Spinnaker heel lift, topping lift, fore and after guys 10mm.

Genoa sheets 14mm

Staysail sheets 12mm

Main sheet 12mm

Running backstay tails 10mm.

Reef lines, Cunningham, Main outhaul etc. 10mm.

Jack lines: heavy duty webbing with 6mm Dyneema lines to Carabiner Hooks. 2 x Spinlock harness.

Blocks: 2 x heavy duty Lewmar snatch blocks. 2 x light duty snatch blocks. 3 x blocks with becketts.

Soft shackles and Dyneema stops.

Spare SS shackles and snap shackles.

DINGHY:

Achilles 4 person rigid bottom inflatable with sun cover. Folding transom allows for stowage on aft cabin top.

Outboard motor: Honda 5 HP 4 stroke

ELECTRICAL/ELECTRONICS

All wiring, fuses, breakers and breaker panel replaced in 2016.

House battery bank, 3 x 125Ah AGM batteries
Starting battery, 1 x 95Ah

Solar 2 x 250W modules, each with Blue Sky Solar Boost charge controller.

USB C chargeable reading lights (6), dimmable LED rope lights in saloon, overhead LED main lights (6).

Aims Power 600W (1200W surge) sine wave inverter

Iridium Satellite phone – can be use for calls with correct SIM card and for world wide GRIB forecasts with computer app and data only SIM.

NAVIGATION/SAILING INSTRUMENTS

Standard Horizon Matrix AIS/VHF

Furuno GP-32 GPS

B&G Triton2 wind/depth/speed/heading/gps instruments with chart table and cockpit displays

Icom IC-R75 communications receiver

TANKAGE/PUMPS

Water: 475 liters +/- in 2 tanks

Fuel (Diesel): 200 liters +/- in 2 tanks

Propane: 4 x 10kg. “Big Mama” fiberglass tanks (enough for 6-8 months cooking) with remote on/off solenoid. Stove top is a 4 burner “SMEG” on gimbals.

Fresh water foot pumps (Whale Gusher) in head and galley

Salt water foot pump (Whale Gusher) in galley

Head: Lavac

Showers: Pump-up shower in head, sun shower on deck.

Bilge pump: Whale Mk.5

Spare parts for all pumps.

SELF-STEERING/AUTO PILOT

A lot of work in the design stage of Khaya was put into ensuring the boat could be managed by a wind vane gear. The owners had previous experience with the Aries self-steerer and wanted to use one again. A performance sail boat of over 10 tonnes is towards the upper limit of what one can expect such equipment to manage in all conditions and on all points of sail. Accordingly such things as hull shape, the “lead” of the center of effort over the center of lateral resistance, keel section and plan form as well as rudder location, section, leading edge radius and counter balance were considered. To minimize friction in the connecting lines they are attached to a tiller that points back from the rudder stock. This means that the lines do not have to be crossed.

Whether by luck, divine intervention or skill Khaya is incredibly well balanced under sail in all conditions and on all points of sail. If she has steerage way the Aries manages her without problem to the point that once out of port we disconnect the wheel and steering ram. We are even able to tack and gybe using the Aries. More than any other single attribute this makes Khaya a very special boat. Recently we have purchased a simple Tiller Mate auto-pilot and fabricated points of attachment to the boat and Aries vane holder. Since we so rarely motor we have yet to try it out but are confident that it will work, especially in calm conditions.

KHAYA'S STORY

Khaya was launched in the early summer of 1988. After some sailing trials around the coast of England we left in September for Gibraltar. Predictably we ran into both gales in the Bay of Biscay and dense fog around Cape Finisterre. From Gibraltar we sailed the length of the Mediterranean to the south coast of Turkey where we spent a very enjoyable winter and spring. Before leaving we got a commission to design a pair 68-foot steel ketches for the charter trade. The work went well although time was short as our visas were expiring and I had committed to sailing in an international regatta in Sardinia. The snag was that although we had priced the job in US dollars with a day left on our time the client showed up with 10.5 million Turkish lire in 2 brown paper bags! The Turkish lire is not a hard currency and cannot be exchanged for other currencies. At one point it looked as though we'd be sailing around the Caribbean with “Buy your Turkish Carpets Here” emblazoned on our mainsail.

Since that time we have worked variously in Maine (on 2 occasions, once for Bruce King Yacht Designs on plans for a pair of 130 foot yachts and later as General Manager for Trenton Marine/Able Custom Yachts building both power and sail yachts), Virginia (as project manager for the 2 year construction of a custom cold-molded wishbone ketch at Zimmerman Marine) and more recently designing a handful of off-grid homes in California and Portugal. Khaya has crossed the Atlantic 5 times to date as well as several trips to the South Pacific via Panama, California, Mexico and Easter Island, always with a crew of two.

FAQ's.

What is involved in the maintenance of a boat like Khaya?

As noted above Khaya is built of wood and epoxy using a method known variously as “cold-molded”, “laminated”, “strip planked”, “double diagonal” etc.. All these methods (except strip planked) have in common the use of 2 or more layers of wood glued together. The advent of resorcinol and later epoxy glues made this possible. The advantages of this type of construction are many. For a custom boat like Khaya very little set-up (male or female molds, jigs etc.) that is not part of the finished structure is required, light weight woods that glue well can be used allowing a thicker and therefore stiffer and better insulated panel and the wood grain can be orientated in multiple directions to resist the stresses imposed on the structure by waves, the rig and other “unfair” loads that are inevitable in a structure that operates at the interface of two media (water and air).

This form of construction is quite distinct from conventional plank on frame construction that has been around since Noah built the ark. In this method multiple seams between the planks have to be caulked or splined, strong, heavy and expensive wood species need to be used and diagonal bracing in the hull is frequently needed because the grain of the planks, and thus its greatest strength, is all in the fore and aft direction.

What does all this mean for the maintenance of Khaya? To start with 95% of the upkeep concerns equipment common to all sail boats – systems, engine, shaft and prop, rig and rigging, sails, interior and at some point exterior paintwork, haul outs. Khaya's exterior paintwork is all 2 part polyurethane from Awlgrip. We have resprayed the hull twice in 37 years, the last time in 2016. Twice a year I give the hull a deep wash and then hand apply Awlcare 73240 Protective Polymer Sealer. The deck, gloss areas and non-skid sections were last painted 2 years ago. The mast and spars were re-sprayed in 2016.

Occasional repairs from overenthusiastic visitors or badly executed docking are easy to accomplish with a cold-molded boat, and can best be described by following the steps I took to repair damage caused when an aluminum barge with a transom bow hit us amidships with sufficient force to knock us off our feet. The corner of the bow gouged a hole some 12mm deep over an area of 30cm square, cracking the innermost hull layer. While upsetting at the moment of impact the structural fix was easily accomplished. Using a chisel (a battery-powered router might have been better) I cleaned the damage section back to undamaged wood. From the stock of wood pieces that we carry aboard I cut and planed a piece of Douglas Fir to the correct size being sure to make it a millimeter or two thinner than the space it was filling. Both this piece and the surrounding exposed wood of the hull was treated with a couple of coats of pure (catalyzed) epoxy resin and then the fir piece was glued into place using resin mixed with silica powder to a thickness that ensured it would not run down the hull before hardening. On the inside of the hull I glued a piece of 8mm by 15cm. hardwood spanning between 2 frames. Once painted it blended into the existing interior. Finish work on the hull exterior followed the usual regime of filling (epoxy with low density filler) and sanding followed by a couple of coats of 2 part polyurethane with sanding up to 1500 grit and a quick polish using 3M's Finesse-it. All this work took 3 days of part-time work and was done with the boat afloat in the lagoon of Tikehau.

While we were prevented from visiting Khaya for almost 2 years during Covid she suffered some damage from termites in the front section of the boat. Last year we had the whole boat treated by a professional company giving a 3 year warranty. Infected areas were either removed and replaced with sound wood and epoxy as described above or 6mm holes were drilled to a depth of 12mm into which the treatment was injected. 3 months later these holes were filled with epoxy, sanded flush and painted over.

Concerning the other 95% requiring maintenance: the engine is essentially new with 67 hours on it. The sails are almost new and of very high quality. The running rigging is in very good condition, as is the standing rigging. We will haul, paint the bottom, service the seacocks, Maxprop, rudder bearings etc. in early November of this year (2025) as well as repainting the double white boot stripe and polishing the hull.

Overall Khaya is a simple boat. She has everything necessary for living aboard and crossing oceans without being burdened with unnecessary “luxuries”. This, in part, explains her exceptional qualities under sail. Few cruising sailors realize the repercussions of added weight. These range from poor performance under power and sail, increased motion (pitching and rolling), increased load on the rigging and greater angles of heel under sail.

Does Khaya have a life raft?

We do not. Having started sailing across oceans well before the arrival of GPS, AIS and EPIRBs we have always preferred a more active approach to saving ourselves than sitting in a round raft waiting to be picked up. We understand that with the advent of EPIRBs the chances of that happening are nowadays much greater but remain content with our decision. We do, however, equip our inflatable dinghy with equipment designed to protect us from the elements, catch food and water, have some control over the direction we are moving and attract the attention of any vessel that crosses our path. This is obviously a highly personal decision and easily changed.

Does Khaya have a holding tank?

Again, we do not. When she was launched it was not a requirement and since then we have never been asked about it. Just in case we do have a bucket, seat and trash bags that meet the letter of the law. The head we have is a Lavac that has worked perfectly over many years. We have replaced the pump a couple of times and have a new spare aboard. As with the life raft question it would not be difficult to install a black tank or a composting toilet.

Does Khaya have a water maker?

You guessed it, we do not! What we do have is a good awning with sewn in funnels to catch rain water. The only areas we have ever found this to be insufficient were south west Turkey in the summer and in the southern Bahamas. We have found water makers to be costly in terms of initial purchase, maintenance and power consumption and, for us at least, completely superfluous.