

# **Analytic-10 steel**

## **Steel oceanic yacht**



Steel yacht – most resistant to damage (plastic strains) and easiest to repair after damage (welding)

The yacht is equipped with bow bulkhead

### **Crew:**

- ideal for 3 persons crew (yacht has 3 separate cabins)
- sleeping places for 11 persons
  - forepeak 3
  - mess 4 (2 + 2 unfolded berths)
  - stern 4
- a perfect yacht for one person (in a crew cruise for one person running the boat), including long and difficult cruises
  - the yacht has the simplest possible rigging and reefing system (only three basic ropes: mainsail halyard, mainsail sheet and roller rope)
  - no boom (facilitates sailing in difficult conditions)
  - electric and mechanical self-steering special construction, coupled directly with the rudder

### **Hull:**

- steel, welds of stiffenerings undercut with melting and no lap welding (sheet 5) – therefore there are no cavity sources of corrosion, elements that are welded or screwed to hull are hot-dip galvanised, bottom plating 6mm – twice as thick as required.

no commercial CAD system was used for shell plating spread (comprehensive designing with my own designing software)  
all dimensions of plating (numerical) are made available only to constructors  
body plans are not published  
location centre of buoyancy, centre of lateral resistance and centre of sails are not published  
for those who choose one of the suggested interior layouts ( sheet 1A), all detailed technical drawings of interior elements are made available (for installation of interior furniture and mechanical, electrical, hydraulic and plumbing systems, etc.)

### **Ballast:**

- two bilge keels with lead bulbs supported by angle struts to chine of hull, permanently fixed, but with the possibility of lifting sideways in order to decrease draft of the yacht.

### Application of advantages of the ballast:

permanently fixed for oceanic sailing

fixed at the end of angle struts with one screw only with shear strength e.g. 30kN – after running aground, the screw is cut, the ballast is partly lifted and stays in this position thanks to a special pawl at the end of the angle strut (ballasts lift themselves sideways and remain lifted)

ballast can be lifted (sideways) for sailing shallow waters and canals – the ballast is lifted with any ordinary hoisting winch, fixed between the gunwale and the end of the angle strut (before lifting you have to unscrew the screws that fasten the angle struts)

Easy refloating and little danger during stranding

Ballast lifting system does not occupy space inside the yacht

Ballast keels do not have any integral lifting mechanisms

Ballast keels may have any profile by adding concrete on the surface (on welded reinforcement)

Due to no ballast trunk and special bottom valves, the yacht does not have to be slipped for winter in order to protect it from freezing

### **Rigging – sails and mast:**

- design features only one mainsail, reefed by rolling on a rotating mast in any wind force
- the sail has no boom, but thanks to wide stern it can have wide horizontal trim angle for sailing close hauled, sheet guides make it possible to change also the vertical trim angle
- please note that mainsail without boom is not very aerodynamically efficient with beam winds and wind free, but in such situation its function is taken over by additional sails anyway (e.g. gennaker)
- additional sails: extra emergency mainsail, gennaker (gennaker halyard block and gennaker halyard are lifted on top of the mast with the mainsail)
- carbon epoxy mast filled with foam with designed breaking strength at the deck of approx 800 kNm, rotating, supported on rustproof roller bearings
- roller has two directions of sail rolling (this guarantees proper aerodynamics of the sail on both tacks)
- properties of mast flexibility specifically designed together with the sail to ensure they work together efficiently
- fixing the mast to the hull is designed in such a way that after mounting a simple hydraulic piston and unscrewing fastening screws, the mast can be easily folded and set up by one person

Time necessary to prepare the yacht to go under a low bridge or through canals (reduction of draft and folding of the mast) – less than one hour for one person

### **Stability:**

- CE/A requirements are fulfilled, also with lifted ballast
- thanks to the fact that the mast is filled in with foam, the yacht is entirely uncapsizable (for details see stability diagrams)

All published technological and design novelties are available for constructors and designers, but can only be used with logo: *Analytic-10 steel* + name of a part, e.g. *Analytic-10 steel* Keel, or with source explicitly defined e.g. AnalyticYacht Design... (acronym: AYD)

### **Engine:**

- one or two outboard engines – diesel or petrol (gasoline) (the second one could be also used for the tender)
- after lifting, the engines are hidden under cockpit benches
- engine is connected with the rudder (for better manoeuvring)
- fuel tanks are located in the cockpit

No engine installations inside yacht  
Low noise level inside yacht

### **Cockpit:**

- deck in cockpit area is lowered so that water flows well, also in yacht heeling
- all elements within cockpit (from board to board) are wooden – this gives an impression of sailing on a wooden yacht
- because these elements do not play any role in the stiffness of the hull construction, they can be freely divided into many shallow lockers, tight or drain ones (lockers volume, together with space for engines, c. 4 cubic metres - additional 0.5 cubic metres in bow locker)

### **Anchor:**

- on an extension arm with a roll, all folded into bow locker – after unfolding, the anchor is always ready to let go (no necessity to walk to the bow when letting go or weighing the anchor)
- electric and emergency manual anchor winch drive

The yacht does not have automatic devices or any special mechanisms, which reduces failure frequency, simplifies construction and lowers construction costs

### **Navigation equipment:**

- navigation table ( $\frac{1}{4}$ ) placed in the centre of the yacht, big screen for computer, big displays of instruments (all visible from cockpit), double basic navigational aids, a place for additional notebook
- any chair or seat – fixed or fold-up

### **Steering:**

- lifted rudder

- yoke construction makes it possible to select balancing in order to reduce forces on tiller to minimum

### **Gennaker bowsprit:**

- folded

### **Construction technology:**

- because of plating, solutions are precisely defined; building sequence as follows: first welding of plating, then welding-in the stiffening, sand blasting, painting and equipping
- if standard equipment of the interior is chosen, equipment elements may be built meanwhile of hull construction, which reduces time of investment

Yacht can be constructed on one's own or by a team of specialists in the place specified by an investor

### **List of drawings and comments:**

1. General plan
- 1A. Interior plan
  - version A,B,C, D or an intermediate version can be selected (an already existing yacht can be easily rebuilt to match one of the versions)
2. Hull construction – side view
3. Hull construction – bottom view and top view
4. Hull construction – frames
  - sheets 2, 3 and 4 do not contain lofting dimensions
  - sections of elements of all frames are the same as on the selected frame presented on sheet 4, but the frames are different from each other with dimensions and the manner of connecting them to yacht construction
5. Hull welding method
  - sections and strength of all welds not indicated on drawings should be not less than these presented on sheet 5
6. Ballast – side view
7. Ballast – front view (starboard ballast – position after lifting)
8. Steering gear
9. Mast
10. Deck plan
11. Classification dimensions and dimensions adopted for calculation purposes
12. Destructive forces – calculated from sections area and resistance of materials
13. Stability curve
14. Electric installation diagram
15. Pipes-lines diagram

#### Planned certificates:

1. CE/A
2. Germanischer Lloyd – GL Yacht Plus

The design will be available for constructors after a prototype has been made and certificates obtained

Please direct all questions and comments to discussion forum [www.](#)  
in: