

# Francis Drake

## Fiberglass Bill of Materials

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All lumber used should be first grade free from knots, shakes, or other defects. Lumber typical to the locale and proven in use on boats in the locale may be used. Suitable woods include white oak, mahogany (both Philippine and Honduras types), Sitka spruce, Douglas-fir, longleaf yellow pine, Port Orford cedar, apitong, and teak. All lumber thickness specified is standard lumberyard stock finished as full as possible except for stock noted "net". For example, stock listed 1" is purchased as "four quarters" stock which will finish from 3/4" to 7/8" in net thickness. All widths are noted as net. An exception is material which is listed 2" or thicker, which will usually finish less in both thickness and width dimensions. Grouping lumber and purchasing random-random material to resaw to the required size will result in considerable savings. All wood must be checked to the work for accuracy. All plywood must be intended for marine or exterior use. Interior grades are not acceptable. The marine grade core features solid inner plies, while exterior plywood cores may have inner voids not apparent to the eye. In most cases, the glues used in both types are the same waterproof variety. All plywood is preferably five ply type if available with the best face being used for the exposed surface. Douglas-fir plywood is acceptable for all plywood, although various hardwood veneer types can be used alternately.

**MATERIALS-FASTENINGS & METALS:** All fastenings should be non-corrosive type. Screws as noted are the flat head type, while nails should be the annular ring shank nail commonly used in boatbuilding. Screws should be hot dipped galvanized or silicon bronze, while nails can be Monel or bronze type. Electroplated steel which will rust and low strength brass fastenings should not be used. For a boat which will remain in salt or brackish water for a considerable length of time, bronze fastenings are recommended. For a boat which will not remain in salt water or will be trailered, hot dipped galvanized fastenings can be used. Stainless steel can be used for the various sail hardware items although some grades of stainless steel are not highly corrosion resistant. Dissimilar metals (such as bronze and aluminum) should not come in contact with one another, especially where they will be immersed in salt water.

**HULL CONSTRUCTION MATERIALS:** The following list of materials used in the construction of the basic hull is based on the square footage of the actual hull. It is not possible to accurately calculate the materials that will be required when building a hull using fiberglass materials. There are several reasons for this limitation. First, fiberglass materials come in not only varying weights but

also various widths which will vary not only the lengths of a given width that will be required, but also how the widths of material will be utilized in the actual lay-up in the construction. Also, the fact that joints in the material will require staggering in many cases will vary the amount used. Another nuance is the fact that additional layers of material will be required in some areas and not in others. Of course, there is the chance that some material will be wasted as well. Also, it is not possible to accurately determine how much resin will be required. It is possible to accurately determine how much resin SHOULD be used to obtain the ideal resin/glass content, but this figure will not include lost resin from running off during application, or wasted resin which can set up before being used. The figures listed for both fiberglass material and resin take these factors into consideration and allow some degree of extra material, however, it is highly probably that the builder will require more materials than listed due to these variables. For these reasons, it is recommended that the builder use the list as a general guide only. Resin is best purchased in bulk quantities for a boat this size, starting off with one drum of resin initially and using this amount before buying more resin. Similar statements are applicable to the fiberglass planking and the foam material, although to a lesser degree. The figures listed include an overage factor, however, much will depend on how the builder utilizes the material as well as the sizes purchased. The listing includes materials for the basic hull only and does not include any material used for the internal cabin structure or joinery work due to the possible variations which may be desired by the builder. In many instances, a portion of the laminate will state "or equivalent". This statement means that any combination of fiberglass material may be used as long as the total weight of fiberglass material used is the same.

### **HULL MATERIAL LISTING - FIBERGLASS PLANKING METHOD:**

- Fiberglass planking "CF-65", 12" wide: 500 lineal feet
- Fiberglass mat 1 oz per square foot: 3300 square feet or 206 lbs.
- Fiberglass woven roving 18 oz per square foot: 2800 square feet or 350 lbs.
- Polyester resin with catalyst: 2 drums (55 gal size or approx. 1000 lbs net) plus approx. 20 gals (200 lbs.) non-thixotropic laminating resin for initial coat on fiberglass planking.

### **HULL MATERIAL LISTING - FOAM SANDWICH METHOD:**

- Foam material (PVC) 5/8" thick x 3' x 6': 28 sheets
- Fiberglass mat 1 oz per square foot: 3000 square feet or 188 lbs.
- Fiberglass woven roving 18 oz per square foot: 2400 square feet or 300 lbs.

- Polyester resin with catalyst: 2 drums (55 gal size or approximately 1000 lbs net)

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## Francis Drake Plywood Bill of Materials

The following list of materials is intended to be a general guide only. Before ordering any materials, the text and plans should be checked for possible options. All lumber listed as 1" stock is to be standard "lumberyard four-quarter" material which when finished may vary to somewhat less or slightly more than 3/4" in thickness. All widths are NET and all lengths allow for cutting to fit. Grouping lumber and purchasing random-random material to resaw to the required size will result in considerable savings. All lumber used should be first grade free from shakes and knots. Lumber typical to the locale and proven in use in boats in the locale of similar type and size can be used. Suitable woods include white oak, mahogany (both Philippine and Honduras types), Sitka spruce, Douglas-fir, longleaf yellow pine, Port Orford cedar, apitong, and teak. All plywood (PW) is to be marine (MAR) or exterior (EXT) grade. The marine-type is preferable as the inner cores are solid and thus the panel has more structural integrity. Douglas-fir (DF) is satisfactory with the quality of the exposed faces of the veneer being designated by the letters "A" or "B". The "AA" grade panels are always preferable, however, "AB" grade is acceptable. All plywood should be a minimum of five plies, if available. All fastenings should be bronze or hot dipped galvanized ferrous metal. Brass fastenings are not advised nor are the electroplated screws commonly sold in hardware stores. All screws are to be of the flat head type intended for wood. All nails are of the ring-type nail common to boat construction. Unless otherwise specified, all wood-to-wood joints are to be glued with a waterproof or highly water resistant glue such as plastic resin, resorcinol, epoxy, or other equivalent type used per the manufacturer's instructions regarding temperature, clamping requirements, curing time, and mixing method.

ITEM	SIZE	LENGTH OR NO. RQD.
<b>LUMBER:</b>		

Framing members	1" (four-quarters) random-random stock in as long of lengths as possible at least 6" wide, preferably much wider - 150 bd. ft. 1-1/4" (five-quarters) - 20 bd. ft.	
Keel	1" x 12" x 21'	3 required
Keel appendage	1" x 10" x 450 lin. ft <b>OR</b> 2" x 10" x 225 lin. ft.	
Longitudinal battens	1" x 1-1/2" x 30'	18 required
Sheer clamps	1" x 3" x 31'	4 required
Floor timbers/Frame #4 & #5 laminations/motor beds bowpiece	2" (eight-quarters) - 30 bd. ft. 3" (twelve-quarters) - 145 bd. ft., random-random stock with some widths to 12"	
Bowsprit	4" x 4" x 8'	1 required
Mooring bitts	2" x 4" x 10'	1 required
Sheer cleats	1" x 2" x 31'	4 required
Bulwark cap	1" stock of width to suit curvature	70 lin. ft.
<b>PLYWOOD:</b>		
Hull planking	1200 square feet 1/4" plywood	

Structural bulkheads	5/8" x 4' x 8'	8 Sheets
Stem/breasthook/ transom/ floor timber Frame #7	3/4" x 4' x 8'	3 Sheets