



Bristol Yachts Screening formula results

This page contains the calculated results of various screening formulas. Included are Displacement/Length ratio, Sail Area/Displacement ratio, hull speed, velocity ratio, ballast ratio, capsizes risk and comfort factor.

This work was started by [Mr.Holtrop](#), who characterized over 600 boats in a spreadsheet, I added several of the Bristols and will compare them against some other boats below.

DISPLACEMENT / LENGTH RATIO = $\text{disp.}/2240/((.01*\text{lw}^3))$ Dimensionless, if you ignore the constant "2240" than converts displacement. to long tons. ".01" is another constant that scales the result. Probably the most used and best understood evaluation factor. Low numbers (resulting from light weight and long waterlines) are associated with high performance. Cruising designs begin around 200 and can go up to the high 300's. Many racing designs are below 100. The general trend for new designs is towards performance.

SAIL AREA / DISP RATIO = $\text{sail area}/(\text{disp}/64)^{.666}$ Dimensionless. "64" converts displacement, to cubic feet . This is basically a ratio of power to weight, calculated using a 100% jib. Most monohull designs range between 16 to 18. Racers can be much higher, motor sailors lower.

HULL SPEED = $1.34*\text{lw}^{.5}$ Dimensions of "Length" to the 1/2 power. Another empirical formula, generally regarded as the most practical velocity for a displacement boat (in KNOTS) assuming a reasonable power input (2-3 hp per ton). The higher the speed, the "longer " the hole the boat makes in the water. A short boat falls into this hole at lower speeds. An enormous amounts of power (50-100 hp / ton) is required to "climb out" of this hole and transition to higher speeds (planing).

VELOCITY RATIO = $1.88*\text{lw}^{.5}*\text{sail area}^{.33}/\text{disp}^{.25} / \text{hull speed}$ Dimensionless. The numerator of the equation calculates potential maximum speed, using an empirical relationship. Boats with a generous sailplan and light displacement will have a velocity ratio greater than 1. Under powered or heavy boats will be less than 1.

BALLAST / DISP = ball/disp Dimensionless. One indicator of stability, but the center of gravity, center of buoyancy Vs heel angle, and total weight is needed for a complete picture. Values range from a low of 0.25 to a maximum of 0.5.

CAPSIZES RISK = $\text{beam}/(\text{disp}/9*64)^{.333}$ Dimensionless. An empirical factor derived by the USYRU after an analysis of the 1979 FASTNET Race. The study was funded by the Society of Naval Architects and Marine Engineers. They concluded that boats with values greater than 2 should not compete in ocean races. Values less than 2 are "good". The formula penalizes boats with a large beam for their high inverted stability, and light weight boats because of their violent response to large waves. Some modern coastal cruisers and many racing designs have problems meeting this criteria.

COMFORT FACTOR = $\text{disp}/(.65*(.7*\text{lwl}+.3*\text{loa})*\text{beam}^{1.33})$ Dimensions of "Length" to the 2/3 power. An empirical term developed by yacht designer Ted Brewer. Large numbers indicate a smoother, more comfortable motion in a sea way. The equation favors heavy boats with overhang and a narrow beam. These are all factors that slow down the boats response in violent waves. This design philosophy is contrary to many modern "racer / cruisers", but it is based on a great deal of real blue water data, not just what looks good in a boat show. A value of 30 - 40 would be an average cruiser. Racing designs can be less than 20, and a full keel, Colin Archer design, could be as high as 60.

Screening Formula Results

Model	Displacement/ Length	Sail Area/ Displacement	Hull speed	Velocity ratio	Ballast/disp	Capsize risk	Comfort
Bristol 24	446	14.52	5.7	1.06	0.51	1.71	28.6
Bristol 27	382	13.87	5.96	1.04	0.39	1.65	29.1
Bristol 29.9	279	14.89	6.56	1.06	0.42	1.92	23.5
Bristol 30	316	15.62	6.4	1.08	0.41	1.74	27.2
Bristol 32	482	15.47	6.29	1.07	0.37	1.63	35.4
Bristol 35	417	15.83	6.53	1.07	0.42	1.67	33.3
Bristol 35.5	322	15.55	7.03	1.06	0.43	1.70	32.5
Bristol 39/40	377	16.49	7.03	1.08	0.37	1.59	37.1
Other boats:							
Alberg 35	407	16.16	6.56	1.08	0.42	1.61	34.7
Hinckley B-40	370	15.85	7.2	1.06	0.33	1.68	35.5
Catalina 30	291	15.22	6.7	1.06	0.41	1.94	24.7
J-24	161	19.84	6.07	1.20	0.31	2.39	11.9

So, what does this mean?

Basically, the Bristol 39/40 will be a stiffer boat than the famous Hinckley B-40, and more comfortable in a seaway too. All the Bristols have lower capsize risk than the J-boat, but they also will not surf as quickly (or at all). Most of the Bristol designs follow this characteristic. I have included several other boats at the bottom for comparison against common designs or benchmarks. Hopefully this will provide owners or potential owners with a way of judging the boat's potential sailing characteristics. As always feel free to

contact me to reference another boats characteristics, be it a Bristol or another manufacturer.
Douglas Axtell

You are visitor number



[Home](#)