

THE HISTORY OF PHRF

Before 1976, cruising yachts raced under various handicap measurement rules. Each rule used a formula to predict the potential speed of the yacht compared with the speed of the others. The calculated result was the yacht's rating in equivalent feet. This was used to determine the time allowance handicap. Most measurers charged fees, and the classes charged fees for running the rating calculations. Some of the rules also required the yacht to be lifted out of the water and weighted. This improved measurement accuracy but added to the cost.

When yachts are similar in design, a simple rule with few measurements can be equitable. As boats vary more widely in their design, a fair rule becomes more complex and difficult to develop, requiring more measurements and becoming more expensive for the owners. Good yacht designers study measurement rules to find ways to design yachts that are fast but appear slow to the rules. To correct the handicaps of such "rule-beaters" requires adjustment of the rule. Most any adjustment affects not only the rule-beater, but all other yachts in the class as well, sometimes unfairly or contrary to the intent of the rule makers.

What was needed was an inexpensive handicapping system that could correct the handicaps of individual rule-beaters without affecting other yachts in the class. The boating industry expanded rapidly during the 70's. Low maintenance fiberglass boats were built by the thousands, hundreds out of the same molds. The number of new sailors racing increased just as rapidly. Many of them came from one-design day sailor fleets. They did not understand the measurement rules and they didn't want to spend a lot of money on ratings. They simply wanted to get out on the water and race. Many of the "old salts" as well were tired of the expense and complication of the measurement rules.

In Southern California a group of yachtsmen developed a new approach to handicapping, and organized the Pacific Handicap Racing Fleet. The British were already using the Portsmouth Yardstick system of handicapping different classes of day sailors to facilitate their racing together. Portsmouth numbers were assigned on the basis of observed performance. Similarly, the Pacific Handicap Racing Fleet assigned handicaps to classes of cruising boats based on observations of actual performance, instead of operating on measurement or design information. They made supplemental use of the same measurements when performance data was not available, but not in a rating formula. The system was inexpensive, easy to administer, and produced ratings quickly. The method of rating yachts became popular and spread to other parts of the country, where "Pacific" in Pacific Handicap Racing Fleet was changed to "Performance" to become Performance Handicap Racing Fleet, which we now know to be PHRF.

PHRF is a locally administered handicapping system that uses the perceived speed potential of a yacht as the basis for the handicap. An initial handicap is assigned based on comparisons with similar yachts. The handicap may then be adjusted based on the performance of the class of the yacht. In most fleets there is no credit for lack of sailing skill or boat preparation. The handicap is based on the yacht being sailed by a top notch crew with the best equipment. The PHRF system handicaps yachts, not sailors.

PERFORMANCE HANDICAPS

Performance handicaps are not measurement ratings. Each reflects an estimate of a sailboat's speed potential of a boat determined as far as possible on knowledge of previous racing experience supported by a consensus of the effect of differential hull and rig parameters. Performance handicaps are arrived at through an empirical process based upon observation and analysis of race results. It is the intent of the performance handicapping process to produce a relative measure of speed such that any well maintained and well sailed boat has a good chance of winning a race. Therefore, performance handicaps are adjusted on the basis of a boat's performance so that each well sailed boat has an equivalent opportunity to win. This is the fundamental concept of performance handicapping for both monohull and Offshore multihull racing/cruising sailboats.

Performance handicaps are not intended to reflect skipper and crew capability. Handicaps are not adjusted to encourage a poor or careless skipper, and conversely no handicap adjustment is made to penalize proficiency. The intensity of competition and the influx of new and aggressive sailors require each skipper to maintain consistently high performance in order to place well. The performance handicapping process for either monohull or Offshore multihull categories does not produce measures of speed potential so they may race equitably in the same section over an identical race course. Monohulls and multihulls may not race competitively against one another.

Performance handicaps are assigned locally or regionally by a Performance Handicap Racing Fleet. (PHRF®). Each local or regional PHRF® organization issues and validates handicap certificates according to the rule and ASSOCIATED regulations described in this document. Some PHRF® organizations may also sponsor and manage races, but this is not a requirement for a certificate issuing body.

THE PHRF RULE AND MONOHULL AND MULTIHULL BOAT DESIGNS

The PHRF® is an open rule. There are few national hull or sail restrictions other than those consistent with standards of safety for offshore monohulls or multihulls. This means that monohulls must be self-righting and multihulls must be positively self buoyant or unsinkable. There are no other fundamental limitations on ingenuity other than those contained in the US SAILING (formerly USYRU) rules. Class restrictions may be applied locally but are not a matter for national policy.

Well designed and constructed boats are expected not to be made obsolete by newer designs under PHRF®. PHRF® does not use measurement to determine base handicaps. As faster designs appear, they are handicapped accordingly. Therefore, one of the major benefits of the PHRF® system is to provide handicaps such that older boats can race competitively with the latest designs.

PHRF® discourages "rule beating." If a skipper modified his boat, PHRF® will attempt to compensate for the new speed potential. The use of taller masts, longer spinnaker poles, extra ballast, gutted interiors or other modifications intended to increase speed are compensated for by the rating assigned.

IS PHRF REALLY FAIR?

This is the bottom line question and the answer is yes or no, depending on your particular philosophy, "Yes" if you can afford or wish to spend enough money to equip your boat as well as the best in the fleet, and "no" if you are racing with equipment that is not as up to date or extensive as your competition and expect to beat them on a one to one basis. As well, in common with every other rating system, *PHRF makes no allowance for racing ability.*

EQUIPMENT

PHRF® assumes that a boat is equipped to race. It does not attempt to rate a partially equipped boat, or a boat which differs from others in its class, in that it is unusually heavy, out of balance, or has unusual windage (as from a dinghy on davits). However, if the basic hull and rig differ from others in its class, it will, of course be rated uniquely. In 2006, SBCC instituted a correction for boats that are equipped for cruising and race in this 'cruise equipped' configuration. See section M for specifics.

BASE PERFORMANCE HANDICAPS FOR MONOHULLS AND OFFSHORE MULTIHULLS

PHRF® ratings are expressed in seconds per nautical mile to be deducted from elapsed times to produce corrected times. The higher rating indicates the slower boat. *In the South Bay Cruising Club, monohulls and multihulls cannot be scored in the same division. If needed, another class will be provided, and will follow the same guidelines as the monohulls.*

PHRF® time allowances are not related to other systems.

PHRF® base handicaps are made on the assumption that:

1. the spinnaker pole length is equal to "J",
2. the spinnaker maximum width is 183% of "SPL",
3. the spinnaker maximum length is equal to 95% of the length of the jibstay i.e., .95x
4. the genoa LP is between 150% and 155% of "J" (unless the stock boat configuration is with a different size jib. See section J),
5. number of battens and length of battens are restricted by class rules or as permitted by PHRF® fleet rules,
6. the boat is in racing condition, (Changes to the 2006 SBCC HC allow corrections for 'Cruising Boats that Race'. See relevant section near the end of this document).
7. the boat has a folding or feathering propeller, a two bladed solid propeller in an aperture or a retractable outboard motor, and
8. the hull and appendages are unmodified.

CHANGES TO DESIGN OR EQUIPMENT

A skipper may experiment with different ways of improving the performance of his boat. If there are changes to the hull, rig, sails or other factors upon which the existing rating is based, they must be reported to the handicapper for evaluation. If possible deviations on the part of the owner become apparent; other contestants are urged to appeal to the area handicapper.

EXPRESSING HANDICAPS

The handicap of an individual boat is expressed in seconds per nautical mile. The smallest increment of performance normally used for rating is 3 sec/mi. Observations of numerous races show that it is impossible to spot a boat's potential speed or performance more accurately than this because of the multiple factors involved. Differences in skipper and crew skill represent a much larger factor than 3 sec/mi.

Because headsail size has so much to do with boat speed, SBCC PHRF® uses this factor as a means of handicapping. Boats are rated for use with large or small headsails with 155% of LP being the dividing line (see section J for exceptions). Once a boat is rated with a large headsail, this rating must be used, even though wind conditions may preclude use of the sail. A skipper is not allowed to have his boat re-rated frequently by choosing his headsail to fit expected race conditions. Maintaining the proper LP on file will be done by an annual declaration of LP certificate and therefore renew and update the yachts existing SBCC PHRF certificate on file.

HANDICAPPING PROCEDURE

A new boat in an established class is given the rating for the class. Adjustment may be made for any deviation from the class. If adjustments are made, an indication is made in the handicap record that the boat is not a standard class boat.

- For new classes and "one-of-a-kind" boats, the rating is determined on the basis of comparison with similar boats with established ratings. Comparison is made considering type of design and principal dimensions. The rating is assigned conservatively, and is adjusted as performance data becomes available. These ratings will be maintained by the Handicap and Measurement Chairman and Committee and adjusted as needed. Reviews and monitoring will be frequent and initiated by appeal or request by SBCC members.

PHRF SBCC utilizes a valid computer scoring program providing analytical methods to calculate race results and to collect statistics by boat class. Each class is handicapped against the performance of the fleet as a whole and the handicap raised or lowered as required for good racing. However, winning races does not automatically lead to an adjustment of the handicap.

APPEALS

Formal appeals of ratings are made to the local Board of Handicappers and are considered in their meetings. A skipper may appeal his own, or others' ratings. The appellant sets forth his views in writing, and documents his case with supporting information. When the appellant is not satisfied with the resolution of the appeal, a national appeal may be invoked when both the local fleet and appellant agree to abide by the national appeal procedure elsewhere described.

ADJUSTMENTS

The following are adjustments that the South Bay Cruising Club (SBCC) normally makes to a base boat for non standard equipment. The base boat is assumed to be in as-built configuration with a 153% to 155% genoa, a spinnaker/whisker pole length equal to J, a spinnaker width equal to 1.8 times J, a spinnaker height equal to .95 times the square root of I squared plus J squared, (or .95 times the headstay length) and either a folding or feathering propeller on an exposed shaft, or a two bladed solid propeller in an aperture, or a removable/retractable (tilting) outboard motor. Sport boats will be handicapped in the configuration as built by the manufacturer and handicapped with standard class sails defined by their governing authority. Variations from the class standard will have a handicap adjustment.

"WHAT IS A "STANDARD BOAT"?"

A standard boat is basically an unmodified boat with PHRF "standard equipment" (defined later). It is possible however, that a boat may not be considered "standard" even if it hasn't been modified. What can happen is that the first boat rated becomes the standard by default and subsequent boats, even if completely unmodified, may be slightly different and therefore not considered "standard".

For example, later built boats might have improvements that change the rig or hull. It's common to have a variety of mast heights for a single type of boat over five or ten years of production. If the later boats still fit in within acceptable tolerances they may be considered standard, but if a significant change occurs, a new class category is generally initiated. We have had, for example, two versions of C&C 25's, C&C 30's, C&C 35's and three types of Catalina 30's and countless varieties of O'Day's, Hunters, and Morgan's with vague descriptions. Unfortunately manufacturers do not generally publicize these manufacturing changes so PHRF Handicappers must continue to come on board to make measurements just to keep the "standard" up to date or identify the correct boat.

A modified boat is a standard boat that has been changed in some way that might affect its performance. Some boat "modifications" are ignored by SBCC PHRF and some require that a rating change be considered.

Some of the modifications which must be considered are:

- 1.Modification to the shape of the hull, keel, or rudder.
- 2.Changes to the sailplan. This includes larger sails and bigger spars.
- 3.Structural changes that affect boat height or weight distribution
- 4.Changes in mechanical propulsion.(Changes from gas engine to diesel or inboard to outboard)

Boat modifications that are generally not considered are:

- 1.Headfoil systems.
- 2.Fairing and smoothing of the bottom.
- 3.Addition of sail handling gear such as winches, blocks, line material, sail track, or genoa tracks.
- 4.Additional sails no bigger than the maximum standard.
- 5.Sail material such as Mylar, Kevlar, Dacron, etc.
- 6.Cosmetic changes to the hull, interior, or rigging of the boat not affecting the speed of the boat.

IF THE BOAT DIFFERS FROM THE BASE BOAT, THESE ADJUSTMENTS APPLY -

A. Adjustment is based on the largest jib and is determined by the **LP/J** ratio stated as a percentage (See section J for exceptions) - This table is based upon boats that are designed for a nominal 150% LP.

LP / J %	Adjustment Code
> 175 - 185%	-9 sec.
> 165 - 175%	-6 sec.
> 155 - 165%	-3 sec.
> 145 - 155%	+0 sec.
> 135 - 145%	+3 sec.
> 125 - 135%	+6 sec.
> 115 - 125%	+9 sec.
> 105 - 115%	+12 sec.
> 105 and less	+15 sec.

*NOTE: No headsails may be set to extend aft of the **LP** line used to establish the handicap.*

B. Spinnaker

Adjustment is normally based on the largest spinnaker and determined by the **SMW/J** ratio stated as a percentage.

SPIN %	Adjustment Code
228.1 and higher	-12 X
213.1-228.0	-9 V
198.1-213.0	-6 U
183.1-198.0	-3 T
168.1-183.0	0 S
Asymmetrical	0 A
No spinnaker	0 N

NOTE: If the spinnaker pole (SPL) is greater than J, then the SPIN % is equal to SMW / J or $1.8 \times SPL / J$ whichever is greater. Asymmetrical Spinnakers may be used as spinnakers without penalty providing the following conditions are met and they otherwise meet the existing standards for spinnakers. Sails not complying with these conditions may in some cases be permitted with appropriate penalties if:

1. The average of the lengths of the luff and leech do not exceed the luff length permitted for a standard spinnaker (95% of the square root of I squared plus J squared).
2. The girth at any height in the sail, found by measuring between points on the luff and leech that are equidistant from the head, does not exceed the girth permitted for a standard spinnaker ($1.8 \times J$).
3. The point at which the sail is tacked is not at a greater distance from the mast than the value reported for SPL on the certificate.
4. The SBCCPHRF Committee is notified that such a sail is being used.

C. Mast and or Boom –

The effect on performance of changes from standard rig dimensions varies from boat to boat to so great an extent that no rational table of rating changes based on rig size can be formulated. Accordingly, these changes are treated on a case by case basis. If your boat is one of a class and your rig differs from the standard for that class, you must notify the Committee of that fact. If you have a custom boat and your rig is changed from that described on your rating application, you must notify the Committee of the changes. A "change" refers not only to length, but also to material, weight, wire size, number of spreaders, diameter, etc...These changes will be reflected in the SPECIAL area of the Handicap Certificate.

Both I and E increased Adjustment M Code

Standard Rig	0	S
0.5% to 3%	-3	E1
3.01% to 5%	-6	E2
5.01% to 7%	-9	E3
7.01% to 9%	-12	E4
9.01% to 11%	-15	E5
11.01% to 13%	-18	E6
13.01% to 15%	-21	E7

Increase in Boom Length Adjustment B Code

Standard Boom	0	B0
0.5% to 10%	-3	B1
10.01% to 20%	-6	B2

It is intended not to give credit for minor reductions in sail area. Therefore credit will not be given unless a significant reduction is made. An example would be that you would have to reduce the boom length (mainsail foot) by at least 5% to get a credit. The value will be decided on a case by case basis.

D. Propulsion -

Prop Installation Adjustment Code

Folding/Feathering Out of Aperture 0 FF

Fixed 2-Blade In Aperture +3 2A

Outboard Retracted When Racing 0 OB

Outboard Not Retracted +12 OF

Fixed 2-Blade Out of Aperture +6 2F

Fixed 3-Blade In Aperture +6 3A

Fixed 3-Blade Out of Aperture +12 3F

Non-Standard *As estimated by handicapper.* NS

Crew Weight -

Although added crew weight is an advantage upwind when the wind is up, that same crew weight can be a disadvantage downwind. The intent of SBCC is to encourage participation in racing and cruising and to this end we do not want to discourage skippers from bringing additional crew (and perhaps encouraging future new members).

For this reason, there is no limitation on number of crew or crew weight.

F. Roller Furling Adjustment -

Limited sail inventory on jib roller furling, +6. The boat must have a working roller furling system with the sail tack and head attached to swivels and above deck drum are required. The largest headsail must be flown from the roller furler. If the drum is below deck, the credit will be halved. Boats that come with built in roller furling, as in many sport boats, are not eligible for this credit. In cases where the intent of this adjustment is not honored, the credit will be denied. The credit may also be reduced on performance oriented boats to 3 seconds per mile. *As a rule of thumb, the foot skirt should not exceed 3 percent of the foot length in depth.* If the boat is cutter rigged, the staysail must also be roller furling and be capable of being used upwind.

R0 = no roller furling adjustment.

R3 = +3 sec adjustment.

R6 = +6 sec adjustment.

G. Roller Furling Main Adjustment

Main with no battens or positive roach +6sec code = M6

Main with battens or extra large roach +3sec code = M3

M0 code = no adjustment.

H. Hull/Ballast Changes/Interior Modifications/Shoal Draft Version of STANDARD RATED boat not already handicapped or listed-

On a case by case basis. It will be assumed that the modification was made to improve speed. Contact SBCC measurer if you feel your rating should be modified.

A staysail is allowed on a normal cutter rig. The cutter rig staysail **must** be used up wind. As only one headsail at a time may be flown by a sloop, a staysail shall not be flown by a sloop.

I. Asymmetrical Spinnakers

If part of standard boat configuration 0

In addition to a symmetrical spinnaker 0

If only spinnaker on boat and flown from bow without pole or sprit (May be attached to headstay or Jib tack fitting)

This credit is **lost** if a spinnaker pole is carried on board. +9 (K)

If sprit added to conventional boat -3 per 10% J increase

SL = average of SLU and SLE (Does not apply to boats where this spinnaker is standard.

Maximum width = $1.83 \times JC$ (Does not apply to boats where this spinnaker is standard. Sport boats are handicapped with the largest class spinnaker.

Minimum mid girth, mid leech to closest luff point = $.75 \times \text{max width}$

Boats that have an asymmetric spinnaker as standard will be handicapped in the class configuration. Variations from the class standard will have a handicap adjustment.

J. PERFORMANCE BOATS

Defining just what a performance boat is a problem. Sport boats usually have the following characteristics, among others:

1. Displacement-Length Ratio less than 100
2. Upwind Sail Area-Displacement Ratio greater than 30
3. Downwind Sail Area-Displacement Ratio greater than 75
4. A sprit length greater than 50 percent of J

The above four criteria are guidelines. There can be exceptions, one way or the other, from these criteria. The bottom line is that if it looks like a duck and quacks like a duck, it might be a duck. Sport boats do not follow many of the guidelines used to handicap boats. Sport boats are handicapped in their "as presented" configuration, whatever it is. Their handicaps reflect the type boat they are and need no further corrections to their handicap and are generally handicapped through experience and observation. Ratings include spinnaker and jib sizes as well as mainsail girths that are standard to their class. The base handicaps will be with the class spinnaker, with the exception of the J-80 where the "jumbo" spinnaker is considered the base spinnaker and working jib base headsail. If a change is made in this configuration, it must be reported to the Chief Handicapper.

K. SAIL MEASUREMENT LIMITATIONS AND RATING CERTIFICATE FILINGS -

The ratings assigned by the PHRF Committee assume that sail dimensions and Hull information not specifically stated on the certificate conform either to the yacht's class or to limitations that have long been standard in all measurement rules. Any departure from these limitations amounts to a change from the standard or norm. Therefore notice of the departure must be given to the Committee. Omissions will result in a default listings of standard specifications and may not reflect your yachts rating adequately.

In the case of yachts not belonging to a one-design class, attention is specifically directed to the following:

- * Mainsail headboards may not exceed in width the greater of 6 inches or 4% of E.
- * Mainsails and mizzen may have no more than four battens, approximately evenly spaced along the leech. The top batten may not exceed 10% of E plus one foot, or 21% of E, whichever is greater. The bottom batten may not exceed 10% of E plus one foot, or 25% of E, whichever is greater. The middle battens may not exceed 12% of E plus one foot, or 34% of E, whichever is greater.
- * Mainsails with full battens are allowed without penalty if the roach of the mainsail has not been increased from the roach of a mainsail with battens as described in paragraph above.
- * The SL may not exceed 95% of the square root of the sum of I squared plus JC squared.
- * A sail may not be measured or used as a spinnaker unless its mid-girth is at least equal to 75% of its foot length.
- * A sail may not be measured or used as a jib unless its mid-girth does not exceed 50% of its foot length, and the length of any intermediate girth does not exceed a value similarly proportionate to its distance from the head of the sail.

L. SPINNAKER LIMITATIONS -

Jib Limitations: Non-spinnaker racing is defined, for this purpose, as prohibiting the use of any headsail whose mid-girth (mid-luff to mid-leech) measurement is more than 50% of its foot measurement. Except when changing headsails, participating yachts may not fly more than one headsail at a time. (Yachts that are permanently cutter rigged may fly their staysails.)

M. PROPER RACING TRIM -

Yachts shall race as rated with at least all the equipment and furnishings supplied as standard by the manufacturer. A yacht that has altered in a way that improves the speed potential has an obligation to notify the handicap committee.

N. OWNERS OBLIGATION TO DISCLOSE ALTERATIONS -

SBCC PHRF ratings are based on information supplied to the SBCC PHRF Committee by the boat owner. The success of the program is entirely dependent upon the integrity of the participants. In signing an application for a rating, or for the renewal of a rating, the owner attests to the accuracy of the information supplied. Any subsequent changes in the boat or alterations in that information must be reported to the Committee.

Changes to the Handicap Information, Rating Systems and Scoring Programs will be published as needed, and may change as required to continuously maintain fair and equitable racing and the needs of our members. Updates will be published in the Masthead, as well as current handicap lists. Any questions should be directed to the Handicap Chairman or the Regatta Chairman for review.

O. CRUISING BOATS THAT RACE

1. Many of the SBCC boats are continuously outfitted for cruising and/or rendezvousing. These boats will have cushions and bedding on-board, at least two adequate anchors, have at least a half tank of water and a half tank of fuel. In addition, they normally have a well-stocked galley. For these boats, the SBCC offers a handicap adjustment of +3 seconds for boats up to 30' and +6 seconds for boats greater than 30'. This adjustment can be requested from the handicap committee and if granted will be denoted with a '-C' code. To be eligible the boat must fit all of the following criteria while racing. In cases where the intent of this adjustment is not honored, the credit will be denied.

- Fresh water tanks and fuel tanks filled to at least ½ capacity. Only the standard size tanks are considered. Extra tanks do not have to be used in the calculation.
- At least two substantial anchors on board (not aluminum anchors).
- The normal assortment of pots, pans, dishes, serving wear on board.
- The galley stocked with the normal provisioning expected to be on a cruising boat.
- The boat must sit below the designed waterline mark.

P. DEEP DRAFT BOATS

Boats that can not normally get up to hull speed because of the mismatch between their draft, displacement and the depth of the water in the bay will be given an adjustment. This is denoted by a '-D' code. Boats 36' and over will be assumed to fit in this category and will be given the adjustment. Vessels that are over 40' will be given a +6 sec adjustment and boats between 36' and 40 feet will be given +4 seconds, Boats 30' or less overall and 'Sport Boats' will not be given this adjustment. Boats over 30' and less than 36' will be done on a case by case basis. If you feel that you qualify please contact the handicap committee. This adjustment is only given for races conducted on the Great South Bay. For ocean races this adjustment will not be used.

Q. PROVISIONAL HANDICAP

A provisional handicap can be applied for by the skipper of any boat that has not placed in a race according to SBCC club rules in the last 2 years. The adjustment will be +6 sec. Upon placing in any race the provisional handicap will be removed. The designation for a provisional handicap is '-P6' code.

R. SUMMARY OF ADJUSTMENT CODES

The handicap code can be analyzed, with the help of the table below, as follows:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

S	F	F	R	0	S	-	D	C	/	M	6	K	B	1	E	4
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

The first character is for the jib adjustment (see section A).

The next two characters (position 2 and 3) are for the propulsion correction (see section D).

Positions 4 and 5 are for the roller furling headsail (see section F).

Position 6 is for the spinnaker adjustment (see section B).

After position 6 there may be fields denoted by a hyphen and/or a slash.

Codes after the hyphen but before the slash are:

A '-C' code is for cruising boat that races, a '-D' code is for a deep draft adjustment and a '-P6' code for a provisional handicap. See sections O, P and Q for these descriptions.

An example of a code is '5

SFFR0S-DC/M6KB1E4'

This represents:

S = Up to 155% jib (S= standard, which applies for a masthead rig with a 155%. For a J-80 an 'S' would indicate the standard one-design jib for the class. If you see a '5' in this field for a J-80, then this would mean that the boat is using a 153 – 155% and would carry a penalty adjustment),

FF = Folding/Feathering prop out of aperture,

R0 = No roller furling headsail adjustment,

S = Spinnaker; 168.1 to 183.0,

-D = Adjustment for deep draft vessel,

-C = Adjustment for a cruising equipped boat.

/M6 = Roller furling main adjustment,

/K = Adjustment if the boat only has a spinnaker and it is flown from the bow,

/B1 = Boom length adjustment,

/E4 = Adjustment for 'E' and 'I' increase from standard rig.

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