

Definitions of Critical Hull, Rig and Sailplan Dimensions Applied to Performance Handicapping of Monhull Racer/Cruisers

(Note: All dimensions are expressed in decimal feet and pounds.)

Dimension	Description
LOA	Length of hull over all less bowsprit or boomkin,
LWL	Loaded or water line length.
BEAM	Maximum beam of the vessel.
KDRAFT	Deepest draft of the vessel.
CBDRAFT	Draft with centerboard, drop keel, swing keel or daggerboard fully extended
RUDDER	Noted as spade, skeg, attached, or transom mount
DISPL	Displacement measured in pounds without crew, water, fuel, and stores on board.
EXTERNAL BALLAST	Weight of ballast mounted outside of canoe body of hull.
INTERNAL BALLAST	Weight of ballast mounted within canoe body of hull.
ENGINE	Noted as inboard, saildrive, outboard, or none.
KEEL TYPE	Noted as full, fin, fin/bulb, wing, daggerboard, drop keel, swing keel keel/centerboard with prefix of "shoal" where descriptively correct.
PROP TYPE	Noted as fixed 2, 3 or 4 blade, folding or feathering,
PROP INSTALLATION	Noted as exposed shaft, in-aperture, outboard (retractable), or Outboard (fixed in well).
MAST AND BOOM MATERIAL	Noted as wood, aluminum, or carbon.
RIG	Noted as masthead or fractional; sloop, cutter, yawl, ketch, schooner, or other.
I	Height of the foretriangle measured from deck sheer line abeam the mast to the highest point of sail attachment.
ISP	Length of the spinnaker hoist measured from the deck sheer line abeam the mast to the highest point of spinnaker attachment. Limited to 100% of I without penalty.
J	Distance perpendicular from the foreside of the mast line to the point of intersection of the forestay with the deck.
P	Luff length of the mainsail measured from the boom to the headboard in its highest position.
E	Foot length of the mainsail measured from the mast to clew in its most outboard position.
PY	Luff length of the mizzen (two masted boats only) measured same as P.
EY	Foot length of the mizzen (two masted boats only) measured same as E.
LP	Length of the perpendicular defined as the distance perpendicular from the luff to the clew of the largest jib or genoa. LP is often expressed as a percentage of J not to exceed 155% without penalty.
SPL	Spinnaker (or whisker pole) length measured from the centerline of the mast to the outboard end of the pole with the pole in fitting and in a horizontal position athwartship. SPL is often expressed as a percentage of J not to exceed 100% without penalty.
JC	Distance perpendicular from the foreside of the mast line to the point of intersection with the outermost point of sail attachment with the bowsprit, boomkin or prod. JC may equal or exceed TPS and SPL and force a handicap adjustment.
TPS	Noted as the horizontal distance from the foreside of the mast at its lowest point above the deck or coach roof to the point of attachment at deck level of the foremost tacking point of an asymmetric spinnaker if tacked to the deck or to the extreme forward end of any bowsprit in its maximum extended position.
SMW	Spinnaker maximum girth or width measured luff to luff. [Fold on centerline; measure width multiply by 2.] The measurement may not exceed 180% of SPL without penalty.
SL	Length of spinnaker luff measured along luff tape from head to clew on the largest spinnaker. The measurement may not exceed .95 times the square root of the sum I^2 plus J^2 without penalty.
ALU	Length of an asymmetric spinnaker luff measured along longest luff tape from head to tack. This measure expressed as a percent must be no less than 100% nor greater than 110% of the square root of the sum I^2 plus J^2 without penalty.
ALE	Length of the asymmetric spinnaker leech measured along the shortest tape from head to clew.
AF	Length of asymmetric spinnaker foot measured along foot tape from clew to tack. AF expressed as a percentage of JC may not exceed 180% without penalty.
AMG	Asymmetrical spinnaker mid girth measured from mid-point on the luff to mid-point on the leech expressed as a percentage of AF. May not be less than 80% of AF or greater than 180% of TPS or SPL without penalty.

Rig Type	Keel Type	Engine Type	Propeller Installation
Cat rig	Full	Inboard	Exposed Shaft
Masthead Sloop	Keel/Centerboard	Saildrive	In Aperture
Fractional Sloop	Daggerboard	Outboard - retractable	Folding/Feathering
Cutter	Fin	Outboard - fixed in well	Solid 2 blade
Ketch	Fin/Wing		Solid three blade
Yawl	Fin/Bulb		
Schooner	Swing		
Wishbone	Sheel		
	Articulating		

Types of Roller Furling Installations

Standard feature of Production Design
 After Market Installation
 Drum Above Deck
 UV/"Sunbrella" Cover

LMPHRF Performance Handicaps are systematically derived for each class or type of racing/cruising sailboat.

The handicap takes into account the influence of sails, rig and hull form on potential speed. It is not unusual for handicaps to consider the overall influence of wind, sea conditions and course types that are typical for a particular geographic region.

The base LMPHRF handicap is a single number developed for application in Time-On-Distance scoring and determination of finish position. Handicaps for Distance Races, for Time-On-Time Scoring of races and for sailing without spinnakers are also derived. Base handicaps are systematically determined using computational algorithms for analyzing race results and observations of on the water performance. Within the system, accuracy is sufficient to lead to fair competitive racing.

Deriving a LMPHRF Handicap depends upon empirical data gathered from a great many races in which many boats of a particular type or class have competed regionally and nation-wide. These results are correlated with general design parameters (critical dimensions) for rig, sails and hull form to assess potential speed of these wind driven boats to arrive at a base handicap. This latter process includes the systematic application of several speed potential prediction algorithms. Potential speed is reflected as a positive or negative handicap number scaled in three seconds per nautical mile increments. The error variance among PHRF handicaps is plus or minus 3 seconds/nautical mile.

Base handicaps are assigned assuming the boat is a standard production model or a custom design in top racing condition. The base handicap for a boat type or class assumes:

1. Standard hull and interior, keel, rudder, and rig and other features specified in the original design and build of a production boat or custom one-of-a kind monohull or multihull sailboat prepared for racing.
2. Jib overlap (LP) of 155% of J.
3. Spinnaker pole length (SPL) no longer than J.
4. Spinnaker mid-width (SMW) no greater than 180% of SPL.
5. A folding prop, a retracted outboard, or a solid prop in an aperture.

Adjustments are often made to the base handicap to arrive at a final handicap when standard design parameters are altered. The list of adjustments includes the following as examples.

1. LP Adjustment: 155% of J, 0 sec./nm.; 155.1% to 165% of J, -3 sec./nm. greater than 165% of J, -6 sec./nm.
2. SPL Adjustment: Less than J, 0 sec./nm.. Each 6% or fraction thereof greater than J, -3 sec/nm
3. SMW Adjustment: Less than 180% of SPL, 0 sec./nm. Each 6% or fraction thereof greater than 180%, -3 sec./nm.
4. SL Adjustment: $.95 (\sqrt{J^2 + J^2})$, 0 sec./nm. Each 6% or fraction thereof greater than SL, -3 sec./nm.
5. I Adjustment: Standard I, 0 sec./nm. Each 6% or fraction thereof greater than I, -3 sec./nm.
6. ISP Adjustment: Standard I, 0 sec./nm.. Each 6% or fraction thereof greater that ISP, -3 sec./nm.
7. Mainsail Adjustments:
 - a) Change to P or PY. Each 6% increase or fraction thereof, -3 sec./nm.
 - b) Change to E or EY. Each 6% increase or fraction thereof, -3 sec./nm.
 - c) Full-length battens will not be penalized. Mainsails must be constructed within established limitations. Boats not in compliance will not be rated.
 - d) Mainsails with girth measurements exceeding the maximum values up to 5% receive a -3 sec./nm. adjustment. Excessive girth mainsails are adjusted -6 sec./nm. depending upon the amount of increased girth.
8. Boom length adjustment: For an increase of 0.5% to 10%, a -3 sec./nm. penalty is assessed; for an increase of 10.01% to 20% a -6 sec./nm. penalty is assessed.
9. Asymmetric area for boats with spinnaker poles. The asymmetric spinnaker area must not be greater than the area of the maximum sized symmetric spinnaker. Each 6% or fraction thereof greater than this standard, -3 sec./nm. is assessed

10. Auxiliary Power Propeller Adjustments for varying types and installations

Two or three blade folding or feathering propeller on an exposed shaft	no adjustment (0 sec./nm.)
Two bladed solid propeller on an exposed shaft	+6 sec./nm. (formally +3 sec./nm.)
Three bladed solid propeller on an exposed shaft	+9 sec./nm. (formally +6 sec./nm.)
Three bladed solid propeller in an aperture	+3 sec./nm.
Feathering or two bladed fixed propeller in an aperture	no adjustment (0 sec./nm).
Outboard fixed in well with two bladed solid propeller	+6 sec./nm.

11. Roller furled main or genoa adjustment of 3 to 6 seconds per nautical mile qualified by rule.

Important notes

Do not treat the measurements that you supply for your hull, rig or sails lightly. There are usually some slight differences in actual measurements from designed or allowed measurements that do not result in penalties or credits and in fact reflect the actual hull, rig or sail plan of the boat as shipped and equipped from the manufacturer. If you are unsure about measuring and reporting critical hull, rig and sail dimensions, please see your sailmaker, LMPHRF Regional Handicapper, or LMPHRF Club Representative.

Be reminded there is no credit for under canvassed boats. Boats designed and delivered with a limited sail plan are handicapped with that feature taken into account.

USPHRF and US Sailing keep an updated list of ODR or OD hull and rig specifications. When you correct your boat type designation and use the ODR or OD suffix, be sure that your reported measurements are in compliance with the class and certified by a class measurer's certificate. Attach a copy of the certification with your application.

Use additional pages to supply clearly typed or printed information if needed to complete descriptions of modifications to standard boat designs

LMPHRF shall handicap those boats that have declared moveable ballast and/or other than manual power on their handicap certificate application in accordance with class rules. Thus, RRS 51 and RRS 52 are changed per 86.1(c) to permit boats that have declared that moveable ballast and/or stored power are an integral part of their basic design and class rule.. Such declaration must specifically describe what may be moved and/or how stored power may be utilized while racing.

LMPHRF issues certificates that are endorsed or not endorsed. An endorsed certificate has current sailmaker measurement certificates on file with LMPHRF. Certificate that are not endorsed do not have current a sailmaker measurement certificates on file with LMPHRF. Endorsed certificates are helpful in resolving protests or appeals.

Handicaps are based primarily on self-report of critical sail plan dimensions used for handicapping. A renewal or application for a handicap without sailmaker's certificates on file does not prevent assigning a handicap or racing, but may not be helpful in protests and appeals.

LMPHRF Regions and Regional Handicappers

Region	Handicappers	Phone	E-mail
I. Waters of Green Bay and Upper Peninsula of Michigan	Darrell Askins	920.743.8442	daskins@itol.com
II. Lake Winnebago and Inland Lakes of Wisconsin	Steve Mauritz	920.231.5992	mauritz@lmphrf.org
III. Milwaukee to Kenosha	Bob Sample	847.426.9643	bsample@ameritech.net
IV. Waukegan to Michigan City and the inland lakes and reservoirs of Illinois and Indiana excluding Chicago	Gene Bach	847.623.5680	bachgroup@earthlink.net
V. Chicago	Brenda Sollitt	312.664.7771	bksollitt@att.net
VI. Southeast Shore of Lake Michigan to Point Betsie and the bays and inland lakes of Indiana and Michigan	Carl Petersen	616.842.7978	carlpetersen@charter.net
VII. Point Betsie to Traverse Bay	Carl Petersen	616.842.7978	carlpetersen@charter.net
VIII. All regions not otherwise mentioned including Canada and	Paul Ansfield Perry King	920.233.5743 612.529.2684	ansfield@uwosh.edu perryking@mac.com
VIIIa. Multihulls from any LMPHRF Region	Trey Ritter	847.362.3773	treysail@tds.net

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