

### HOW YACHTS ARE MEASURED.

In the earlier days of yacht racing "it was discovered," says Frederick W. Pangborn, "that a big boat could beat a small one, and the necessity of time allowance rules became obvious to the yachters.

"At first it was deemed sufficient to grade the boats according to size; and actual size being an unattainable measure, length was adopted as a standard of size.

"So the yachts were measured over their decks for the purpose of classification. Then began an era of building to beat the racing rule, and the result was a boat longer on the keel than over deck.

"Objection was made to this unfairness, and the rule was changed, the measure of length on the keel being adopted as fair. In a short time the yachting world witnessed the birth of a new type of boat with the keel cut away forward and aft. Again the boat was made bigger than her measure indicated.

"Next came the waterline rule of measurement, which was fair, excepting that it took no account of the overhang sterns of many yachts, which thus gained advantage over square-sterned boats of equal waterline length. So a reckoning was made for overhang, and this is the general practice to-day. When the New York Yachting Association was organized, this question of racing length was decided in a manner so satisfactory that no just complaint of unfairness has ever arisen; and the majority of clubs in the country have adopted the Association rule, which is simple, sportsmanlike and free from the complaints that always cause trouble in clubs which use tonnage and sail-area rules. The Association rule measures a yacht by this formula:

$$\frac{\text{Length over deck} + \text{Waterline length}}{2} = \text{Sailing measure.}$$

that is to say, one-half of the overhang of the stern is allowed."

The New York Yacht Club, however, has adopted the Seawanhaka rule, which is expressed by this formula:

$$\frac{L. W. L. + \sqrt{\text{Sail Area}}}{2}$$

that is, the length on the waterline is added to the square root of the sail area and divided by two. This is an arbitrary rule, having been adopted because it seemed to aid in developing as a type of racing yacht the boat of moderate power and small sail area.

Such a boat under this rule has a racing length not much greater than her actual waterline, while the modern extreme racing machine has her racing length very much increased by this rule, over the waterline measurement.

The measuring of racing yachts in these days of close calculation, when races are won by a couple of seconds, and boats come to within a quarter of an inch of being too large for their class, has become a science demanding mathematical exactness.

The racing length then determines the allowance or handicap which is given by a larger yacht to one of smaller dimensions.

#### MEASURING THE SAIL PLAN.

The measurer begins this operation by sending a man

aloft with the end of a steel tape long enough to reach from the topmast to the deck.

"The man aloft holds his end touching the under side of the sheave or block through which the topsail halliard runs, while below the distance is taken to the upper side of the main boom, just where it goosenecks to the mast. This is taken as the perpendicular of the triangle which the main-sail jib, forestaysail and topsail are supposed to form.

"To find the base of the triangle the distance is taken from the end of the main boom to a point half way between jib and jib topsail stay on the bowsprit.

"If there were no gaff this would be all that was necessary to get the approximate sail area, but the end of the gaff projects beyond the line from the topmast to the end of the main boom. To include this strip of sail outside the main triangle in the sail area, 80 per cent of the length of the topmast is subtracted from the gaff measurement, and the remainder added to the base line.

"To find the sail area from these measurements all that is necessary is to multiply the base by the perpendicular height, and divide by two when he has found the sail area.

"The measurer has next to get the length on the waterline, and here is where the difficulty comes in measuring modern yachts. Any one can see that a boat with a straight bow and short stern would change her waterline length very little if raised or lowered an inch or two in the water, and that, consequently, there could be no difficulty in finding the actual measurement, even if the water was not perfectly smooth.

"With a boat like Vigilant, of the modern type, it is very different, as her long overhang, forward and aft, increases or lessens her length a foot or more for every inch she is put down or raised in the water.

"Even with all weight the same it is impossible to get accurate measurements agreeing with each other if there is the slightest possible ripple, as the smallest wave changes the measurement an inch or two, and that means a few seconds time allowance, which, in these days, often wins or loses a race.

"To get the points on the bow or stern from which the waterline is measured, a piece of wood floating level with the surface of the water is pushed under the overhang until it reaches the point of junction with the water. Here it is held and moved a little back and forth until the point where the water touches the hull is found."

This is carefully marked and the same operation gone through at the other end of the boat. When these spots have been located, a plumb line is dropped from the rail just above the mark at the waterline, and regulated by sighting until it is plumb with the spot below. This is done forward and aft and the distance between these spots transferred to the deck, where a tape stretched between them gives the exact waterline length.—From Yachts and Yachtsmen of America.

The 20-rater Dragon, owned by Lord Dunraven, and which is fitted with a centerboard, recently had some lead taken off her keel. It did not prove beneficial, and it was soon after replaced.