

# Racing under ORR-Ez

## How do I/should I compare myself to my competitors?

By far, the easiest way to compare yourself to your competition is by seconds-per-mile. Even when Time-on-Time is being used, ToD ratings will still give you a decent yardstick when racing and being accurate is questionable in the first place.

For general comparisons of boats, the IR# is a first place to start when looking at relative, average performance. This number is a Time-on-Distance and Time-on-Time number representing the number of seconds to travel 1 mile on an "average" racing course. This "average course" is a close approximation of what PHRF has traditionally used for their ratings. Looking at the difference between boat's IR#s will give you some general ideas of performance.

The next step to get more detail is to use either the Polars or PHRF Ratings which will give you ToD numbers for course configurations and wind ranges. By calculating differences here between you and your competitors, you can build a chart to quickly reference for seconds-per-mile deltas.

If you want even more detail and your club is using ToT scoring, you can calculate seconds-per-10-minutes which we will cover later. There's a bit of math involved.

My best advice for anyone who wants to "optimize" themselves to their ORR-Ez rating is to calculate your target boat speeds for wind angles and work to optimize sail trim and crew work to stay in these targets as much as possible while racing. If you can't stay close to these targets, now you can work to identify if it's crew work, sail shape, driving habits, etc. that may be shaving performance off the boat.

With more accurate rating data, boat performance becomes even more of a game of inches than it was under a single-number handicap.

## Why is my boat not performing as well as it was under PHRF?

Because PHRF is a single-number handicap, it can only represent the performance of boats at an average wind speed and course configuration. This means if your club predominantly holds races outside of the "average", certain boats will be "faster" and some "slower" than their ratings would otherwise indicate.

For example, if the average winds are lighter than the average, lighter weight boats that accelerate faster will perform better than their PHRF rating, or if your race courses are mostly

reaching or big triangles, boats that are faster off the wind will have an advantage over those optimized for windward/leeward courses. "Horses for the courses" can be heard when talking about why certain boats seem faster in certain conditions.

ORR-Ez (and any wind sensitive/course sensitive rating system) will tend to eliminate those advantages. A boat that is a 2,000 lbs lighter than its closest competitor will see a bigger rating hit in light air in most course configurations to compensate for the fact that it should accelerate faster. Boats with tall masts and large spinnakers will be hit more on courses with lots of deep reaching.

## **What is Time-on-Time?**

A Time-on-Time rating is a handicap number given which is the ratio of the potential average speed of the yacht to an arbitrary standard yacht, and is generally expressed as a multiplier. As an example, if the reference boat has a handicap of 1.00, a boat with a handicap of 0.90 will have a corrected time equal to .90 times its elapsed time (90% of the speed of the scratch boat). A boat with a handicap of 1.10 would have a corrected time equal to 1.10 times its elapsed time.

This handicap number is known as a Time Correction Factor or TCF.

## **What are some advantages of Time-on-Time:**

In a theoretical situation where the exact distance and configuration of a race course is known and the wind conditions are constant, ToD and ToT will both result in the same corrected times.

Because the course distance is a fixed number in the calculations with ToD, if the conditions start to change, certain boats will gain an advantage, some will lose. In an evening race with a dying breeze, the larger/faster boats will get across the line first and the slower/smaller boats will battle with the dying breeze and lose time. Alternatively, in a light-air race where the breeze builds dramatically at the end, the boats in the back of the fleet may be pushed up to "compress" the fleet and they'll end up correcting over the faster boats.

Time-on-time will smooth out some of these variations because the rating is based on the time spent on the course and is less dependent on wind conditions. With EZ, these ratios of boat speed still change based on the wind speed and course.

Time-on-time is easier to get more precise with the course measurement. A smartwatch, GPS, or smartphone is very easy to get by-the-second accuracy in the measurement of time. With dropped marks, it can be more difficult to get truly accurate distance readings based on the type

of GPS/tool/app that's used, if there's an offset and how far away is it, current dragging marks, etc.

## How is ToT different from ToD in the results?

ToT results will normally have the same boats at the top and the bottom. The middle may get a little mixed up with the corrected times being much closer in difference than if the race was scored with ToD.

## How to think about Time-on-Time

Time on time is harder to think about, mostly because doing the math in your head is challenging and usually requires you to calculate the deltas before the race. Instead of thinking seconds per mile that we need to beat a competitor, we need to think "seconds per 10 minutes" to beat a competitor.

When you're comparing yourself to a slower competitor, you have to remember they will be on the race course longer, so we have to think about the ratio of our ratings and not just pure seconds/mile like we do in ToD.

**Formula:  $600 - (600 \times (\text{competitor TCF} / \text{your TCF}))$**

### Example in Light/Medium, random leg:

Boat	TCF	Sec per 10 min	Sec per 10 to beat
Frers 33	.706	421.8	27.3 sec
Santana 30/30	.671	402.6	

## Calculating target boat speeds from your certificate

Because the ratings in the Polars tab of the certificate are Time-on-Distance numbers, for all angles besides upwind and downwind VMG, you calculate the target boat speeds by taking the number of seconds in an hour and dividing by the number on the cert.

If the cert says 10 knots of breeze is 545 at 52 deg, then the target is  $3600 / 545 = 6.6$  knots.

For upwind and downwind VMG, we have to calculate the distance first. For upwind, it's  $1/\cos(\text{angle})$  to find the actual distance. Then it's  $3600 / (\text{rating} / \text{distance})$ .

For downwind VMG, it's  $1/\cos(180 - \text{run angle})$  for distance, then  $3600 / (\text{rating} / \text{distance})$ .

Easiest way to handle this is to use an Excel spreadsheet.

## What is PCS?

PCS is known by two names "Polar Curve Scoring" or "Performance Curve Scoring" but are talking about the same concept.

PCS is a different way of thinking about boat performance on a race course. Instead of trying to figure out a wind range to score the race in (or just using an average wind speed like in PHRF), we look at the course length, course configuration, and your elapsed time to determine how efficiency you sailed the race.

The number we arrive at to determine this "efficiency" is called indexed wind or implied wind. What this means is based on your boat's polars, the wind must of have been blowing this velocity for you to have completed the course in the time recorded. The more efficiently you sail your boat (either by good sail trim, catching shifts, etc.) that higher your indexed wind speed will be and you will finish better than those who weren't as efficient with how they sailed the course.

The nice part of PCS is that we don't worry about wind ranges. When there are large differences between boat performance in light breeze compared to light/medium, these difference are smoothed out by the "curve".

These curves are generate for each boat individually based on their polar ratings found on the ORR-Ez certificate. All the calculations for these are done by software so you don't have to worry about the fine details.

Because PCS puts more work on the race committee to have accurate data for courses and timing, it tends to be used are larger/regional/national events over Wednesday nights.

## Sticking to target boat speeds

Because ORR-Ez affords a large variety of ways for a race committee to score a race, trying to keep up can be overwhelming to most crews.

Regardless of which scoring system is being used, figuring out your target boat speeds and working hard to stay as close to them as possible is your best friend for top finishes. Are you able to tack in the angle listed on your certificate for the wind conditions? Does your boat accelerate slow so it takes a long time to get back to targets after a tack? Or do you need to

heat up a little downwind and throw in one gybe to keep that VMG up? Answering these questions and keeping your speed up will be the key to unlocking top performances