

The Elusive Tie on Corrected Time

and Rounding Rules for PHRF Time-on-Time Handicapping

Corrected time \check{t} is calculated using the formula

$$\check{t} = t \times \frac{\star\text{PHRF} + 557 \text{ s/mi}}{\text{PHRF} + 557 \text{ s/mi}}$$

where t is a boat's elapsed time in seconds, PHRF is its handicap in seconds per nautical mile and $\star\text{PHRF}$ is the scratch handicap common for all the boats in the class. Elapsed times t are always measured to the second and PHRF ratings are always a whole number of seconds per nautical mile. Before the 2005 rule book, all corrected times were rounded to the nearest second. Since PHRF does not specify a rounding rule for time-on-time scoring, a tie between Boat A and Boat B can now only occur when

$$\frac{t^{\text{for Boat A}}}{\text{PHRF}^{\text{for Boat A}} + 557 \text{ s/mi}} = \frac{t^{\text{for Boat B}}}{\text{PHRF}^{\text{for Boat B}} + 557 \text{ s/mi}}$$

or, equivalently, by cross-multiplying

$$t^{\text{A}} \times (\text{PHRF}^{\text{B}} + 557 \text{ s/mi}) = t^{\text{B}} \times (\text{PHRF}^{\text{A}} + 557 \text{ s/mi})$$

This rarely occurs for boats with different handicaps, and ties almost never happen. Corrected times are still reported rounded to the nearest second and so results that may appear to be tied usually won't be. That Boat A beats Boat B in corrected time can be verified by checking that

$$t^{\text{A}} \times (\text{PHRF}^{\text{B}} + 557 \text{ s/mi}) < t^{\text{B}} \times (\text{PHRF}^{\text{A}} + 557 \text{ s/mi})$$

The scoring programme will do this comparison for you and will always order the results correctly using exact arithmetic.

It should also be noted that, before 2005, the requirement for rounding corrected times made the criteria for tying critically dependent on the choice of the scratch handicap. Under one choice for $\star\text{PHRF}$ boats could tie yet using a different value for $\star\text{PHRF}$, for the exact same finishes, corrected times might fall one second apart. Without rounding, the choice of the scratch handicap can make no difference in tying or in the ordering of boats under corrected times. Indeed, it will be convenient for competitors to see the exact same results with different scratch boats selected.

There is no consensus on how to report corrected times with fractions of a second. Some clubs elect to display long decimal fractions sufficient to visibly break all ties. South Port displays corrected times rounded to the second and lets the computer hide the finer calculations that break apparent ties.