

Factbox: America's Cup sailing rules and tactics

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The 34th America's Cup is the first in its 162-year history to be held inshore close to waterfront spectators. A new electronic umpiring system will police the race course in the confined waters of San Francisco Bay and will penalize boats that violate the rules or sail out of the racing area. With radically innovative 72-foot hydrofoiling catamarans match racing on a tight course, at speeds exceeding 50 miles per hour, the rules are crucial to keep the competition fair and safe.

MATCH RACING

* In America's Cup match racing, two boats/crews race against each other. While match racing is distinct from fleet and team racing, all race types are governed by the International Sailing Federation's (ISAF) Racing Rules of Sailing, with some variations in rules and tactics between them.

* The basic tactic is to try get ahead of your opponent and stay between them and the next course mark (an inflatable buoy or anchored Race Committee boat), taking into account wind shifts, tides and currents.

* Crews will maneuver their sailboats with the intent to get their opponent to break a rule and incur a time penalty that can give the leading team an advantage.

* Race officials will use green, amber, red and blue lights onboard each AC72 to electronically signal its approach to a turning mark or course boundary and when a boat is protesting or being penalized for a rule infraction.

RACE COURSE

* The course consists of five or seven legs, oriented so the boats sail as much as possible reaching across the wind or running downwind with the prevailing westerly sea breeze from the Pacific Ocean. From start to finish, the shortest route is approximately 10 nautical miles (11.5 miles) for five legs and 16 nautical miles (18.4 miles) for seven and race officials will choose based on wind and water conditions before each race.

*** On reach legs and runs the AC72s will maximize the horizontal lift of 130-foot-tall fixed-wing mainsails to sail fast enough for their perpendicular underwater foils to generate vertical lift. Sailing up out of the water with little**

drag from the narrow rudders and daggerboards, a hydrofoiling AC72 can reach 40 knots (46 mph.)

*** Foiling AC72s can sail off the wind at more than twice the actual wind speed. They generate so much “apparent wind” over the sails that, just as on a motorcycle, it always feels like it’s from dead ahead, even when jibing to turn the boat from one reach to another at high speed. On most sailboats, jibing brings the wind across the stern.**

* The tight race course will require constant jibing and crossing of paths, which will help viewers judge which boat is ahead. The AC72s must try to stay up on their foils during the jibe maneuver to maintain speed and position. A foiling AC72 may quickly overtake one sailing on its twin hulls.

* Though AC72s can make 20 knots upwind, they may not hydrofoil much to windward because they need their long hulls in the water to prevent sideways slip. It is not efficient to bring a catamaran about into the wind, so don’t expect as many tacking duels as might have occurred between closely matched keelboats.

* Sailboats must be steered upwind in long zig-zags. When “tacking,” the bow moves through the wind, which alternately fills the sails on either side of the boat. Few boats sail closer than 40-45 degrees off the true wind direction. The efficiency of the fixed wing on the AC72 provides lift all the way to head-to-wind.

START AND FINISH

* The starting sequence begins with a five-minute warning. With two minutes to go, the boats cross an entry line perpendicular to the wind into the start zone from opposite sides and maneuver for advantage before the start signal.

* At the start signal, each will have sought to be on the favored side of the starting line sailing at maximum speed, and to have used right of way rules to force the opponent to the wrong side of the course. The start line is positioned so the first leg will be a short fast reach to the first turning mark -basically a drag race. A good start is critical.

* The final leg is another reaching sprint to the finish. The first boat to reach the finish line wins the race.

SOME BASIC RIGHTS OF WAY

* Starboard tack boat has right of way. Port tackers (wind filling the mainsail from the left side of boat) must keep clear of starboard (wind from the right.) When converging, starboard can force port to change tack or steer behind and lose distance.

* Leeward boat has right of way. When overlapped, the windward (upwind) boat must keep clear of the leeward boat.

* Boat clear ahead has right of way. An overtaking boat must keep clear of a boat clear ahead.

* Room at marks. When the boats reach an imaginary three-boat-length circle around a mark, an inside overlapped boat must be given room to make her turn by the outside boat. If not overlapped, the first boat to enter the circle must be given room to turn around the mark, even if the boat astern gets an inside overlap after the circle is reached.

(1 nautical mile=1.15 mile)

(1 knot = 1.15 mile per hour)

(Sources: America's Cup Event Authority; ISAF Racing Rules of Sailing, 2013-2016 edition; Sailing World)

(Editing by Alden Bentley)

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