

Vanguard Sailboats Guide to Tuning The New C420 Sails

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In the spring of 2003, the Club 420 Class sails were redesigned to provide a better competitive and useful lifespan. Now that several events have been sailed using the new sail design, it is clear that the new sails will provide unprecedented durability as well as excellent performance.

Because the new sails are shaped somewhat differently than the old ones, there are several adjustments that sailors should make when tuning their rigs. First, let's have a look at what the major shape-affecting changes are in the new sails.

Mainsail tack: The mainsail tack is now attached to the mast by a slug which fits in the track, rather than connected to the boom by a pin. This allows the tack to float up, reducing the diagonal wrinkles you see in the main when going downwind.

Mainsail shape: The mainsail is a bit flatter through the bottom and middle sections of the sail, and the leech is a little looser.

Jib clew: The jib clew is higher than on the old sails. The area cut away in raising the clew is added back elsewhere in the sail.

Jib shape: The jib is slightly flatter in the lower part, with a significantly more open leech, especially in the upper section of the sail.

Jib luff wire: The jib luff wire is slightly thicker than on the old sails, but is made out of slightly stretchier wire. The luff wires on the new sails are overall a very small amount stretchier than the old luff wires.

Rig Tuning Changes

Overall, the boat is rigged the same way as before. The lines are all strung as before, the mainsheet bridle remains unchanged, and all line lengths remain the same.

Mast butt position can be moved one to two holes aft from the traditional "pin max forward" position. Before, it was mandatory to have the mast butt placed all the way forward in the step because the mast was set up with so little rake. This will balance the helm as much as possible. Most people sailing with the new sails have noticed how nice it is not to have lee helm anymore. The mast rake, mast butt position and helm balance are all closely tied together.

With the old sails, the game was to set the mast without any rake (rearward lean) at all. Because the jib lead position on the C420 is fixed, the old jib's low clew made it necessary to have the rig far forward in order to get proper leech tension for good pointing. The old jib was also quite finicky in that once you tensioned the clew, it would very easily become overtensioned and the leech would hook to windward. This is primarily due to a design/construction detail which has been addressed with the new sails.

Because the old sails set up with little rake, moving the butt forward “leaned” the rig back as much as could be done, easing the lee helm that usually crops up when the rig is set up with very little rake. Because the mast is now raked significantly more, moving the butt backward one to two holes provides a rig with properly balanced helm. If you feel a lot of weather helm and, at the same time, feel a lack of pointing (which is a very strange combination to have), you should try moving your mast butt aft.

A benefit of having the mast butt further aft is that you decrease the overlap between main and jib. While this doesn’t have a huge effect, it will allow you to play the main a little more aggressively without having the jib interfering with the main.

Rig tension has a profound effect on how your sails will set. Simply, more rig tension will give you flatter sails with more open leeches, while less rig tension will give you fuller sails with tighter leeches. To simplify things a bit, this just means that if you needed more power you would ease the rig tension and if you needed less power, you would increase rig tension.

Because the mast on a C420 is so stiff, the primary effect of pulling on more rig tension is to tighten the jib luff wire. This flattens the shape of the jib, and to a smaller degree will pull the jib draft forward. It will also loosen the leech of the jib. Pulling the draft forward in a sail and flattening the sail both contribute to loosening the leech. The magic of this, in a C420, is that this allows you to trim the jib tighter (with both the leeward and windward sheets) and thus point higher. With this kind of setup you will have greater speed and pointing in fully powered conditions, but will lack power, and thus speed and pointing, in lighter airs.

***A Brief Warning About Rig Tension:** Some sailors have experimented with extreme rig tensions in their C420s. This tuning guide recommends a maximum shroud tension of 350 pounds. Some crews may wish to go slightly firmer than this. It is VERY POSSIBLE AND EVEN LIKELY that your boat (hull or rigging) will suffer a breakdown if you use more than 400 pounds of rig tension. The C420 was not designed to sail under excessive rig tensions. Your boat’s lifespan will be shortened if you regularly sail with excessive rig tension. Before you go for that extreme setting, ask yourself if you are willing to risk a possible regatta ending breakdown by going for that extra amount of rig tension.*

Mast rake in a C420, as mentioned above, is a primary driver of jib lead angle. To help with understanding jib lead angle, imagine your C420 rigged, with the jib trimmed in for going upwind. If the jib sheet points to the bottom of the jib, you will be trimming the foot more and the leech less. If the sheet points into the middle of the jib, you will be trimming the leech and foot about equally. If the sheet points up towards the top of the jib, you will be trimming the leech more and the foot less. On the old jibs, in order to get any leech tension at all, the mast had to be set up with almost no rake at all in order to get the clew high enough to give any leech tension. With the newer sails, the clew is higher and you get a much better lead angle with more rake.

More rake is also good for opening the slot between the main and the jib. Whenever the air leaving your jib is flowing into your main, it is slowing you down. Having a wider slot is better

for windier conditions when you need to depower, but a narrower slot will let you point higher in conditions where you can keep the boat flat. More rake = bigger slot + less power + better speed + lower pointing. So if you are having trouble keeping the boat flat, and are stuck pinching and not going fast, rake back a little bit. If you are feeling underpowered and have bad pointing, rake forward a little bit.

To measure rake, thread your main halyard end through the end of a 25' or longer tape measure and hoist the halyard to the top of the mast. With enough pressure to pull the tape straight but not enough to bend the mast tip, measure the distance from the top of the mast to the top of the transom on the centerline. It is also important to note that mast rake is measured with the rig fully tensioned. Pull up your jib to full tension, then measure the rake. If the rake measurement is too big, lower the pins on your shroud adjusters, re-hoist the jib, then re-measure the rake.

Main trim with the new sails is quite a bit nicer than with the old ones. Basically, with the old sails, you needed to pull the mainsheet hard to keep the top of the sail sheeted in, but in doing so the bottom 2/3rds of the sail would be badly overtrimmed. With the new mains, the bottom 2/3rds of the sail is a little flatter. Now you can trim hard enough to keep the top of the main trimmed properly without overtrimming and closing off the lower 2/3rds of the leech. In moderate winds it is critical to trim the mainsheet hard to obtain pointing and to keep the crew on the wire. In heavier winds, the new sail shape allows the trimmer to obtain plenty of twist in the leech for depowering by using the vang and mainsheet together.

RIG TUNE FAULT FINDER

Here are some common symptoms and things you can do to help solve them. You should ask yourself these questions in order as the earlier questions are easier fixes and more often incorrectly set.

Bad pointing

- Is your mainsheet bridle too high?
- Is your mainsheet trimmed tight enough?
- Is your jib sheet trimmed tight enough?
- Is your windward jib sheet trimmed tight enough?
- Is your mast raked too far back?
- Is your mast foot too far forward?
- Do you have too much rig tension?

Bad speed

- Is your mainsheet over trimmed?
- Is your jib sheet over trimmed?
- Is your windward jib sheet over trimmed?
- Is your mast raked far back enough?
- Do you have enough rig tension?

SETTINGS GUIDE

Here are some common settings for the new C420 sails. All of these settings are based on the mast butt being positioned 2 holes back from the forward-most hole. These are based on combined crew weight of about 250 pounds. If you are much lighter than this, move up one range (use the 12-14 setup in 9-11 knots of breeze). If you are much heavier, move your setup down one range. You should move down one range if there is significant chop.

0-4 Knots

Rake: 20'3"

Shroud Tension: 100 pounds

Centerboard: Full down

Mainsheet Bridle: Block sheave top 21" from board cap

Mainsheet Trim: Top batten telltale flying constantly

Vang: Loose

Outhaul: Slight horizontal wrinkles along boom

Cunningham: Loose but only a few horizontal wrinkles

Jib trim: Firm leeward sheet, slight or no windward sheet

5-8 Knots

Rake: 20'4"

Shroud Tension: 140 pounds (leeward shroud should be just a tiny bit loose going upwind)

Centerboard: Full down

Mainsheet Bridle: Block sheave top 21" from board cap

Mainsheet Trim: Top batten telltale stalling often

Vang: Very slight tension

Outhaul: Slight horizontal wrinkles along boom

Cunningham: Loose to none

Jib Trim: Firm leeward sheet, firm windward sheet

9-11 Knots (this is the zone where you start to transition to trapezing)

Rake: 20'3"

Shroud Tension: 200 pounds

Centerboard: Full down

Mainsheet Bridle: Block sheave top 20" from board cap

Mainsheet Trim: Firm

Vang: Neutral in lulls, slight tension in puffs

Outhaul: Horizontal wrinkles along boom

Cunningham: Very slight tension

Jib Trim: Very firm leeward and windward sheet

12-14 Knots

Rake: 20'2"

Shroud Tension: 230 pounds

Centerboard: Full down

Mainsheet Bridle: Block sheave top 17" from board cap

Mainsheet Trim: As hard as you can pull

Vang: Firm tension
Outhaul: Hard horizontal wrinkles along boom
Cunningham: Tensioned
Jib Trim: Very firm leeward and windward sheet

15-18 Knots

Rake: 19'11"
Shroud Tension: 300 pounds
Centerboard: Raised 1"
Mainsheet Bridle: Block sheave top 16" from board cap
Mainsheet Trim: Pull hard until you start to heel too much
Vang: Very firm tension
Outhaul: Hard horizontal wrinkles along boom
Cunningham: Hard tension
Jib Trim: Extremely firm leeward sheet tension, moderate windward sheet tension

19+ Knots

Rake: 19'10"
Shroud Tension: 330 pounds
Centerboard: Raised 3"
Mainsheet Bridle: Block sheave top 15" from board cap
Mainsheet trim: Pull hard until you start to heel too much then ease, hike, trim
Vang: Very firm tension
Outhaul: Hard horizontal wrinkles along boom
Cunningham: Hard tension
Jib Trim: Extremely firm leeward sheet tension, slight to slack windward sheet tension