



Sunreef Yachts
LUXURY YACHT BUILDING

PERFORMANCE PREDICTIONS 74CXX



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■ GENERAL

- ✓ LOA : 22.41m
- ✓ BOA : 10.40m
- ✓ Draft : 2.20m
- ✓ Air draft : 35m
- ✓ Displacement: 55t
- ✓ Main : 182m²
- ✓ Staysail : 47m²
- ✓ Staysail (Self Tacking) : 34m²
- ✓ Genoa : 150m²
- ✓ Genoa (Self Tacking) : 120m²
- ✓ Code 0 : 210m²
- ✓ Gennaker : 260m²
- ✓ Reacher : 420m²
- ✓ Runner : 470m²





■ SCOPE OF STUDY

The purpose of the study is to analyse the advantage of the new **Sunreef 74** Sailing compared to the previous version as well as two different rig layout for the new version. It will be shown that the performance of the new **Sunreef** model is much faster than the previous version. It makes sense since the sail area carried on the new **Sunreef 74** is more important than the previous **Sunreef 70**. We also the differences between the two rig proposed for the **Sunreef 74** and analyse the pros and cons of each of them.

■ 5 REASONS FOR MOVING THE MAST AFT

As well as increasing the sail area, the **Sunreef Design Team** decided to move the mast backward. Without increasing the sail area, and therefore increasing the rig loads, changing the rig layout by moving the mast aft, improves the rig efficiency. There are 5 reasons for a new rig:

- ✓ The more the rig is centered, the better the balance of the sail plan is.
- ✓ The more aft the rig, the larger the downwind sails.
- ✓ The shorter the boom is, (with same mast height), the higher the aspect ratio is, improving performance.
- ✓ With a longer distance between the mast and the forestay there are more foresail solutions
- ✓ Centered mast = lighter mast-rig-sails = less pitching

Therefore a mast placed more aft means:

- ✓ More performance
- ✓ Less pitching
- ✓ More downwind sails possibilities
- ✓ Easier manoeuvring
- ✓ Less efforts
- ✓ Better visibility from the steering station

And an easier way of sailing:

- ✓ Shorter boom = gybing made easier
- ✓ Lighter mainsail = easier to use
- ✓ Easier reefing
- ✓ Self-tacking jib

■ SQUARE TOP MAINSAIL



In order to increase the performance of the boats, the **Sunreef Design Team** decided to implement square top main sail on the new **Sunreef 74**. The advantages are described below:

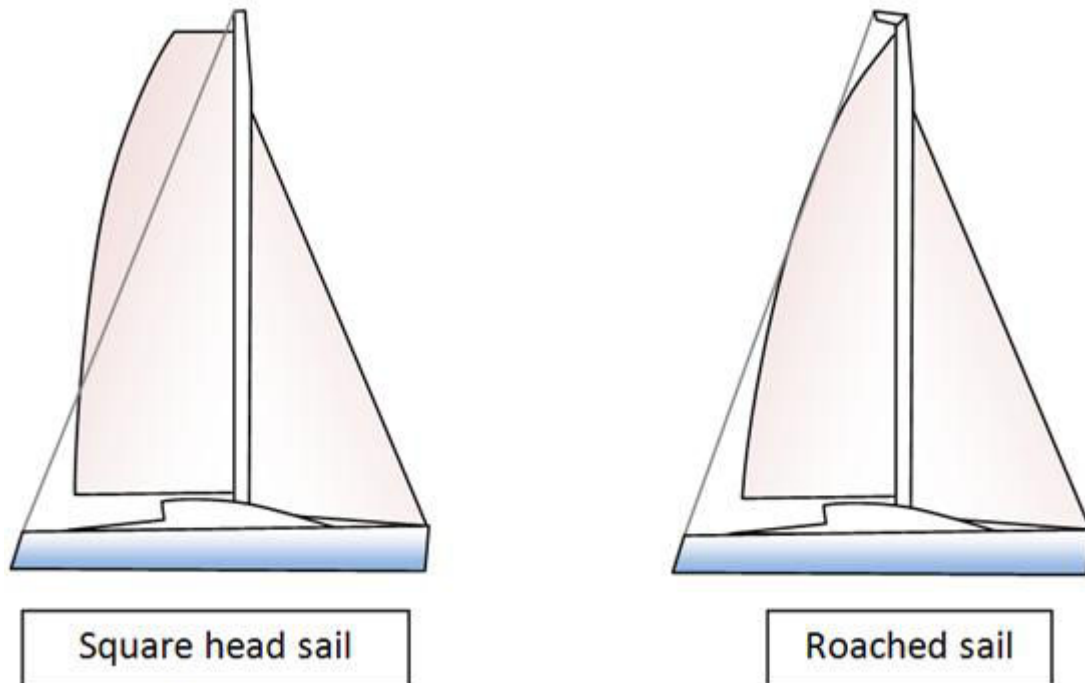


Illustration 1: Mainsail shapes

- ✓ The square head allows a better control of the main sail twist, and self-regulates the sail shape during gusts.
- ✓ The surface area of a square head sail will be bigger than a roached sail for the same mast length (luff).
- ✓ The head of a square head sail is more tolerant for small angles of attack, and then produces less induced drag,
- ✓ The square head gives a better aerodynamic efficiency in the upper part where the wind is stronger (velocity gradient), the square head does not increase the lift but reduces the drag,
- ✓ For the same surface area, a square head sail will have a smaller mast than a roached sail, therefore the centre of gravity of the rigging, and the centre of effort of the sail will be lower, which increases the longitudinal stability of the boat, critical on a catamaran.

■ HEADSAILS, OVERLAPPING OR SELF TAKING

The **Sunreef Design Team** as well as sail makers, have been working on offering a choice of self taking jib to the client. The non-overlapping aspect of these sails means they're a lot



easier to handle than an overlapping Genoa, which is nice when sailing short-handed, or with an inexperienced crew. They also don't suffer the same wear & tear as an overlapper. The smaller area can mean a loss of performance in lighter wind conditions, however this option offers an excellent compromise between performance & ease of handling.

- ✓ Easy to handle
- ✓ Smaller loads applied in the structure
- ✓ Automatic manoeuvres
- ✓ Good performance in closed hauled conditions
- ✓ Best combination between performance/handling

Overlapping genoa offer a largest sail area which is great in light airs and/or reaching conditions. You are able to partially reef them down in stronger winds, while still holding a reasonable shape. However the general rule of thumb is that you can only reef a Genoa down about 1/3 of its area before you start losing its shape. For example, if you have a 135% overlapping Genoa, you could reef it down to about 100% reasonably effectively. You can still reef it down further than this in heavy winds, but it will probably start looking pretty baggy and you won't be able to go to windward very well. While the extra area of these sails can be a benefit in the right conditions, they can be a handful to manage, especially when tacking & manoeuvring etc. Remember that overlapping genoas are also susceptible to damage through wear & tear, because the sail gets hit around the mast & rigging every time you tack, so careful attention needs to be paid to chafe damage etc.

- ✓ Biggest sail area, offering best light airs and reaching performance.
- ✓ Higher loads applied in the structure
- ✓ Hard to handle for manoeuvres
- ✓ Requires more crew to manoeuvre
- ✓ Susceptible to damage around rig when tacking/gybing

■ CODE 0 AND DOWNWIND SAILS

In order to increase the performance of the boat in the reaching range, the **Sunreef Design Team** developed in collaboration with the sail makers a new set of sails. The **Sunreef** standards boat are usually equipped with large mainsails, small headsails and a gennaker. From time to time, clients request also a symmetrical spinnaker. Hoisting and dropping the spinnaker is not an easy task for the inexperienced sailors as additional halyards and chute need to be handled.

The Code 0, developed by **Sunreef Yachts** and the sail manufacturer is in fact a mix between a large genoa and a gennaker. Heavier than a conventional gennaker, it carries a UV protection stripe on the luff which is also more tensioned than a conventional gennaker allowing the boat to keep the rolled sail up even when sailing with another sail. The Code 0 has therefore a wide range of use, from 50 to 120 degrees.

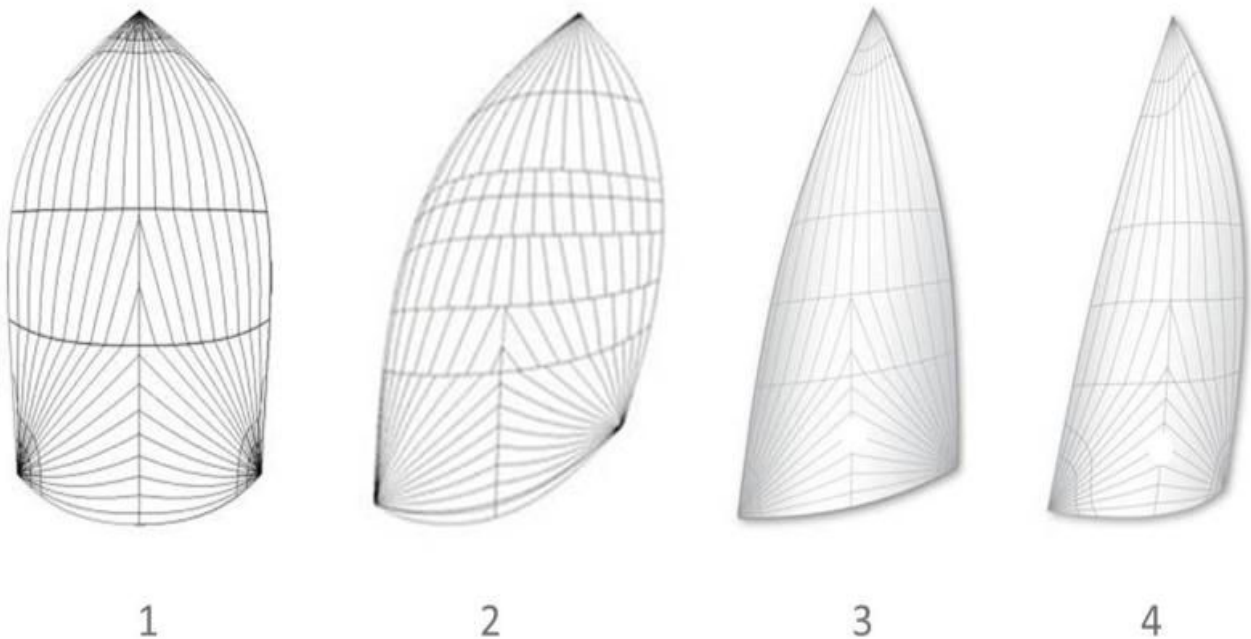


Illustration 2: Downwind sails

- 1- Symmetrical spinnaker
- 2- Asymmetrical spinnaker
- 3- Gennaker
- 4- Code 0

- ✓ Better reaching performance
- ✓ Better acceleration
- ✓ Wide range of use
- ✓ Easy to use
- ✓ Simple sail with UV stripe and no sleeve handling
- ✓ Simple furling
- ✓ Able to be carried when furled and using other sails

While conventional boats are using symmetrical spinnaker for optimum performance in running course, the symmetrical spinnaker are not such easy sail to use. On such large boats, the sail is too large, and the luff too round to be furled. In order to hoist and drop the spinnaker, it is therefore required to set a sleeve. Also in order to use the maximum of their performance, the tack point need to be moved from one hull to another while gybing. The **Sunreef Design Team** and sail makers are working on asymmetrical spinnaker bringing the following advantages:

- ✓ Furling ability
- ✓ Better reaching performances
- ✓ Easy handling
- ✓ Simple deck layout



- ✓ More stable sail than a symmetrical spinnaker
- ✓ Simple furling
- ✓ Wide range of use

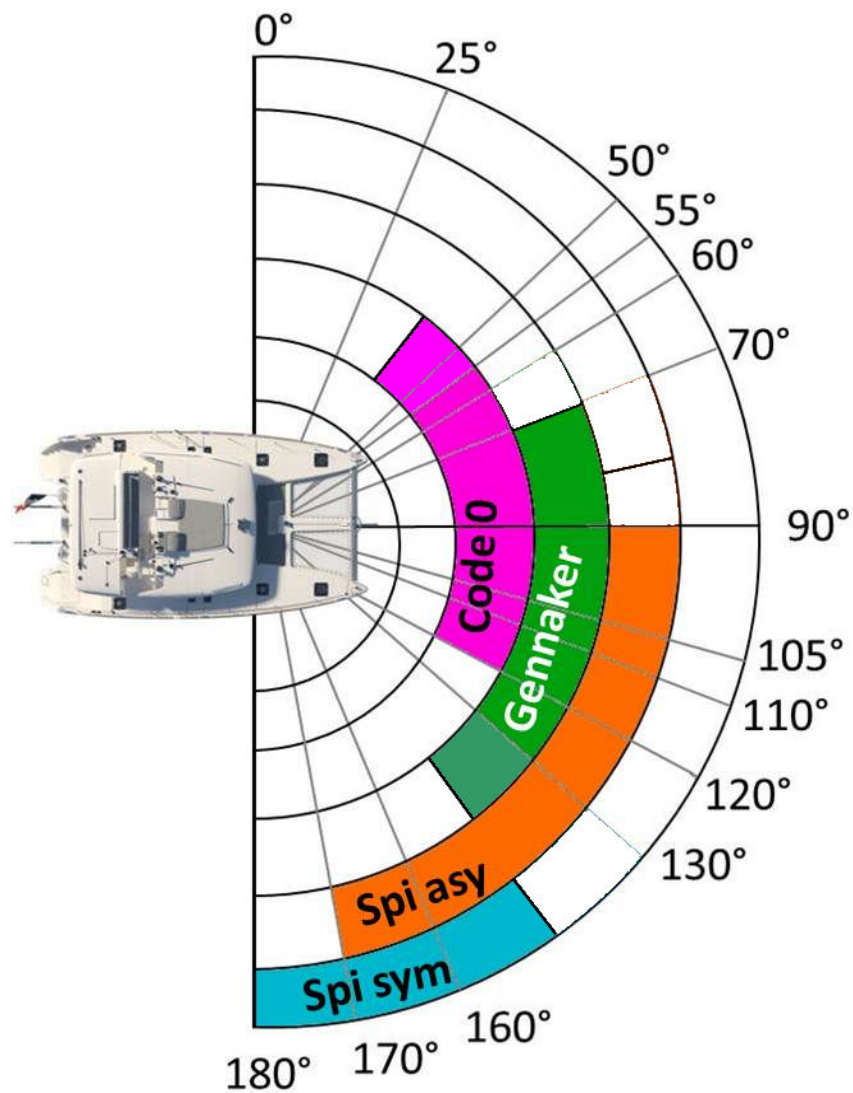


Illustration 3: Typical downwind sails range of use



■ SUNREEF 74CXX “CLASSIC”

■ *DIMENSIONS*

Main sail:	182m ²
P	27.14m
E	9.64m
BAD	4.1m
Staysail:	47m ²
Genoa:	150m ²
IG	28.7m
J	10.2m
LP	10.07m
HBI	2.52m
Gennaker:	260m ²
Runner:	470m ²

■ *DESCRIPTION*

The boat is equipped with:

- ✓ Square top main sail
- ✓ Overlapping staysail
- ✓ Overlapping genoa
- ✓ Gennaker
- ✓ Symmetrical Spinnaker (Runner)

Reefing/hoisting/handling options:

- ✓ Mainsail in-boom furling
- ✓ Manual headsails furler
- ✓ Headsail longitudinal tracks
- ✓ Gennaker + UV protection sock
- ✓ Spinnaker sleeve
- ✓ Symmetrical Spinnaker (Runner)
- ✓ Spinnaker starboard, port and centred tackpoint position

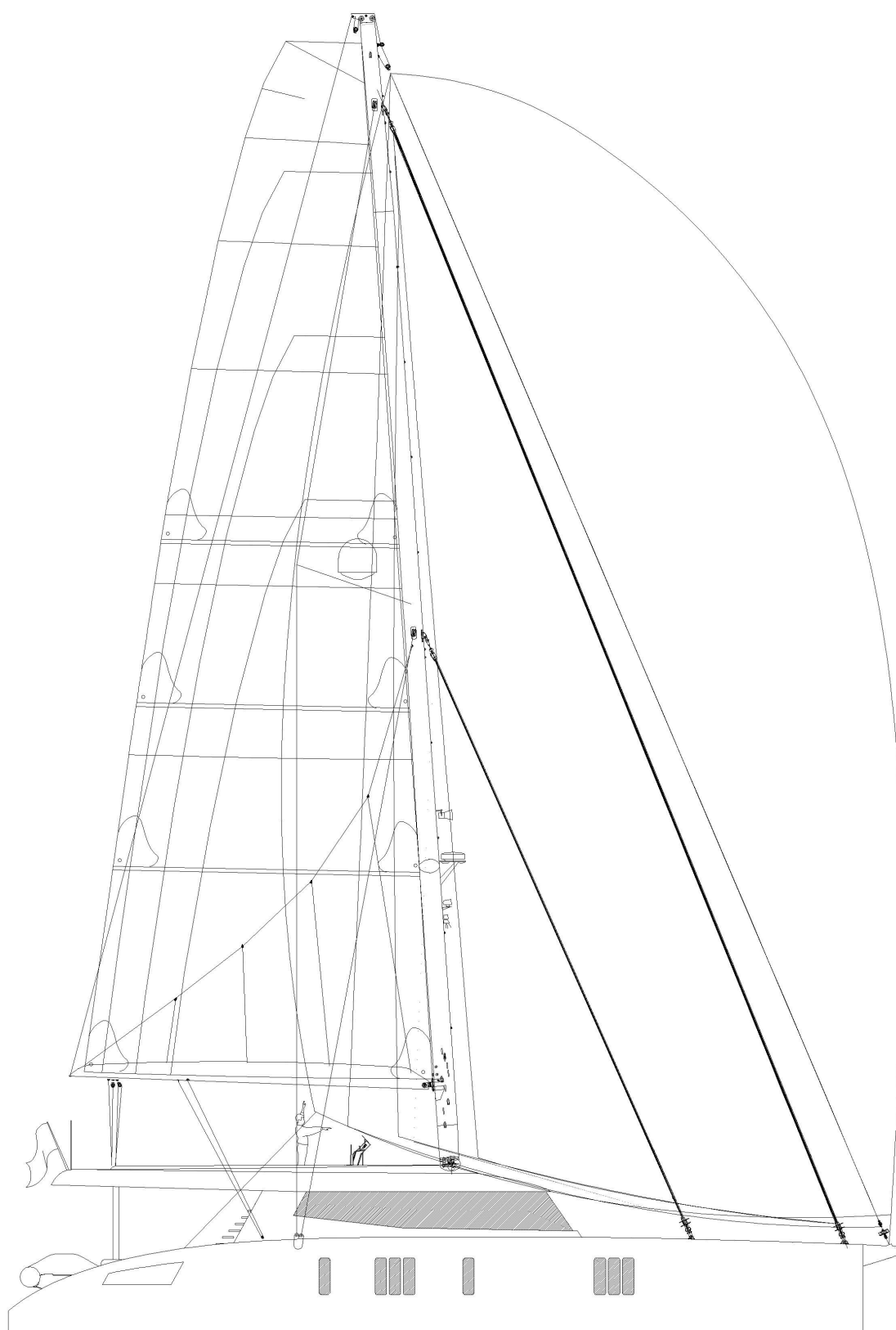


Illustration 4: Sunreef 74CXX "Classic"



■ SPEED PREDICTION

The speed prediction are analysed below (in knots):

AWA	AWS in knots									
	4	6	8	10	12	14	16	20	25	30
36	-	-	-	-	-	-	-	-	-	-
40	2.00	4.01	7.58	8.11	7.12	6.13	6.20	7.40	8.76	7.99
45	2.10	4.35	6.24	7.45	7.61	7.09	7.75	7.39	7.53	8.24
52	3.03	4.50	5.84	7.00	8.45	8.63	8.94	9.35	9.55	9.33
60	3.63	5.29	6.71	7.98	9.16	9.71	10.08	10.62	11.04	11.22
70	4.07	5.84	7.33	8.68	9.92	10.69	11.11	11.78	12.40	12.82
75	4.20	6.00	7.50	8.88	10.13	11.10	11.54	12.29	13.02	13.56
80	4.28	6.10	7.61	9.00	10.26	11.40	11.94	12.77	13.61	14.27
90	4.31	6.13	7.64	9.02	10.28	11.43	12.59	13.66	14.74	15.66
110	4.50	6.36	7.93	9.37	10.67	11.90	13.19	15.22	16.83	18.22
120	4.10	5.87	7.35	8.70	9.95	11.09	12.23	14.79	17.60	19.22
135	3.69	5.38	6.85	8.19	9.47	10.65	11.78	14.22	16.79	18.79
150	2.95	4.34	5.66	6.85	7.98	9.07	10.11	12.09	14.78	17.94
165	2.44	3.62	4.77	5.87	6.90	7.89	8.85	10.68	12.93	15.40
180	2.18	3.25	4.29	5.30	6.26	7.18	8.06	9.79	11.82	13.95

The sails used for the best performances is described below:

AWA	Best sail set									
	4	6	8	10	12	14	16	20	25	30
36	-	-	-	-	-	-	-	-	-	-
40	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
45	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
52	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
60	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
70	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
75	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
80	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
90	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
110	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn
120	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn
135	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru
150	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru
165	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru
180	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru	M+Ru

M+G

Main sail + Genoa

M+Gn

Main sail + Gennaker

M+Ru

Main sail + Runner Symetrical Spinnaker

Advantages:

- ✓ Good close hauled performances
- ✓ Good downwind running performances



- ✓ Good reaching performances under Genoa and Main only

Disadvantages:

- x Complicated headsails to handle for manoeuvres
- x High loads in superstructure
- x Gennaker to be fitted only with non effective UV protection stripe
- x Gennaker to be fitted with sock and MUST be dropped
- x Spinnaker to be fitted with a sleeve for hoisting/dropping
- x Complicated spinnaker for manoeuvres
- x Multiple tack poitn position
- x Complex deck hardware layout
- x Numerous halyards running inside the mast



■ SUNREEF 74CXX “VMG”

■ ***DIMENSIONS***

Main sail:	182m ²
P	27.14m
E	9.64m
BAD	4.1m
Staysail:	34m ²
Genoa:	120m ²
IG	28.7m
J	10.2m
LP	8.35m
HBI	2.52m
Code 0:	210m ²
Reacher:	420m ²

■ ***DESCRIPTION***

The boat is equipped with:

- ✓ Square top main sail
- ✓ Self-taking staysail or/
- ✓ Self-taking genoa
- ✓ Code 0
- ✓ Asymmetrical Spinnaker (Reacher)

Reefing/hoisting/handling options:

- ✓ Mainsail in-boom furling
- ✓ Manual headsails furler
- ✓ Headsail transversal tracks for self taking
- ✓ Code 0 on furler
- ✓ Asymmetrical Spinnaker (Reacher)
- ✓ Single poitn tack poin

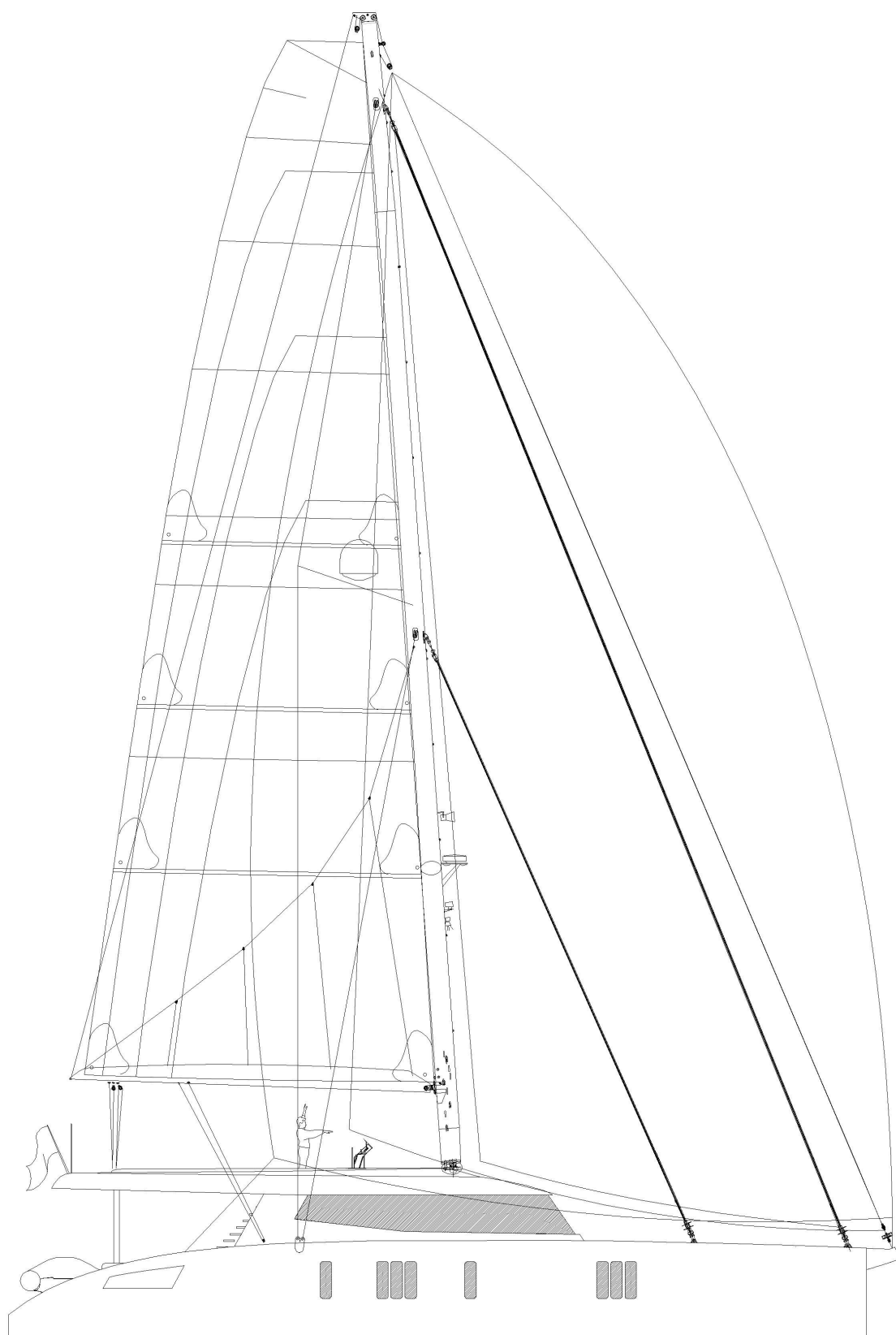


Illustration 5: Sunreef 74CXX “VMG”



■ SPEED PREDICTION

The speed prediction are analysed below (in knots):

AWA	AWS in knots									
	4	6	8	10	12	14	16	20	25	30
36	-	-	-	-	-	-	-	-	-	-
40	1.97	3.96	7.40	8.02	7.02	6.10	6.00	7.35	8.70	7.54
45	2.05	4.28	6.10	7.24	7.57	7.02	7.70	7.38	7.50	8.23
52	2.98	4.41	5.73	6.86	7.90	8.62	8.93	9.34	9.54	9.32
60	3.78	5.52	6.99	8.32	9.24	9.73	10.09	10.62	11.04	11.23
70	4.32	6.18	7.74	9.17	10.22	10.72	11.15	11.83	12.46	12.88
75	4.49	6.38	7.96	9.42	10.61	11.14	11.60	12.36	13.09	13.63
80	4.60	6.50	8.10	9.57	10.87	11.51	12.01	12.85	13.70	14.37
90	4.67	6.57	8.17	9.65	10.94	12.16	12.74	13.76	14.86	15.78
110	4.62	6.55	8.20	9.71	11.05	11.98	13.92	15.25	16.84	18.33
120	4.31	6.15	7.71	9.16	10.48	11.71	12.98	14.81	17.65	19.32
135	3.60	5.25	6.68	7.98	9.22	10.36	11.44	13.70	16.95	18.93
150	2.78	4.10	5.36	6.51	7.58	8.61	9.61	11.46	13.88	16.70
165	2.31	3.43	4.52	5.57	6.55	7.49	8.41	10.16	12.24	14.47
180	2.09	3.10	4.10	5.07	6.00	6.88	7.73	9.37	11.31	13.28

The sails used for the best performances is described below:

AWA	Best sail set									
	4	6	8	10	12	14	16	20	25	30
36	-	-	-	-	-	-	-	-	-	-
40	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
45	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
52	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
60	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b
70	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b
75	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b
80	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b
90	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b	MC0b
110	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	MC0b	MC0b	MC0b
120	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+C0	MC0b
135	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re
150	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re
165	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re
180	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re	M+Re

M+G

Main sail + Genoa

MC0b

Main sail + Code 0

M+Re

Main sail + Reacher Asymmetrical Spinnaker

Advantages:

- ✓ Good close reaching performances
- ✓ Good broad reach performance



- ✓ Easy taking
- ✓ Easy handling of downwind sails
- ✓ Possible to carry the Code 0 up all the time
- ✓ Code 0 can be used as a gennaker
- ✓ Code 0 fitted with UV protection stripe
- ✓ Able to furl asymmetrical spinnaker
- ✓ No sock or sleeve
- ✓ Simple deck layout
- ✓ Simple sail to handle
- ✓ Low load applied on superstructure

Disadvantages:

- x Lower performances in close hauled
- x Lower performances in running downwind



■ SUNREEF 70CXX “PREVIOUS”

■ *DIMENSIONS*

Main sail:	175m ²
P	24.20m
E	8.80m
BAD	4.1m
Staysail:	53m ²
Genoa:	89m ²
IG	21.07m
J	7.17m
LP	7.60m
HBI	2.52m
Gennaker:	175m ²

■ *DESCRIPTION*

The boat is equipped with:

- ✓ Roach mainsail
- ✓ Overlapping staysail
- ✓ Overlapping genoa
- ✓ Gennaker

Reefing/hoisting/handling options:

- ✓ Mainsail manual reefing
- ✓ Manual headsails furler
- ✓ Headsail longitudinal tracks
- ✓ Gennaker + UV protection sock
- ✓ Gennaker sock

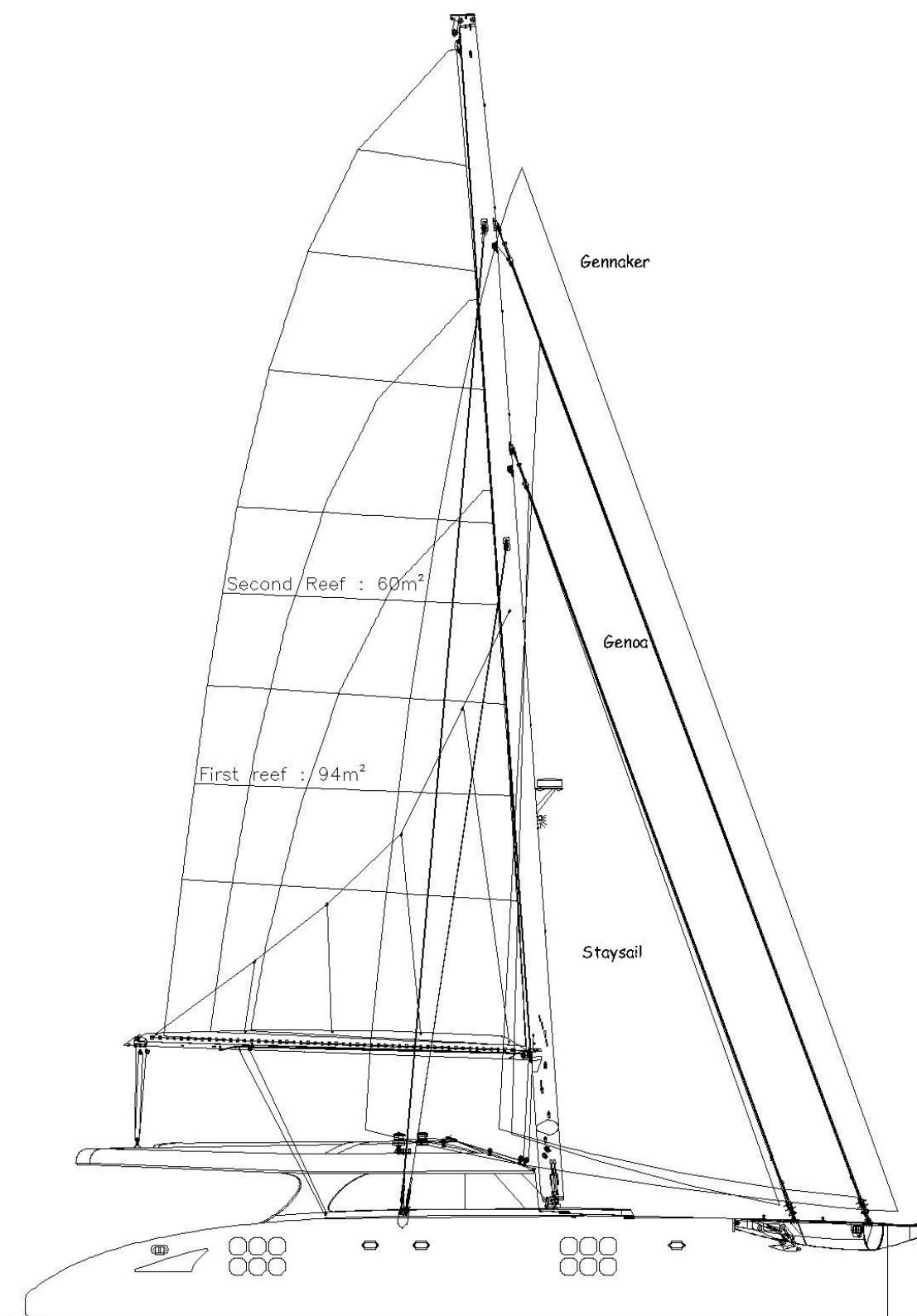


Illustration 6: Sunreef 70CXX “Previous”



■ SPEED PREDICTION

The speed prediction are analysed below (in knots):

AWA	AWS in knots									
	4	6	8	10	12	14	16	20	25	30
36	-	-	-	-	-	-	-	-	-	-
40	1.58	2.48	3.40	4.28	5.04	5.90	6.10	6.57	6.75	6.45
45	1.75	2.76	3.78	4.75	5.60	6.90	7.00	7.30	7.50	7.17
52	2.66	3.92	5.11	6.14	7.07	7.94	8.72	9.14	9.37	9.30
60	3.10	4.53	5.80	6.90	7.92	8.88	9.81	10.29	10.69	10.89
70	3.42	4.96	6.28	7.44	8.53	9.54	10.44	11.10	11.95	12.35
75	3.52	5.09	6.42	7.60	8.70	9.72	10.64	11.53	12.52	13.03
80	3.57	5.16	6.50	7.69	8.81	9.83	10.76	12.28	13.07	13.69
90	3.58	5.17	6.50	7.69	8.81	9.84	10.77	12.66	14.13	15.00
110	3.85	5.52	6.92	8.18	9.37	10.43	11.45	13.67	16.28	17.62
120	3.51	5.07	6.41	7.60	8.72	9.77	10.72	12.67	15.66	18.60
135	2.86	4.18	5.42	6.51	7.53	8.51	9.44	11.15	13.39	16.10
150	2.36	3.48	4.57	5.60	6.54	7.44	8.32	9.97	11.90	14.01
165	2.10	3.11	4.10	5.06	5.97	6.82	7.65	9.25	11.10	12.99
180	2.03	3.01	3.97	4.91	5.80	6.65	7.46	9.04	10.88	12.73

The sails used for the best performances is described below:

AWA	Best sail set									
	4	6	8	10	12	14	16	20	25	30
36	-	-	-	-	-	-	-	-	-	-
40	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
45	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
52	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
60	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
70	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
75	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
80	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
90	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G	M+G
110	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn
120	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn
135	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn
150	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn
165	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn
180	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn	M+Gn

M+G

Main sail + Genoa

M+Gn

Main sail + Gennaker

Disadvantages:

- x Long and heavy boom
- x Difficult handling for taking and gybing
- x Small headsails



- x Low general performances
- x Difficult to handle headsails for manoeuvres
- x Low performance mainsail
- x Heavy mast and stay profile



■ COMPARISON 70CXX VS 74CXX

■ SPEED COMPARISON

AWA	AWS in knots									
	4	6	8	10	12	14	16	20	25	30
40	78.75%	61.95%	44.88%	52.71%	70.79%	96.25%	98.39%	88.78%	77.05%	80.76%
45	83.33%	63.45%	60.58%	63.76%	73.59%	97.32%	90.32%	98.78%	99.60%	87.01%
52	87.79%	87.11%	87.50%	87.71%	83.67%	92.00%	97.54%	97.75%	98.12%	99.68%
60	85.40%	85.63%	86.44%	86.47%	86.46%	91.45%	97.32%	96.89%	96.83%	97.06%
70	84.03%	84.93%	85.68%	85.71%	85.99%	89.24%	93.97%	94.23%	96.37%	96.33%
75	83.81%	84.83%	85.60%	85.59%	85.88%	87.57%	92.20%	93.82%	96.16%	96.09%
80	83.41%	84.59%	85.41%	85.44%	85.87%	86.23%	90.12%	96.16%	96.03%	95.94%
90	83.06%	84.34%	85.08%	85.25%	85.70%	86.09%	85.54%	92.68%	95.86%	95.79%
110	85.56%	86.79%	87.26%	87.30%	87.82%	87.65%	86.81%	89.82%	96.73%	96.71%
120	85.61%	86.37%	87.21%	87.36%	87.64%	88.10%	87.65%	85.67%	88.98%	96.77%
135	77.51%	77.70%	79.12%	79.49%	79.51%	79.91%	80.14%	78.41%	79.75%	85.68%
150	80.00%	80.18%	80.74%	81.75%	81.95%	82.03%	82.29%	82.46%	80.51%	78.09%
165	86.07%	85.91%	85.95%	86.20%	86.52%	86.44%	86.44%	86.61%	85.85%	84.35%
180	93.12%	92.62%	92.54%	92.64%	92.65%	92.62%	92.56%	92.34%	92.05%	91.25%

■ ANALYSIS

The above table shows the performance of the **Sunreef 70CXX** versus the **Sunreef 74CXX**. As it is possible to see, overall the **Sunreef 70CXX** is 15% slower than the **Sunreef 74CXX**. If we analyse in more details, we can see that in the worst case, the previous model is slower by 25% (close hauled) and only 7.5% in the best condition (running downwind).

■ EXPLANATION

Generally speaking, the sail area is larger on the modern version (74CXX) than on the previous version (70CXX) resulting in better performances. The rig is set more forward on the previous version, resulting in a less balanced rig. This was a really classic rig for the time the boat was designed. It was a really classic rig on light catamarans. The rig set on the modern version is better for heavy cruiser, bringing better balance and more power in reaching conditions. Moreover, the rig is lower and less capable of catching free air. Also the rig is heavier, with smaller stay angle resulting in higher compression load in the mast tube. With smaller angle in the stays, the load in the rod is higher, meaning heavier profile. Weight in the rig produces more pitching behaviour, slowing down the hull in waves.

Beside the lower performances, handling such a rig is more complex. The main sail is large. Gybing and tacking with such a sail can be dangerous for inexperienced people. Because the boom is longer, it is also heavier, resulting in high range movement during both sailing and motoring.



■ COMPARISON 74CXX

■ SPEED COMPARISON “VMG” VS “CLASSIC”

AWA	AWS in knots									
	4	6	8	10	12	14	16	20	25	30
40	98.50%	98.75%	97.63%	98.89%	98.60%	99.51%	96.77%	99.32%	99.32%	94.37%
45	97.62%	98.39%	97.76%	97.18%	99.47%	99.01%	99.35%	99.86%	99.60%	99.88%
52	98.35%	98.00%	98.12%	98.00%	93.49%	99.88%	99.89%	99.89%	99.90%	99.89%
60	104.13%	104.35%	104.17%	104.26%	100.87%	100.21%	100.10%	100.00%	100.00%	100.09%
70	106.14%	105.82%	105.59%	105.65%	103.02%	100.28%	100.36%	100.42%	100.48%	100.47%
75	106.90%	106.33%	106.13%	106.08%	104.74%	100.36%	100.52%	100.57%	100.54%	100.52%
80	107.48%	106.56%	106.44%	106.33%	105.95%	100.96%	100.59%	100.63%	100.66%	100.70%
90	108.35%	107.18%	106.94%	106.98%	106.42%	106.39%	101.19%	100.73%	100.81%	100.77%
110	102.67%	102.99%	103.40%	103.63%	103.56%	100.67%	105.53%	100.20%	100.06%	100.60%
120	105.12%	104.77%	104.90%	105.29%	105.33%	105.59%	106.13%	100.14%	100.28%	100.52%
135	97.56%	97.58%	97.52%	97.44%	97.36%	97.28%	97.11%	96.34%	100.95%	100.75%
150	94.24%	94.47%	94.70%	95.04%	94.99%	94.93%	95.05%	94.79%	93.91%	93.09%
165	94.67%	94.75%	94.76%	94.89%	94.93%	94.93%	95.03%	95.13%	94.66%	93.96%
180	95.87%	95.38%	95.57%	95.66%	95.85%	95.82%	95.91%	95.71%	95.69%	95.20%

■ ANALYSIS

The above table shows the performance of the **Sunreef 74CXX “Classic”** versus the **Sunreef 74CXX “VMG”**. It shows in green where the “VMG” version is faster than the “Classic” version. In pink, it shows where the “VMG” version is slower than the “Classic” version. As expected the results show better performances in reaching condition but slower in close hauled and deep running conditions. An interesting aspect is that in the worst case, the “VMG” version is slower by maximum 7% but faster by up to 8.5%. Also another aspect, is that the “VMG” version is really interesting in low wind speed. In fact the stronger the wind is the less obvious the difference of speed is. If we calculate the average of the above values, we find out that in all conditions, the speed of the two boats are equivalent with a variation of 0.05% in favour of the “VMG” version.

■ EXPLANATION

The “VMG” version has less sail area in upwind (close hauled) and downwind running conditions resulting in lower speed. However it has more sail area in reaching condition resulting in higher speed from close to broad reaching. The Code 0 sail starts to be used from 60 degrees AWA up to 120 degrees where it becomes more a gennaker than a large genoa. Therefore the use of a Code 0 optimises the speed in reaching condition especially in light wind.



■ **ADVANTAGES AND DISADVANTAGES**

74CXX “VMG”

- ✓ Easy handling head sails
- ✓ Easy handling Downwind sails
- ✓ Light rig
- ✓ Code 0 fitted with UV stripe
- ✓ Spinnaker can be furled
- ✓ High performance in reaching
- ✓ Low load in superstructure
- ✓ Simple deck layout
- ✓ Easy manoeuvres for limited crew
- ✓ Fast tacking

- x Low performance in close hauled conditions
- x Low performance in deep downwind conditions

74CXX “Classic”

- ✓ Light rig
- ✓ Good performance in close hauled conditions
- ✓ Good performance in deep downwind conditions

- x Non self taking head sails
- x High load in superstructure
- x Gennaker must be UV protected with a sock
- x Gennaker must be dropped after use
- x Spinnaker can be furled
- x Spinnaker must have a sleeve for dropping
- x Complex deck layout
- x Complex manoeuvres for limited crew
- x Slow tacking



■ CONCLUSION

The new 74CXX is an optimised yacht compared to the previous version 70CXX. With a mast moved aft, handling the sails has been made easier, loads have been reduced and overall rig weight reduced too resulting in a better behaviour of the boat, in waves for example. Moving the mast aft allowed to have larger head sails, giving more power in reaching conditions and more balanced hull. Head sails have been made more efficient with larger area, improved efficiency and high aspect ratio.

The “VMG” version has better performances in reaching conditions but worst in close hauled and downwind running conditions. Overall the average speed between the two rigs are the same. **Sunreef Design Team** believes that it is more interesting to optimize the rig for the reaching conditions. In fact, close hauled and deep downwind are not very comfortable conditions for a catamaran and the boat are usually powered by both sails and motor. Also conventional rig tend to lack of sail area in close reaching as the genoa starts to be inefficient and the boat is sailing to high to use the gennaker. The **Sunreef Design Team** decided to increase the performance where the previous version was lacking power. It is believed that the boat will be sailing most of the time in those condition for both confort and course reason.

As we have seen, the “VMG” rig optimises performances in reaching conditions, whereas the “Classic” version is better for close hauled and deep downwind. Although the overall average speed are similar with a variation of 0.05%, sails are much easier to handle on the “VMG” version. In fact, the self taking jib, allows to tack really easily. Turning the wheel is therefore the only thing to do, the rest is automatic. This point can still be discussed depending on the sailing program of the boat.

The most interesting aspect of the “VMG” rig is the ability of having a Code 0, used as a large genoa for close reaching and as a gennaker for deep reaching cindition. Having a Code 0 instead of a gennaker, besides the added performance in close reaching allow to have a more tensioned luff. Also the sail material being a little heavier, it can carry a UV protection stripe. Both features allow the sail to be furled, and carried all the time when not in use. Whereas a “Classic” gennaker cannot carry a UV protection stripe. It would make the luff too heavy and the sail will not perform. It is mandatory to hoist a gennaker sock in order to protect the sails from the UV's. The luff of the sail is also more slacked resulting, when not in used, in a thick tupe located in front of the genoa. This thick “banana” will create a lot of turbulences and affect the genoa performance. At last, the banana will move from side to side while sailing.

Optimising performance in reaching is also really interesting as it allow the boat to carry an asymmetrical spinnaker. Unlike conventional symmetrical spinnaker, the luff is tighter and furling system can be used.

Having a Code 0 and an asymmetrical spinnaker improves crew handling, as they both can be furled. The Code 0 is a very versatile sail that can be used in a really wide range of conditions and carried all the time. They are the perfect sails for limited crew.



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