



VAUHTI KORJAA VIRHEET

***BSF VAUHTI-ILTA
11.2.2021***

SPEED MAKES YOU SMART

ILLAN TEEMAT:

- THEORY of LIFT
- SOLA
- INDUSOITU VASTUS
- POLAARIT JA TARGETIT
- FINRATING MITTAKIRJAN
MAHDOLLISUUDET

VOIKO FIKSU OLLA NOPEE?

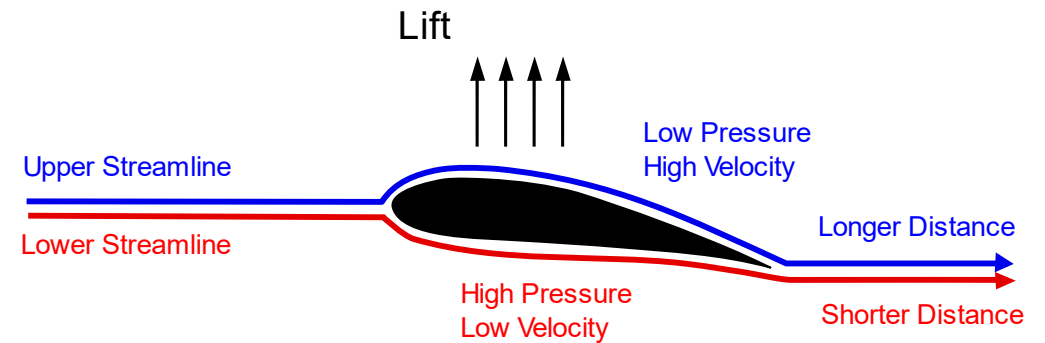
Theory of Lift (eli nostovoiman salaisuus)

- Purjevenettä eteenpäin vievä voima

✓ Väärä "lentäjäteoria"

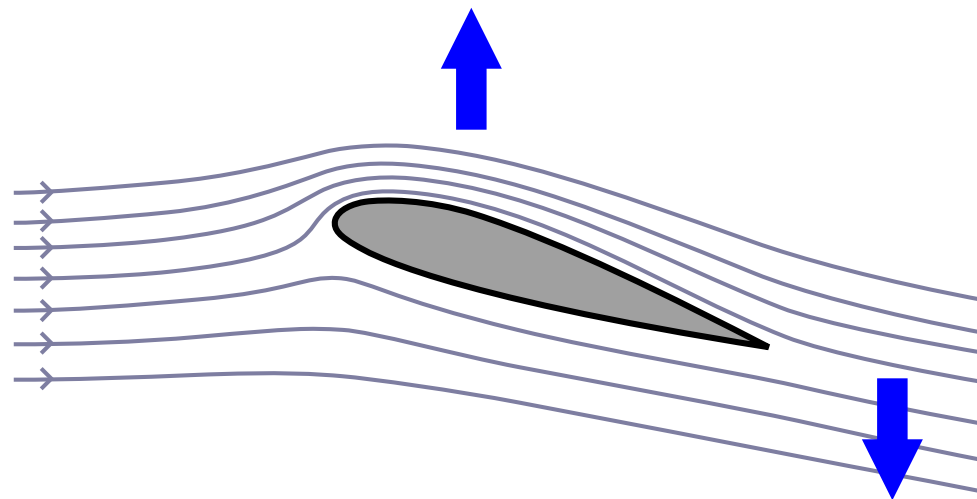
✓ Newtonin laki

✓ Benoulli ja Coanda



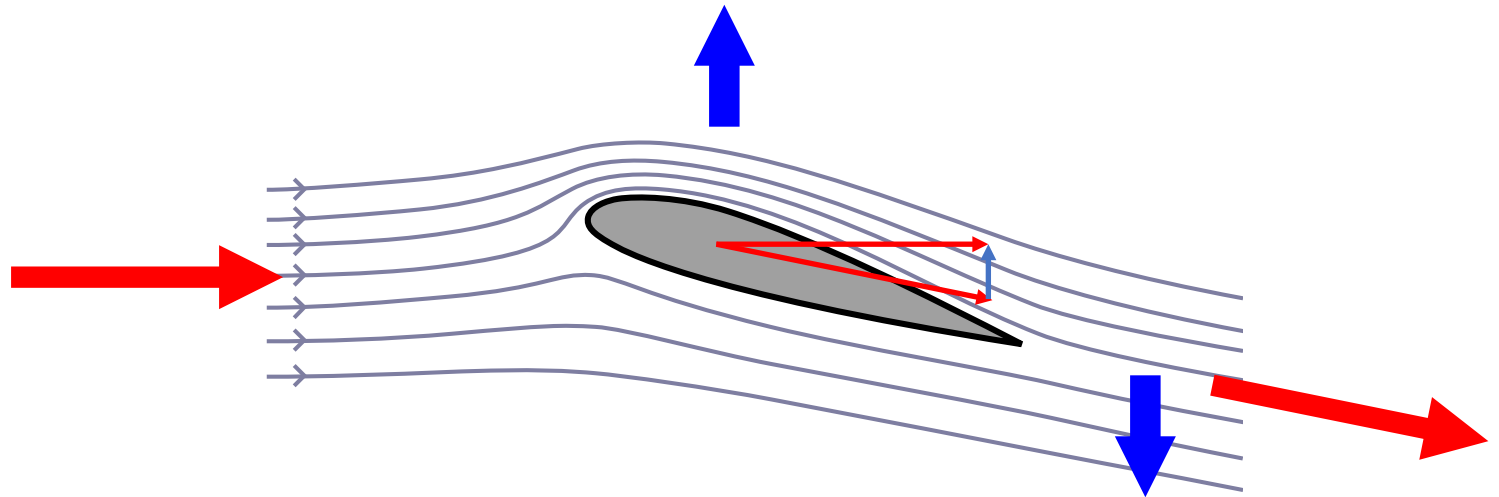
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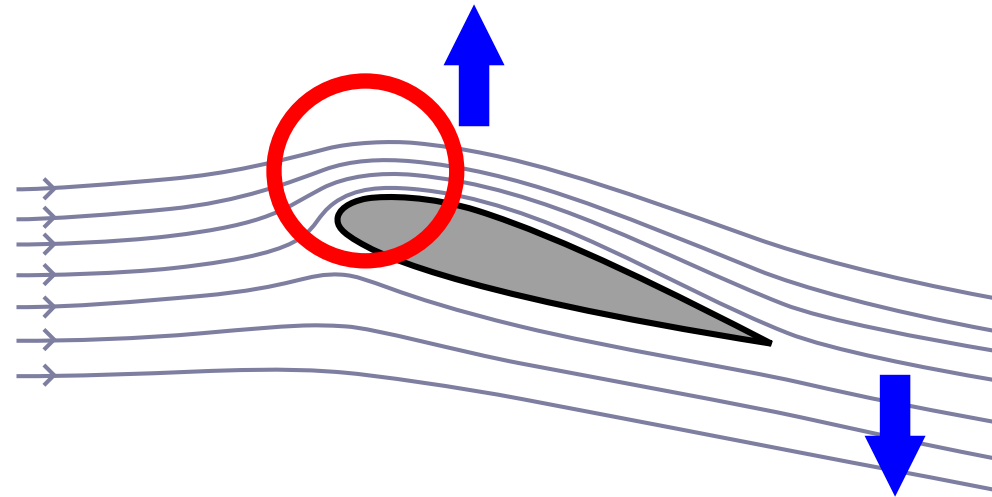
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Bernoullin laki / Venturi-ilmiö:

Venturi-ilmiö on [Bernoullin lakiin](#) liittyvä ilmiö, jossa virtaavan [fluidin nopeus](#) suurenee ja [paine](#) pienenee, kun se kulkee kavennetun putken läpi



Theory of Lift (eli nostovoiman salaisuus)

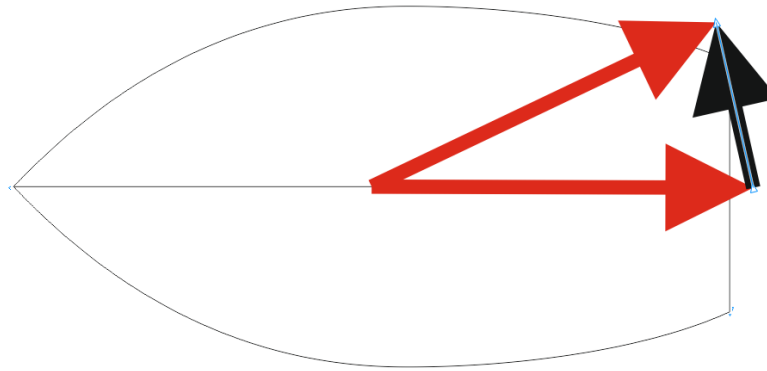
- Purjevenettä eteenpäin vievä voima

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Coandă-ilmiö on virtauksen pyrkimys kääntyä kohti sitä lähellä olevaa pintaa.

Theory of Lift (eli nostovoiman salaisuus)

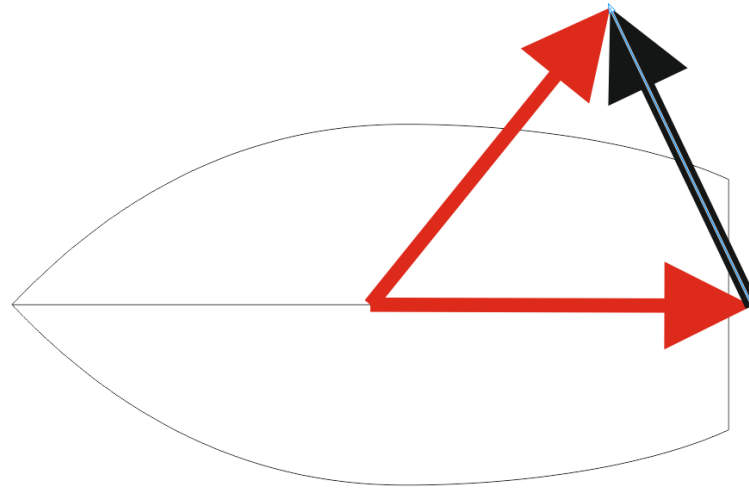
$< 30^\circ$



$< 0^\circ$ jättövirtauksen suunta

Theory of Lift (eli nostovoiman salaisuus)

$< 45^\circ$



$< 0^\circ$ jättövirtauksen suunta

Newtonin laki:

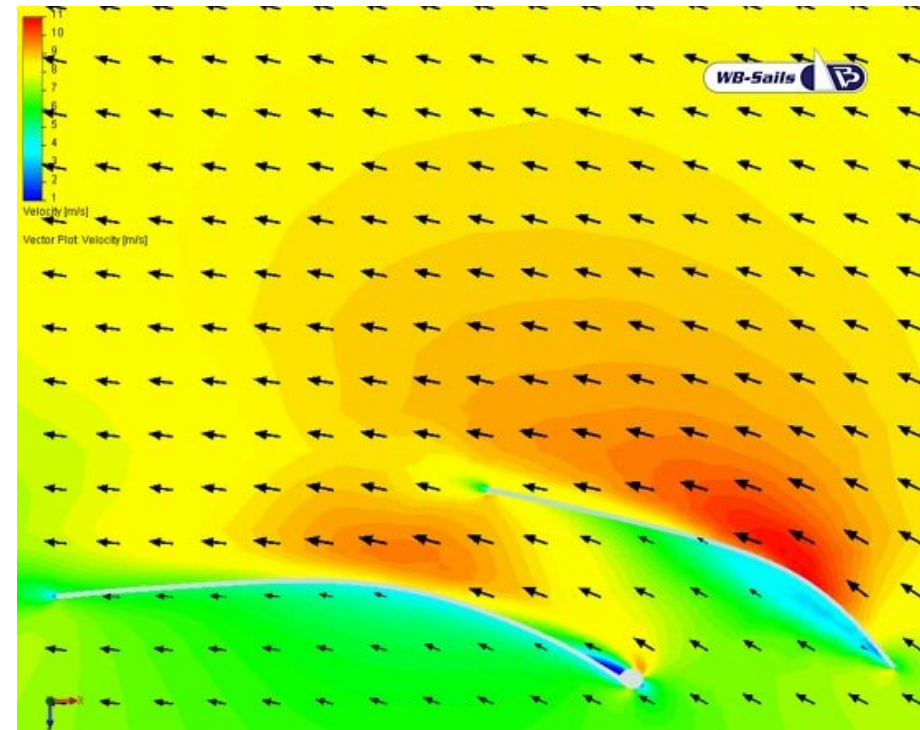
- Kohtauskulma kasvaa $\rightarrow$ voima suurenee
- Kohtauskulma kasvaa $\rightarrow$ voima kääntyy eteenpäin

Sola

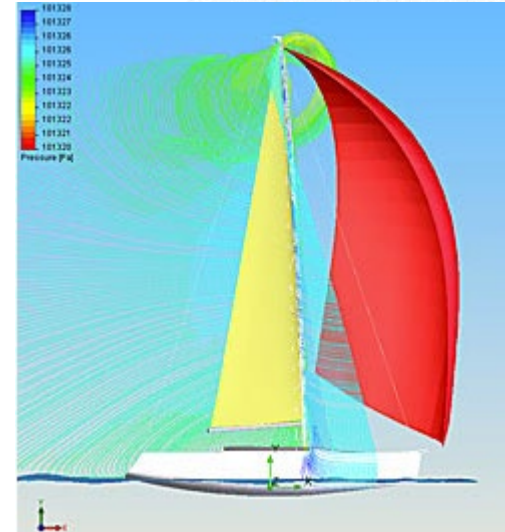
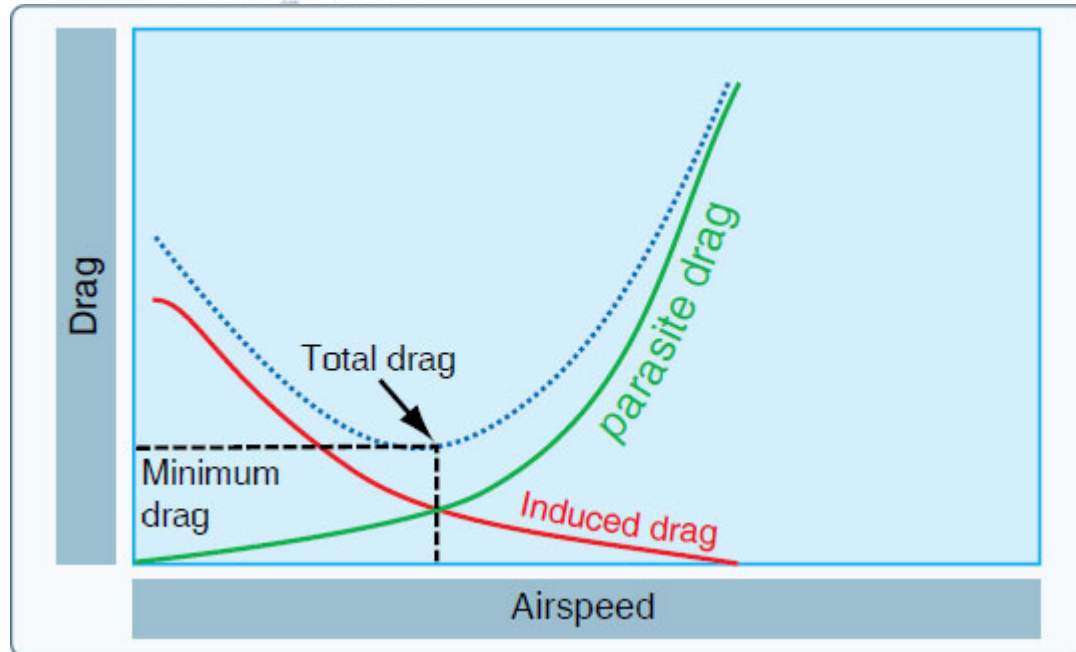
- Fokasta säädetään etuliikkiä, isosta takaliikkiä
- MUTTA: solan tehtävä on "liimata" virtaus kiinni purjeeseen niin, että sitä voidaan taivuttaa enemmän ->

fokan takaliikin säätö vaikuttaa ison takaliikkiin

http://cdn2.hubspot.net/hub/209338/news/Ad_aerodynamics/index2.htm#



Indusoitu vastus

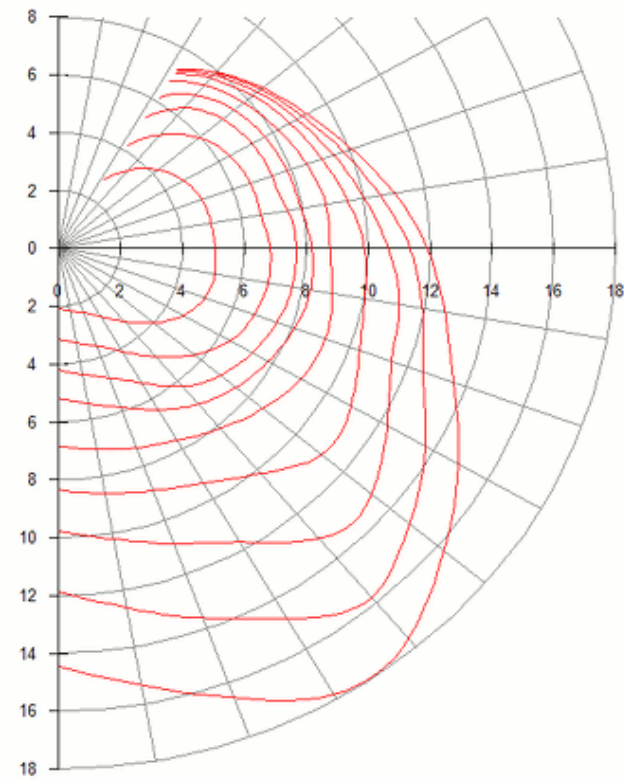


- kevyessä keskitytään indusoidun minimoimiseen -> kiertymä minimiin
- kovassa indusoidulla ei ole merkitystä -> voi huoletta twistata

Note how much Margriet Matthijse is leaning back her mast on a breeze day in Hyeres. Lots of rake opens the leech, depowering the top/front part of the sail. She's effectively sailing with a "reefed" triangle whose top lies somewhere around the N in NED. The very top of the sail, backwinding, is actually supporting the boat, providing extra righting moment.

Polaarit ja Targetit

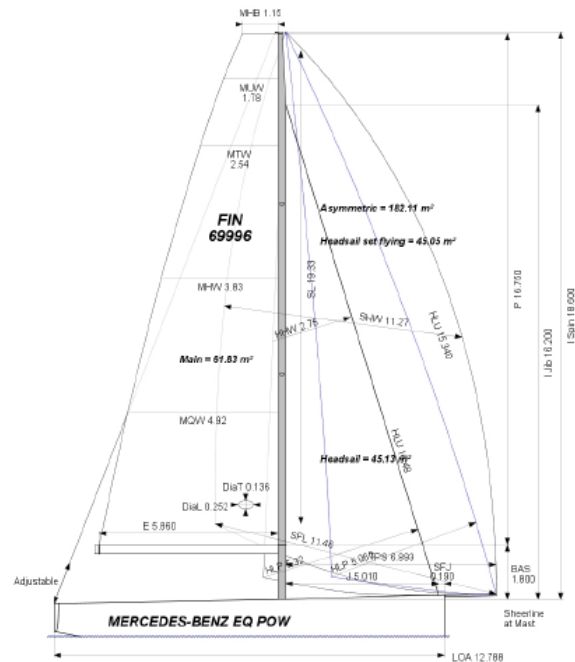
Animula 2001



Polaarit ja Targetit

gp42-silva_black hybrid 2											
Best Boatspeeds (kt)											
	4	5	6	7	8	9	10	12	14	16	20
32	3,011	3,841	4,587	5,25	5,764	6,161	6,465	6,866	7,071	7,16	7,137
36	3,527	4,436	5,256	5,933	6,461	6,852	7,137	7,493	7,674	7,781	7,847
40	3,973	4,956	5,803	6,536	7,046	7,399	7,641	7,935	8,105	8,221	8,328
45	4,455	5,502	6,409	7,168	7,603	7,888	8,088	8,347	8,525	8,656	8,805
60	5,502	6,679	7,657	8,242	8,557	8,791	8,98	9,266	9,525	9,729	10,007
70	5,879	7,132	8,021	8,602	8,98	9,227	9,446	9,817	10,12	10,371	10,768
80	6,04	7,318	8,161	8,764	9,273	9,624	9,869	10,293	10,671	11,026	11,6
90	6,035	7,382	8,348	8,843	9,302	9,816	10,209	10,739	11,24	11,689	12,46
100	6,237	7,593	8,527	9,064	9,43	9,766	10,152	11,124	11,753	12,314	13,298
110	6,233	7,584	8,519	9,191	9,628	10,001	10,35	11,052	11,993	12,898	14,064
120	5,989	7,321	8,264	8,972	9,62	10,153	10,562	11,383	12,184	12,965	14,705
135	5,087	6,206	7,274	8,069	8,682	9,276	9,868	11,152	12,581	13,634	15,305
150	3,714	4,647	5,524	6,352	7,164	7,827	8,366	9,374	10,403	11,652	14,513
160	2,988	3,774	4,533	5,267	5,955	6,651	7,306	8,325	9,194	10,069	12,162
170	2,503	3,16	3,813	4,45	5,077	5,679	6,274	7,428	8,357	9,184	10,891
180	2,317	2,924	3,532	4,129	4,716	5,292	5,846	6,955	7,93	8,736	10,302
Up.Vs	4,592	5,501	6,431	7,008	7,286	7,458	7,582	7,745	7,877	7,993	8,153
Up.Bt	46,46	44,99	45,2	43,62	41,95	40,53	39,47	38,14	37,76	37,82	38,44
Up.Vmg	3,163	3,89	4,532	5,074	5,419	5,669	5,853	6,092	6,227	6,314	6,386
Dn.Vs	5,024	6,037	7,002	7,536	7,934	8,281	8,686	9,694	11,694	13,2	15,358
Dn.Bt	135,79	136,78	137,73	140,8	143,48	145,69	146,82	147,13	141,32	141,59	145,9
Dn.Vmg	3,601	4,4	5,181	5,84	6,376	6,84	7,27	8,142	9,129	10,344	12,717

gp42-silva_black hybrid 2											
Best Heel Angles (deg)											
	4	5	6	7	8	9	10	12	14	16	20
32	2,61	4,23	6,87	9,7	12,47	14,42	16,1	18,7	20,43	21,03	21,41
36	2,98	5,33	7,87	11,19	14,28	16,17	17,74	19,94	20,97	21,17	21,7
40	3,31	5,92	8,73	12,64	15,67	17,49	18,78	20,56	20,85	21,05	21,66
45	3,65	6,52	9,66	14,32	17,01	18,42	19,44	20,48	20,64	20,89	21,6
60	4,18	7,4	10,88	15,54	18,37	19,28	19,91	19,79	20,11	20,48	21,38
70	4,07	7,18	10,08	13,61	18,53	19,45	19,56	19,82	20,15	20,56	21,63
80	3,68	6,39	8,64	11,12	14,56	19,29	19,52	19,79	20,2	20,67	21,75
90	4,47	8,05	12,96	19,26	10,76	13,51	17,38	19,79	20,2	20,67	21,81
100	4,43	7,98	12,63	19,13	19,09	19,08	11,11	17,19	20,17	20,67	21,79
110	4,06	7,17	10,68	15,66	18,95	18,95	19,05	19,42	14,07	20,62	21,67
120	3,31	5,66	7,82	10,03	12,8	16,79	18,99	19,35	19,8	20,3	19,01
135	1,6	2,38	3,28	4,05	5,3	6,21	7,27	10,12	15,24	20,18	21,25
150	0,38	0,6	0,85	1,13	1,45	1,77	2,09	2,85	3,79	5,38	8,73
160	0,13	0,2	0,29	0,4	0,51	0,64	0,78	1,05	1,34	1,67	2,53
170	0,02	0,02	0,04	0,05	0,06	0,08	0,1	0,14	0,18	0,22	0,33
180	0	0	0	0	0	0	0	0	0	0	0
Up	4,21	6,52	9,69	13,89	16,29	17,62	18,68	20,33	20,94	21,14	21,69
Dn	1,64	2,28	2,95	2,96	2,86	2,79	2,95	3,86	8,21	11,02	12,85



BOAT Name Mercedes-Benz EQ Pow Sail Nr FIN-69996		GPH 496.0		HULL Data File L69996 LOA 12.788m Offset File GER6999_3 MB 3.868m Displacement 4.493kg Draft 2.559m IMS Division Performance Dynamic All. 0.000% Plan Review Construction Carbon Fiber Rigging No Aramid Core No Crew Arm Ex Carbon Rudder Yes Light Stanchions No IMSL 12.464m VCGD -0.422m Sink 22.85kg/mm RL 11.685m VCGM -0.460m WS 29.18m ² LSMO 12.087m Displacement/Length ratio Water Ballast Trim Tab No BLR Index 0.0000			
CLASS Class GP 42 Designer Felci Builder Decision Series 04.2008 Age Date 04.2008 Age Allowance 0.390%				COMMENTS			
PROPELLER Installation Strut PRD 0.400 Type Folding 2 blades PBW 0.100 PIPA 0.0025				CENTERBOARD N/A			
SCORING OPTIONS							
COASTAL / LONG DISTANCE				WINDWARD / LEEWARD			
Time on Distance	486.3			553.5			
Time on Time	1.2339			1.2194			
Triple Number	Low	Medium	High	Low	Medium	High	
Time on Distance	558.2	444.5	387.8	731.2	561.3	481.8	
Time on Time	1.2093	1.5186	1.7405	0.9231	1.2026	1.4011	



ORC
Offshore Racing Congress
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2020 ORC Club Certificate

Rating Office
FSBF Rating Office
Joakim Majander
Matinlahdenkatu 3 E25
02230 Espoo



Certificate
Number 69996
Issued On 30.09.2020
ORC Ref 03290000R7S
VPP Ver. 2020 1.02
Valid until 31.12.2020

Crew Weight
Default 902kg
Maximum 850kg
Minimum* 638kg
*when applied by the NOR and CI
Non Manual Pwr No

Special Scoring
ToD ToT
Non Spin GPH 538.6 1.1140
Non Spin OSN 528.0 1.1363

Sails Limitations
Headsails 7 Spinnakers 5
Asymmetric on centerline
Spinnaker configuration
Symmetric: No
Asymmetric: Yes 182.11
Flying H/S: Yes 64.10
Spin Pole: No

Class Division Length
CDL = 12.070

Stability (Measured)
Limit Positive Stab.: 131.6°
Stability Index: 128.2

Owner
Jani Lehti
M

I certify that I understand my
responsibilities under ORC Rules and
Regulations
Signature



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Offshore Racing Congress
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2020 ORC Club Certificate Appendix

BOAT			
Name	Mercedes-Benz EQ Pow	Certificate Number	69996
Sail Nr	FIN-69996	Issued On	30.09.2020

TIME ALLOWANCES							
Wind Velocity	6 kt	8 kt	10 kt	12 kt	14 kt	16 kt	20 kt
Beat VMG	828.9	681.7	636.3	617.7	603.9	593.1	594.9
52°	536.2	456.3	438.0	429.9	424.9	416.9	413.2
60°	494.3	439.5	422.5	413.2	407.2	398.2	389.0
75°	460.6	420.7	399.4	383.8	374.4	367.3	350.7
90°	455.6	411.1	378.6	359.9	346.3	335.6	322.7
110°	467.7	414.1	372.8	346.4	323.3	302.1	277.2
120°	491.1	426.2	382.4	342.8	314.5	295.1	260.9
135°	571.9	454.1	408.6	363.8	322.8	294.1	245.2
150°	686.6	538.4	459.6	412.1	376.2	334.5	262.4
Run VMG	792.8	621.7	530.7	478.4	434.4	386.2	303.0
Selected Courses							
Windward / Leeward	810.8	651.7	583.5	548.1	519.1	489.7	448.9
Circular Random	675.3	549.5	482.5	442.6	416.0	396.1	366.3
Coastal / Long Distance	809.0	612.1	523.5	468.3	431.3	396.4	343.0
Non Spinnaker	748.6	602.1	522.7	475.1	444.0	422.0	391.8

Velocity Prediction in Knots for True Wind Speeds							
Wind Velocity	6 kt	8 kt	10 kt	12 kt	14 kt	16 kt	20 kt
Beat Angles	43.9°	42.0°	39.8°	39.0°	39.0°	38.6°	39.4°
Beat VMG	4.34	5.28	5.66	5.83	5.96	6.07	6.05
52°	6.71	7.89	8.22	8.37	8.47	8.64	8.71
60°	7.28	8.19	8.52	8.71	8.84	9.04	9.26
75°	7.82	8.56	9.01	9.38	9.62	9.80	10.26
90°	7.90	8.76	9.51	10.00	10.40	10.73	11.16
110°	7.70	8.69	9.66	10.39	11.14	11.92	12.99
120°	7.33	8.45	9.41	10.50	11.45	12.20	13.80
135°	6.30	7.93	8.81	9.90	11.15	12.24	14.68
150°	5.24	6.69	7.83	8.74	9.57	10.76	13.72
Run VMG	4.54	5.79	6.78	7.53	8.29	9.32	11.88
Gybe Angles	142.0°	141.5°	148.5°	152.0°	148.0°	144.0°	144.8°

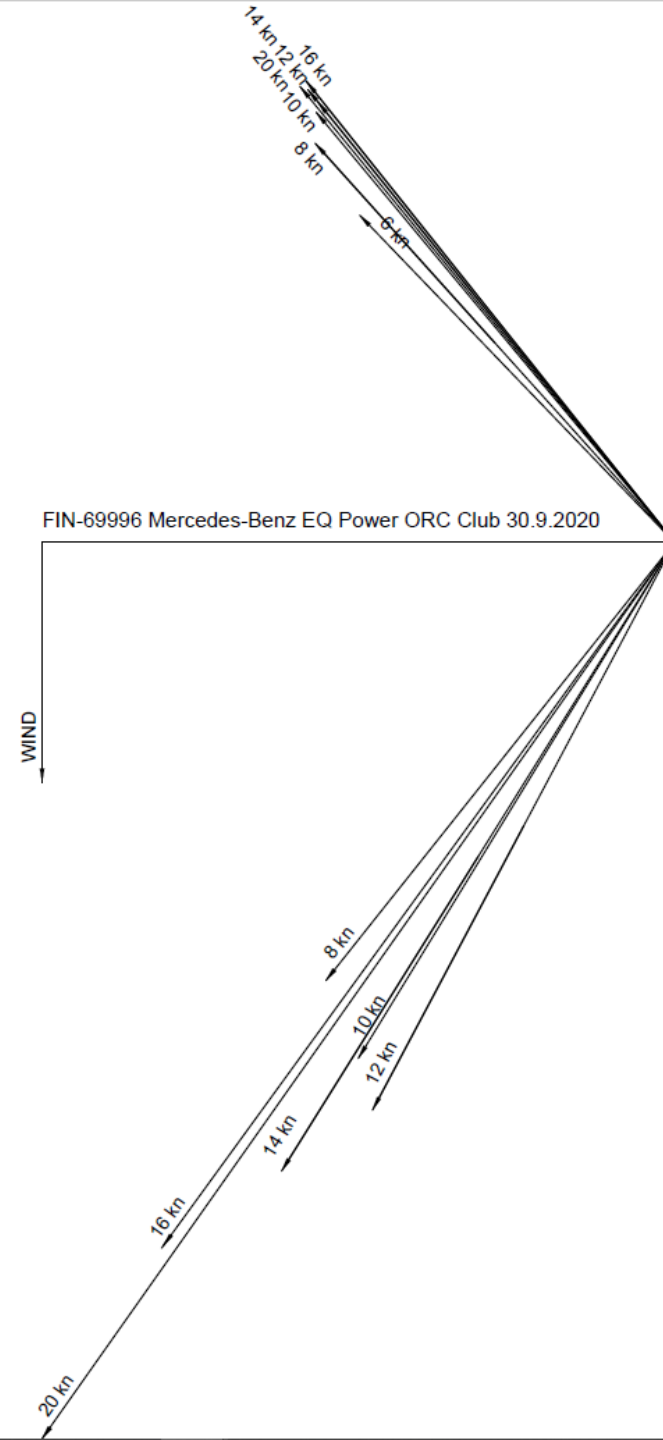
FIN-69996 Mercedes-Benz EQ Power ORC Club 30.9.2020

UPWIND

TWS	6 kn	8 kn	10 kn	12 kn	14 kn	16 kn
TWA	43,9°	42,0°	39,8°	39,0°	39,0°	38,6°
VMGtarget	4,34	5,28	5,66	5,83	5,96	6,07
SPDtarget	6,0	7,1	7,4	7,5	7,7	7,8

DOWNWIND

TWS	6 kn	8 kn	10 kn	12 kn	14 kn	16 kn
TWA	142,0°	141,5°	148,5°	152,0°	148,0°	144,0°
VMGtarget	4,54	5,79	6,78	7,53	8,29	9,32
SPDtarget	5,8	7,4	8,0	8,5	9,8	11,5
AWA	74°	77°	96°	110°	106°	99°



9. Styring

I lite og mellomvind styres båten så høyt som mulig. I mye vind jobber man for å styre lavest mulig, men samtidig ikke lavere enn at båten holdes plant.

TACTICIAN

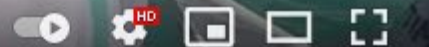
Terry Hutchinson

- <https://www.youtube.com/watch?v=loa96m2QbLs>



Toista (k)

0:04 / 1:01:17





VAUHTI KORJAA VIRHEET

BSF VAUHTI-ILTA
11.2.2021