

LEIF ÄNGERMARK MARIN YACHT DESIGN

G – Z curve versus real stability.

When we talk to “ordinary” yachtsmen, we frequently notice that it is very easy to the misunderstand the meaning of the usually published stability curve that indicates the righting lever (G-Z)

This curve alone is no measure of a yacht´s real stability.

To illustrate this statement we have prepared stability data for three different boats, and it is very common that the G-Z curves ar interpreted as indicating that all 3 yachts have roughly the same capacity to resist a capsize.

In fact it is the curve of righting moment that illustrates this capacity.

Every wave contains a certain amount of energy en every vessel requires a certain amount of energy to be turned over.

The energy required to capsize a ship is represented by the area of curve above the baseline, and energy needed to return it to an upright position is represented by the the area below the baseline.

NOTE: This is only valid for the curve representing the righting moment,
NOT the G-Z kurve

Thus we can see that it takes more than 4 times more energy to overturn the MALÖ 41 as the 33 footer.

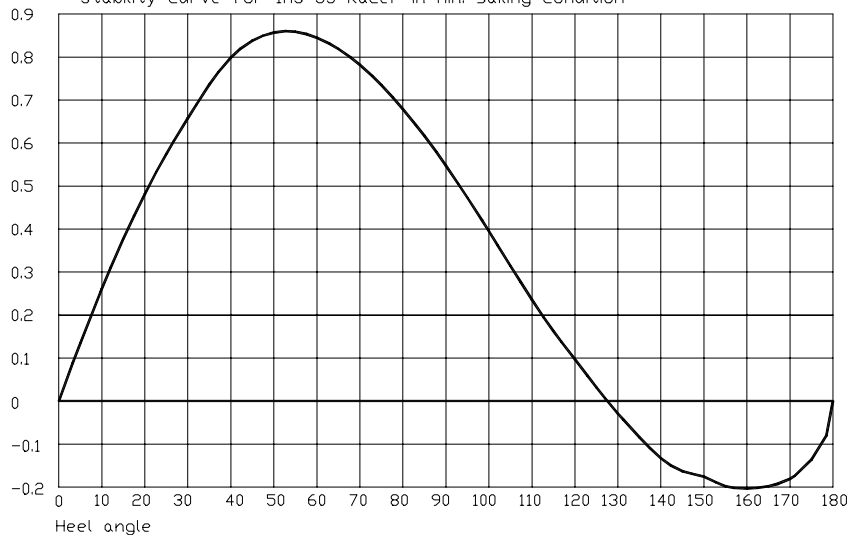
To return the MALÖ 41 it takes a wave containg 1/9 of the energy required to turn it over.

A much better assesment of the real stability is thus to compare the curves of righting moment, and also look to the STIX number as defined in the ISO standard. It should be noted that the STIX number is heavily based on hull length, so that the larger yachts should have considerably larger STIX numbers.

Righting arm
G - Z m

Stability curve for IMS 33 Racer in min. sailing condition

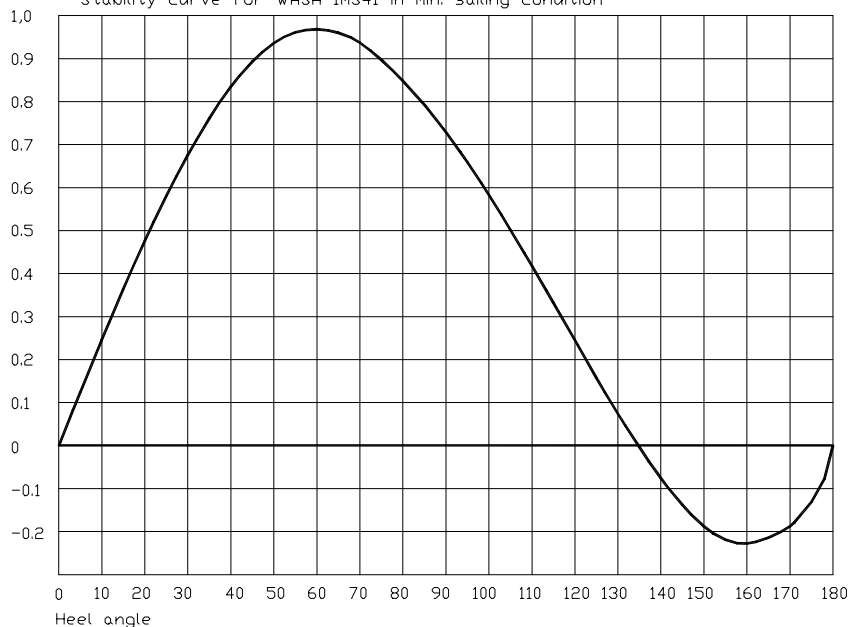
L.D.A. 9.90m
L.W.L. 8.55m
Bmax 3.37m
Dspl 2.98t



Righting arm
G - Z m

Stability curve for WASA IMS41 in min. sailing condition

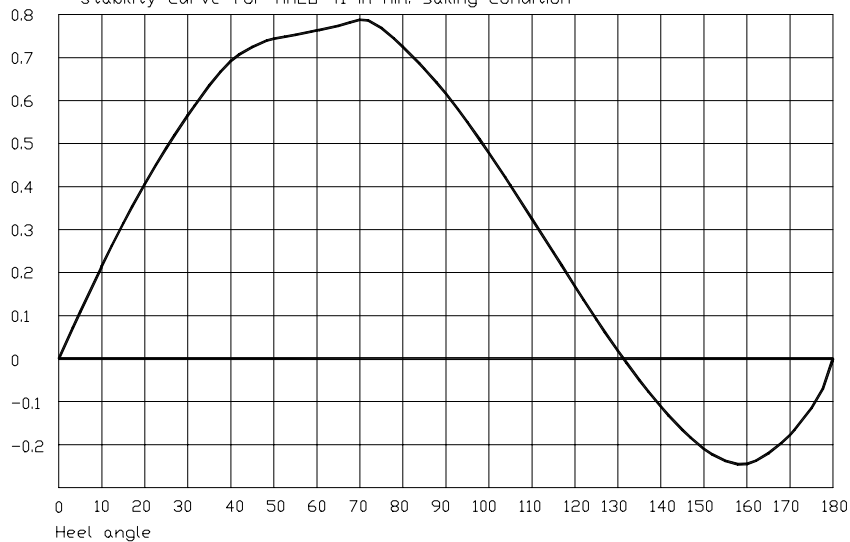
L.D.A. 12.49m
L.W.L. 10.71m
Bmax 3.70m
Dspl 6.50t



Righting arm
G - Z m

Stability curve for MALÖ 41 in min. sailing condition

L.D.A. 12.80m
L.W.L. 11.04m
Bmax 3.97m
Dspl 11.92t

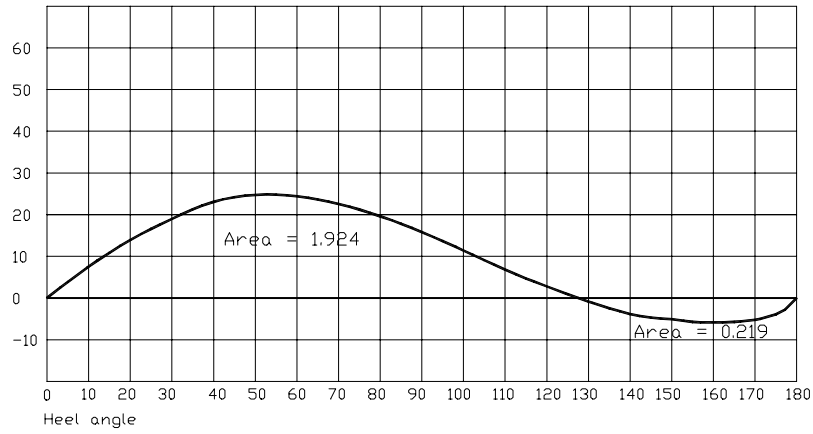


Righting moment
(kN)

Stability curve for IMS 33 Racer in min. sailing condition

L.O.A. 9.90m
L.W.L. 8.55m
Bmax 3.37m
Dspl 2.98t

+RM / -RM = 8.79



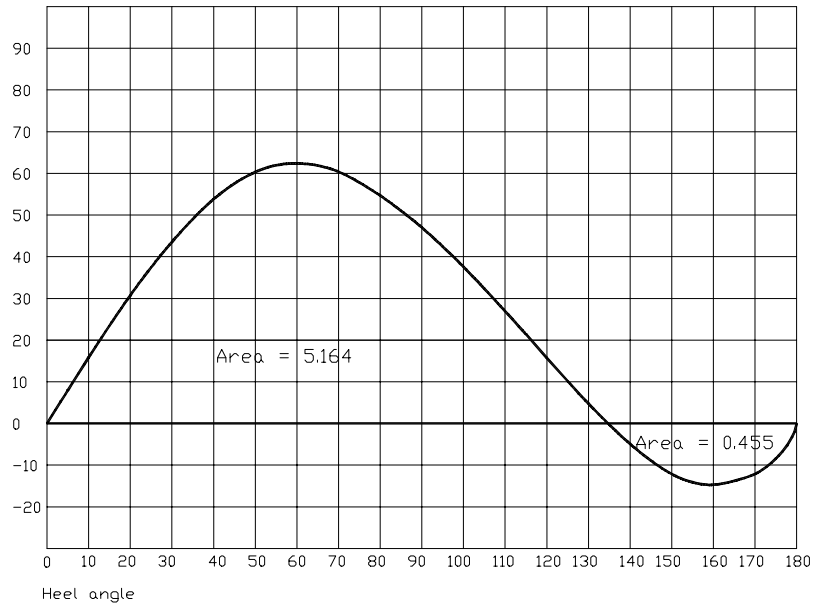
Stability Index (STIX) acc. to ISD 12217:2 = 33.3

Righting moment
(kN)

Stability curve for WASA IMS41 in min. sailing condition

L.O.A. 12.49m
L.W.L. 10.71m
Bmax 3.70m
Dspl 6.50t

+RM / -RM = 11.35



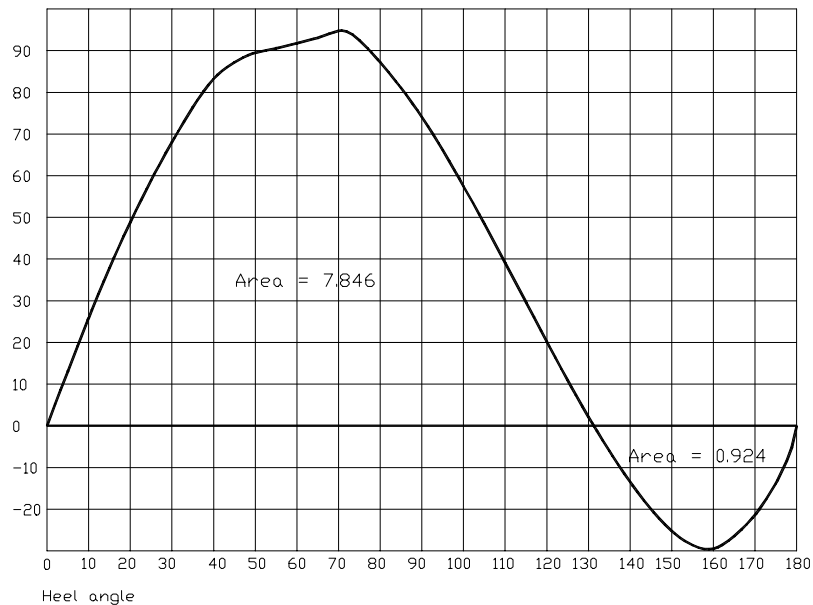
Stability Index (STIX) acc. to ISD 12217:2 = 47.8

Righting moment
(kN)

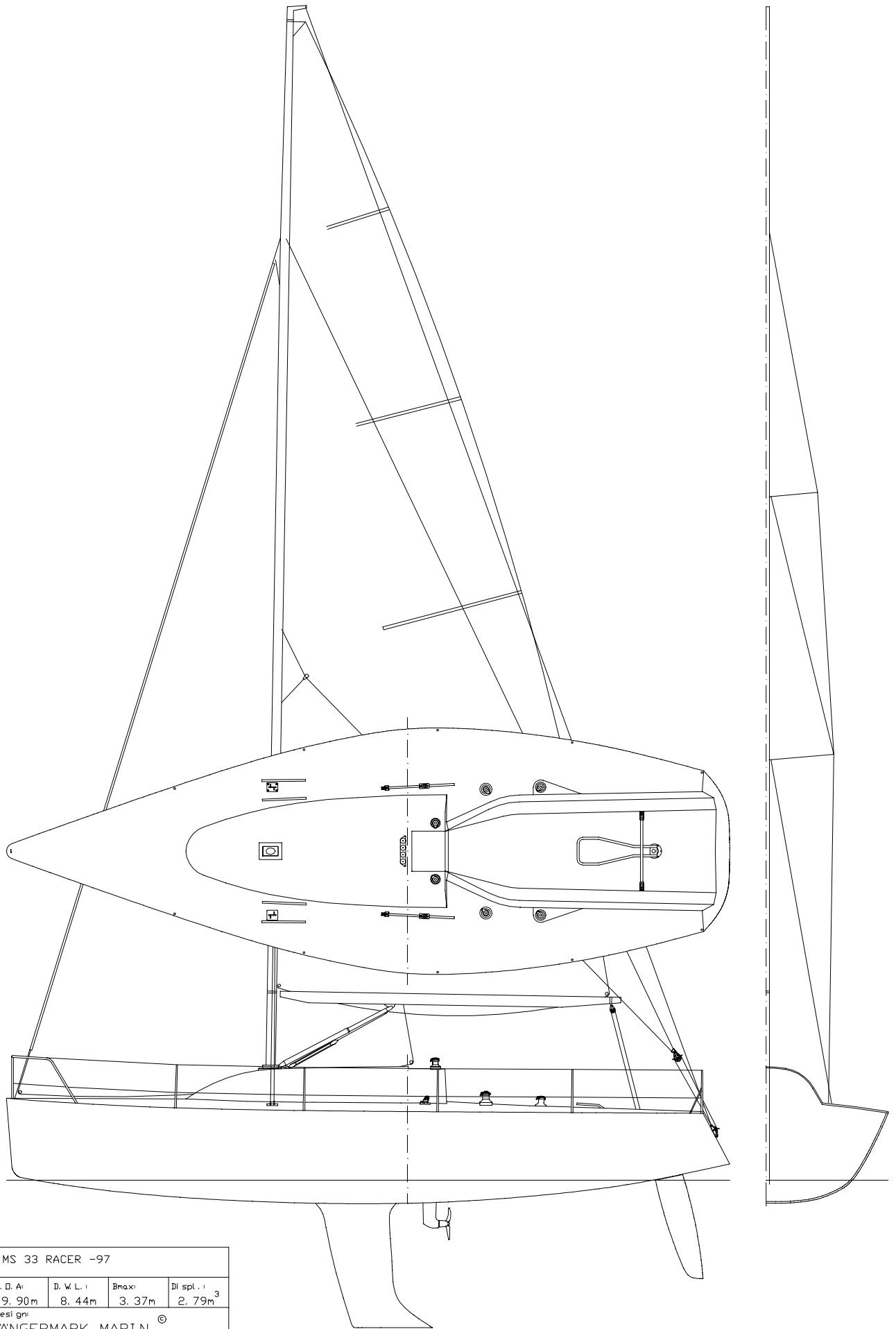
Stability curve for MALÖ 41 in min. sailing condition

L.O.A. 12.80m
L.W.L. 11.04m
Bmax 3.97m
Dspl 11.92t

+RM / -RM = 8.49



Stability Index (STIX) acc. to ISD 12217:2 = 55.4

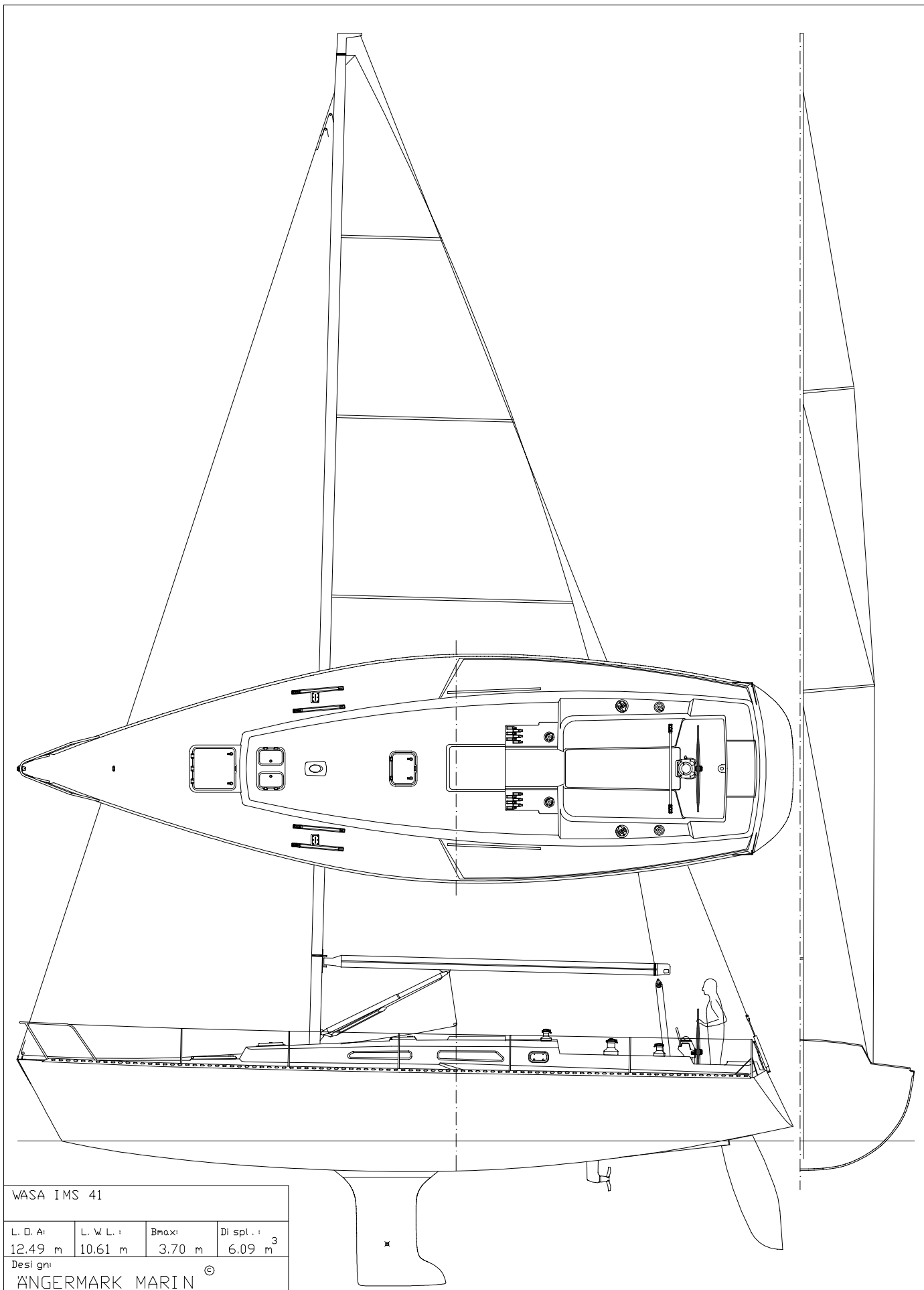


IMS 33 RACER -97

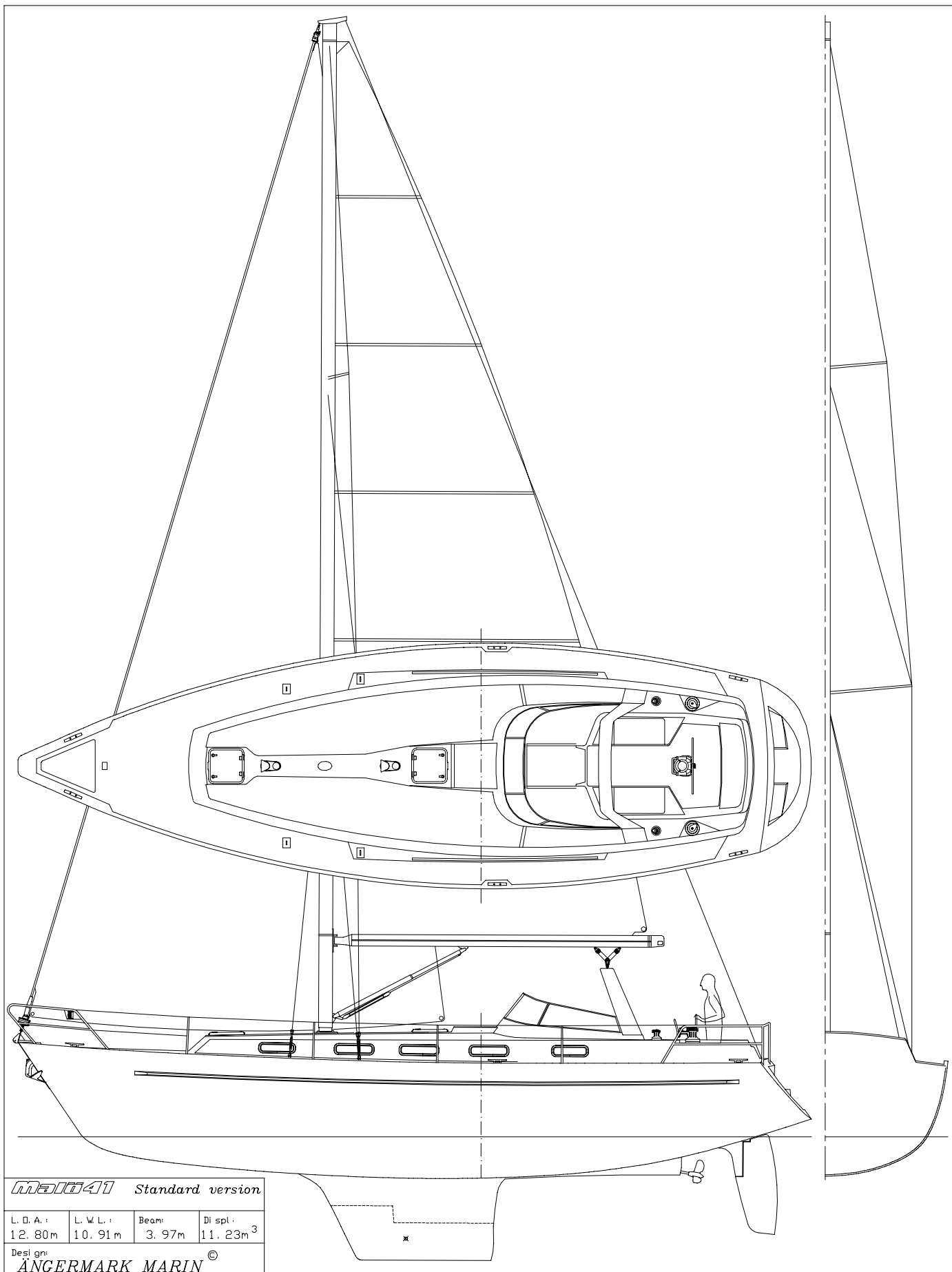
L. O. A:	D. W. L. :	Bmax:	Displ. :
9.90m	8.44m	3.37m	2.79m ³

Design:

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WASA IMS 41			
L. O. A:	L. W. L.:	Bmax:	Di spl. :
12.49 m	10.61 m	3.70 m	6.09 m ³
Desi gn: ÅNGERMARK MARIN ©			



<i>41041 Standard version</i>			
L. O. A. :	L. W. L. :	Beam:	Displ. :
12.80m	10.91m	3.97m	11.23m ³
Design: ÅNGERMARK MARIN ©			