PAUL LINDENAU GmbH & CO KG
Schiffswerft und Masch.-Fabrik
Skagerrakufer 10
2300 KIEL-FRIEDRICHSORT

MS * Strande *
Yard # : S 214

CHAPTER IV

Page : 01 - 23

Hamburg, den [5. Sep. 1984
SEE - BERUFSGENOSSENSCHAFT
Schiffssicherheitsabteilung
i.A.

Trim & stability calculations

Note : Case # 1 : Light ship

a). Page # 2 : Light ship [Hull only]
b). Page # 4 : Light ship [With deckhouse]

Case # 2 : Tide land trip [300 Passengers]

a). Page # 5 : Passenger moment
b). Page # 6 : Departure [Hull only]
c). Page # 9 : Departure [With deckhouse]
d). Page # 10 : Arrival [Hull only]
e). Page # 13 : Arrival [With deckhouse]

Case # 3 : ——— " ———[240 Passengers]

a). Page # 14 : Passenger moment
b). Page # 15 : Departure [Hull only]
c). Page # 18 : Departure [With deckhouse]
d). Page # 19 : Arrival [Hull only]
e). Page # 22 : Arrival [With deckhouse]

Sail area [Last page] : page # 23

MS "STRANDE" Kieler Verkehrs-AG

2300 Kiel-Friedrichsort
Date : 1984-06-29

For the yard....:

Clement
Petersen

Geprüft
For the classification society :
Examined
Tgb. Nr. 4509-5-84
Hamburg, den 13. Aug. 1984
Germanischer Lloyd
i.V. Werner i.A. Wadewitz

PAUL LINDENAU GmbH & CO KG
Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

Date : 1984-06-29
MS ** Strande **
Yard # : S 214

TRIM & STABILITY

Case..#.: 1

Cargo...: LIGHT SHIP

DESIGNATION	Weight	Lcg	Vcg
	to	m	m
LIGHT SHIP [FIXED BALLAST INCLUDED]..	193.00	14.081	3.075
DISPLACEMENT	193.00	14.081	3.075

Draft.....abl :	1.914	m	Kmt.....:	4.209	m
Volume.....V :	187.356	m^3	MG uncorrected..:	1.134	m
Mct.....Etm :	254.000	mt/m	MG...corrected..:	1.134	m
Incr. of disp.:	1.633	t/cm			
Lcf.....[WL]:	13.725	m	Delta...draft...:	-0.086	m
WL.....[La]:	13.725	m	Delta...Da.....:	0.040	m
WL.....[Lf]:	15.775	m	Delta...Df.....:	-0.046	m
Cg forw..App :	14.081	m	Draft...aft.....:	2.149	m
Lcb forw..App :	14.194	m	Draft...midsh...:	2.106	m
Trimlever.... :	-0.113	m	Draft...forward.:	2.063	m

Angle F	10	20	30	40	50	60	70
M0S	-0.010	-0.042	-0.157	-0.419	-0.690	-0.977	-1.266
MG*SinF	0.197	0.388	0.567	0.729	0.869	0.982	1.066
R-lever	0.187	0.346	0.410	0.310	0.179	0.005	-0.200

*** Light ship : see official report of heeling experiment ***

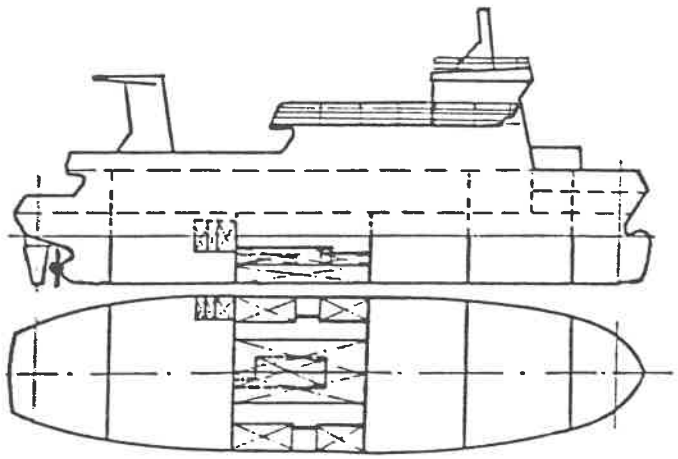
MOMENT OF WIND

DESIGNATION	SAIL AREA		SAIL LEVER		REMARKS
	m^2		m		
to axis 2.20 m	Area 1	160	e1	3.07	
Topical draught	Area	169	e'+D/2	4.15	
Angle F	0	10	20	30	40
S-lever	0.218	0.215	0.205	0.189	0.167

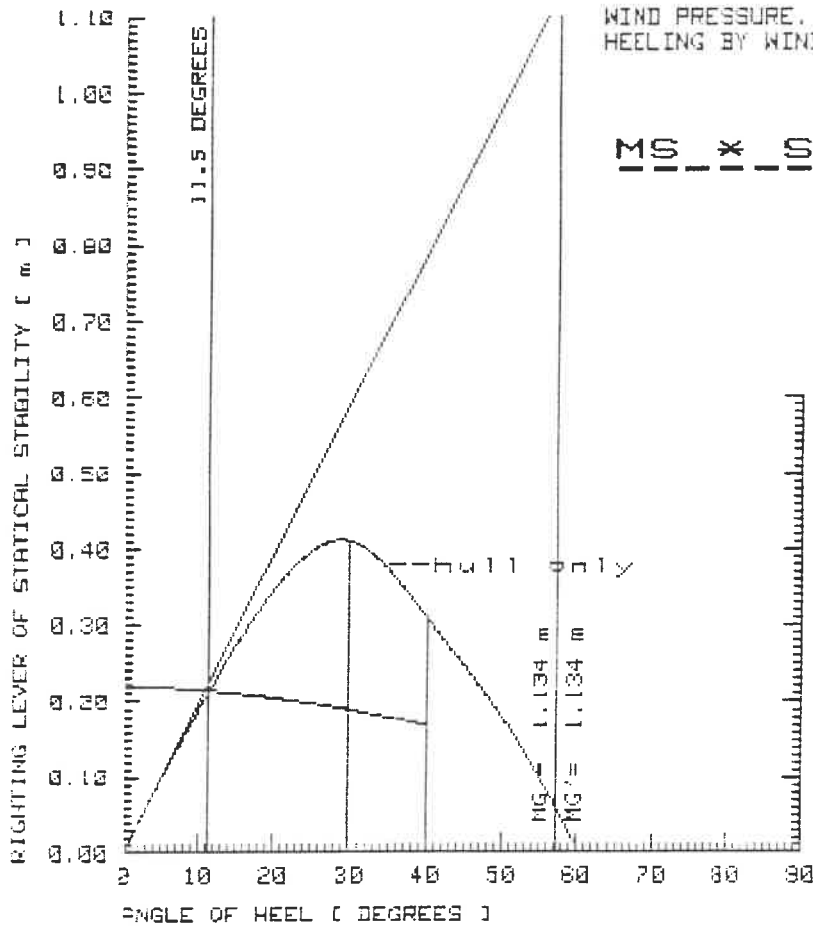
*** Sail area : look at the last page ***

Type : PASS-VESS. Date : 1984-06-29	TRIM and STABILITY	Yard...# : S 214 Page...# : 3

Cargo.....: LIGHT SHIP
Stowage factor.: 0.000 t/m^3 | Case...# : 1



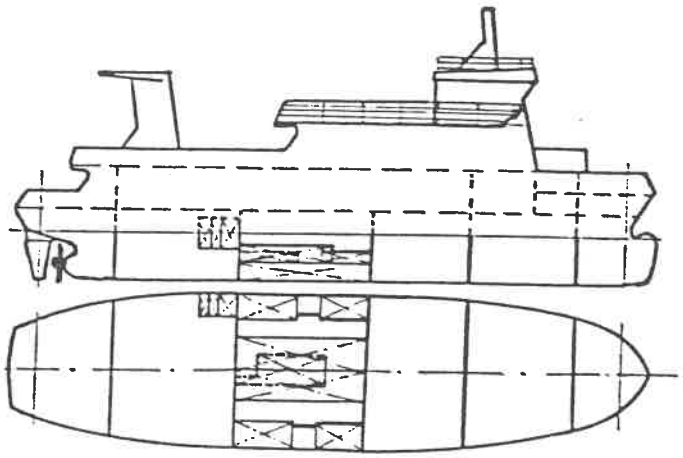
Angle [Phi]	10	20	30	40	50	60	70
MOS.....	-0.010	-0.042	-0.157	-0.419	-0.690	-0.977	-1.266
MG * SIN Phi..	0.197	0.388	0.567	0.729	0.869	0.982	1.066
R-lever.....	0.187	0.346	0.410	0.310	0.179	0.005	-0.200



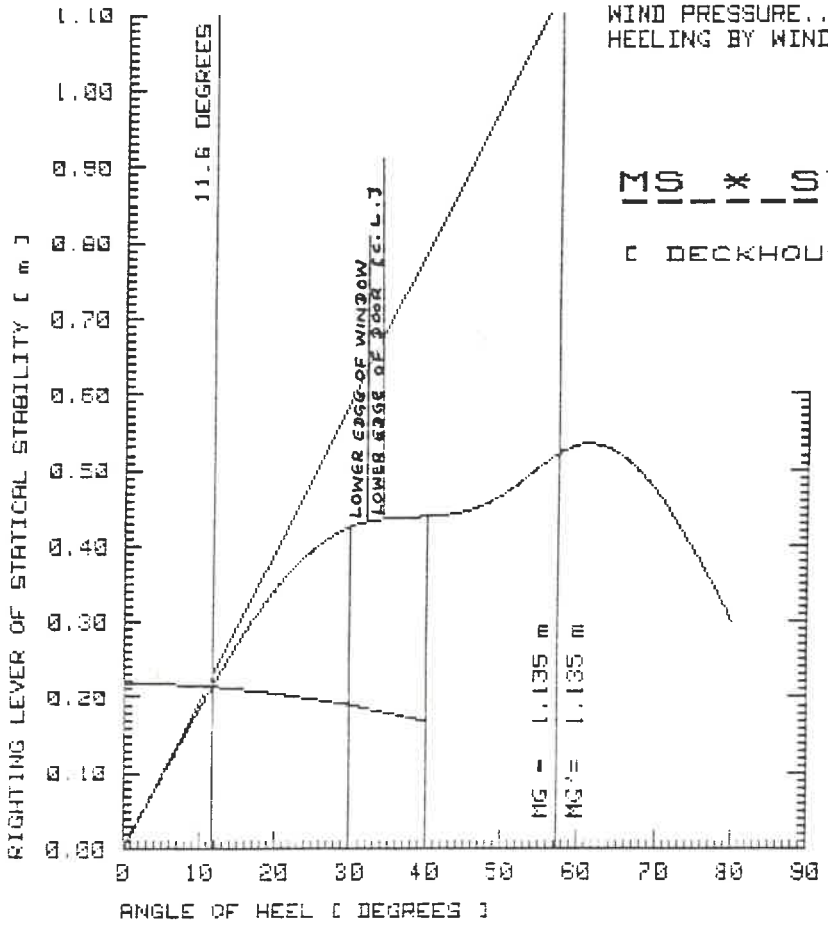
AREA 0-30 DEG. :	7.56 cm^2 =	0.1320 mrad	MOMENT OF SAIL..: 42.05 mpm
AREA 0-40 DEG. :	11.25 cm^2 =	0.1963 mrad	A. 11.5-40 DEG. : 4.46 cm^2 = 0.0778 mrad
AREA 30-40 DEG. :	3.69 cm^2 =	0.0643 mrad	

Type : PASS-VESSL Date :	TRIM and STABILITY	Yard...# : S 214 Page...# : 4

Cargo.....: LIGHT SHIP [Superstructure included]
Stowage factor.: 0.000 t/m^3 | Case...# : 1



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.011	-0.044	-0.143	-0.292	-0.402	-0.450	-0.595
MG * SIN Phi..	0.197	0.388	0.568	0.730	0.869	0.983	1.067
R-lever.....	0.186	0.344	0.425	0.438	0.467	0.533	0.472



WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 11.550 deg.

MS * STRANDE *

[DECKHOUSE INCLUDED]

AREA 0-30 DEG. :	7.55 cm^2 =	0.1318 mrad	MOMENT OF SAIL..: 42.05 mpm
AREA 0-40 DEG. :	11.89 cm^2 =	0.2076 mrad	A. 11.6-40 DEG. : 5.11 cm^2 = 0.0892 mrad
AREA 30-40 DEG. :	4.34 cm^2 =	0.0758 mrad	

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2300 K I E L- Friedrichsort

TRIM & STABILITY

Case..#.: 2

Passenger moment for 300 Passengers [all on one side].

DESIGNATION	Weight	Tcg	
	to	m	
Maindeck : 42 persons : seated.....	3.15	2.500	0.000
Maindeck : 1 person : seated.....	0.08	1.450	0.000
Maindeck : 53 persons : standing.....	3.98	1.150	0.000
Maindeck : 25 persons : standing.....	1.88	2.700	0.000
Maindeck : 1 person : standing.....	0.08	2.800	0.000
Upperdeck: 28 persons : seated.....	2.10	2.200	0.000
Upperdeck: 18 persons : seated.....	1.35	2.400	0.000
Upperdeck: 2 persons : seated.....	0.15	0.950	0.000
Upperdeck: 2 persons : seated.....	0.15	1.250	0.000
Upperdeck: 7 persons : seated.....	0.53	0.000	0.000
Upperdeck: 18 persons : standing.....	1.35	-0.500	0.000
Upperdeck: 18 persons : standing.....	1.35	0.500	0.000
Upperdeck: 14 persons : standing.....	1.05	1.200	0.000
Upperdeck: 12 persons : seated.....	0.90	2.600	0.000
Upperdeck: 8 persons : seated.....	0.60	2.300	0.000
Upperdeck: 12 persons : standing.....	0.90	0.600	0.000
Upperdeck: 12 persons : standing.....	0.90	1.300	0.000
Upperdeck: 16 persons : standing.....	1.20	2.200	0.000
Upperdeck: 8 persons : standing.....	0.60	2.100	0.000
Upperdeck: 3 persons : standing.....	0.23	2.600	0.000
	22.50	1.653	0.000

Passenger moment = 22.5 * 1.653 = 37.193 mt

[Weight of a passenger = 0.075 t]

PAUL LINDENAU GmbH & CO KG
Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

Date : 1984-06-29
MS ** Strande **
Yard # : S 214

TRIM & STABILITY

DEPARTURE

Case..#.: 2

Cargo...: 300 PASSENGERS, [TIDE LAND TRIP], - DEPARTURE -

DESIGNATION	Weight to	Lcg m	Vcg m
LIGHT SHIP [SEE PAGE 2].....	193.00	14.081	3.075
CREW : 1 PERSON.....	0.08	22.000	8.800
CREW : 1 PERSON.....	0.08	23.000	4.300
CREW : EFFECTS	0.08	22.000	8.800
CREW : EFFECTS	0.08	23.000	4.300
FUELOIL STORAGE TANK , DB (PS).....	7.15	13.250	0.540
FUELOIL STORAGE TANK , DB (SB).....	5.71	13.250	0.465
FUELOIL.....DAYTANK , (PS).....	1.00	9.500	2.200
LUBRICATING OIL TANK	0.51	8.250	2.210
FRESHWATER.....TANK , DB (SB).....	5.80	13.250	1.240
PASSENGERS : MAINDECK : 122 PERSONS...	9.15	14.500	4.305
PASSENGERS : UPPERDECK : 107 PERSONS...	8.03	17.500	6.600
PASSENGERS : UPPERDECK : 71 PERSONS...	5.33	8.500	6.600
PASSENGERS : MAINDECK : EFFECTS...	0.61	14.500	4.300
PASSENGERS : UPPERDECK : EFFECTS...	0.54	17.500	6.600
PASSENGERS : UPPERDECK : EFFECTS...	0.36	8.500	6.600
KIOSK.....: PROVISION	1.00	19.500	4.300
STORE.....: LOWER ROOM FORWARD	1.00	17.500	1.900
STORE.....: FOREPEAK	0.25	27.500	3.000
STORE.....: AFT	0.24	4.250	4.300
DISPLACEMENT	240.00	14.044	3.153

Draft.....abl :	2.185	m	Kmt.....:	4.208	m
Volume.....V :	232.977	m^3	MG uncorrected..:	1.055	m
Mct.....Etm :	332.000	mt/m	MG...corrected..:	1.030	m
Incr. of disp.:	1.829	t/cm			
Lcf.....[WL]:	12.980	m	Delta...draft...:	0.009	m
WL.....[La]:	12.980	m	Delta...Da.....:	-0.004	m
WL.....[Lf]:	16.520	m	Delta...Df.....:	0.005	m
Cg forw..App :	14.044	m	Draft...aft.....:	2.376	m
Lcb forw..App :	14.031	m	Draft...midsh...:	2.381	m
Trimlever.... :	0.013	m	Draft...forward.:	2.385	m

Angle F	10	20	30	40	50	60	70
MGS	-0.013	-0.052	-0.241	-0.504	-0.799	-1.099	-1.395
MG*SinF	0.183	0.361	0.528	0.678	0.808	0.914	0.991
R-lever	0.170	0.309	0.287	0.174	0.009	-0.185	-0.404

*** Total number of passengers = 300 persons ***

PAUL LINDENAU GmbH & CO KG
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Skagerrakufer 10
2300 K I E L- Friedrichsort

Date : 1984-06-29
MS ** Strande **
Yard # : S 214

FREE SURFACES

Case..#.: 2

Cargo...: 300 PASSENGERS, [TIDE LAND TRIP], - DEPARTURE -

DESIGNATION	Frame #	Pos.	TMI m^4	GAMMA t/m^3	MOMENT mt
FUELOIL STORAGE TANK.....	20 - 23	PS	3.16	0.870	3
FRESHWATER.....TANK.....	20 - 33	SB	1.26	1.000	1
DIRTY WATER.....TANK.....	20 - 29	CL	1.90	1.000	2
FUELOIL.....DAYTANK.....	18 - 20	PS	0.18	0.870	0
TOTAL					6

DRAUGHT.ab.baseline..	m	2.185	MG....uncorrected	m	1.055
CG.....	m	3.153	Delta.....[MG]	m	0.025
KMT.....	m	4.208	MG .....corrected	m	1.030

Angle F	10	20	30	40	50	60	70
M0S	-0.013	-0.052	-0.241	-0.504	-0.799	-1.099	-1.395
MG*SinF	0.179	0.352	0.515	0.662	0.789	0.892	0.968
R-lever	0.166	0.300	0.274	0.158	-0.010	-0.207	-0.427

*** Compilation of all free surfaces : see chapter III ***

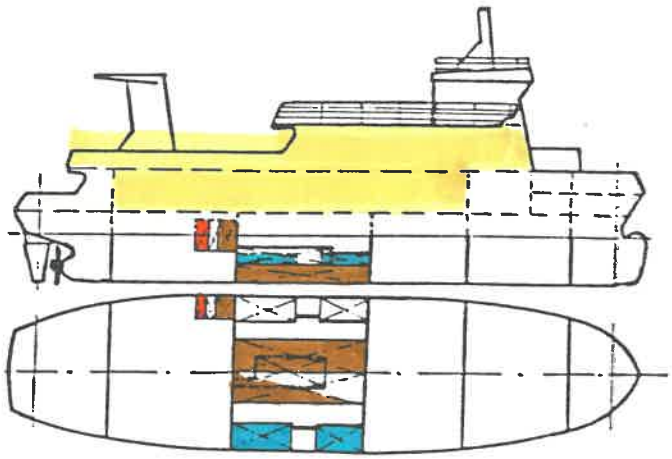
MOMENT OF WIND

DESIGNATION	SAIL AREA m^2		SAIL LEVER m		REMARKS
to axis 2.20 m	Area 1	160	e1	3.07	
Topical draught	Area	161	e'+D/2	4.17	
Angle F	0	10	20	30	40
S-lever	0.168	0.165	0.157	0.145	0.128

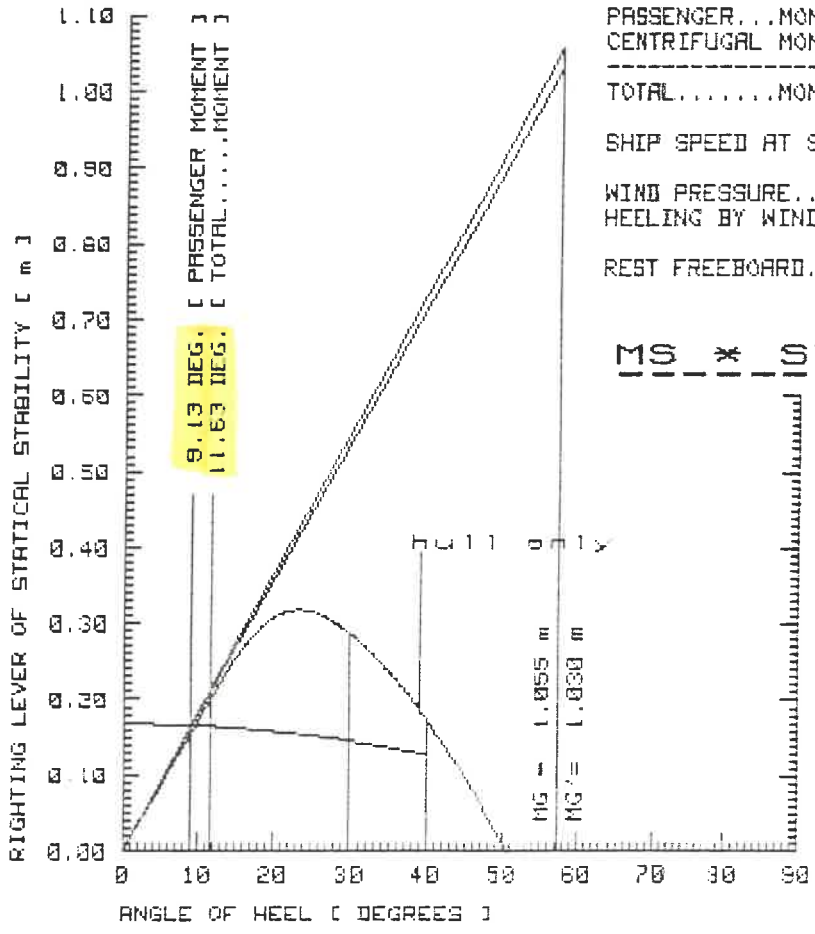
*** Sail area : look at the last page ***

Type : PASS-VESS. Date : 1984-06-29	TRIM and STABILITY	Yard...# : S 214 Page...# : 8

Cargo.....: 300 PASSENGERS, [TIDE LAND TRIP], - DEPARTURE -
Stowage factor.: 0.000 t/m^3 | Case...# : 2



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.013	-0.052	-0.241	-0.504	-0.799	-1.099	-1.395
MG * SIN Phi..	0.183	0.361	0.528	0.678	0.808	0.914	0.991
R-lever.....	0.170	0.309	0.287	0.174	0.009	-0.185	-0.404



PASSENGER...MOMENT : 37.193 mt
CENTRIFUGAL MOMENT : 10.382 mt

TOTAL.....MOMENT : 47.575 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 9.700 deg.

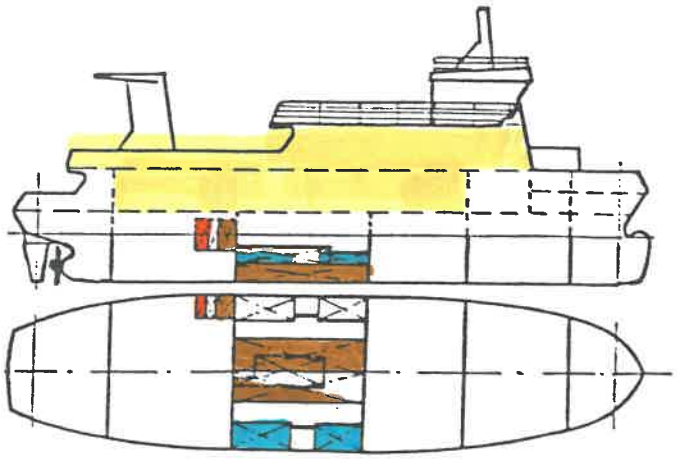
REST FREEBOARD.....: 0.333 m

MS * STRANDE *

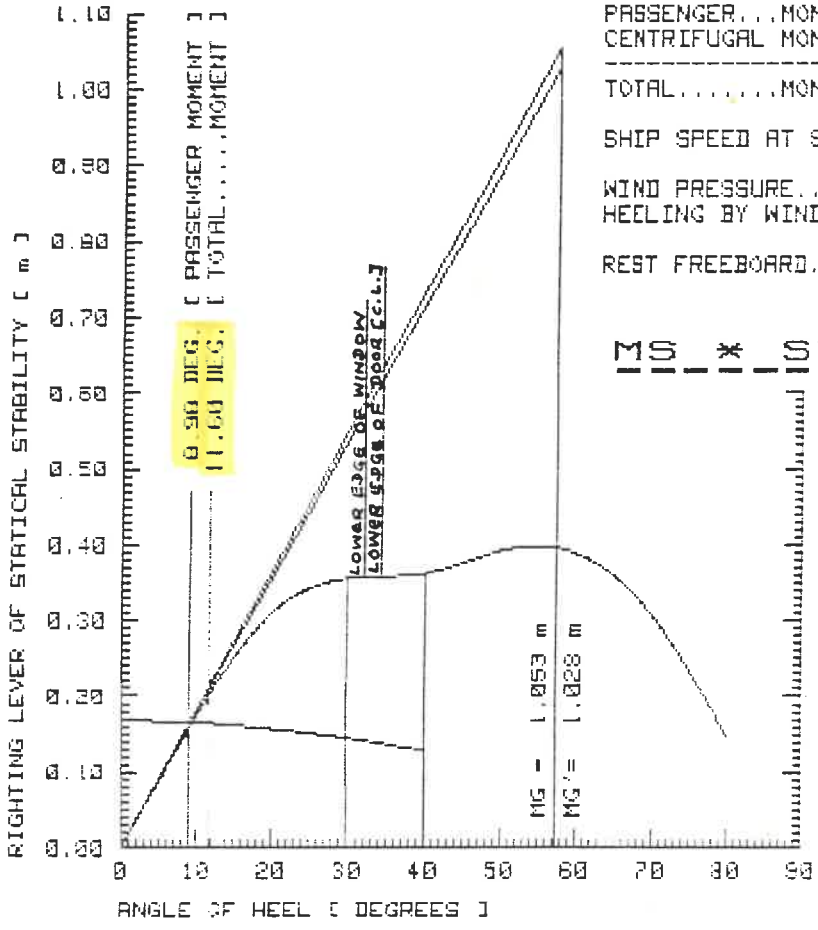
AREA 0-30 DEG. :	6.43 cm^2 =	0.1123 mrad	MOMENT OF SAIL..:		40.31 mpm
AREA 0-40 DEG. :	8.73 cm^2 =	0.1534 mrad	A. 3.7-40 DEG. :	3.45 cm^2 =	0.0859 mrad
AREA 30-40 DEG. :	2.36 cm^2 =	0.0411 mrad			

Type : PASS-VESSL Date :	TRIM and STABILITY	Yard...# : S 214 Page...# : 9

Cargo.....: 300 PASSENGERS, [TIDE LAND TRIP],with deckhouse - DEPART.
Stowage factor.: 0.000 t/m^3 | Case...# : 2



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.011	-0.049	-0.171	-0.315	-0.415	-0.524	-0.682
MG * SIN Phi..	0.183	0.360	0.527	0.677	0.807	0.912	0.990
R-lever.....	0.172	0.311	0.356	0.362	0.392	0.388	0.308



PASSENGER...MOMEMT : 37.193 mt
CENTRIFUGAL MOMEMT : 10.382 mt

TOTAL.....MOMENT : 47.575 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 9.550 deg.

REST FREEBOARD.....: 0.335 m

MS * STRANDE *

DECKHOUSE INCLUDED

AREA 0-30 DEG. :	6.75 cm^2 =	0.1178 mrad	MOMENT OF SAIL..: 40.22 mpm
AREA 0-40 DEG. :	10.33 cm^2 =	0.1803 mrad	A. 30-40 DEG. : 4.87 cm^2 = 0.0867 mrad
AREA 30-40 DEG. :	3.58 cm^2 =	0.0625 mrad	

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Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

Date : 1984-06-29
MS ** Strande **
Yard # : S 214

TRIM & STABILITY

ARRIVAL

Case..#.: 2

Cargo...: 300 PASSENGERS, (TIDE LAND TRIP], - ARRIVAL -

DESIGNATION	Weight to	Lcg m	Vcg m
LIGHT SHIP [SEE PAGE 2].....	193.00	14.081	3.075
CREW : 1 PERSON.....	0.08	22.000	8.800
CREW : 1 PERSON.....	0.08	23.000	4.300
CREW : EFFECTS	0.08	22.000	8.800
CREW : EFFECTS	0.08	23.000	4.300
FUELOIL STORAGE TANK , DB (PS).....	5.00	13.250	0.540
FUELOIL.....DAYTANK , (PS).....	1.00	9.500	2.200
LUBRICATING OIL TANK	0.35	8.250	2.210
FRESHWATER.....TANK , DB (SB).....	2.00	13.325	0.900
DIRTY WATER TANK.....	6.85	11.880	1.350
PASSENGERS : MAINDECK : 122 PERSONS...	9.15	14.500	4.305
PASSENGERS : UPPERDECK : 107 PERSONS...	8.03	17.500	6.600
PASSENGERS : UPPERDECK : 71 PERSONS...	5.33	8.500	6.600
PASSENGERS : MAINDECK : EFFECTS...	0.61	14.500	4.300
PASSENGERS : UPPERDECK : EFFECTS...	0.54	17.500	6.600
PASSENGERS : UPPERDECK : EFFECTS...	0.36	8.500	6.600
KIOSK.....: PROVISION	0.50	19.500	4.300
STORE.....: LOWER ROOM FORWARD	2.10	17.500	1.900
STORE.....: FOREPEAK	0.25	27.500	3.000
STORE.....: AFT	0.24	4.250	4.300
DISPLACEMENT	235.62	14.029	3.210

Draft.....abl :	2.161	m	Kmt.....:	4.210	m
Volume.....V :	228.730	m^3	MG uncorrected..:	1.000	m
Mct.....Etm :	327.000	mt/m	MG...corrected..:	0.975	m
Incr. of disp.:	1.816	t/cm			
Lcf.....[WL]:	13.033	m	Delta...draft...:	-0.014	m
WL.....[La]:	13.033	m	Delta...Da.....:	0.006	m
WL.....[Lf]:	16.467	m	Delta...Df.....:	-0.008	m
Cg forw..App :	14.029	m	Draft...aft.....:	2.362	m
Lcb forw..App :	14.049	m	Draft...midsh...:	2.355	m
Trimlever.... :	-0.020	m	Draft...forward.:	2.348	m

Angle F	10	20	30	40	50	60	70
M0S	-0.013	-0.050	-0.233	-0.498	-0.792	-1.090	-1.387
MG*SinF	0.174	0.342	0.500	0.643	0.766	0.866	0.940
R-lever	0.161	0.292	0.267	0.145	-0.026	-0.224	-0.447

*** Tota l number of passengers = 300 persons ***

FREE SURFACES

Case..#.: 2

Cargo...: 300 PASSENGERS, (TIDE LAND TRIP], - ARRIVAL -

DESIGNATION	Frame #	Pos.	TMI m^4	GAMMA t/m^3	MOMENT mt
FUELOIL STORAGE TANK.....	20 - 23	PS	3.16	0.870	3
FRESHWATER.....TANK.....	20 - 26	SB	1.26	1.000	1
DIRTY WATER.....TANK.....	20 - 26	CL	1.90	1.000	2
FUELOIL.....DAYTANK.....	18 - 20	PS	0.18	0.870	0
TOTAL					6

DRAUGHT.ab.baseline..	m	2.161	MG....uncorrected	m	1.000
CG.....	m	3.210	Delta.....[MG]	m	0.026
KMT.....	m	4.210	MG .....corrected	m	0.975

Angle F	10	20	30	40	50	60	70
M0S	-0.013	-0.050	-0.233	-0.498	-0.792	-1.090	-1.387
MG*SinF	0.169	0.333	0.487	0.626	0.747	0.844	0.916
R-lever	0.156	0.283	0.254	0.128	-0.045	-0.246	-0.471

*** Compilation of all free surfaces : see chapter III ***

MOMENT OF WIND

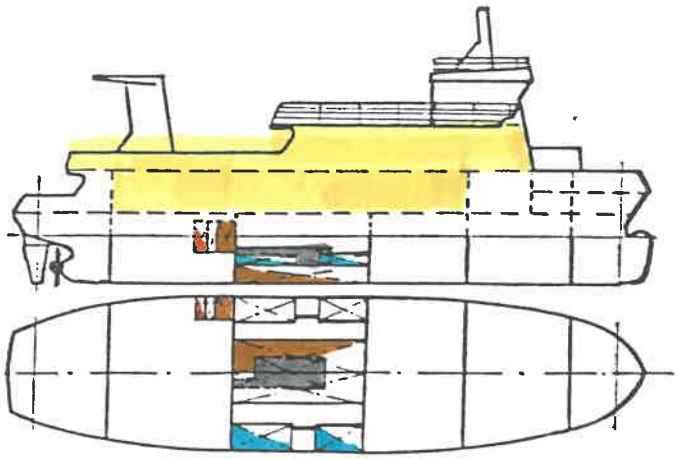
DESIGNATION	SAIL AREA m^2		SAIL LEVER m		REMARKS
to axis 2.20 m	Area 1	160	e1	3.07	
Topical draught	Area	162	e'+D/2	4.17	

Angle F	0	10	20	30	40
S-lever	0.171	0.169	0.161	0.148	0.131

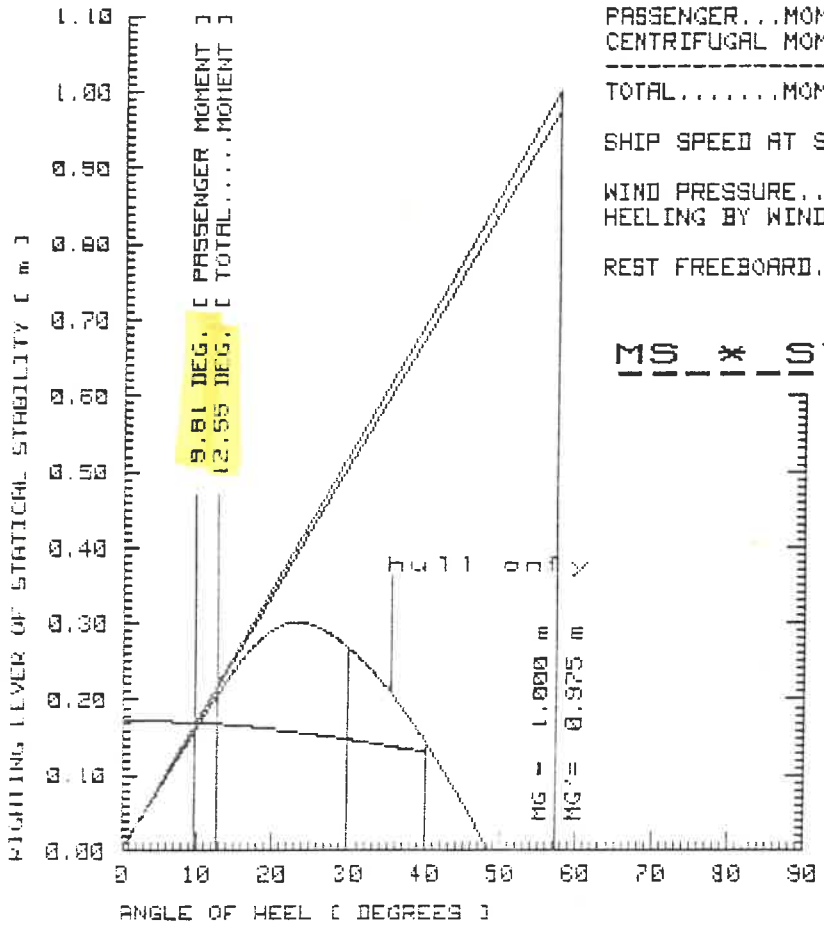
*** Sail area : look at the last page ***

Type : PASS-VESS. Date : 1984-06-29	TRIM and STABILITY	Yard...# : S 214 Page...# : 12

Cargo.....: 300 PASSENGERS, (TIDE LAND TRIP], - ARRIVAL -
Stowage factor.: 0.000 t/m^3 | Case...# : 2



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.013	-0.050	-0.233	-0.498	-0.792	-1.090	-1.387
MG * SIN Phi..	0.174	0.342	0.500	0.643	0.766	0.866	0.940
R-lever.....	0.161	0.292	0.267	0.145	-0.026	-0.224	-0.447



PASSENGER...MOMEMT : 37.193 mt
CENTRIFUGAL MOMEMT : 10.533 mt
TOTAL.....MOMEMT : 47.726 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 10.450 deg.

REST FREEBOARD.....: 0.293 m

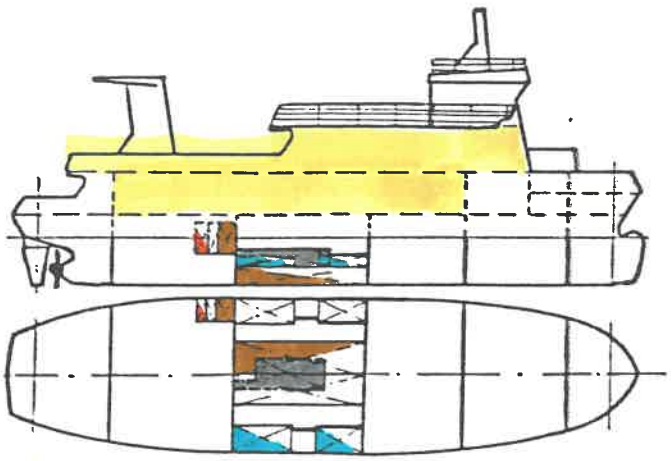
MS * STRANDE *

AREA 0-30 DEG. : 6.07 cm^2 = 0.1060 mrad
AREA 0-40 DEG. : 8.19 cm^2 = 0.1429 mrad
AREA 30-40 DEG. : 2.11 cm^2 = 0.0369 mrad

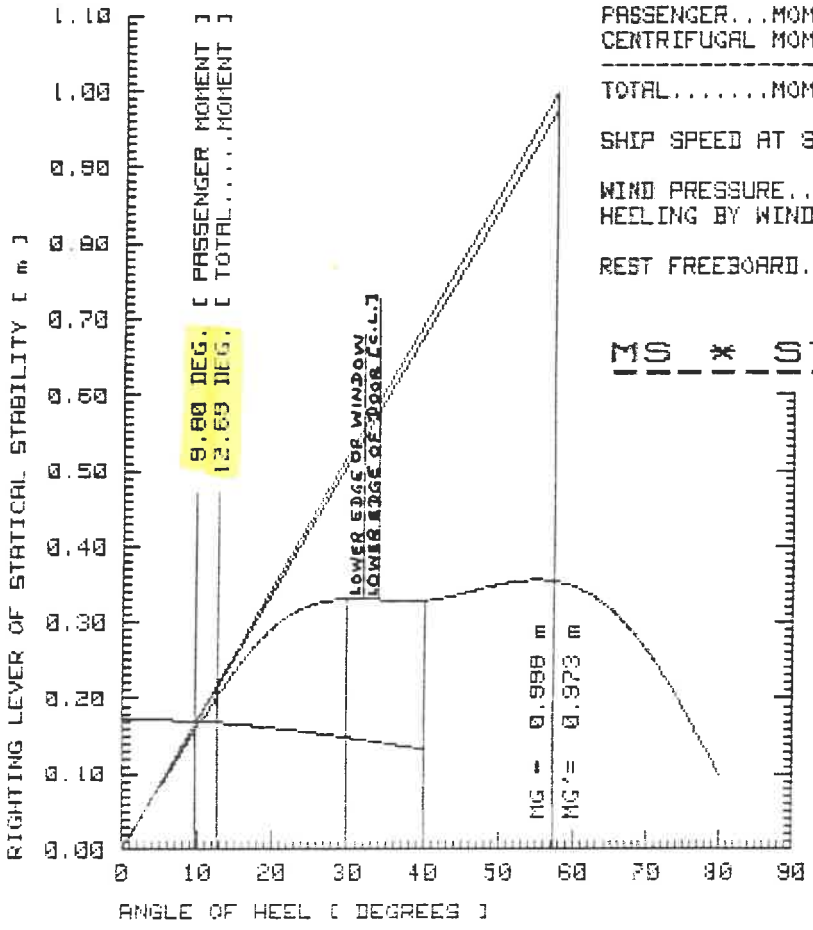
MOMENT OF SAIL..: 40.39 mpm
A. 10.5-40 DEG. : 2.78 cm^2 = 0.0486 mrad

Type : PASS-VESSL Date :	TRIM and STABILITY	Yard...# : S 214 Page...# : 13

Cargo.....: 300 PASSENGERS, (TIDE LAND TRIP],Deckhouse incl. - ARRIVAL
Stowage factor.: 0.000 t/m^3 | Case...# : 2



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.012	-0.048	-0.169	-0.314	-0.415	-0.519	-0.675
MG * SIN Phi..	0.173	0.341	0.499	0.642	0.765	0.865	0.938
R-lever.....	0.161	0.293	0.330	0.328	0.350	0.346	0.263



PASSENGER...MOMENT : 37.193 mt
CENTRIFUGAL MOMENT : 10.533 mt
TOTAL.....MOMENT : 47.726 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 10.450 deg.

REST FREEBOARD.....: 0.293 m

MS * STRANDE *

DECKHOUSE INCLUDED

MS "STRANDE" Kieler Verkehrs-AG

AREA 0-30 DEG. : 6.32 cm^2 = 0.1104 mrad
AREA 0-40 DEG. : 9.61 cm^2 = 0.1677 mrad
AREA 30-40 DEG. : 3.28 cm^2 = 0.0573 mrad

MOMENT OF SAIL..: 40.39 mpm
A. 10.5-40 DEG. : 4.20 cm^2 = 0.0733 mrad

PAUL LINDENAU GmbH & CO KG
Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

TRIM & STABILITY

Case..#.: 3

Passenger moment for 240 Passengers [all on one side].

DESIGNATION	Weight to	Tcg m	
Maindeck : 42 persons : seated.....	3.15	2.500	0.000
Maindeck : 1 person : seated.....	0.08	1.450	0.000
Maindeck : 53 persons : standing.....	3.98	1.150	0.000
Maindeck : 25 persons : standing.....	1.88	2.700	0.000
Maindeck : 1 person : standing.....	0.08	2.800	0.000
Upperdeck: 28 persons : seated.....	2.10	2.200	0.000
Upperdeck: 18 persons : seated.....	1.35	2.400	0.000
Upperdeck: 2 persons : seated.....	0.15	0.950	0.000
Upperdeck: 2 persons : seated.....	0.15	1.250	0.000
Upperdeck: 7 persons : seated.....	0.53	0.000	0.000
Upperdeck: 18 persons : standing.....	1.35	0.500	0.000
Upperdeck: 14 persons : standing.....	1.05	1.200	0.000
Upperdeck: 12 persons : seated.....	0.90	2.600	0.000
Upperdeck: 8 persons : seated.....	0.60	2.300	0.000
Upperdeck: 9 persons : standing.....	0.68	2.800	0.000
	18.00	1.865	0.000

Passenger moment = 18.0 * 1.865 = 33.570 mt

[Weight of a passenger = 0.075 t]

PAUL LINDENAU GmbH & CO KG
Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

TRIM & STABILITY

DEPARTURE

Case..#.: 3

Cargo...: 240 PASSENGERS, - DEPARTURE -

DESIGNATION	Weight to	Lcg m	Vcg m
LIGHT SHIP [SEE PAGE 2].....	193.00	14.081	3.075
CREW : 1 PERSON.....	0.08	22.000	8.800
CREW : 1 PERSON.....	0.08	23.000	4.300
CREW : EFFECTS	0.08	22.000	8.800
CREW : EFFECTS	0.08	23.000	4.300
FUELOIL STORAGE TANK , DB (PS).....	7.15	13.250	0.540
FUELOIL STORAGE TANK , DB (SB).....	7.15	13.250	0.540
FUELOIL.....DAYTANK , (PS).....	1.00	9.500	2.200
LUBRICATING OIL TANK	0.51	8.250	2.210
FRESHWATER.....TANK , DB (PS).....	5.80	13.250	1.240
FRESHWATER.....TANK , DB (SB).....	3.38	13.300	1.038
PASSENGERS : MAINDECK : 122 PERSONS...	9.15	14.500	4.305
PASSENGERS : UPPERDECK : 118 PERSONS...	8.85	16.500	6.600
PASSENGERS : MAINDECK : EFFECTS...	0.61	14.500	4.300
PASSENGERS : UPPERDECK : EFFECTS...	0.59	16.500	6.600
KIOSK.....: PROVISION	1.00	19.500	4.300
STORE.....: LOWER ROOM FORWARD	1.00	17.500	1.900
STORE.....: FOREPEAK	0.25	27.500	3.000
STORE.....: AFT	0.24	4.250	4.300
DISPLACEMENT	240.00	14.133	3.040

Draft.....abl :	2.185	m	Kmt.....:	4.208	m
Volume.....V :	232.981	m^3	MG uncorrected..:	1.168	m
Mct.....Etm :	332.000	mt/m	MG...corrected..:	1.143	m
Incr. of disp.:	1.829	t/cm			
Lcf.....[WL]:	12.980	m	Delta...draft...:	0.074	m
WL.....[La]:	12.980	m	Delta...Da.....:	-0.033	m
WL.....[Lf]:	16.520	m	Delta...Df.....:	0.041	m
Cg forw..App :	14.133	m	Draft...aft.....:	2.347	m
Lcb forw..App :	14.031	m	Draft...midsh...:	2.384	m
Trimlever.... :	0.102	m	Draft...forward.:	2.421	m

Angle F	10	20	30	40	50	60	70
M0S	-0.013	-0.052	-0.241	-0.504	-0.799	-1.099	-1.395
MG*SinF	0.203	0.399	0.584	0.751	0.895	1.011	1.097
R-lever	0.190	0.347	0.343	0.247	0.096	-0.088	-0.298

*** Total number of passengers = 240 persons ***

PAUL LINDENAU GmbH & CO KG
Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

Date : 1984-06-29
MS ** Strande **
Yard # : S 214

FREE SURFACES

Case..#.: 3

Cargo...: 240 PASSENGERS. - DEPARTURE -

DESIGNATION	Frame #	Pos.	TMI m^4	GAMMA t/m^3	MOMENT mt
FUELOIL STORAGE TANK.....	20 - 23	PS	3.16	0.870	3
FRESHWATER.....TANK.....	20 - 33	SB	1.26	1.000	1
DIRTY WATER.....TANK.....	20 - 29	CL	1.90	1.000	2
FUELOIL.....DAYTANK.....	18 - 20	PS	0.18	0.870	0
TOTAL					6

DRAUGHT.ab.baseline..	m	2.185	MG....uncorrected	m	1.168
CG.....	m	3.040	Delta.....[MG]	m	0.025
KMT.....	m	4.208	MG .....corrected	m	1.143

Angle F	10	20	30	40	50	60	70
M0S	-0.013	-0.052	-0.241	-0.504	-0.799	-1.099	-1.395
MG*SinF	0.198	0.391	0.571	0.734	0.875	0.990	1.074
R-lever	0.185	0.339	0.330	0.230	0.076	-0.109	-0.321

*** Compilation of all free surfaces : see chapter III ***

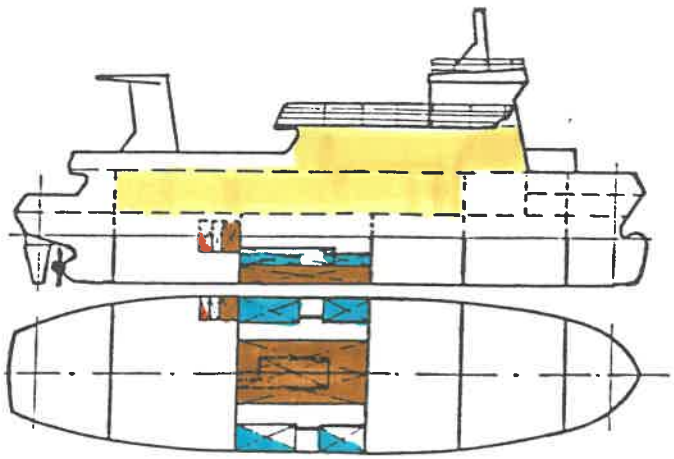
MOMENT OF WIND

DESIGNATION	SAIL AREA m^2		SAIL LEVER m		REMARKS
to axis 2.20 m	Area I	160	e1	3.07	
Topical draught	Area	161	e'+D/2	4.17	
Angle F	0	10	20	30	40	
S-lever	0.168	0.165	0.157	0.145	0.128	

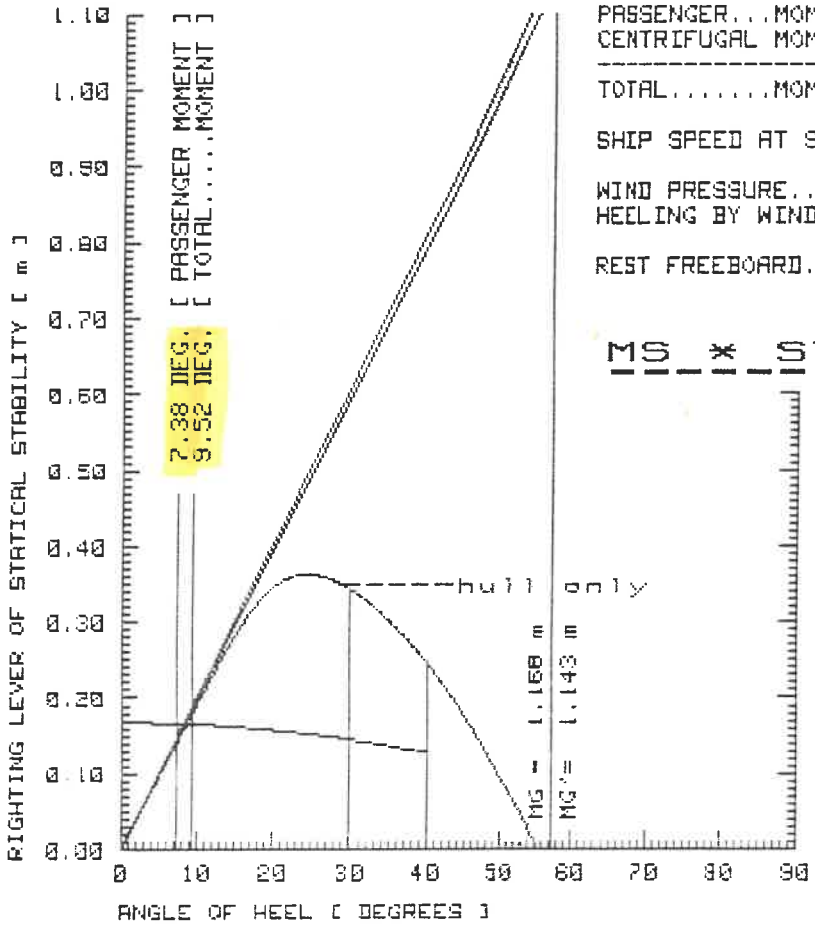
*** Sail area : look at the last page ***

Type : PASS-VESS. Date : 1984-06-29	TRIM and STABILITY	Yard...# : S 214 Page...# : 17

Cargo.....: 240 PASSENGERS, - DEPARTURE -
Stowage factor.: 0.000 t/m^3 | Case...# : 3



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.013	-0.052	-0.241	-0.504	-0.799	-1.099	-1.395
MG * SIN Phi..	0.203	0.399	0.584	0.751	0.895	1.011	1.097
R-lever.....	0.190	0.347	0.343	0.247	0.096	-0.088	-0.298



PASSENGER...MOMENT : 33.570 mt
CENTRIFUGAL MOMENT : 9.814 mt
TOTAL.....MOMENT : 43.384 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 8.700 deg.

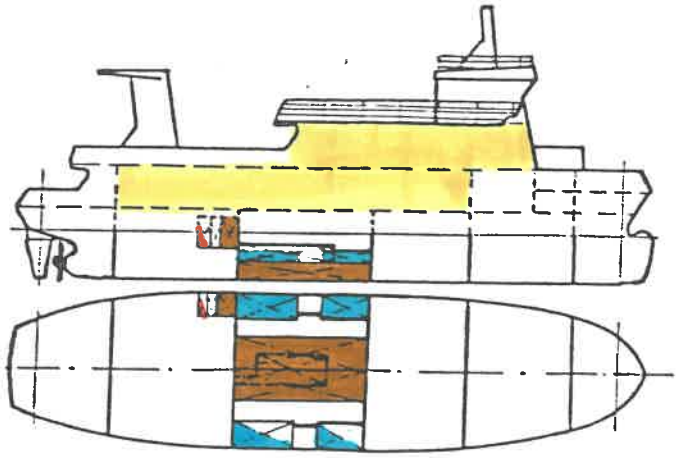
REST FREEBOARD.....: 0.478 m

MS * STRANDE *

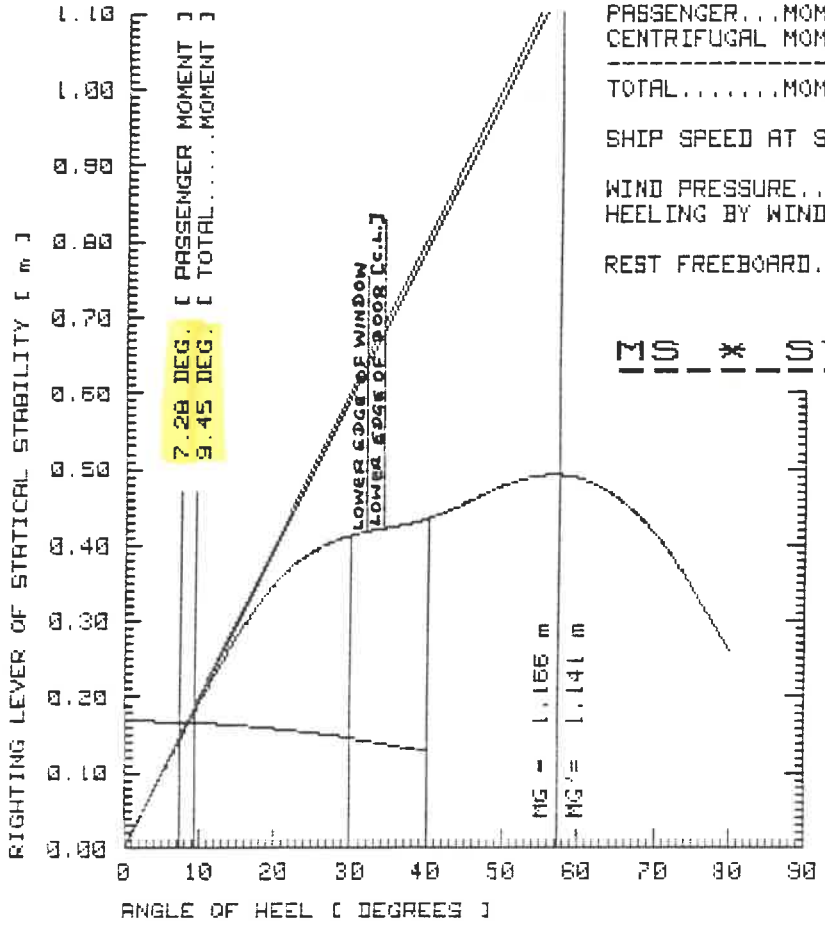
AREA 0-30 DEG. :	7.30 cm^2 =	0.1273 mrad	MOMENT OF SAIL..: 40.22 mpm
AREA 0-40 DEG. :	10.30 cm^2 =	0.1798 mrad	A. 8.7-40 DEG. : 4.87 cm^2 = 0.0850 mrad
AREA 30-40 DEG. :	3.00 cm^2 =	0.0524 mrad	

Type : PASS-VESSL Date :	TRIM and STABILITY	Yard...# : S 214 Page...# : 18

Cargo.....: 240 PASSENGERS, with deckhouse- DEPARTURE
Stowage factor.: 0.000 t/m^3 | Case...# : 3



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.011	-0.049	-0.171	-0.315	-0.415	-0.524	-0.682
MG * SIN Phi..	0.202	0.399	0.583	0.749	0.893	1.010	1.096
R-lever.....	0.191	0.350	0.412	0.434	0.478	0.486	0.414



PASSENGER...MOMEMT : 33.570 mt
CENTRIFUGAL MOMEMT : 9.814 mt
TOTAL.....MOMEMT : 43.384 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 8.600 deg.

REST FREEBOARD.....: 0.483 m

MS * STRANDE *

DECKHOUSE INCLUDED

AREA 0-30 DEG. : 7.61 cm^2 = 0.1328 mrad
AREA 0-40 DEG. : 11.83 cm^2 = 0.2065 mrad
AREA 30-40 DEG. : 4.22 cm^2 = 0.0737 mrad

MOMENT OF SAIL..: 43.22 mpm
A. 0.6-40 DEG. : 6.39 cm^2 = 0.1116 mrad

PAUL LINDENAU GmbH & CO KG
Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

Date : 1984-06-29
MS ** Strande **
Yard # : S 214

TRIM & STABILITY

ARRIVAL

Case..#.: 3

Cargo...: 240 PASSENGERS, - ARRIVAL -

DESIGNATION	Weight to	Lcg m	Vcg m
LIGHT SHIP [SEE PAGE 2].....	193.00	14.081	3.075
CREW : 1 PERSON.....	0.08	22.000	8.800
CREW : 1 PERSON.....	0.08	23.000	4.300
CREW : EFFECTS	0.08	22.000	8.800
CREW : EFFECTS	0.08	23.000	4.300
FUELOIL STORAGE TANK , DB (PS).....	5.00	13.250	0.540
FUELOIL.....DAYTANK , (PS).....	1.00	9.500	2.200
LUBRICATING OIL TANK	0.35	8.250	2.210
FRESHWATER.....TANK , DB (SB).....	2.00	13.325	0.900
DIRTY WATER TANK.....	6.85	11.880	1.350
PASSENGERS : MAINDECK : 122 PERSONS...	9.15	14.500	4.305
PASSENGERS : UPPERDECK : 118 PERSONS...	8.85	16.500	6.600
PASSENGERS : MAINDECK : EFFECTS...	0.61	14.500	4.300
PASSENGERS : UPPERDECK : EFFECTS...	0.59	16.500	6.600
KIOSK.....: PROVISION	0.50	19.500	4.300
STORE.....: LOWER ROOM FORWARD	2.10	17.500	1.900
STORE.....: FOREPEAK	0.25	27.500	3.000
STORE.....: AFT	0.24	4.250	4.300
DISPLACEMENT	230.81	14.138	3.139

Draft.....abl :	2.134	m	Kmt.....:	4.211	m
Volume.....V :	224.060	m^3	MG uncorrected..:	1.072	m
Mct.....Etm :	321.000	mt/m	MG...corrected..:	1.046	m
Incr. of disp.:	1.800	t/cm			
Lcf.....[WL]:	13.111	m	Delta...draft...:	0.050	m
WL.....[La]:	13.111	m	Delta...Da.....:	-0.022	m
WL.....[Lf]:	16.389	m	Delta...Df.....:	0.028	m
Cg forw..App :	14.138	m	Draft...aft.....:	2.307	m
Lcb forw..App :	14.069	m	Draft...midsh...:	2.332	m
Trimlever.... :	0.069	m	Draft...forward.:	2.357	m

Angle F	10	20	30	40	50	60	70
MOS	-0.013	-0.048	-0.224	-0.490	-0.732	-1.080	-1.376
MG*SinF	0.186	0.367	0.536	0.689	0.821	0.928	1.007
R-lever	0.173	0.319	0.312	0.199	0.089	-0.152	-0.369

*** Total number of passengers = 240 persons ***

PAUL LINDENAU GmbH & CO KG
Schiffswerft u. Masch.-Fabrik
Skagerrakufer 10
2300 K I E L- Friedrichsort

FREE SURFACES

Case..#.: 3

Cargo...: 240 PASSENGERS, - ARRIVAL -

DESIGNATION	Frame #	Pos.	TMI m^4	GAMMA t/m^3	MOMENT mt
FUELOIL STORAGE TANK.....	20 - 23	PS	3.16	0.870	3
FRESHWATER.....TANK.....	20 - 26	SB	1.26	1.000	1
DIRTY WATER.....TANK.....	20 - 26	CL	1.90	1.000	2
FUELOIL.....DAYTANK.....	18 - 20	PS	0.18	0.870	0
TOTAL					6

DRAUGHT.ab.baseline..	m	2.134	MG....uncorrected	m	1.072
CG.....	m	3.139	Delta.....[MG]	m	0.026
KMT.....	m	4.211	MG .....corrected	m	1.046

Angle F	10	20	30	40	50	60	70
M0S	-0.013	-0.048	-0.224	-0.490	-0.782	-1.080	-1.376
MG*SinF	0.182	0.358	0.523	0.672	0.801	0.906	0.983
R-lever	0.169	0.310	0.299	0.182	0.019	-0.174	-0.393

*** Compilation of all free surfaces : see chapter III ***

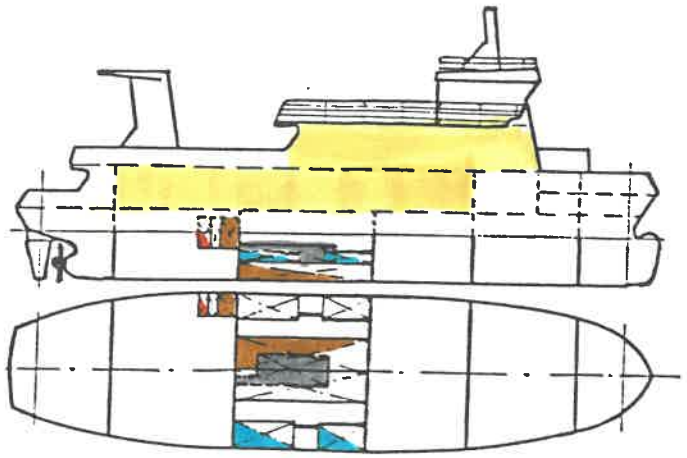
MOMENT OF WIND

DESIGNATION	SAIL AREA m^2		SAIL LEVER m		REMARKS
to axis 2.20 m	Area 1	160	e1	3.07	
Topical draught	Area	162	e'+D/2	4.17	
Angle F	0	10	20	30	40
S-lever	0.176	0.173	0.165	0.152	0.135

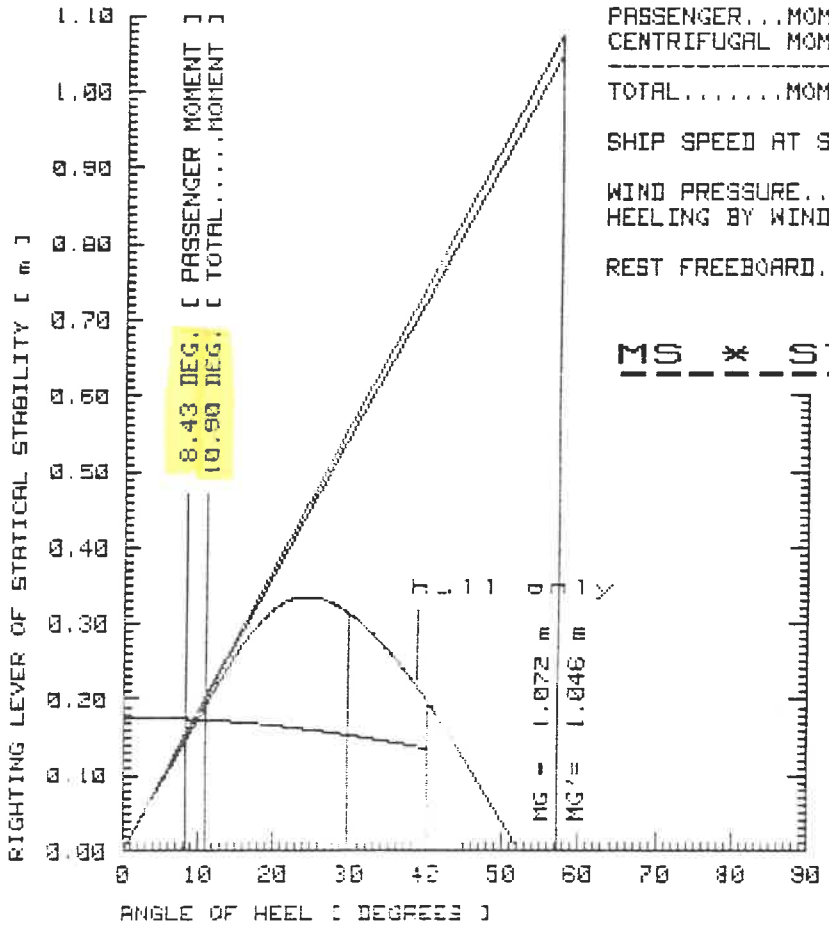
*** Sail area : look at the last page ***

Type : PASS-VESS. Date : 1984-06-29	TRIM and STABILITY	Yard...# : S 214 Page...# : 21

Cargo.....: 240 PASSENGERS, - ARRIVAL -
Stowage factor.: 0.000 t/m^3 | Case...# : 3



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.013	-0.048	-0.224	-0.490	-0.782	-1.080	-1.376
MG * SIN Phi..	0.186	0.367	0.536	0.689	0.821	0.928	1.007
R-lever.....	0.173	0.319	0.312	0.199	0.039	-0.152	-0.369



PASSENGER...MOMENT : 33.570 mt
CENTRIFUGAL MOMENT : 10.041 mt

TOTAL.....MOMENT : 43.611 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 10.000 deg.

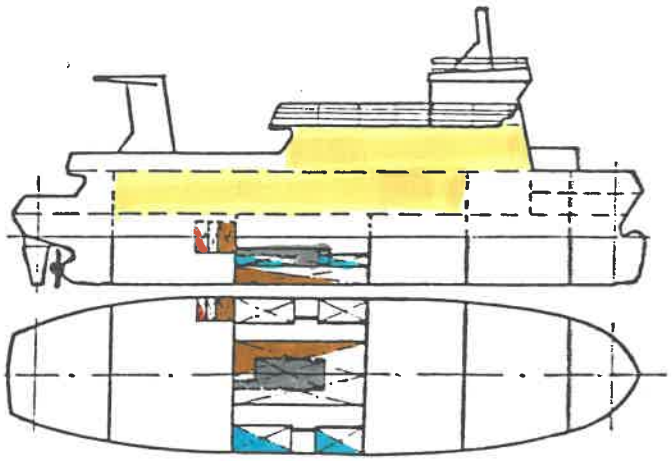
REST FREEBOARD.....: 0.434 m

MS * STRANDE *

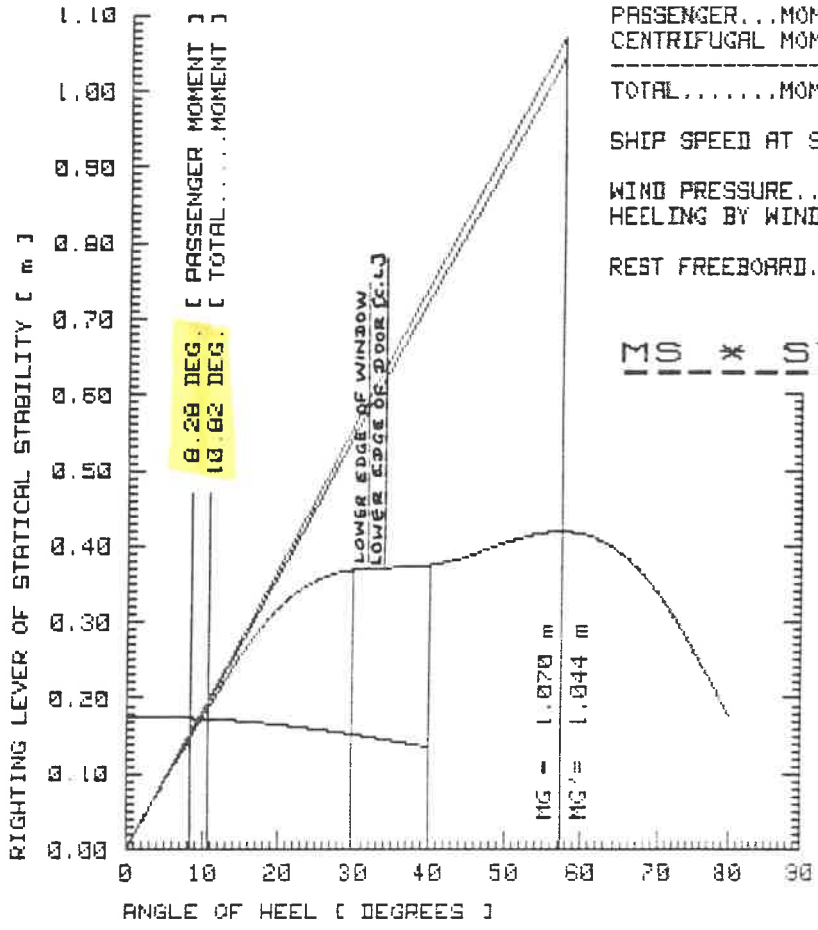
AREA 0-30 DEG. :	6.88 cm^2 =	0.1167 mrad	MOMENT OF SAIL..:		40.57 mpm
AREA 0-40 DEG. :	9.30 cm^2 =	0.1623 mrad	A. 10.0-40 DEG. :	3.71 cm^2 =	0.0648 mrad
AREA 30-40 DEG. :	2.61 cm^2 =	0.0456 mrad			

Type : PASS-VESSL Date :	TRIM and STABILITY	Yard...# : S 214 Page...# : 22

Cargo.....: 240 PASSENGERS. with deckhouse - ARRIVAL -
Stowage factor.: 0.000 t/m^3 | Case...# : 3



Angle [Phi]	10	20	30	40	50	60	70
M0S.....	-0.011	-0.046	-0.166	-0.313	-0.415	-0.512	-0.666
MG * SIN Phi..	0.186	0.366	0.535	0.688	0.820	0.927	1.005
R-lever.....	0.175	0.320	0.369	0.375	0.405	0.415	0.339



PASSENGER...MOMENT : 33.570 mt
CENTRIFUGAL MOMENT : 10.041 mt
TOTAL.....MOMENT : 43.611 mt

SHIP SPEED AT SEA..: 11.000 kn

WIND PRESSURE.....: 0.060 t/m^2
HEELING BY WIND....: 9.850 deg.

REST FREEBOARD.....: 0.440 m

MS * STRANDE *

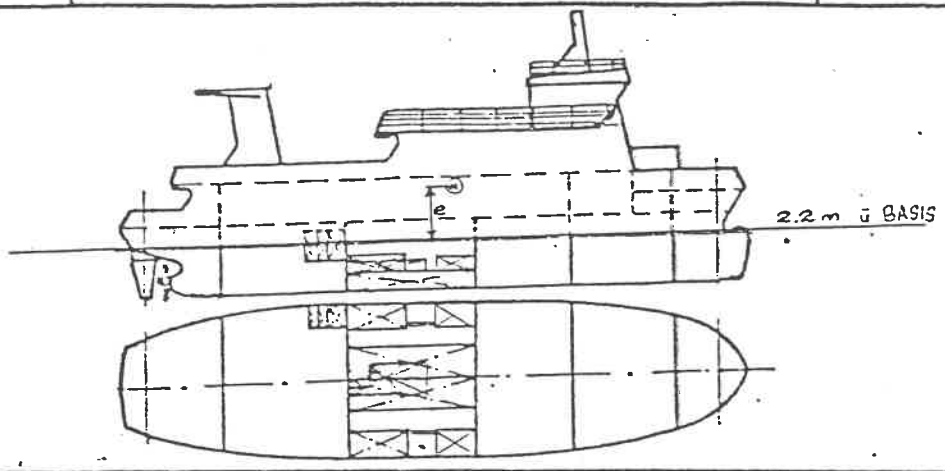
DECKHOUSE INCLUDED

AREA 0-30 DEG. :	6.33 cm^2 =	0.1210 mrad	MOMENT OF SAIL..:		40.57 mpm
AREA 0-40 DEG. :	10.65 cm^2 =	0.1859 mrad	A. 9.3-40 DEG. :	5.05 cm^2 =	0.0881 mrad
AREA 30-40 DEG. :	3.72 cm^2 =	0.0649 mrad			

PAUL LINDENAU GmbH & Co
KOMMANDITGESELLSCHAFT
SCHIFFSWERFT + MASCHINENFABRIK
KIEL - FRIEDRICHSORT

WINDDRUCKMOMENT

BAU-NR.: S 214
DATUM: 1984-06-28



BEZEICHNUNG	LÄNGE M	HÖHE M	FLÄCHE M^2	e M
SCHANZKLEID + AUSSENHAUT	31.80	2.12	67.42	1.06
BACKDECK	6.25	1.20	7.50	2.72
SCHOTTENDECK → BRÜCKENDECK	22.60	1.25	28.25	2.745
BRÜCKENDECK → PEILDECK	13.65	2.30	31.40	5.02
SCHORNSTEIN	1.75	3.30	6.45	5.80
RETTUNGSBOOT	5.00	0.90	4.00	6.75
RETTUNGSINSELN	1.40	0.60	0.84	3.95
RETTUNGSINSEL	1.40	0.60	0.84	6.25
MAST USW. AUF PEILDECK	–	–	1.80	8.85
PEILDECK	4.65	2.25	10.46	6.80
zusätzlich auf Brückendeck zw. Sph. 50 u. 54	2.00	0.70	1.40	3.75
GESAMT	–	–	**160.36**	**3.07**

ALLGEMEIN:

$$h_w = \frac{P \times A}{\Delta} [e + T/2] \cos \varphi \; [M]$$

$\cos 0° = 1 \rightarrow$

$$h_w = \frac{P \times A}{\Delta} [e + T/2]$$

FÜR KALKULATION:

$$h_w = \frac{P \times A}{\Delta} [e + 2.5 - T/2] \cos \varphi$$

IF $T < 2.50$ m

$A_2 = L_{pp} * (2.50 - T)$

$e_2 = 1/2 * (T - 2.50)$

$A = A_1 + A_2$

$e = (A_1 e_1 + A_2 e_2) / A$

WINKEL	0°	10°	20°	30°	45°	60°	75°	90°
COS φ	1,000	0,9848	0,9397	0,8660	0,7071	0,5000	0,2588	0,000
M_W								
h_W								