ORIGINAL

CONTRACT

Pursuant to form adopted by the Swedish Shipbuilders' Association on the 30th January 1947 with amendments adopted on the 28th January 1964

This Contract is made between Partrederiet S. 592, Stockholm, Managing Owner Rederiaktiebolaget SLITE, Stockholm/ Schweden, Sturegatan 6

as Purchaser, on the one part and Shipyard Jos. L. Meyer, 2990 Papenburg (-Ems)/ Germany, Hauptkanal rechts 2

as Builders, on the other part.

Whereby it is agreed as follows:

§ 1.

The vessel ordered

Subject to the conditions set out below the Builders will build for the Purchaser ~~and will deliver~~ at the Builders' yard at Papenburg (Ems)-Germany and will deliver a two compartment car- and passenger ferry at Emden/ Germany (hereinafter called "the Vessel") having the Yard No. S. 592, substantially in accordance with the specifications and drawings numbered 5686/78 dated 1st June, 1978 relating to this Contract, and intended to be taken as part hereof.

The Yard number shall be considered solely as the means of identifying the Vessel and the parts intended for her and does not imply any priority in regard to other vessels accepted for earlier delivery by the Builders.

In the event of any discrepancy between this Agreement and the said specifications of drawings the provisions of this Agreement shall prevail and be adopted. In the event of any discrepancy between the specifications and the drawings the specifications shall prevail.

§ 2.

Leading dimensions and particulars

The dimensions of the Vessel shall be the following:

Length overall: ..... approx. 137,00 m

Length between perpendiculars 119,00

Breadth, moulded .. in A-Deck (car deck) 24,20
.. in waterline 23,60

Depth, moulded, to upper deck 13,00

Depth, moulded, to second deck 7,65

Number of passengers 1700

Number of crew 150

The deadweight capacity of the Vessel including fuel, stores, provisions, fresh water, passengers (if any), crew and spare parts beyond the requirements of the Classification Society, etc., shall be about 2400 tons (of 1000 whereof min. 1600t for cargo (lorries on car de kilos) on the international summer freeboard, corresponding to a mean draft in salt water (specific gravity 1.025) of about 5,45 m

The propelling machinery of the Vessel shall consist of four main engines MAN, type 8 L 40/45, each 4400 KW (6000 HP) at 600 rpm.

~~developing approx.~~ ~~I.H.P./B.H.P. (metric) at approx.~~ ~~r.p.m.~~

The mean speed of the Vessel on trials with clean bottom ~~when loaded to the said mean draft~~ with a draft corresponding to 1500 tons deadweight and with her propelling machinery developing the said power is estimated to be 21 knots in calm weather and smooth sea on opposite runs over a measured mile.

~~The warranties of deadweight and speed shall be deemed to have been complied with if the Purchaser shall dispense with the trials or shall not for the purpose of the trials provide and ship on board the deadweight required to submerge the Vessel down to the said mean draft.~~

The fuel consumption of the propelling machinery, ~~including all auxiliaries required for the propulsion of the Vessel~~, when developing approx. 24.000 HP ~~I.H.P./B.H.P.~~ (metric) and when running on 1800 sec. Redw.I, 100° F with an effective thermal value of at least 10.000 kcal per kilo, is estimated not to exceed 154 ± 3% grams per ~~I.H.P./B.H.P.~~ HP (metric) per hour.

The Vessel with her accomodation, equipment and machinery shall be built in accordance with the rules and requirements for class

BUREAU VERITAS

I 3/3 + Deep Sea Finnish Ice Class 1 A

and rules/regulation corresponding to specification

.....

.....

.....

.....

.....

The Builders shall supply at their cost Builders' certificate, certificate of the Classification society, and certificates of tonnage for international measurement ~~and for~~ .....

.....

.....

~~Unless otherwise agreed between the parties Svensk Varvsstandard (Swedish Shipbuilding Standard) shall apply to all equipment, materials etc., for which such standard is publishe~~d.

If, during the period of building, alterations or additions are made to any rules, regulations or enactments in force before .....15th of May, 1978..... and applicable to the Vessel the Builders shall inform the Purchaser thereof as soon as possible. The Purchaser must then decide whether and to what extent the alterations or additions which are not mandatory shall be incorporated in the Vessel. The amount of the additional expense or saving in cost arising from any alterations or additions shall be borne by or credited to the Purchaser, as the case may be.

§ 3.

Deficiency in deadweight and speed; excessive fuel consumption

If the estimated deadweight capacity mentioned in Clause 2 be not attained and if the deficiency exceeds ~~1~~ 3 % of the said deadweight capacity, the liability of the Builders shall be limited to the payment to the Purchaser, as liquidated damages, of .....20.000 Skr..... for every .....1..... tons of deficiency beyond the said margin of ~~1~~ 3 %.

On the other hand, the Purchaser shall pay the same amount to the Builders for every .....1..... tons, by which the actual deadweight exceeds the said estimated deadweight increased by 2 %.

~~Should the speed estimated in Clause 2 not be attained, the liability of the Builders shall be limited to the payment to the Purchaser, as liquidated damages, of the following percentages of the contract price stated in Clause 10:~~

~~For the first two tenth (2/10) of a knot deficiency ..... Nil.~~

~~For each successive complete tenth (1/10) of a knot deficiency up to one half (1/2) of a knot ..... 0,2 %~~

~~For each complete tenth (1/10) of a knot deficiency exceeding one half (1/2) of a knot ..... 0,4 %~~

~~Should the fuel consumption exceed the consumption estimated in Clause 2 by more than 5%, the liability of the Builders shall be limited to the payment to the Purchaser, as liquidated damages, ... for each full five (5) grams per I.H.P./B.H.P. (metric) per hour by which the fuel consumption is increased beyond the said margin of 5 %.~~

The Builders guarantee the speed of the Vessel to be not less than 20 knots as determined under Clause 2. If the deadweight capacity of the Vessel determined in Clause 2 will be less than 2200 tons or the cargo capacity

including war risk and sabotage as from launching until delivery of the Vessel

§ 13.

Insurance

Until delivery has been effected, the Builders shall keep the Vessel and all parts intended for use in her construction insured against the usual builder's risks, for an amount not less than the instalments paid on account by the Purchaser. If considered necessary by the Builders or purchaser the Vessel shall also be insured against war risks, and the cost of such insurance shall be borne by the Purchaser.

Should the Vessel in the opinion of the Builders be damaged by fire or other accident, to a considerable extent, the Builders shall be entitled to cancel this Contract and shall thereupon refund to the Purchaser the instalments paid on account of the contract price. plus interest

§ 14.

Disputes

This Contract shall be construed and the relations between the parties determined in accordance with Swedish law. Disputes shall be settled by arbitration at the venue of the place of building according to the Swedish law relating to arbitrations.

If the Builders so require the Purchaser shall lodge such security as is approved by the arbitrator(s) for costs and damages likely to arise from the arbitration proceedings. If the Purchaser does not meet this requirement, he shall be debarred from any further step in the proceeding.

§ 15.

Assignment of Contract

This Contract cannot be assigned without the written consent of the Builders.

This Contract with attached specifications, drawing and appendices has been drawn up and signed by or on behalf of the parties hereto in duplicate, one copy being retained by each party.

This contract is valid subject the approval of Sveriges Riksbank and subject Purchaser finalizing the negotiations with Bank regarding the financing of the Vessel on terms acceptable to Owner.

Stockholm, June 24, 1978
Signed in duplicate:

PURCHASER:

Partrederiet för S. 592
Roberg AB/13 SLITE

BUILDERS:

Jos. L. Meyer

Enclosure 2.3.1.6

Jos. L. Meyer, Papenburg-Ems
Schiffswerft, Maschinenfabrik, Dockbetrieb

S. 592

Besprechung Bureau Veritas Hamburg am 23. Juni 1978

Herr Schwenker	Bureau Veritas
Herr ~~de Guna~~ Di Sauza	Bureau Veritas
Herr Lormes	Bureau Veritas
Herr Wehnes	Jos. L. Meyer
Herr Möhlenkamp	Jos. L. Meyer

1. Das Kollisionsschott muß durch eine wasserdichte Rampe bis zum A-Deck weitergeführt werden. Die Lage der Rampe zum VL kann in der Schrägen gemittelt werden, Absprache mit BV und der schwedischen Sicherheitsbehörde.

2. Die Schmierölumlauftanks können ohne Kofferdämme zum Boden gebaut werden, wenn die Tanks durch Absperrorgane voneinander getrennt werden können.

3. Der Eisgürtel in der Außenhaut muß geändert werden von 0,3 auf 0,6 m über LWL.

4. Bei Abnahme und Prüfung der Hängedecke durch die Klasse kann das Klassenzeichen den Zusatz PFA erhalten. BV 11-43.5 S. 330.

5. Der Winkel von 73° zwischen den Wellerbockarmen ist i. O., die Klasse hat hier keine speziellen Vorschriften.

6. Die PKW-Rampe muß nur für die Wagenbelastung ausgelegt werden, Gurtungsdeck-Zuschläge sind nicht erforderlich.

7. Nach Aufgabe der Hubschraubergröße kann die Belastung des Decks nach 6 - 24.4 festgelegt werden,

8. Das dickwandige Kabelrohr zum Bugstrallruderraum kann bis zu 40 % des Querschnittes mit Kabeln belegt werden. Wegen der Leckstabilität muß auf den 1/5-Bereich der Abschottung geachtet werden.

9. Gegen eine Überlappte Verbindung der Längsdeckbalkon nach vorgelegter Skizze bestehen keine Bedenken.

10. Nach SOLAS Regel 26 II müssen die Fenster im Bereich der Back in B 15 - Ausführung sein. (Pietermann Hardgles BV, Postbus 30, Loetermeer, Holland)

11. Durchführung von Kunststoffrohren durch horizontale Schotte: Nach Rapport från Byggforskeningen, Stockholm, bis zu einem gewissen Durchmesser keine Stahlmanschetten erforderlich (Kopie des Berichtes liegt im TBS vor).

12. BV übergab der Werft die Vorschriften für den Einbau von Liftanlagen.

TBS-Mö-Zw
23. Juni 1978

Enclosure 2.3.1.7

[redacted] Tagesspesen (A)

23.10.78 [illegible]

1.) [illegible]

2.) K.S.S. [illegible]

3.) [illegible]

[illegible] 26.10.78

Dank für [illegible] für [illegible] [illegible] [illegible] doch ohne Abnahme an [illegible] [illegible] [illegible] [illegible] [illegible]

D.M. 25,200.—

1 Stck. Hundehütte – Anfertigung [illegible] Hundehütte liefern und einbauen

D.M. 2.450.—

[illegible] D.M. 1.000.—

Enclosure 2.3.1.8

20.11.78

Hr. C.B. Meyden
Frau Meyden
Hr. Kuxe
Hr. Tillberg
Hr. E. Andersson

Ug.

Tagebuch (1)

1.) Rettungsboote: 4 x 85 = 340
1 x 60 = 58 ÷ 60 wird mitgebaut
1 x 15 = 15
= 415 = 30%

100% ~ 1400 ; bis auf 1400 anzahlungsbare Rettungsmittel

Vorschlag mit Reederei: [redacted] 720 Fahrgäste
– 100 Besatzung
820
– 410 Boote
410 64 = 16/17

Rettungsinseln ≙ 4 Kräne, da 4 Inseln pro Kran.

2.) Bei Bestellung von Rettungsinseln darauf achten, daß a.) selbstbar
b.) Betriebsanleitung oben!

per Fax 20.11.78

3.) Sjöfartsverket Rotterdam: anfragen welche Sachen abgenommen werden sollen!!

4.) Port of v. Sjöfartsverket Beantwortung einer Anfrage für Kalefaktor P. für Sabbatum beantragen. (Hauptfahrstuhlgestelle, sonst entbehrlich bei Urlaub).

5.) Unbedingt: Schreiben VIRSING-LANE Mitteilungen von Diana.

6.) 140-Betten Nach Aussage von d. Kjellgard muß Personaraum im Stockholm durchgeführt

K.J. Jöhlin: Kettenmodell + Kind. Abteilungen

(N.S. 23.6.78)

B.V. Funke B-15 SOLAS Reg. 26 II

(N.S. 23.6.78 P. 10)

Tagebuch Wolines (1)

BILAGA 9
1(8)

PASSENGER SHIP SAFETY CERTIFICATE

Enclosure 2.3.1.9

This certificate shall be supplemented by a Record of Equipment (Form P).

SWEDEN

for [ ] an international voyage
[x] a short (Select as appropriate)

Issued under the provisions of the INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA 1974, in accordance with Assembly resolution A.718(17) relating to the early implementation of the harmonized system of survey and certification under the authority of the Government of Sweden by the National Maritime Administration.

Particulars of ship

Name of ship : DIANA II

Port of registry: Slite

Gross tonnage : 11537

Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for a conversion or an alteration or modification of a major character was commenced: 1978

Call sign : S I A J

IMO Number : 7816874

Sea areas in which ship is certified to operate (reg.IV/2) : -

THIS IS TO CERTIFY:

1 That the ship has been surveyed in accordance with the requirements of regulation I/7 of the Convention.

2 That the survey showed that:

2.1 the ship complied with the requirements of the Convention as regards:

.1 the structure, main and auxiliary machinery, boilers and other pressure vessels;

.2 the watertight subdivision arrangements and details;

.3 the following subdivision load lines:

Subdivision load lines assigned and marked on the ship's side amidships (regulation II-1/13)	Freeboard	To apply when the spaces in which passengers are carried include the following alternative spaces
C.1	2012	
C.2		
C.3		

BILAGA 9
2(8)

2.2 the ship complied with the requirements of the Convention as regards structural fire protection, fire safety systems and appliances and fire control plans;

2.3 the life-saving appliances and the equipment of lifeboats, liferafts and rescue boats were provided in accordance with the requirements of the Convention;

2.4 the ship was provided with a line-throwing appliance and radio installations used in life-saving appliances in accordance with the requirements of the Convention;

2.5 the ship complied with the requirements of the Convention as regards radio installations;

2.6 the functioning of the radio installations used in life-saving appliances complied with the requirements of the Convention;

2.7 the ship complied with the requirements of the Convention as regards shipborne navigational equipment, means of embarkation for pilots and nautical publications;

2.8 the ship was provided with lights, shapes, means of making sound signals and distress signals in accordance with the requirements of the Convention and the International Regulations for Preventing Collisions at Sea in force;

2.9 in all other respects the ship complied with the relevant requirements of the Convention.

3. That an Exemption Certificate [X] *has* [ ] *has not* been issued. (Select as appropriate.)

This certificate is valid until : 1 February 1995

Issued Malmö (Date of issue) at 10 June 1994 (Place of issue of certificate)

(Signature of authorized official issuing the certificate)

Åke Sjöblom

SJÖFARTSVERKET

95 08:17 FAX +49 4961 81296 MEYER WERFT 15

JOS. L. Meyer, Papenburg-Ems
Schiffswerft, Maschinenfabrik, Dockbetrieb

Enclosure 2.4.1.11

13.9.79

SPECIFICATION 1-1

for a 1-8

abt. 15.000 BRT A-12

CAR-PASSENGER FERRY 2-5

3-3

(in connection with general arrangement plan 5675/79 dated 5.9.1979)

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Jos. L. Meyer, Papenburg-Ems
Schiffswerft, Maschinenfabrik, Dockbetrieb

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1. GENERAL

General Regulations

The vessel shall be built in accordance with this specification and the General Arrangement drawings, equipped to comply with the specific regulations.

Inventories shall be delivered according to the included lists. Should any object be mentioned in more than one place, however it is only to be delivered once.
When two or more materials or methods of manufacture are mentioned, the Builders have the right to choose between these.

The design of subcontractors' equipment and recommendations for installation of the same equipment refer to their standard on the date of this specification.

If, as a result of increased experience or general technical development, other designs, materials or methods of manufacture than those stated in this specification are found equivalent but more practical, the Builders reserve the right to adopt these new designs etc. Such alterations, however, are always to be submitted to the Owners' surveyor for approval before being carried out.

The shipyard alone is responsible for the construction and quality of work of the ship. The fact that drawings or other documents, test results, etc. have been shown to the Owners or been approved by the Owners or an authority or that modifications have been carried out according to Owners' requirements does not relieve the shipyard from the above mentioned responsibility.

If drawings are submitted and any discrepancy should exist between this specification and the drawings, the specification shall prevail.

Details and equipment necessary for a ship of this type but not stated in this specification to be done according to yard's praxis approved by the Owners'.

General Description

The ship to be built in every respect as a modern car/passenger ferry, designed for short international voyage.

23/02 '95 05:21 FAX +49 4961 81298 MEYER WERFT TS 019

Jos. L. Meyer, Papenburg-Ems
Schiffswerft, Maschinenfabrik, Dockbetrieb

1-1

1. GENERAL

General Regulations

The vessel shall be built in accordance with this specification and the General Arrangement drawings, equipped to comply with the specific regulations.

Inventories shall be delivered according to the included lists. Should any object be mentioned in more than one place, however it is only to be delivered once.
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General Description

The ship to be built in every respect as a modern car/passenger ferry, designed for short international voyage.

14. CLASSIFICATION, REGULATIONS, NOISE PREVENTING

The vessel with her accommodation, equipment and machinery shall be built under special survey to Bureau Veritas class, I 3/3 E + Car and Passenger ferry Deep sea Finnish Ice class I A
+(AUT) ≡ £ ∂
The vessel with equipment shall comply with the following rules and regulations:

- The Finnish Board of Shipping.
- International Conference on Safety of Life at Sea 1974
- International Load Line Convention 1966 and admendments 1971 + 1975
- Convention for Tonnage Measurement of Ships, Oslo 1947
- Pollution Preventions 1973
- International Regulations for Preventing Collision at Sea 1972
- Finnish Authorities' recomendations for Safety Ship Labour 77 : 33
- US Regulations regarding sanitation (fresh water tank arrangement excluded) (as reasonable applicable)
- Convention on the Protection of the Marine Environment of the Baltic Sea Area 1974/232
- IMCO resolution A 325 (ix) 1975 concerning regulations for machinery and electric installations in passenger vessel and cargo ships
- USCG requirements for passenger vessels' safety to be followed, as reasonable applicable
- The Finnish Board of Shipping and Navigation Rules and Recommendations of Noise Level Criterium

13.CERTIFICATES, DELIVERY DRAWINGS,MODELS

133. CERTIFICATES

All necessary certificates to be delivered with the ship including:

- Certificate from the Classification Society for Hull and Machinery
- Tonnage Certificates
- Load Line Certificate
- Safety Construction Certificate
- Safety Equipment Certificate
- Safety Radiotelegraphy Certificate
- Register of Lifting Gear (attestation by the classification
- Builder's Certificate
- Deratting Certificate

Certificates for
anchors, chain cables, davits, navigation lights, compasses etc. will be delivered.

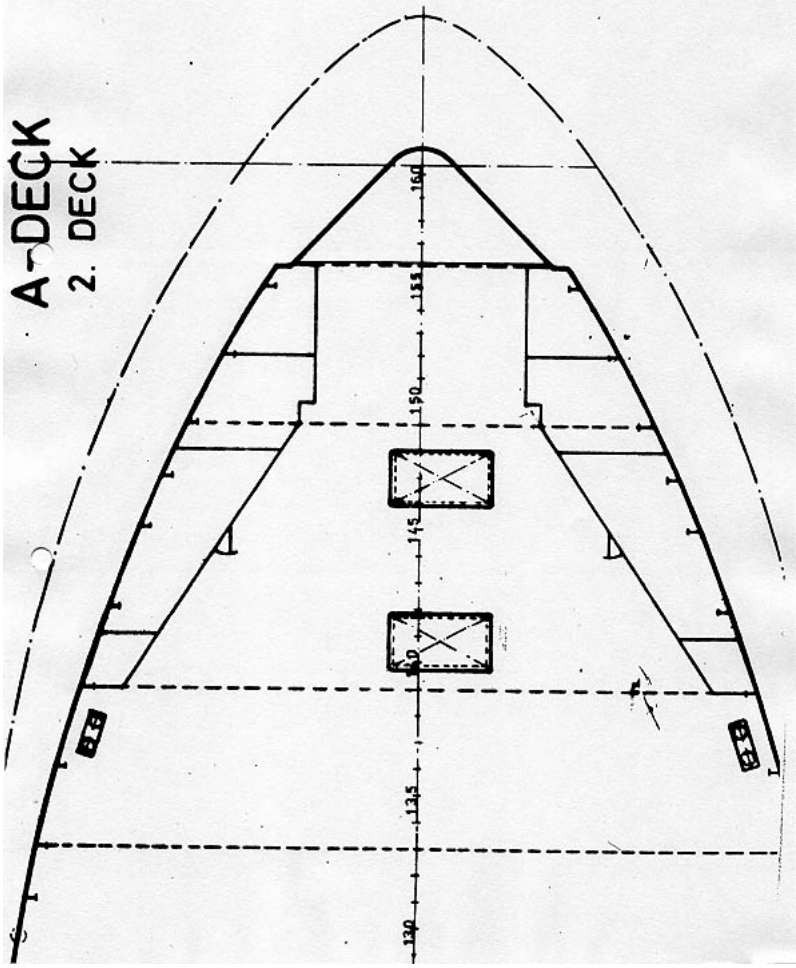
Certificates and costs for approval of plans by the Authorities concerned shall be paid for by the Builders.

214. BULKHEADS

Steel bulkheads below car deck to fulfil the two-compartment stability and flooding requirements. Steel bulkheads on upper decks for main fire zones, main stair casings, around galley departments, store rooms etc. of 4 mm corrugated plates.

Part of GA-drawing
dated 5.9.79

Enclosure 2.4.1.12



Enclosure 2.4.1.13

CONTRACT

Pursuant to form adopted by the Swedish Shipbuilders' Association on the 30th January 1947 with amendments adopted on the 28th January 1964

This Contract is made between Rederiaktiebolaget Sally, Strandgatan 7, 22100 Mariehamn, Finland

as Purchaser, on the one part and Shipyard Jos. L. Meyer, W-Germany, 2990 Papenburg (EMS), Hauptkanal Rechts 2

as Builders, on the other part.
Whereby it is agreed as follows:

§ 1.

Subject to the conditions set out below the Builders will build for the Purchaser ~~and will deliver~~ at the Builders' yard at Papenburg (EMS)-Germany and will deliver *The vessel ordered* a two compartment car- and passenger ferry at Emden/Germany (hereinafter called "the Vessel") having the Yard No. S 590, substantially in accordance with the specification~~s~~ and drawing~~s~~ numbered

5675/79 dated 5th September, 1979

relating to this Contract, and intended to be taken as part hereof.

The Yard number shall be considered solely as the means of identifying the Vessel and the parts intended for her and does not imply any priority in regard to other vessels accepted for earlier delivery by the Builders.

In the event of any discrepancy between this Agreement and the said specifications ~~or~~ drawings the provisions of this Agreement shall prevail and be adopted. In the event of any discrepancy between the specifications and the drawings the specifications shall prevail.

§ 2.

Leading dimensions and particulars

The dimensions of the Vessel shall be the following:

Length overall: ..... approx. 155,40 m

Length between perpendiculars ..... 137,40 m

Breadth, ~~moulded~~ max ..... 24,60 m

moulded in waterline 23,60 m

Depth, moulded, to upper deck ..... 13,40 m

Depth, moulded, to second deck ..... 7,65 m

Number of passengers 2.000

Number of crew 188

The deadweight capacity of the Vessel including fuel, stores, provisions, fresh water, passengers (if any), crew and spare parts beyond the requirements of the Classification Society, etc., shall be about 2.800 tons (of ~~1,016~~ 1.000 kilos) on the international summer freeboard, corresponding to a mean draft in salt water (specific gravity 1.025) of about 5.55 m

The propelling machinery of the Vessel shall consist of four main engines of M.A.N., type 8L 40/45, each 4400 kw (5.984 HP) at 600 rpm

~~developing approx. ..... I.H.P./B.H.P. (metric) at approx. ..... r.p.m.~~

The mean speed of the Vessel on trials with clean bottom ~~when loaded to the said mean draft~~ with a draft corresponding to 1.460 tons deadweight and with her propelling machinery developing ~~xxxxxxxxxxxxxxxx~~ /90% of the MCR at 188,5 rpm/ is estimated to be 21,2 knots in calm weather and smooth sea on opposite runs over a measured mile.

The warranties of deadweight and speed shall be deemed to have been complied with if the Purchaser shall dispense with the trials ~~or shall not for the purpose of the trials provide and ship on board the deadweight required to submerge the Vessel down to the said mean draft.~~

The fuel consumption of the propelling machinery, ~~including all auxiliaries required for the propulsion of the Vessel~~, when developing approx. 17.600 kw ~~I.H.P./B.H.P. (metric)~~ and when running on 1.500 sec redwood I, 100°F with an effective thermal value of at least 10.000 kcal per kilo, is estimated not to exceed 209 ± 3 % grams per kw ~~I.H.P./B.H.P.(metric)~~ per hour.

The Vessel with her accomodation, equipment and machinery shall be built in accordance with the rules and requirements for class

Bureau Veritas

I 3/3 E + car- and passenger ferry deep sea, ~~Finnish/~~ ice class IA

+ (Aut) and rules/regulations corresponding to specification

The Builders shall supply at their cost Builders' certificate, certificate of the Classification society, and certificates of tonnage for international measurement and ~~for~~ other certificates provided for in the specification

Unless otherwise agreed between the parties ~~Svensk Varvsstandard (Swedish Shipbuilding Standard)~~ Scandinavian standard for car/passenger ferries shall apply to all equipment, materials etc., ~~for which such standard is published.~~

If, during the period of building, alterations or additions are made to any rules, regulations or enactments in force before ~~concerned and 1st April 1979 in all other respects~~ 11th September 1979 as far as the classification society is and applicable to the Vessel the Builders shall inform the Purchaser thereof as soon as possible. The Purchaser must then decide whether and to what extent the alterations or additions which are not mandatory shall be incorporated in the Vessel. The amount of the additional expense or saving in cost arising from any alterations or additions shall be borne by or credited to the Purchaser, as the case may be.

§ 3.

Deficiency in deadweight and speed; excessive fuel consumption

If the estimated deadweight capacity mentioned in Clause 2 be not attained and if the deficiency exceeds ~~x%~~ 2,35% of the said deadweight capacity, the liability of the Builders shall be limited to the payment to the Purchaser, as liquidated damages, of DEM 15.000,- for every ..... tons of deficiency beyond the said margin of ~~x%~~ 2,35%.

On the other hand, the Purchaser shall pay the same amount to the Builders for every ..... tons, by which the actual deadweight exceeds the said estimated deadweight increased by ~~x%~~ 4%.

Should the speed estimated in Clause 2 not be attained, the liability of the Builders shall be limited to the payment to the Purchaser, as liquidated damages, of the following percentages of the contract price stated in Clause 10:

For the first two tenth (2/10) of a knot deficiency ..... Nil.
For each successive complete tenth (1/10) of a knot deficiency up to one half (½) of a knot ..... 0,2 %
For each complete tenth (1/10) of a knot deficiency exceeding one half (½) of a knot ..... 0,4 %

~~Should the fuel consumption exceed the consumption estimated in Clause 2 by more than 5%,~~ the liability of the Builders shall be limited to the payment to the Purchaser, as liquidated damages, ... for each full five (5) grams per I.H.P./B.H.P. ~~(metric) per hour by which the fuel consumption is increased beyond the said margin of 5%.~~

The Builders guarantee that the deadweight capacity of the vessel determined in clause 2 shall not be less than 2500 tons, whereof no less than 1500 t. for cargo (lorries) on car deck and that the speed determined as stated in clause 2 shall not be less than 20,1 knots.

Builders cannot fulfill one or both of these two guarantees the Purchaser
the right and option to refuse to take delivery of the vessel and to cancel
contract with an obligation for the Builders to refund immediately to the Purchaser 4
instalments paid on account of the contract price plus interest.

§ 4.

When the Builders have notified the Purchaser that the Vessel is ready for delivery, a trial trip shall take place off EMDEN to ascertain whether the Vessel conforms with the terms of the contract. The trial trip, which shall be undertaken in the presence of representatives of the Purchaser and representatives of the clo: shall be completed according to the specification ~~xxxx

Should the Vessel not be delivered before 1st November 1980 the Purchaser has the option of cancelling this contract against being paid back the instalments paid on account of the contract price plus interest and also compensation due for payment as mentioned above.

~~the instalments already paid by the Purchaser in cash or by bills, at the highest rate charged from time to time by the Swedish private commercial banks on loans secured by mortgages on ships.~~

The Builders shall not be liable for damages or otherwise howsoever if the delay is due to war or warlike operations, strike, lockout or other labour conflicts, whether approved or supported by trade unions or not, shorter working hours imposed on the Builders, ~~shortage of manpower or materials, late delivery of materials or goods, defects in outer forgings or castings, materials or goods supplied by sub-contractors~~, fire, accident, act of God, ~~unfavourable weather~~ exceptionally bad weather or any other circumstances outside the control of the Builders and ~~whether~~ affecting the Vessel ~~or any other commitments of the Builders~~. And the time for delivery shall be extended by the number of working days lost to the Builders by reason of any of the above mentioned occurances, even if the cause of the delay arises after the date of delivery stated in this Contract.

If, during the period of building, the Vessel sustains damage which has been repaired to the satisfaction of the Classification Society and/or the government authorities concerned, the Purchaser is not thereby entitled to refuse delivery of the Vessel or to claim compensation.

If the Vessel is put into service by the Purchaser before it is entirely ready for delivery, the Purchaser's right to claim compensation for any delay in the delivery shall cease from the day the Vessel is put into such service.

If the Vessel is ready for delivery before the date mentioned in the first paragraph of this Clause and the Builders give to the Purchaser at least two weeks notice thereof the Purchaser shall take delivery as soon as it has been ascertained that the Vessel has been built in accordance with the terms of the Contract. If such events occur, which in the Builders' judgement, may cause a delay, the Builders shall within two weeks notify the Purchaser of such events and, if possible, the estimated duration of the delay. If such written notice is not given within the stipulated two weeks, force majeure cannot be claimed for the period preceding such notice.

§ 9

Liability

(a). When the Vessel has been delivered to the Purchaser or the Purchaser has, at his request, taken over the Vessel, the liability of the Builders shall cease, except that the Builders shall remedy at their own yard, free of charge and as speedily as possible any defect detailed in writing by the Purchaser to the Builders which may have developed in the propelling or auxiliary machinery during the six months from the date the Vessel was delivered to or taken over by the Purchaser, provided such defect is due to inferior workmanship or latent defects in material and is not due to overloading, incorrect fuel or lubrication, wear and tear, neglect, careless handling, external causes, accident or the like, or is due to putting the Vessel into service before it was entirely ready for delivery.

If the defect cannot be conveniently remedied at the Builders' yard, and if no other agreement can be arrived at between the parties, the Builders shall only be bound to pay in full and final settlement of their liability under this Clause to the Purchaser, such a sum as it would have cost the Builders had they done the work at their yard.

During the guarantee period ~~xxxxxxxxx~~ the Builders shall have the right to appoint a marine engineer, or mechanic fully conversant with the construction and running of the machinery as guarantee engineer, and the person so appointed shall receive from the Purchaser the customary salary and other remuneration due to a chief engineer on board a ~~Swedish~~ Finnish vessel of the same size, together, if so required, with a free passage and maintenance home as well as salary for the journey home. The Builders may accept the Purchaser's engineer as guarantee engineer.

The Builders' responsibility for the propelling and auxiliary machinery during the guarantee period shall cease if the guarantee engineer is dismissed without the Builders' approval. The Builders shall not be liable for any faults or omissions on the part of the guarantee engineer or on the part of any other member of the engineroom staff during the guarantee period.

(b). The Builders shall not in any circumstance be liable for loss of earnings or profits or for any other loss, or damage, whether direct or indirect, or for accidents or the consequences thereof which may arise after the delivery of the Vessel nor shall their liability extend further or otherwise than in the first paragraph of this Clause provided.

(c) The Builders shall upon request supply the Purchaser with copies of the relevant guarantee clauses regarding important goods installed in the Vessel.

force majeur

The same sha apply to lat delivery cau by late deli of substanti parts or ser vices by sub contractors providing th reason for l delivery wou constitute force majeure for the Buil

such as

gladly

und hull

welve

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er period

s may be

granted by

the sub-

contractor

twelve

§ 10.

The Purchaser undertakes to pay to the Builders as follows: *Payment*

	In Cash	By bills of exchange
On signing of this Contract	10 %	-
On ~~receipt of the bulk of rolled steel material~~ the 15th October 1979 .	-	15 %
On ~~laying of the keel or when construction~~ the 15th December 1979	-	15 %
on ~~the berth commences~~ The 2nd January 1980	10 %	-
On launching ..... (March 1980)	10 %	10 %
On delivery ..... (June 1980)	30 %	40 %
On delivery to be covered by way of the loan	30 %	
Total	60 %	40 %

The Builders shall inform the Purchaser at least fourteen days in advance of the date on which each of the foregoing instalments is due for payment.

~~The Purchaser undertakes to hand over to the Builders at the signing of the contract the following securities in addition to the first instalment:~~

The total fixed price for the Vessel amounts to eightytwomillionsevenhundred-andfiftythousand (DEM 82.750.000,-) German marks. The Bills of exchange and and additional instalment of 30 %, equalling total of 70 % of the contract price will be covered by a loan.

~~The Purchaser shall pay to the Builders in advance, interest on the amount of outstanding bills~~ together with any charges at the rate charged from time to time by the Swedish private commercial banks for bills of the kind delivered (the rate at present being ..... %).

The cost of additional work done as well as allowances made, in accordance with Clauses 2, 3 and 5 hereof, shall be settled in cash on the delivery of the Vessel.

If for any reason the Purchaser cannot take delivery of the Vessel on the date the Builders have notified that the Vessel will be ready for delivery, the Purchaser shall nevertheless be ~~liable to make full and final payment on that date.~~

~~The bills shall mature at six monthly intervals and shall be redeemed by half-yearly instal-~~ ments of

.....

beginning six months after the date of delivery. The Purchaser shall, however, have the right to redeem the amount of the bills wholly or in part at any time prior to their maturity dates.

As security for the bills the Purchaser shall on the delivery of the Vessel hand over to the Builders a first priority mortgage in a form to be approved by the Builders registered on the Vessel for the full amount of the bills and interest thereon.

If the Builders so desire, the Purchaser shall apply to a credit institution approved by the Builders for the largest sum obtainable by way of loan on the security of a mortgage on the Vessel and in her charterparty (if any). The amount of such loan shall be paid to the Builders as soon as received and the Builders shall then hand to the Purchaser bills of the same amount as the loan as well as the mortgage required for the loan. If and when such loan is redeemed the mortgage thereby released shall be transferred to the Builders in exchange for any mortgage of lesser priority which the Purchaser may have created on the Vessel in favour of the Builders.

As long as any part of the bills remains unpaid the Purchaser shall keep the Vessel after delivery fully insured with such underwriters, insurance companies or institutions and on such terms as approved by the Builders for all marine and other risks and protection and indemnity risks and war risks, with (if possible) mortgagee's protection insurance in addition. The policies shall provide (unless otherwise agreed) that all losses and claims shall be paid direct to the Builders who shall be entitled, out of the proceeds of the insurances, to retain an amount sufficient to meet what is owing by the Purchaser to the Builders.

If, at the time of delivery, there exists an abnormal international situation affecting currency and/or insurance conditions which may, in the Builders' opinion, prejudice the ready transfer of money to the Builders, the Purchaser shall at the request of the Builders redeem on delivery of the Vessel all outstanding bills or make available a guarantee acceptable to the Builders.

In addition to the foregoing the "General Loan conditions" annexed to this Contract shall apply.

§ 11.

Delay in payment

If payments in accordance with Clause 10 hereof are not made on due dates, the Builders shall be entitled to interest on the amount due, until payment made, at the highest rate charged by the ~~Swedish~~ German private commercial banks for short term loans on securities other than bonds or real estate mortgages, with a minimum of 6%.

If, during the period of building, any payment is more than thirty days in arrear, the Builders shall have the right to cancel this Contract and to claim damages according to law. If any delay in payment occurs after the delivery of the Vessel, the Builders shall be entitled to call for the immediate payment of all sums due from the Purchaser for the Vessel, with interest thereon.

§ 12.

Crisis Clause

If, by reason of circumstances of an exceptional nature, such as, for example, war, or the risk of war, or occurences or incidents which have a like effect or consequence as war or the risk of war, the rate of wages, and/or costs and/or prices for materials increase to such an extent that it would be unreasonable for the Builders to bear the increase occasioned as aforesaid, then the Builders shall be entitled to request an additional payment from the Purchaser of an amount which the parties hereto may agree on a basis reasonable to them both. If the parties are unable to reach an agreement, the amount of the payment shall be decided by arbitration in the manner laid down in Clause 14 hereof.

Such payment shall be made in cash on the delivery of the Vessel.

§ 13

Until delivery has been effected, the Builders shall keep the Vessel and all parts intended for use in her construction insured against the usual builder's risks, including war risk and sabotage as from the launching until the delivery of the vessel, for an amount not less than the instalments paid on account by the Purchaser. If considered necessary by the Purchaser the Vessel shall also be insured for an amount equaling the difference between the contract price and the present repurchase price and the additional cost of such insurance shall be borne by the Purchaser. Insurance

Should the Vessel be a total loss the parties may agree to cancel this contract and the Builders shall thereupon refund to the Purchaser the instalments paid on account of the contract price, plus interest and, in the event an additional insurance has been taken for the repurchase price, the difference between the contract price and the repurchase price.

§ 14

This contract shall be construed and the relations between the parties determined in accordance with German law. Disputes shall be settled by arbitration at the venue of the place of building according to the German law relating to arbitrations. Disputes

If the Builders so require the Purchaser shall lodge such security as is approved by the arbitrator(s) for costs and damages likely to arise from the arbitration proceedings. If the Purchaser does not meet this requirement, he shall be debarred from any further step in the proceeding.

§ 15

This contract cannot be assigned without the written consent of the Builders, which the Builders shall not unreasonably withhold. Assignment of contract

§ 16

The scope of supply for S. 592 is included in the specification for the Vessel. Scope of supply

§ 17

Defects in major forgings or castings can only be considered to constitute force majeure for the Builders provided the Builders have ordered the respective goods with utmost dispatch, have had the respective goods tested by X-ray or other available, effective method either at the sub-contractors works or at the yard at the earliest possible date, and have taken every reasonable step to avoid delay and provided such defects and the resulting delay in the construction affects the delivery date of the Vessel. Defects in forgings and castings

§ 18

This contract is subject the approval of Finlands Bank. Subject

This contract with attached specifications and drawings has been drawn up and signed by or on behalf of the parties hereto in duplicate, one copy being retained by each party.

Mariehamn, 11th September, 1979.

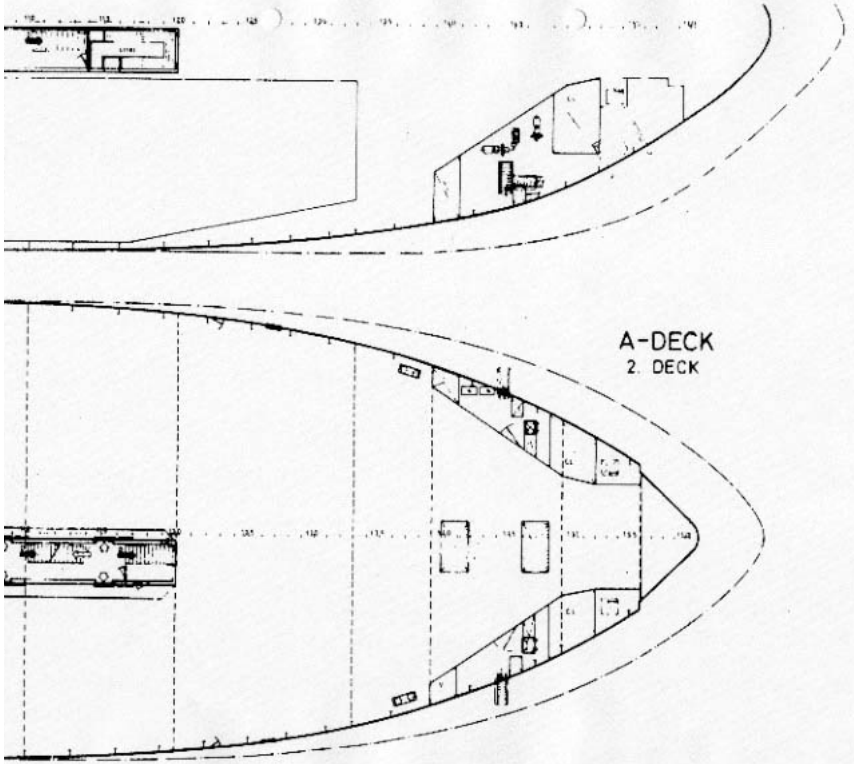
REDERIAKTIEBOLAGET SALLY

Sven-Erik Johansson

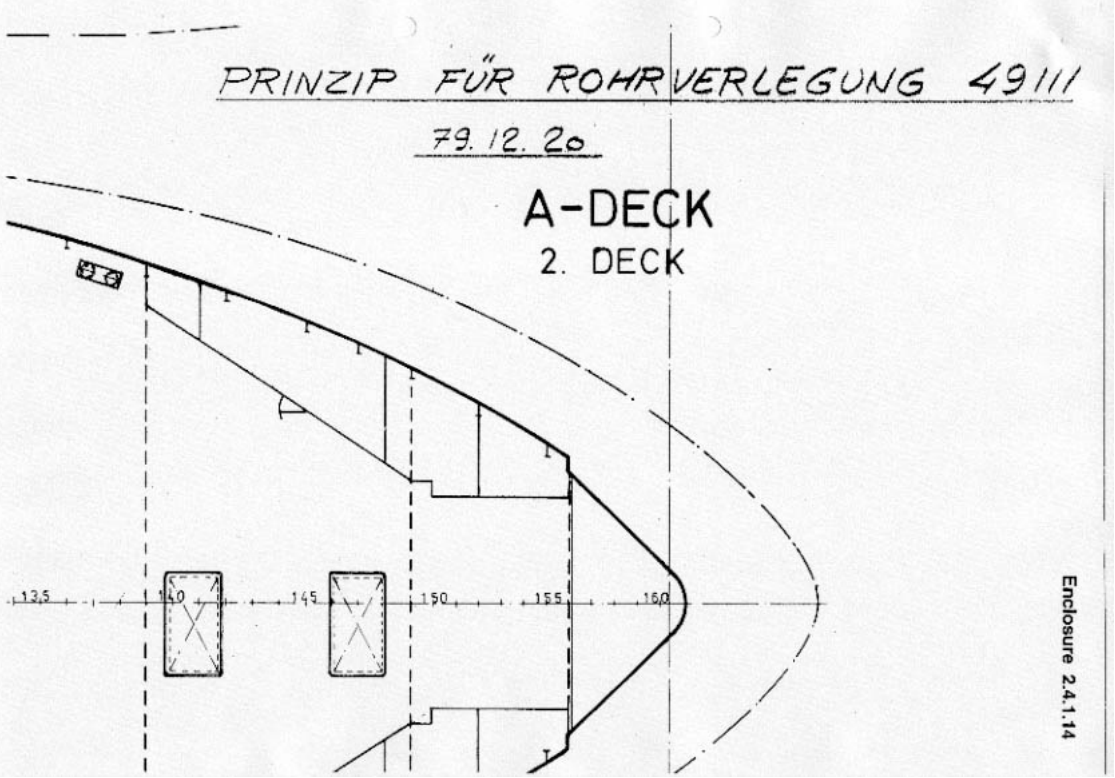
JOS. L. MEYER

Joseph F. Meyer

Witnesses:



Enclosure 2.4.1.15



Enclosure 2.4.1.14

CLEANCUT TELEX SCHNEEWEISS TELEX SNOW WHITE TELEX SNEEUWWIT TELEX

6315 elgot sf
2711By meypb tbs/mo/zi tlx no. 1378 30/8/79

att. mr. alf johansson

8M

nwubau einer faehre
projekt nr. 5675/78-79

sehr geehrter herr johansson,

bezugnehmend auf das gestrige telefongespraech moechte ich innen hiermit aufgaben, welche mit innen besprochenen punkte in meinem angebot mit fs vom 28.8.79 nicht brw. modifiziert beruecksichtigt worden sind:

1. klasse: bureau veritas anstelle von det norske veritas
2. maschinenanlage wird gebaut nach den vorschriften und mit abnahme von b.v. die automation wird ausgelegt nach den vorschriften von b.v. fuer das klassenzeichen: (aut), jedoch ohne abnahme.
3. schleppversuche sind nicht vorgesehen, da mit dem bau des schiffes nach auftragserteilung sofort begonnen werden muss, zur information koennen sie zu einem spaeteren zeitpunkt, falls gewuenscht, durchgefuehrt werden.
4. die genannten os-vorschriften sind bei diesem schiff nur teilweise zu erfuellen. die mgeln, die nicht eingehalten werden koennen, werden ihnen aufgegeben.
5. die stahl-qualitaeten fuer den schiffskoerper werden entsprechend den vorschriften von b.v. gewaehlt.
6. bug- und heckrampenanordnung entsprechend ''dizna ii''.

   betriebsdruck der hydrauliksanlage bis 250 bar.

ich hoffe, innen hiermit gedient zu haben.

m f g

jos.l. meyer, papenburg
gez. motikat

2711By meypb ttttttttcccccccc
6315 elgot sf

06/07 '85 12:16 ☎+49 4961 21300 SE XEROX FAXFT 2004

Jos. L. Meyer, Papenburg-Ems
Schiffswerft, Maschinenfabrik, Dockbetrieb

Umbau "VIKING 4"

Die Werft erhielt für englische Rechnung den Auftrag, die "VIKING 4" umzubauen. Dieses Schiff wurde 1973 unter der Baunummer S. 570 von der Werft an die Reederei SALLY abgeliefert und wurde erfolgreich von der VIKING-LINE im Verkehr zwischen Schweden und Finnland eingesetzt, bis sie jetzt durch die neue Fährengeneration, zu der auch Neubau S. 590 "VIKING SALLY" gehört, ersetzt wird. Nach der Sommersaison 1980 kommt das Schiff nach Papenburg, und die Werft wird folgende umfangreiche Arbeiten durchführen:

- Einbau einer neuen Hauptmotorenanlage
- Einbau einer Flossenstabilisierungsanlage
- Umstellung des Schiffes auf englische Flagge (Erfüllung der DOT-Vorschriften)
- Änderungen in der Einrichtung für den neuen Liniendienst
- Wartungsarbeiten.

Nach Rücklieferung des umgebauten Schiffes Anfang 1981 wird das Schiff von der Reederei SEALINK U.K. LIMITED gechartert und in Verkehr zu den Kanalinseln eingesetzt werden.

Papenburg, 25. Juni 1980

06/07 '85 13:40 ☎-49 4961 81300 SK MEYER WERFT 098

Enclosure 2.4.1.18

24. 6. 80

Aus Ordner
Mängel + Fehlerliste

BV 1) Fundamentpunkte Kosten

4-18 a) Pos. 452 fehlt in allen Pos. 246.
Stück und Handgriff / Steinzeug.
in Kostl. ca. 500 Stck und Preis-
angabe 150.- Rest = 10 / Handgriff.

b) Kaminteile Abgas Kaminstück 800 mm
statt 500 mm. ca. 500 Stck 100.- ?

c) Codrick - Abdeckung Fallleitungen in
Kam. Kehlen 30 mm statt 20 mm
100.- Stck

4-19 d) Keller Sanitärraum / Spiel
vorsorglich 1200,- [illegible] (453) [illegible]

4-19a e) Barcelona Tische rechteckig Standard
16 + 200,- [illegible] gt Tisch 350.- und
Stamp. 2.90.- (Kupferspiegelstahl)

4-19a f) Stühlen zu Barcelona Stahlrohrgestell
fehlt noch 2 St. 200.- Stck. (453)

4-19 g) Lampenschirm (453) nicht so compact
wie Muster 2 St. ca. 15.-

5-4 h) Öffentliche WC's / Tempelsprüchen
für Kinder fehlt. (5-4) (EVBK-Anlage Bestand)

5-4 i) Handtuchspender in öffentl. WC's
fehlen. (cl. Händetrockner

k) Duschen ?

3-21 l) Eigenmarke Verne wurde durch Alu
ca. 4.000 30.000.- ? (233)

2-8 m) Brüstbe wurde in Alu 5.000.
ca. 10.000 (2-8)

8. a) 3-3 Kollisionsschott fehlt.
ca. 2 Std. ... 25.000.-

-9 b) Std. Tür ... Stromlinienform
und fehlt 2 Std. 21.000.-

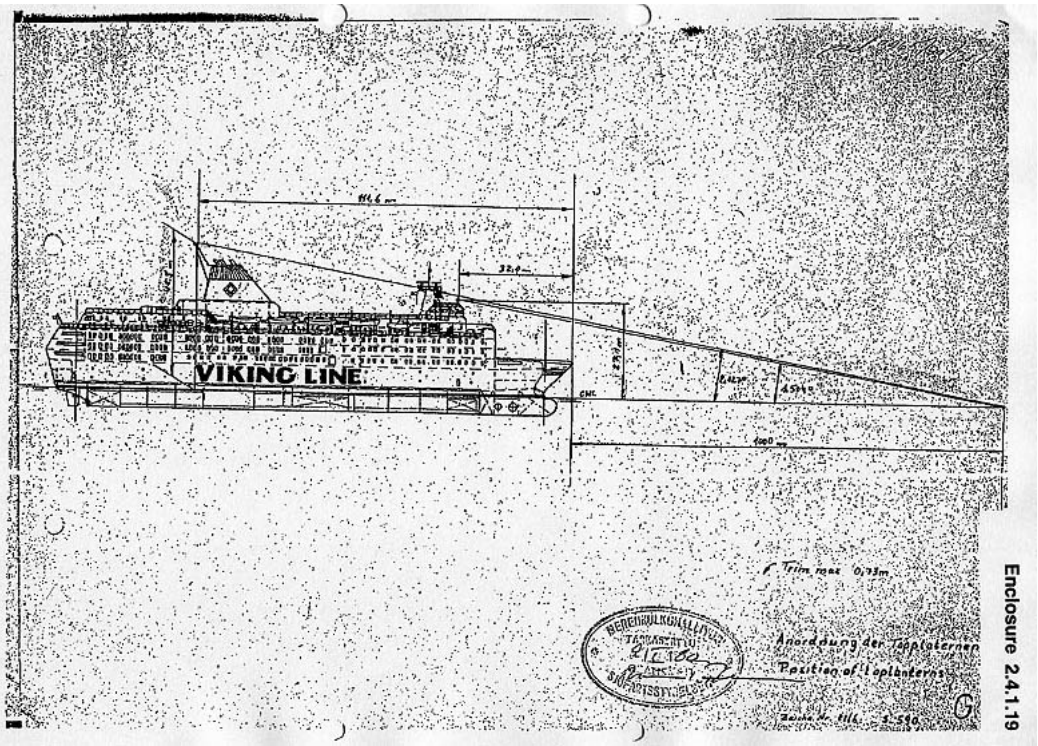
-10 c) 3-10 Fenster in Lemmen aus anderem Material 1 Std. f. Sch.

-11 d) 444 Fußboden nicht entsp. B.V., dieser über Raum der Tollenlinien-Tür

e) Entfall ... Fenster im Mittel Deck (Blechwand) ca. 12. Std.

13. b) Kein Deckboden für Bekleidung ?

c) Lichtleitungen:
Pos. 1 Filter von Lend. zu Lichtf. vom 4.9.79 fehlend ... Anlagen prüfen.
Pos. 2. Für ... gilt ... die Pos. 1; ... und sprechend ändern.
Pos. 3 o.k.
Pos. 4 o.k. Überprüfen
Pos. 5 o.k. —
Pos. 6 —
Pos. 7 —
Pos. 8 —
Pos. 9 —
Pos. 10 — Handgewicht? 9,2 to.



Enclosure 2.4.1.19

Enclosure 2.4.2.20

JOS. L. MEYER PAPENBURG-EMS

SCHIFFSWERFT MASCHINENFABRIK DOCKBETRIEB

Telefon Sammelnummer (04961) 811
Telex 027/18 meyho
Telegramme: Meyerwerft Papenburg
Postscheck: Hannover (BLZ 250) 00501 Kto. 12710-303
Banken: Oldenburgische Landesbank AG, Filiale Papenburg (BLZ 280 215 18) Konto-Nr. 18-33901
Deutsche Bank AG, Zweigstelle Papenburg (BLZ 280 700 90) Konto-Nr. 0270116
Commerzbank AG, Zweigstelle Papenburg (BLZ 285 410 78) Konto-Nr. 4560000
Landeszentralbank Niedersachsen, Filiale Leer (BLZ 285 000 00) Konto-Nr. 285 00 002
Geschäftszeit 7.30 Uhr bis 16.30 Uhr

von Tell GmbH
Sophienallee 24

2000 Hamburg 19

2000 PAPENBURG 1
HAUPTKANAL RECHTS 2
POSTFACH 1120

IHR ZEICHEN YOUR REF.	IHR SCHREIBEN VOM YOUR LETTER OF	MEIN ZEICHEN MY REF.	☎ DURCHWAHL DIRECT EXTENSION (04961)	
		EK-Mö-Cl	/211	27. Sept. 1979

Auftrag Nr. 3344/79 - S. 590 -

In allen Briefen, Rechnungen, Versandpapieren, Frachtbriefen unbedingt anzugeben! Versandanzeigen und Rechnungen zwei fach erbeten!

Hiermit erteile ich Ihnen nachstehenden Auftrag zu meinen umseitigen Einkaufsbedingungen. Auftragsbestätigung sofort erbeten.

Frachtbriefvermerk:

Lieferterm.: siehe Seite 12 und 13

	Menge %		Preis
Pos. 1	1	Hydraulische Betätigung für eine Bugklappe Die Bugklappe wird von Ihnen, wie von mir angegeben, mit einem Gewicht von 56 t angenommen. Sie wird von zwei direkt angelenkten Hydraulikzylindern bewegt. Die Zylinder erhalten Gelenklager, um evtl. Fluchtfehler auszugleichen. Die direkt hinter den Zylindern vorgesehenen Drosselrückschlagventile regeln die Senkgeschwindigkeit. 2 Ausbruch-Zylinder unterstützen am Anfang den Öffnungsvorgang und dämpfen den Schließvorgang. Die Verriegelung der geschlossenen Bugklappe erfolgt hydraulisch. Sie wird so ausgebildet, daß sie auch bei abgeschalteter Hydraulik die Verriegelung	

Jos. L. Meyer, Papenburg (Ems)
Blatt 2 zum Auftrag Nr. 3344/79 - S. 590 - vom 27. Sept. 1979
an von Tell GmbH

Menge		Preis
	sichergestellt. An der Verriegelung werden Kontaktschalter vorgesehen, die bei geschlossener Verriegelung in der Manöverplatte und auf der Brücke befindlichen Lampen einschalten. Es wird eine zusätzliche Verriegelung für die Atlantiksicherung vorgesehen. Das Bugvisier wird mit einer hydraulisch betätigten Feststellvorrichtung, welche nach Beendigung des Öffnungsvorganges bewegt wird, versehen. Die Bugrampe wird gegen die Bugklappe hydraulisch verblockt. Ihr Lieferumfang für diese Anlage umfaßt: 2 Höchstdruck-Hydraulikzylinder, Drosselrückschlagventile, Achsen mit Schmiernuten und Schmiernippeln sowie die erforderlichen Höchstdruck-Hydraulikschläuche. Die erforderlichen Höchstdruck-Hydraulikzylinder für die Verriegelung, die Verriegelung selbst, einschl. Achsen mit Schmiernuten und Nippeln, Hochdruckschläuche und Kontaktschalter für die optische Anzeige. 1 Höchstdruck-Hydraulikzylinder für die Atlantikverriegelung mit Vorsteckbolzen, Achsen mit Schmiernuten und Schmiernippeln sowie Höchstdruck-Hydraulikschläuche. 2 Hydraulikzylinder mit Vorsteckbolzen für die Sicherung der Bugklappe in geöffneter Stellung, einschl. der Achsen mit Schmiernuten und Nippeln und den Höchstdruck-Hydraulikschläuchen. Die Zylinder werden hydraulisch so geschaltet, daß die Bugklappe zwangsweise verriegelt wird, wenn sie ganz geöffnet ist. Dagegen muß die Entriegelung beim Schließen der Bugklappe getrennt erfolgen.	

Jos. L. Meyer, Papenburg (Ems)

Blatt 3 zum Auftrag Nr. 3344/79 - S. 590 - vom 27. Sept. 1979

an von Tell GmbH

Menge		Preis
1	Manöverplatte mit den hintergebauten hydraulischen Steuerungseinheiten für die vorstehend beschriebenen Bewegungsvorgänge, einschl. Lampenanzeige für geschlossene Verriegelung, Atlantikverriegelung und Verriegelung in geöffneter Stellung, ferner Pumpenstart und -Stopp mit optischer Anzeige. Die hydraulischen Steuerungseinheiten werden verrohrt und die elektrischen Teile, soweit erforderlich, verkabelt.	
2	Beschläge für die manuelle Sicherung der Bugklappe	
	Sie liefern ferner das hydraulische und, soweit erforderlich, auch das elektrische Schaltschema für die vorstehend beschriebenen Bewegungen der Bugklappe, einschl. der Zeichnungsunterlagen mit der Anordnung der Hydraulikzylinder und Verriegelung mit Angaben der Kräfte, die in die Schiffskonstruktion eingeleitet werden müssen. An nicht oder schwer zugänglichen Schmierstellen werden automatische Schmiernippel angebracht.	
Pos. 2 1	hydraulisch betätigte Bugrampe	
	Die Bugrampe mit einer Länge von 7,625 m für eine Breite zwischen den Häusern von 5,5 m kann von LKW's mit einer Achslast von 18,0 t bei 1,3 m Achsabstand und einem Radstand von 2,0 m befahren werden.	
	Die wasserdichte Rampe hat an der Vorkante bewegliche Verlängerung von 1,5 m Länge, die automatisch über Seilbetätigung ausgeklappt werden können. Die Außenlager werden im mittleren Teil als Gelenklager ausgebildet. Die Rampe wird durch 2 direkt angelenkte Zylinder, die Gelenklager haben, betätigt. Die Zylinder erhalten eine Bypaßstellung, so daß die Rampe den Schiffsbewegungen folgen kann. Die Verriegelung der geschlossenen Rampe erfolgt ebenfalls hydraulisch. Sie wird so ausgebildet, daß sie auch bei	

Jos. L. Meyer, Papenburg (Ems)

Blatt 4 zum Auftrag Nr. 3344/79 - S. 590 - vom 27. Sept. 1979

an von Tell GmbH

Menge		Preis
	abgeschalteter Hydraulik die Verriegelung sichergestellt. An der Verriegelung werden Kontaktschalter vorgesehen, die bei geschlossener Verriegelung in der Manöverplatte und auf der Brücke befindliche Lampen einschalten. Die Bugklappe wird gegen die Bugrampe hydraulisch verblockt. Die Zaupizylinder erhalten je 1 Rohrbruchsicherung und Absenkventile.	
	Ihre Lieferung umfaßt:	
1	Bugrampe, kompl. mit Vorläufern in den vorgenannten Abmessungen und Belastungen. Die gesamte Fahrbahnbreite wird als Rutschsicherung mit Quadratstahl in Fischgrätenform belegt. Es werden feststehende Geländer vorgesehen, Achsen mit Schmiernuten und Nippeln für die Befestigung am Schiffskörper. Die Stahlkonstruktion wird gestrahlt nach Sa 2,5 und mit Shopprimer ca. 30 my konserviert. An nicht oder schwer zugänglichen Schmierstellen werden automatische Schmiernippel angebracht.	
2	Hydraulikzylinder, Drosselrückschlagventile, Achsen mit Schmiernuten und Schmiernippeln sowie Höchstdruck-Hydraulikschläuche.	
	Die erforderlichen Hydraulikzylinder für die wasserdichte Verriegelung, die Verriegelung mit Achsen mit Schmiernuten und Schmiernippeln, Höchstdruckschläuche, Steuerschieber und Kontaktschalter für optische Anzeige, ferner die erforderlichen Gummidichtungen.	
1	Manöverplatte für die hydraulische Betätigung und Verriegelung sowie wie unter Pos. 1 beschrieben.	
	Erforderliche Zeichnungen wie unter Pos. 1 beschrieben.	

Jos. L. Meyer, Papenburg (Ems)

Blatt 5 zum Auftrag Nr. 5344/79 - S. 390 - vom 27. Sept. 1979

an: Von Tell GmbH

	Menge		Preis
Pos. 3	2	**hydraulisch betätigte Heckrampen** Die Heckrampen, Längen 6,5 m und Spurbreiten 5,5 m (zwischen den Schrammbordern) bilden den wasserdichten Abschluß des Wagendecks am Heck. Die Belastbarkeit wird wie bei der Bugrampe vorgesehen. Die Vorläufer von 1,5 m Länge erhalten einen Anschlag, so daß sie sich beim Auflegen der Rampen auf den Kai von selbst richtig auflegen. Die Außenlager werden im mittleren Teil als Gelenklager ausgebildet. Die Verriegelung und Betätigung erfolgt wie unter Pos. 2 für die Bugrampe beschrieben. Die Bugrampe wird gegen die Bugklappe hydraulisch verblockt. Eine der Heckrampen erhält einen Beschlag für eine Kette oder Seil, um die Rampe im Notfall auch öffnen und befahren zu können, ohne daß sie am Kai aufliegt. Die andere Heckrampe erhält Beschlag für Preventer. **Ihre Lieferung umfaßt:** 2 Heckrampen, komplett mit Vorläufern in den vorgenannten Abmessungen. Die Ausführung der Rampen, mitgelieferte lose Teile und Konservierung wie für die Bugrampe beschrieben. Alle nicht oder schwer zugänglichen Schmierstellen werden automatische Schmiernippel angebracht. Je Rampe 2 direkt angelenkte Hydraulikzylinder, Drosselrückschlagventile, Achsen mit Schmierrohren und Schmiernippeln sowie Höchstdruck-Hydraulikschlauche. Für jede Rampe die erforderlichen Hydraulikzylinder für die wasserdichte Verriegelung, die Verriegelung selbst mit Achsen mit Schmierrohren und Schmiernippeln, Höchstdruck-Hydraulikschläuche, Steuerventilen sowie Kontaktschalter für die optische Anzeige.	

Jos. L. Meyer, Papenburg (Ems)

Blatt 6 zum Auftrag Nr. 3344/79 - E. 590 - vom 27. Sept. 1979

an von Tell GmbH

Menge			Preis
		Je Rampe 2 Hiebruch-Zylinder Für jede Rampe die erforderlichen Gummidichtungen	
	2	Manöverplatten für die hydraulische Betätigung der Rampen und die hydraulischen Verriegelung, sonst wie unter Pos. 1 beschrieben. Die erforderlichen Zeichnungen wie unter Pos.1 beschrieben.	
Pos. 4	4	hydraulisch betätigte Passagier-Seitenpforten auf dem C- und D-Deck Die Seitenpforten, lichte Breite 2,5 m und lichte Höhe 2,0 m, sind einflügelig je auf einem Schwenkarm gelagert und öffnen parallel geführt nach außen. Die Pforten werden komplett mit den erforderlichen Gegenrahmen angeliefert, so daß die fertigen Pforten so in die Außenhaut eingesetzt und verschweißt werden können. Die Gummidichtungen werden lose mitgeliefert. Ihre Lieferung je Pforte umfaßt, d.h. wenn Stückzahlen genannt sind, = 4x.	
	1	Türblatt mit Versteifungen und Lager, Entrostung und Konservierung wie unter Pos. 2 beschrieben.	
	1	Schwenkarm mit Lager	
	1	Parallellenker mit Lager und Höchstdruck-Hydraulikzylinder Die erforderlichen Verriegelungszylinder für die wasserdichte Verriegelung, die Achsen mit Schmiernuten und Schmiernippeln, Höchstdruck-Hydraulikschläuche, Steuerschieber und Kontaktschalter für die optische Anzeige.	
	1	Manöverplatte für die Betätigung und Verriegelung, sonst wie unter Pos. 1 beschrieben.	

Jos. L. Meyer, Papenburg (Ems)

Blatt 7 zum Auftrag Nr. 3344/79 - E. 590 - vom 27. Sept. 1979

an von Tell GmbH

Menge			Preis
		Die erforderlichen Zeichnungen wie unter Pos. 1 beschrieben.	
Pos. 5	2	hydraulisch betätigte Lotsen-Pforten auf dem A-Deck Die Seitenpforten, lichte Breite 1,2 m und lichte Höhe 2,0 m, sind einflügelig und werden nach innen um 90° hydraulisch geschwenkt. Die sonstige Ausführung wie unter Pos. 4 aufgeführt. Lieferumfang je Pforte: Unter Berücksichtigung der anderen Betätigungsart wie unter Pos.4 aufgeführt.	
Pos. 6	1	hydraulisch betätigte wasserdichte Luke für Maschinenraum auf dem A-Deck Der Klappdeckel verschließt eine lichte Öffnung von 2,4 m breit und 1,2 m lang und wird über die lange Seite hydraulisch betätigt und verriegelt. Der Lukendeckel wird für die gleiche Belastungen wie bei der Bugrampe angegeben ausgelegt. Ihre Lieferung umfaßt:	
	1	Lukendeckel mit Versteifungen und Lagern, einschl. Gummidichtung, konserviert wie unter Pos. 1 aufgeführt. Den erforderlichen Hydraulikzylinder für das Öffnen und Schließen der Luke, die erforderlichen Hydraulikzylinder für die wasserdichte Verriegelung der Luke, einschl. der Verriegelung selbst, Achsen mit Schmiernuten und Schmiernippeln, Höchstdruck-Hydraulikschläuche, Steuerschieber und Kontaktschalter für die optische Anzeige.	
	1	Manöverplatte für die Betätigung der Luke und Verriegelung, sonst wie unter Pos. 1 aufgeführt.	

Jos. L. Meyer, Papenburg (Ems)
Blatt 8 zum Auftrag Nr. 3344/79 – A. 590 – vom 27. Sept. 1979
an von Tell GmbH

Menge			Preis
Pos. 7		Hydraulisch mechanisch betätigte Hängedecks mit Auffahrrampen	
	6	An BB-Seite des Schiffes sind 3 Hängedecksektionen und 2 Auffahrrampen von je ca. 20 m Länge und 1 Sektion von 18,4 m Länge und ca. 3,5 m Breite, an SB-Seite ebenfalls 3 Hängedecksektionen und 2 Auffahrrampen von je ca. 20 m Länge und 1 von 18,4 m Länge und ca. 8,5 m Breite vorgesehen. Auf den Hängedecks und Rampen können Pkw's mit einem Raddruck von 400 kg dicht an dicht gestellt werden. Die vollbeladenen Rampen können aus der Rampenstellung in die Horizontale gehoben werden. In Staustellung liegen die Hängedecks und Auffahrrampen hydraulisch hochgezogen und verriegelt unter dem C-Deck. Jede Hängedecksektion wird durch einen hydraulischen Flaschenzug, der in die Hängedecksektionen eingebaut ist, sowie mit Stahlseilen und Umlenkrollen betätigt. Die Flaschenzüge sind für den Hochziehen der leeren Hängedecksektionen ausgelegt. Abgesehen liegen die Hängedecksektionen auf festen Konsolen. Jede Sektion erhält einen eigenen Steuerstand. Die Rampen werden ebenfalls mit hydraulischen Flaschenzügen bewegt, die jedoch an der Außenhaut angeordnet und über Umlenkungen mit Stahlseilen mit den Rampen verbunden werden. Die Rampen können mit Pkw's vollgestellt aus der Rampenstellung in die Horizontale gehoben werden. Die Funktionen, Heben der vollen Rampen in die Horizontale, Absenken in Rampenlage und Heben der leeren Rampe in Staustellung unter dem C-Deck, werden je Rampe von einer Maschinenanlage durchgeführt. Die Sicherung der Rampen in Staustellung unter dem C-Deck erfolgt hydraulisch, in horizontaler Arbeitsstellung mechanisch durch Klappstützen.	

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Jos. L. Meyer, Papenburg (Ems)
Blatt 9 zum Auftrag Nr. 3344/79 – A. 590 – vom 27. Sept. 1979
an von Tell GmbH

Menge			Preis
		Die Rohrleitungen für die Hängedeck-Sprühanlage werden nach meinen Angaben von Ihnen mit in Decks und Rampen vorgesehen. Ihre Lieferung umfaßt:	
	6	Hängedecksektionen mit Umlenkrollen, Fundamenten für die Hydraulikflaschen, Stahlaufbrustung und Konservierung wie Pos. 2.	
	4	Hängedeck-Auffahrrampen, Deckblech gemäß meinem Wunsch aus Tränenblech. Die erforderlichen Stahldrahtseilumlenkrollen, die nicht in den Decks oder Rampen eingebaut werden, mit Stahlachsen, jedoch ohne die Käfige, Steuerschieber, Höchstdruck-Hydraulikschläuche sowie Kontaktschalter für optische Anzeige. Die erforderlichen Klappstützen mit Gelenkar. Die erforderlichen Hydraulikflaschen zum Fahren der Decks und Rampen, einschl. der erforderlichen Hydraulikzylinder, soweit erforderlich, mit Haken und weiteren Zubehör für die hydraulische Verriegelung der Decks und Rampen in Staustellung unter dem C-Deck.	
	12	Handverpinnen für Decks und Rampen, genau wie Pos. 1. Die erforderlichen Zeichnungen etc. wie Pos. 1 sowie zusätzlich die Zeichnungen für die Umlenkrollen-Käfige, die nicht in den Decks oder Rampen eingebaut werden.	
Pos. 8		Hydraulische Betätigung von 2 Passagier-Übergängen	
		Zwischen dem Mittschiffsaufbau auf dem Hangendeck und dem Hängedeck auf BB-Seite muß der Zwischenraum durch Passagier-Übergänge überbrückt werden. Die Übergänge selbst werden werftseitig gefertigt. Die Lieferung umfaßt die Hydraulik und Steuerung.	

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Jos. L. Meyer, Papenburg (Ems)
Blatt 10 zum Auftrag Nr. 3344/79 - B. 590 - vom 21. Sept. 1979
an von Zell GmbH

Menge		Text	Preis
		Ihre Lieferung umfaßt:	
		Die erforderlichen Hydraulikzylinder mit Stahlbelägen, mit Schmierrauten und Schmierzippels, Kochdruckschläuchen und Steuerschieber.	
	2	Manöverplatten für die Betätigung der Übergänge und die hydraulische Verriegelung, sonst wie Pos. 1.	
		Die erforderlichen Zeichnungen wie Pos. 1.	
Pos. 9	4	Elektro-Hydraulik-Zentrale:	
		und zwar:	
	2	mit jeweils 3 Pumpen als Kompaktseinheiten zusammengebaut, die Bug- und Heckhydraulik und Hängedecks mit Auffahrrampen versorgen.	
	1	mit 2 Pumpen als Kompaktseinheit zusammengebaut für die 2 Passagier-Pforten und die 2 Passagier-Übergänge.	
	1	mit 2 Pumpen als Kompaktseinheit zusammengebaut für die Maschinenraumluken und Lotsen-Pforten.	
		Hierbei vorgemerkt, daß von den großen Aggregaten je eines im Vorschiff und eines im Hinterschiff zur Aufstellung kommt. Es wird vorgesehen, daß die getrennten Rohrleitungssysteme dieser beiden Anlagen Ventile so verbunden werden können, daß mit dem einen Aggregat auf das Rohrleitungssystem des anderen Aggregates und umgekehrt gefahren werden kann.	
		Die Förderleistung von 2 Pumpen der 3er-Aggregate wird so dimensioniert, daß sich folgende reine Betriebszeiten ohne Entriegelung oder dergleichen ergeben:	
		Bugklappe ca. 60 sec. Bug- oder Heckrampe ca. 60 sec. Auffahrrampen ca. 30 sec. Hängedecks ca. 15 sec.	

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Blatt 11 zum Auftrag Nr. 3344/79 - B. 590 - vom 21. Sept. 1979
an von Zell GmbH

Menge		Text	Preis
		Die 3. Pumpe je Aggregat wird als Reservepumpe vorgesehen.	
		Die weiteren Doppelpumpenaggregate für die Pforten, Passagier-Übergänge und Luke erhalten je 2 Pumpen gleicher Förderleistung, von denen jede eine in der Lage ist, eine Pforte in ca. 15 sec. zu öffnen bzw. zu schließen auch wiederum als reine Entriegelungszeit, ohne die Verriegelung. Die 2. Pumpe wird auch hier als Reserve vorgesehen.	
		Ihre Lieferung je Kompaktseinheit umfaßt:	
		Öltank mit den erforderlichen Höchstdruck-Hydraulikpumpen (2 x 3 Stück, 2 x 2 Stück), einschl. der E-Motoren für 380 V, 50 Hz, Überdruckventile, Niveauschalter, Ölstandsanzeiger, Manometer, By-Pass-Ventile, Absperrschieber, Rückschlagventile und die Ventile für die Kreuz-Schaltung.	
		Ihre Lieferung endet elektrischerseits an den Klemmkästen der E-Motoren.	
		Sie liefern die erforderlichen Zeichnungen wie Hydraulikschaltschema, Rohrleitungsplan etc.	
Pos. 10	2	Reserveteile nach den Vorschriften der Klassifikationsgesellschaft bzw. Ihren Standard. Die genaue Spezifikation folgt.	
		Da meine Vorstellungen nicht realisierbar waren, fertigen Sie nach Ihren Zeichnungen	
		Pos. 2 1 Bugrampe Pos. 3 2 Heckrampen Pos. 7 5 Hängedecks und 4 Auffahrrampen	
		Auch der Anbau der von Ihnen beizustellenden Teile und Beschläge sowie der Einbau der Betätigungs- und Hydraulikteile erfolgt durch mich.	

Jos. L. Meyer, Papenburg (Ems)

Blatt 12 zum Auftrag Nr. 3344/79 – Nr. 390 – 27. Sept. 1979

an von Voll GmbH

Menge		Preis
	GESAMT-FESTPREIS DM 690.000,—	
	+ frei Werft MwSt-Steuer	
	Über die folgenden Mehr- und Minderleistungen muß noch eine Klärung mit der Reederei herbei geführt werden, und zwar:	
	Lieferung und Einbau von 13 Seezaren Mehrpreis: ~ DM 3.250,—	
	Falls die Luke für den Maschinenraum einschl. Aggregate (Pos. 6) entfällt. Minderpreis: DM 10.400,—	
	Falls die Seitentüren mit 8 Handpumpen ausgerüstet werden müssen. Mehrpreis: DM 4.000,—	
	Falls dafür 1 Motorpumpe entfällt, Minderpreis: DM 1.000,—	
	Falls die Bugklappe mit automatischer Verriegelung versehen wird (Dt.) Mehrpreis: DM 3.500,—	
	Lieferung von Zeichnungen und Plänen:	
	Freigabe der vorliegenden Zeichnungen für die Hängedecks zur Fertigung bis Ende der 39. KW. 1979.	
	Einreichen der neuen Zeichnungen für die neuen Hängedeckaktion bis Ende nächster Woche.	
	Lieferung der Zeichnungen für Auffahrrampe bis zur 42. KW. 1979.	
	Lieferung der Zeichnungen für Heckrampe bis zur 43. KW. 1979.	
	Lieferung der Zeichnungen für Bugrampe bis zur 42. KW. 1979.	
	Vorlage sämtlicher K-Pläne bis zum 31.12.1979. Die K-Werte legen Sie mir bis zur 44. KW. 1979 vor.	
	Einreichen der Hydraulik-Schemata bis zum 31.12.1979	

Jos. L. Meyer, Papenburg (Ems)

Blatt 13 zum Auftrag Nr. 3344/79 – Nr. 390 – 27. Sept. 1979

an von Voll GmbH

Menge		Preis
	Ihre Lieferungen:	
	4 Seitenpforten kompl. und Beschläge für Hängedecks, Heck- und Bugrampen und Bugklappe bis zum 31.12.1979 auf der Werft	
	Hydraulikmaterial für die Hängedecks und Gangway bis zum 31.01.1980 auf der Werft.	
	Hydraulikzylinder bis zum 28.02.1980 auf der Werft.	
	Pumpenaggregate bis zum 15.02.1980 auf der Werft.	
	KONVENTIONALSTRAFE	
	Bei Überschreiten der vorgenannten Lieferterminen zahlen Sie nach Ablauf einer Karenzzeit von 14 Tagen eine Konventionalstrafe in Höhe von 0,5 % je Woche, max. 5 % vom Auftragswert.	
	ZAHLUNGSBEDINGUNGEN	
	10 % – nach Erhalt der Auftragsbestätigung	
	30 % – nach Erhalt der 1. Materiallieferung 31.12.1979.	
	55 % – bei Lieferung des Rohmaterials 28.02.1979	
	5 % – bei Ablieferung des Schiffes an die Reederei (Ende Juni 1980).	
	In dem obigen Preis ist eine Monteurgestellung von 35 Tagen für den Stahlbau bei normaler Arbeitszeit und einmaliger An- und Rückreise enthalten.	
	Ferner eine kostenlose Monteurgestellung für einen Montageinspektor für die Einregulierung der Anlage.	
	ANMERKUNG + TEST	
	Die vorgenannten Anlagen sind nach Vorschrift und mit Abnahme und Test des Norwegischen Veritas Amt und der Französischen Behörde – Finanzielle Board of Navigation – zu liefern.	

Jos. L. Meyer, Papenburg (Ems)

Stem 14 zum Auftrag Nr. 3144/79 - S. 399 - 27. Sept. 1979

von Tell Gmbh

Menge		Preis
	SCHILDER in englischer Sprache **INSTRUKTIONSBÜCHER** 1 x schwedisch/englisch 1 x deutsch **GEWÄHRLEISTUNG** 1. Die Gewährleistungsfrist beträgt 15 Monate nach Schiffsablieferung, jedoch max. 18 Monate nach Versand der Liefergegenstände. 2. Im Gewährleistungsfall tragen Sie die Kosten für die Monteurgestellung und für von den Monteuren benötigtes Hilfspersonal. Außerdem tragen Sie die Kosten der zum Aus- und Einbau benötigten Materialien für die Liefergegenstände. Voraussetzung dazu ist, daß die Arbeiten unter Ihrer Aufsicht in einem Deutschen oder nordeuropäischen Hafen durchgeführt werden. 3. Weiter tragen Sie die Transportkosten für mangelhaft reparierte Teile zwischen Ihrem Werk und Aufstellungsort der Anlage. Sollte innerhalb der Garantiezeit die Ausführung der Arbeiten in einem anderen Hafen als in den vorgenannten erfolgen, tragen Sie die Kosten in der Höhe, wie sie normalerweise in einem der vorgenannten Häfen entstanden wären. 4. Für im Rahmen der Garantie geleistete Ersatz beginnt die Gewährleistungsfrist mit deren Einbau und endet nach 12 Monaten. Für die Abwicklung dieser Bestellung gelten meine Einkaufsbedingungen. Hochachtungsvoll	

Günther Todsen, geb. 31. Juli 1932
wohnhaft Möhnweg 4, 24109 Kiel
Telefon: 0431 / 527591

Ich habe Kfz-Mechaniker in Eckernförde gelernt und diese Lehre 1951 beendet. Anschließend bin ich Lkw gefahren und habe dann 1955 bei HDW-Kiel als Stahlbauschlosser angefangen. Im Jahre 1959 begann HDW im Auftrage der Firma von Tell/Göteborg Lukendeckel zu bauen. Bestandteil des entsprechenden Vertrages zwischen HDW und von Tell war die Gestellung eines Monteurs bei der Montage der Lukendeckel an Bord sowie bei eventuellen Reparaturen. Dies wurde meine Aufgabe. Ich habe also in den folgenden Jahren überwiegend den Einbau sowie die Reparaturen von Lukendeckeln auf Neubauten deutscher und ausländischer Werften überwacht. Mein erster Kontakt mit der Meyer Werft in Papenburg war der Auftrag durch Herrn Rottmann sen. der Firma von Tell, an einer Vorbesprechung über den Einbau von Bugvisier, Bug- und Heckrampe sowie Hängedeck und Außentüren in dem Neubau "DIANA II" teilzunehmen. Dies war im Februar 1979. Ich erinnere das deshalb so genau, weil wir durch den seinerzeitigen zweiten Teil der "Schneekatastrophe" Probleme hatten, mit dem Auto nach Hause zu kommen.

Zirka Anfang April 1979 nahm ich meine Arbeit in Papenburg auf. Kurz vor Himmelfahrt hatte ich einen Arbeitsunfall an Bord der "DIANA II", bei dem ich mir einen Trümmerbruch des großen Zehs des rechten Fußes zuzog. Dadurch fiel ich für mehrere Wochen aus und konnte daher die "DIANA II" nicht fertigstellen. Nach meiner Genesung habe ich Lukendeckel auf verschiedenen Neubauten eingebaut, bis ich im April 1980 den Auftrag bekam, auf dem Neubau "VIKING SALLY" der Meyer Werft in Papenburg den Einbau von Bugvisier, Bug- und Heckrampe, Hängedecks und Außentüren - wie bereits zuvor bei der nahezu baugleichen "DIANA II" - zu überwachen.

Meine Aufgabe bestand im einzelnen darin, die Werft beim Einbau der durch von Tell gelieferten Bauteile bzw. der durch die Werft nach von Tell-.Konstruktionszeichnungen gebauten Teile zu unterstützen und die Arbeiten der Werft in dieser Hinsicht zu kontrollieren. Ich hatte eine große Anzahl von Detailzeichnungen dieser Bauteile zu meiner Verfügung, aus denen sich z.B. die Dimensionierung dieser Teile, aber auch die Schweißnahtstärke ergaben. Ich hatte Kopien dieser Zeichnungen in meinem Keller bis vor etwa zwei Jahren aufbewahrt, sie dann aber beim Aufräumen weggeworfen, da für mich nicht erkennbar war, daß ich sie jemals wieder gebrauchen würde.

Als ich meine Tätigkeit auf der "VIKING SALLY" aufnahm, befand sich das Visier in geschlossener Lage starr durch verschiedene angeschweißte Flach- und Profileisen mit dem Schiffskörper verbunden. In dieser Situation überwachte ich folgende, im Werftbereich durchgeführte Arbeiten:

a) Einbau der Scharniere

Die Bohrungen für die Buchsen waren in der Halle mittels eines Bohrwerks ausgeführt worden. Ich habe die Bohrungen persönlich in Augenschein genommen und befühlt, bevor die Buchsen eingebaut wurden und kann bestätigen, daß es sich keinesfalls um gebrannte Löcher gehandelt hat. Ich hätte eine derartige Pfuscharbeit, wie sie auf den mir vorgelegten Fotos der Restscharnierbleche der "ESTONIA" zu sehen ist, niemals abgenommen. Für den Fall, daß die Werft meine Einwände nicht zur Kenntnis genommen hätte, wäre ich von Bord gegangen und hätte meine Auftraggeber informiert.

So ist es z.B. auf einem Schiff in Dünkirchen geschehen. Ich hatte den Auftrag, die Reparaturen von Lukendeckeln auszuführen. Als die Besatzung sich weigerte, mir die nach meiner Auffassung und Erfahrung erforderlichen Ersatzteile, ohne die die ordnungsgemäße Reparatur nicht möglich gewesen wäre, zur Verfügung zu stellen (obwohl diese an Bord waren), habe ich mich geweigert, die Arbeit fortzuführen und bin zurück nach Kiel gefahren.

An Bord wurden unter meiner Aufsicht die Stahlbuchsen in die Visierarme eingeschweißt und anschließend soweit ausgebohrt, daß die Bronzebuchsen paßten. Diese Bohrungen wurden sehr genau ausgeführt, so daß Backbord und Steuerbord genau in der Flucht waren, um Bruchbelastungen beim Öffnen bzw. Schließen des Visiers zu vermeiden. Anschließend wurden die Bolzen eingeführt, wobei gleichzeitig die Distanzringe (2 mm Stärke) eingesetzt wurden. Ich erinnere diese Arbeit insbesondere deshalb sehr genau, weil es sich um eine ziemliche "Fummelei" handelte. Diese Bolzen waren aus NIROSTA-Stahl und mit einer Fettnut mit Schmiernippel versehen. Mittels dieser Schmiernippel waren die Scharniere mindestens einmal pro Woche per Fettpresse zu schmieren.

Mir sind die Unterwasservideoaufnahmen der "ESTONIA" sowie mehrere Standfotos gezeigt worden. Darauf habe ich u.a. die Scharniere des Visiers mit Bolzen und teilweise Buchsen auf dem Backdeck des Schiffes identifizieren können.

Im einzelnen habe ich folgendes festgestellt:

Backbord-Scharnier:

- Bolzen mit davorhängender äußerer Buchse aus der mittleren, fest eingeschweißten Buchse gerutscht und auf dem angrenzenden Geländer stehend;

- der Distanzring ist nicht erkennbar;

- die Fettnuten am Bolzen sind nicht sichtbar;

- an der Unterseite der mittleren Buchse befindet sich ein rundes, ca. 50 mm breites Loch, von dem Rost- und Fettstreifen auf das direkt darunter liegende grüne Deck gelaufen sind. Eine derartige Öffnung ist beim Neubau nicht vorhanden gewesen;

- an beiden Scharnierblechen sind an den Vorkanten oben Kontakt- bzw. Aufschlagspuren sichtbar;

- der Bolzen glänzt auffällig; dies wäre nicht möglich bei einem Fettfilm.

Steuerbord-Scharnier

- Bolzen ohne äußere Buchse aus der mittleren, fest eingeschweißten Buchse gerutscht und auf dem angrenzenden Geländer stehend;

- der Distanzring ist nicht erkennbar;

- an beiden Scharnierblechen sind an den Vorkanten oben Kontakt- bzw. Aufschlagspuren sichtbar.

Darüber hinaus sind mir auch Fotos einer vom Wrack geborgenen Scharnierbuchse gezeigt worden. Auf den Fotos sind u.a. Teile der Schweißnähte zwischen dieser Buchse und dem Visierarm zu sehen. Ich kann ausschließen, daß es sich dabei um die Schweißnähte handelt, die seinerzeit beim Bau der "VIKING SALLY" durch Schweißer der Meyer Werft gelegt wurden.

b) Seitenverriegelungen

Soweit ich erinnere, waren die Augen für die hydraulischen Verriegelungen sowie die Haken für die manuellen Verriegelungen bereits auf die Achterkantschotte des Visiers geschweißt. Auf jeden Fall wurden die Gegenstücke auf der Schiffsseite dazu passend angeschweißt.

c) Atlantik-Sicherung

Die drei auf das A-Deck geschweißten Augen sowie das an der Achterkante des Visierbodens angebrachte Auge sind Werftlieferungen. Die drei erstgenannten Augen wurden mit Übermaß angefertigt. Es ist aus der entsprechenden Zeichnung ersichtlich, daß die beiden Buchsen der Bolzen sowie Zylinder mit Zylinderstange und die Endlageschalter (Sensoren) von Teil-Lieferungen waren. Das Auge des Visiers wurde angeschweißt und als Festpunkt bei der Ausrichtung der anderen drei Augen der Atlantik-Sicherung benutzt.

Beide Buchsen wurden in der Werkstatt so in die Augen eingeschweißt, daß die große Buchse zwischen Mittel- und Backbordauge und die kleine in das Steuerbordauge mit dem Stützblech paßte. Wie bereits oben erwähnt, lagen mir für alle Einzelteile Detailzeichnungen vor, aus denen u.a. auch die Stärke der Schweißnähte hervorging.

Mir sind Fotos von zwei der drei Restaugen der Atlantiksicherung vorgelegt worden, auf denen auch die Schweißnähte sehr gut zu sehen sind, mit denen die Buchsen mit den jeweiligen Augen verbunden waren. Ich schließe aus, daß es sich bei diesen, höchstens 3 mm dicken Schweißnähten um die Originalschweißungen handelt. Diese sind nach meiner Erinnerung mindestens dreimal so dick gewesen. Ich habe die Schweißungen der Buchsen vor dem endgültigen Einbau kontrolliert und hätte derartige Schweißnähte, wie sie auf den mir vorgelegten Fotos zu sehen sind, niemals akzeptiert.

Der Einbau der Atlantik-Sicherung vollzog sich bei geschlossenen, wie oben beschriebenen Visier, wie folgt:

- Der Festpunkt war das Visierauge;

- danach wurden Hydraulikzylinder und die drei Augen mit bereits zuvor angeschweißten Buchsen ausgerichtet, passend gebrannt und angeschweißt.

Dabei habe ich insbesondere darauf geachtet, daß die drei Augen gleichmäßig, d.h. innen und außen gleich, auf das A-Deck geschweißt wurden und weiterhin dafür gesorgt, daß unterhalb jedes Auges in der Leerzelle unter dem A-Deck eine Verstärkung angebracht wurde.

d) Bugrampe

Die Bugrampe wurde ebenfalls unter meiner Kontrolle eingebaut und ausgerichtet. Die Sicherungsbolzen wurden angepaßt. Beim Verriegeln der Rampe klappte zunächst je ein Haken an jeder Seite über die entsprechenden Teile der Rampe und zog die Rampe nach innen, bis ein bestimmter Totpunkt erreicht und überschritten war. Jetzt lag die Rampe an. Anschließend fuhren auf jeder Seite zwei Bolzen aus dem Schiff nacheinander in entsprechende Taschen an der Rampe.

Diese Bolzen rasteten hörbar in ihren Endstellungen ein. Da von dem Bedienpult auf dem Autodeck weder Visier- noch Rampenverriegelungen einsehbar waren, mußte sich der Bediener auf die Kontrollampen und auf sein Gehör verlassen. Man konnte deutlich hören, wie die Bolzen mit knackenden Geräuschen in den Taschen einrasteten. Erst bei vollständigem Einrasten der Bolzen wurden die Sensoren betätigt, was - wenn alle Bolzen und auch die Haken entsprechenden Kontakt mit den Sensoren hatten - dazu führte, daß am Bedienpult und auf der Brücke "grün" aufleuchtete, d.h. Rampe geschlossen und verriegelt.

e) Gummidichtungen

Der Einbau der 50 mm dicken Gummidichtungen wurde mittels eines Innentasters alle 300-400 mm der Abstand zwischen den gegenüberliegenden Teilen Visier/Schiff gemessen und - wo Abweichungen festgestellt wurden - wurden diese mit Flacheisen ausgeglichen. Dadurch war gewährleistet, daß die danach eingebauten Gummidichtungen bei geschlossenem Visier einen absolut gleichmäßigen Anpreßdruck hatten, da sich das Visier ca. 8-10 mm in die Gummidichtungen eindrückte und dadurch einen wasserdichten (wetterdichten) Abschluß des Innenraumes des Visiers bildete.

f) Erprobungen im Zusammenhang mit der Abnahme

Während der Werftprobefahrt nach Helgoland wurde u.a. auch das Visier auf seine Dichtigkeit geprüft. Es befand sich in vollständig verriegeltem Zustand, d.h. auch die manuellen

Verriegelungen waren eingelegt. Ich habe bei voller Fahrt, d.h. ca. 2,5 m hoher Bugwelle und leicht stampfendem Schiff, mit dem B.V.-Besichtiger Lohmann und einem Vertreter der Reederei, dessen Namen ich nicht erinnere, im Innenraum des Visiers gestanden und festgestellt, daß das Visier nicht völlig wasserdicht war, sondern an einigen Stellen etwas leckte Nach Rückkehr wurden in Emden die Gummidichtungen mit Schlemmkreide eingeschmiert, das Visier geschlossen und anschließend wieder geöffnet. Aufgrund der verbleibenden Abdrücke wurden die leckenden Stellen ermittelt und entsprechend wurden die Gummidichtungen in diesen Bereichen angehoben. Bei einer anschließenden erneuten Dichtigkeitsprobe wurde das Visier für dicht befunden und durch Reederei, Klasse und finnische Schiffssicherheitsbehörde endgültig abgenommen.

Die offizielle Abnahme war - nach erfolgreicher Funktionsprobe am 19. Juni 1980 - bereits am 20. Juni 1980 erfolgt. Anschließend wurde die in der Anlage beigefügte Abnahmebebescheinigung ausgefüllt und von Vertretern der Reederei, des B.V., der Werft und meinem Kollegen Brandt unterschrieben.

Ich habe die "VIKING SALLY" zuletzt bei ihrer Kiel-Kanal-Passage in die Ostsee gesehen und danach mit dem Schiff keinen Kontakt mehr gehabt.

Hamburg, den 26. Juli 1995

Günther Todsen

G. Todsen

Enclosure A.2.2.15.

Office Translation

Günther Todsen, born July 31, 1932
address: Möhnweg 4, 24109 Kiel
telephone: 0431 - 527591

states:

I became an auto mechanic in Eckernförde and terminated my apprenticeship in 1951. Afterwards I drove a truck and then in 1955 started work at HDW-Kiel as a steel construction mechanic. In 1959 HDW began to build hatch covers for von Tell/Göteborg. Part of the corresponding contract between HDW and von Tell was the supply of a mechanic to supervise the mounting of hatch covers onboard as well as possible repairs. This was my work. In the following years I thus supervised the installation as well as the repairs of hatch covers on newbuildings for German and foreign yards. My first contact with Meyer Werft in Papenburg was the participation in a meeting upon instruction of Mr. Rottmann, sen. when the installation of bow visor, bow and stern ramps as well as hanging decks and outer doors were preliminarily discussed. This was in February 1979. The reason for my recalling this so well is that we had tremendous difficulties getting home by car due to the 2nd part of the so-called "snow catastrophe".

Circa at the beginning of April 1979 I took up my work in Papenburg. Shortly before Ascension Day (national holiday in Germany) I had an accident at work onboard "DIANA II" shattering the big toe of my right foot. I was on sick leave for several weeks and therefore could not complete my work on "DIANA II". After my recovery I installed hatch covers on several newbuildings until in April 1980 I received the order to supervise - as previously for the practically identical construction on "DIANA II" - the installation of the bow visor, bow and stern ramps, hanging decks and outer doors on the newbuilding "VIKING SALLY" for Meyer Werft in Papenburg.

My work in detail consisted of assistance to the yard for installation of the components delivered by von Tell resp. the components made by the yard according to the von Tell construction drawings, and of supervising the yard's work in this respect. I had a large number of detail drawings of these construction parts at my disposal, which showed the dimensions of these parts and also of the welding seams. I had saved copies of these drawings in my basement until about two years ago, but then threw them away while cleaning out the basement because I didn't think I would ever need them again.

When I started work on "VIKING SALLY" the bow visor was in closed position, fixed to the ship's hull by means of various flat bars and structural bars. In this position I supervised the following work performed at the yard:

a.) Installation of Hinges

The bore holes for the bushings were made by means of a boring mill in the fabrication hall. I personally took a close look at the the bore holes and touched them with my fingers before the bushings were installed and can confirm that by no means were they burned holes. I would never have accepted such dubbed work as can be seen on the photographs shown to me of the remnants of "ESTONIA's" hinge plate. In case the yard would had not taken notice of my objections I would have left the ship and would have informed my principals accordingly.

This was the case on a ship in Dunkerque. I had the order to execute the repair of the hatch covers. When the crew refused to put the necessary spare parts at my disposal, without which, in my opinion and experience, it was not possible to perform the repairs properly (although these parts were onboard), I refused to continue the work and returned to Kiel.

Under my supervision onboard the steel bushings were welded into the visor's arms and subsequently bored out to the extent that the bronze bushings did fit. These bores were carried out with extreme precision in

order that port side and starboard side were in alignment in order to avoid breaking tension when opening resp. closing of the visor. Subsequently the bolts were guided in whilst simultaneously the distance rings (2 mm thickness) were fitted. I recall this work especially because it was rather fumbly work. The bolts were made of NIROSTA steel and had a grease groove with grease nipple. By means of these grease nipples the hinges had to be greased at least once a week by grease gun.

Underwater videos of the "ESTONIA" as well as several pictures have been shown to me. On these I have been able to identify a.o. the hinges of the visor on the forecastle deck of the vessel together with bolts and partly with bushings.

In detail I have found the following:

Port Hinge:

- Bolts with outer bushings hanging in front, having slid out of the middle firmly welded bushing and standing on the adjacent railing;
- the distance ring is not recognizable;
- the grease groove at the bolt is not visible;
- at the under side of the middle bushing there is a round ca. 50 mm wide hole, from which rust and grease have run onto the green deck directly below. Such an opening has not been there at newbuilding;
- at the upper front edges of both hinge plates contact resp. impact marks are visible.
- the bolt is noticeably shiny; this would not be possible if covered by a grease film.

Starboard Hinge

- Bolt without outer bushing having slid out of the middle, firmly welded bushing and standing on the adjacent railing;
- the distance ring is not recognizable;

- at the upper front edge of both hinge plates contact resp. impact marks are visible.

In addition to this, also pictures of a hinge bushing brought up from the wreck were shown to me. The photos showed among other things parts of the welding seams between this bushing and the visor arm. I can exclude that these welding seams are the welding seams made by welders of Meyer Werft during the newbuilding of "VIKING SALLY".

b) Side locks

As far as I remember, the lugs of the hydraulic locking as well as the hooks of the manual locking were already welded to the aft bulkhead of the visor. In any case the mating parts had been welded to the ship's side respectively.

c) Atlantic lock

The three lugs, welded to the A-deck, as well as the lug at the aft part of the visor's bottom are yard-supply. The 3 first mentioned lugs had been constructed with overmeasure. It can be seen from the respective drawing that both bushings of the bolt, the cylinder including piston rod and the limit switches (sensors) had been delivered by von Tell. The lug of the visor was welded and used as fixing point for the alignment of the other three lugs of the Atlantic lock.

At the workshop both bushings had been welded into the lugs in such a way that the large bushing fitted between the middle and the port lug and the small bushing into the starboard lug with the support bracket. As already mentioned above, I have had detail drawings for all components from which among others also the thickness of the welding seams were revealed.

Photographs were submitted to me, showing 2 of the 3 lug remnants of the Atlantic lock, on which welding seams can be seen very clearly, which had connected bushings with the respective lugs. I exclude that these welding seams, having a maximum thickness of 3 mm, are the orignal welds. According to my memory these welding seams had been at least 3 times as thick. I have checked the weldings of the bushings prior to final installation and would never have accepted such welding seams as recognisable on the photographs submitted to me.

The installation of the Atlantic lock was carried out as follows by closed visor:

- The fixing point was the lug of the visor
- accordingly hydraulic cylinder and the 3 lugs with already previously welded bushings were aligned, burned to fit and welded.

Thereby I paid special attention to the even welding of the 3 lugs to the A-deck, i.e. inner and outer side the same. Furthermore, I took care that below each lug, in the void space under A-deck, a reinforcement was fitted.

d) Bow ramp

The bow ramp as well had been installed and arranged under my supervision. The securing bolts were made to fit. During locking the ramp at first each one hook on each side of the corresponding parts at the ramp lowered and pulled the ramp inwards, up to a special point had been reached and passed. Now the ramp was tight in position. Then two bolts on each side were moving out of the ship into corresponding pockets of the ramp.

The bolts snapped audibly into their end positions. As from the control console on the car deck neither visor nor ramp-locking devices could be seen, the operator had to rely on the control lamps and his sense of hearing. It was clearly audible by snapping noises when the bolts engaged the pockets. Only after the bolts had fully engaged did the sensors become activated, which - if all bolts and also the hooks were in contact with the sensors - led to the "green light" at the control console as well as on the bridge, i.e. the ramp was closed **and** locked.

e) Rubber packings

Prior to installing the 50 mm thick rubber gaskets every 300 - 400 mm the distance between the opposite parts visor/ship were measured by means of an inside callipers and ascertained deviations were compensated by flat iron. This way guaranteed that the afterwards installed rubber gaskets had absolutely the same contact pressure, as the visor was pressed into the rubber gaskets up to 8 - 10 mm, which made the inside of the visor watertight (weathertight).

f) Testing in connection with acceptance

During the trial trip to Helgoland a.o. also the visor was checked in respect of its tightness. The visor was totally locked, i.e. also the manual locking devices were closed.

During full speed - i.e. about 2,5 m high bow wave and slightly pitching vessel - myself, Mr. Lohmann, surveyor of Bureau Veritas, and a representative of the owners, whose name I do not remember, were inside the visor and noted that the visor was not totally watertight, but at some places water was slightly leaking through. After returning to Emden the rubber packings were marked with chalk, the visor was closed and opened again. Due to the remaining imprints the leakings were found out and the rubber packings were raised in these particular areas. During a subsequent

tightness test the visor was found to be tight and finally accepted by the owners, the classification society and the Finnish board of navigation.

The official delivery took place already on 20th June 1980 - after successful function test on 19th June 1980. Afterwards the attached Delivery Certificate was filled in and signed by representatives of the owners, the B.V., the shipyard and my colleague Brandt.

I have seen the "VIKING SALLY" the last time when passing the Kiel Canal to the Baltic sea. Since that time I have never been in contact with this vessel again.

Hamburg, the 26th July 1995 signed by Günther Todsen

Enclosure 2.4.2.22

ANKOM 7 JUL 1980

VON TELL

MOTTAGNINGS- EL. ÖVERLÄMNINGSBEVIS x)
Abnahme- oder Übergabebeschein..gung x)
Receipt or Transfer Certificat.. x)

4911.1/80.151.1

von Tell-Nr. .....
M.S. ....

VARV / Bauwerft / Shipyard: Jos. L. Meyer
NYBYGGE/OMBYGGE x) / Neubau/Umbau x) / Newbuildi..g/Rebuilding x): 500

REDERI / Rederei / Shipping Co.: Sally
KLASS / Klasse / Class: Bureau Veritas

MONTÖR / Service-Mann / Mounter: G. Todsen, H. Brandt
DATUM / Datum / Date: 20. 6. 80

VATTENPROVNING/LUCKMANÖVRERING/ÖVERLÄMNING x)
Wasserprobe/Deckelmanöver/Übergabe x)
Waterproof/Hatch Operating/Transfer x)

LUCKOR / Luken / Hatches: 1 Seitenpo., 1 Bugpo., 1 Heckrampe, 4 Passagierpforten, 2 Lotsenpforten, 2 Stuvgedecks mit Aufzugluken, 1 Abfallpforte

ANMÄRKNING / Bemerkung / Notes: Keine weiteren Anmerkungen

MEDVERKANDE:
Teilnehmer:
Co-Operater:

REDERI / Reederei / Shipping Co.: [signature]

KLASS / Klasse / Class: [signature] B.V.

VARV / Werft / Yard: [signature]

von TELL: Herbert Brandt

UTFÄRDANDEN / Ausfertigungen / Issues: 6-fach

x) ICKE TILLÄMPLIGA STRYKES
Nichtzutreffendes streichen
Not appliecable cross over

N°1

Enclosure 2.4.2.23

To DT1 - Mr Secretain
Mr Cornil

Seek 35387 -

21542617934
20617 vontell s 80-03-18/858 10.10.80 DP

good afternoon this is von tell ab gothenburg/sweden

att.: mr desoussa

re.: ferry in papenburg
bow visor
our ref 4911.1

---

we refer to phone conversation with mr desoussa.

in lack of bv rules we have used the lr rules and got

total horizontal force abt 230 tonne
total vertical force abt 470 tonne

we have calculated with the two side cleatings and the atlantic securing device and will then have a load of abt 80 tonne for each device.

calculated shear stress will be 800 kp/cm2 and bending stress 2400 kp/cm2.

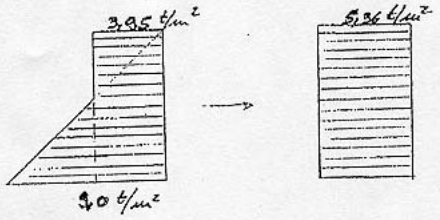
we think we are slightly above the stress permitted by lr and we could change the present steel with min breaking strength of 50 kp/mm2 to a material with a breaking strength of 90 kp/mm2.
75 kp/mm²

please advise++

regards
von tell / a eriksson
21542617934
20617 vontell s

(1)

Angreifende Kräfte nach BV-Rules 1976



Kraftangriffspunkt im Flächenschwerpunkt der Projizierten Flächen:

$P_x = 381$ to

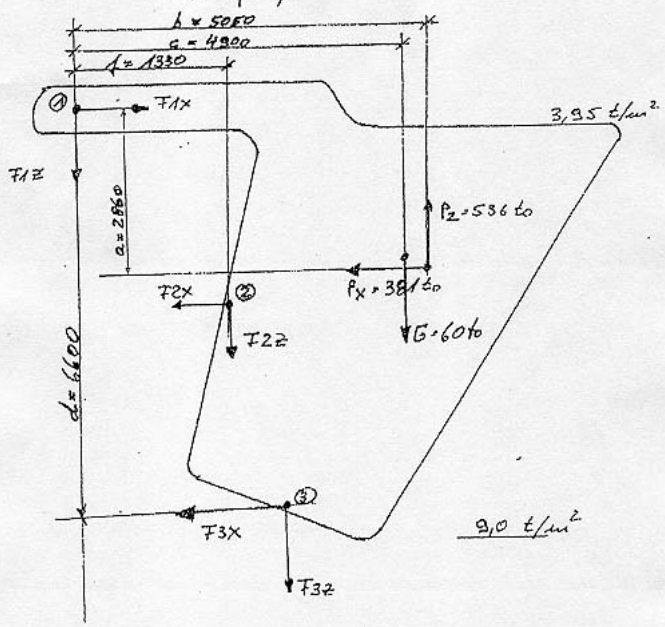
$P_z = 536$ to

$G = 60$ to

(2)

Bugklappe 590

Kräftesystem



Gesamthorizontalkraft:

$$R_x = \frac{P_z(b-l/2) - G(c-l/2) - P_x \cdot a}{d} = 152{,}5 \text{ to}$$

Gesamtvertikalkraft:

$$R_z = P_z - G = 476 \text{ to}$$

Insgesamt 5 Aufhängepunkte

$$F_{ix} = R_x/5 = 30{,}5 \text{ to}$$

$$F_{iz} = R_z/5 = 95{,}2 \text{ to}$$

$$F_R = \sqrt{F_{ix}^2 + F_{iz}^2} = 100 \text{ to}$$

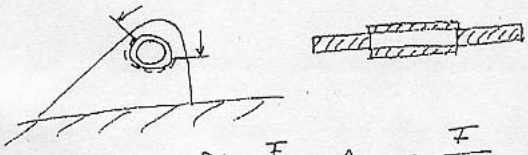
→ <u>100 to Belastung / Aufhängepunkt</u>

Mindestquerschnitte für Augen:

Material: St 52-2

$R_{eH} = 355 \text{ N/mm}^2 \Rightarrow k = 0{,}75$

$\sigma_{zul} = 123/k \Rightarrow 164 \text{ N/mm}^2$



$$\sigma = \frac{F}{A} \qquad A_{min} = \frac{F}{164}$$

$$A_{min} = \frac{100 \text{ to}}{164 \text{ N/mm}^2} = 610{,}0 \text{ mm}^2$$

The German Group of Experts investigating the sinking of M/V "ESTONIA"

c/o AHLERS & VOGEL · Schaartor 1 D-20459 Hamburg · Telephone 49-40-37 85 88-0

Memo

Betr.: Besuch bei Kvaerner Ships Equipment AB, Göteborg und Durchsicht der alten von Tell AB Akten bezüglich "Diana II" und "Viking Sally"

Am 8. und 9.1. d.J. wurde die

Kvaerner Ships Equipment AB
Kämpegatan 3
S-41104 Göteborg
Tel. + 46 – 31 – 725 7900
Fax + 46 – 31 – 705 40 4062

besucht und mit tatkräftiger Unterstützung des Managing Directors Göran K. Johansson, des Sales Managers Dan Magnusson sowie des Consultants Per Fagerlund insgesamt 42 Ordner und Schnellhefter mit Konstruktionsunterlagen und Korrespondenz der Firma von Tell & Trading AB, Göteborg bezüglich "Diana II" und "Viking Sally" durchgesehen.

Zur Vorgeschichte wurde folgendes mitgeteilt:

- Kvaerner hat Ende der 80er Jahre den Aktenbestand mit Kundenkartei aus der Konkursmasse der von Tell & Trading AB gekauft, ohne die Firma selbst zu übernehmen, die als Name nach wie vor besteht und mit der Nummer von Kvaerner im Telefonbuch von Göteborg steht. Die Akten waren in 20-25 Kartons verpackt, die gesichtet wurden und der interessante Teil wurde in das Kvaerner Archiv direkt im Bürogebäude übernommen (ca. 20 lfd. Meter Aktenordner) während der Rest in Kartons in einem Schuppen eingelagert blieb, wo er sich nach wie vor befinden soll.

- Als die "Estonia" Katastrophe bekannt wurde, war Peter Rösholm MD in Göteborg (jetzt Kvaerner, Rostock) und veranlaßte
  (a) Schreiben an das Kommunikationsministerium vom 13.10.94 gemäß Anlage 1, welches mit Schreiben vom 9.2.95 beantwortet wurde (Anlage 2);
  (b) Durchsicht der "Diana II" und "Viking Sally" Akten und Information über deren Vorhandensein an der schwedischen Teil der Internationalen Kommission offenbar telefonisch;
  (c) Kalkulation der Verriegelungen des Visiers mit dem Ergebnis, daß die LCC - nach heutigem Standard – im unteren Bereich lag.

- Im 2. Halbjahr 1995 meldete sich Jan-Ove Carlsson – MD von MacGregor, Göteborg, und verlangte Akteneinsicht. Dieses wurde von Göran Johansson, der inzwischen Peter Rösholm als MD abgelöst hatte, zunächst abgelehnt und um Vorlage einer entsprechenden Vollmacht durch die Internationalen Kommission ersucht. Diese wurde kurz darauf durch Börje Stenström erteilt und J.O. Carlsson beschäftigte sich daraufhin 2 Tage mit den Akten und kopierte diverse, im einzelnen nicht bekannte Teile der Akten. Dafür waren Teile der Akten für mehrere Wochen außer Haus.

- Als nächstes meldete sich im Dezember 1996 Tuomo Karppinen, der anschließend in Begleitung von Klaus Rahka sowie eines weiteren Mitarbeiters der VTT, Helsinki, erschien und einen Tag mit den Akten verbrachte. Anschließend besuchten sie noch die

  GRIMMEREDS VERKSTADS AB

  in Göteborg, wo alle Komponenten der Verriegelungsysteme beider Schiffe, mit Ausnahme der von der Werft hergestellten Augen, angefertigt worden waren. Angeblich sollen sie da von einem langjährigen Mitarbeiter abgefertigt worden sein, nachdem sie ihre Theorie vorgetragen hatten, und mit hängenden Köpfen wieder abgezogen sein.

- Danach war wieder Ruhe bis sich im Vorfeld der Veröffentlichung des Berichtes der Internationalen Kommission mehrere Medienvertreter meldeten, denen jedoch Einsicht in die Akten verwehrt wurde.

Das Ergebnis der Aktendurchsicht durch den Unterzeichneten läßt sich folgendermaßen zusammenfassen (nur bezogen auf die Verriegelungen von Visier und Bugrampe):

1. "Diana II" – S 592 - 48611

1.1. Es sind alle Zeichnungen einschl. Detailzeichnungen vom Entwurf bis zur BV genehmigten Endfassung mit handschriftlichen Vermerken in rot (Original) vorhanden. Es wurden jedoch keine durch das Sjöfartsverket Rotterdam genehmigten Kopien gefunden. Dieses ist wahrscheinlich mit der bis zur "Estonia" Katastrophe durch Sjöfartsverket, wie auch F.B.N., verfolgten Philosophie zu erklären, nämlich daß alle strukturellen Komponenten Sache der Klasse seien. Dieses bezog sich jedoch offensichtlich nicht auf die Belastung der Hängedecks, über die noch weit nach Indienststellung der "Diana II" mit dem Sjöfartsverket korrespondiert wurde.

1.2. Es gibt einen Ordner mit handschriftlichen Berechnungen plus Tipstreifen für die Bereiche:
- Bug- und Heckrampenverriegelungen – keilförmige Bolzen (7 Seiten)
- Belastung Autodecks und Rampen (10 Seiten)
- Verschlußanordnung Maschinenraumluke (3 Seiten)
- Autodeck und Auffahrrampen (42 Seiten)
- Heckrampen
- Bugvisier – ohne Inhalt

1.3. In den insgesamt 3 Korrespondenzordnern, die vollständig zu sein scheinen, wurden u.a. folgende Bemerkungen gefunden:

- Besprechung 26.7.78: Visier soll mit 2 hydraulischen Bolzen verriegelt werden, Atlantiksicherung wird von der Werft gemacht.
- Besprechung 14.9.78: Bugrampe nach 11-44.21 als Kollisionsschott unter Berücksichtigung der rollenden Last.
  Bugvisier wie benachbarte Außenhaut gemäß 11.-44.22, also 1,75 ts.
- 19.10.78 mit BV-de Souza:
  Bugrampe muß spritzwasserdicht sein.
  Bugrampe = Kollisionsschott.
  Bugklappe: - Gummidichtungen müssen durch Schraubverbindungen befestigt werden;
  - Hydraulische Verriegelung plus Handverriegelung
- 20.10.78: Es waren für das Visier ursprünglich 4 manuelle Sicherungen vorgesehen, dieses wurde am 3.10.78 auf Vorschlag von Tell auf 2 reduziert und von der Werft akzeptiert.
- 15.12.78: Einsatz von Todsen abgestimmt.
- 22.12.78: BV hat uns darauf aufmerksam gemacht, daß die Löcher in der Schottwand (Frontschotten) für Verschlußanordnung abgedichtet werden müssen.
- 5.1.79: Kommentar zur Änderung des Visierscharniers.
- 9.1.79: Nach Rücksprache mit der Werft wollen Sie sich wegen der Farben für die Lampen der Verriegelungsanzeige nach den Vorschriften der schwedischen Behörden richten.
  Todsen weist daraufhin, daß im Falle einer Beschädigung der Gummipackungen des Visiers, die Endlagenschalter der Atlantiksicherung unter Wasser stehen und fragt: Sind sie wassergeschützt?
- 24.1.79: Die Reederei (Kure) besteht darauf, die Verriegelung des Visiers und die Atlantiksicherung zu trennen, d.h. 2 Steuerschieber.
- 29.1.79: Es sind nur noch die Beschläge Atlantiksicherung auf dem Zeichentisch und sollen alsbald bestellt werden.

- 5.2.79: Atlantiksicherung liegt noch auf dem Zeichentisch.
- 12.2.79: Endgültige Zeichnungen Atlantiksicherung 372 + 373 + Details abgeschickt.

2. "Viking Sally" – S 590 - 49111

2.1. Es sind Zeichnungen vorhanden, auch Detailzeichnungen mit Schweißnahtstärkenangaben, z.B. für Rampenhaken 5 mm, jedoch keine Originale mit den handschriftlichen BV-Eintragungen.

2.2. Aus den Bestell- bzw. Rechnungsordnern geht hervor, daß die Beschläge für Bugrampe und Visier gemäß Zeichnungen
49111 – 304 / 305
49111 – 360 / 361
49111 – 371 / 372 / 373
am 5.11.79 bei Grimmered bestellt und am 21.12.79 (Rechnungsdatum) geliefert wurden.
Anmerkung: Das bedeutet, daß die Komponente der Atlantik- und Seitenverriegelungen bereits fertig vor Ort waren, als sich die Diskussionen zwischen de Souza und von Tell AB über die Dimensionierung im März/April 1980 abspielten.

2.3. Der Korrespondenzordner, wie auch jedwede Kalkulationsordner, fehlen. Auch eine Durchsicht des Kvaerner Archivs führte zu keinem anderen Ergebnis. Kvaerner wird jedoch die Kartons im Schuppen gelegentlich durchsehen und sich melden, falls die Ordner auftauchen sollten.

3. <u>von Tell & Trading AB Angestellte</u>

Es ergibt sich aus den Unterlagen, daß es sich im Wesentlichen um folgende Personen gehandelt hat:

- Bo Bengtsson – Manager Design Office
- Bo Jonasson
- Alv Eriksson
- Herbert Brandt
- Tage Karlsson (TK)
- Sven Samuelsson
- Ernst Magnusson

Davon wurden vor Abreise des Unterzeichneten in Göteborg

Bo Jonasson (Gothenburg Port Authority)

Alv Eriksson (retired)

lokalisiert und werden in der kommenden Woche angesprochen. Der langjährige Mitarbeiter von Grimmered wurde ebenfalls lokalisiert, ist jedoch aufgrund einer Krebserkrankung nicht mehr ansprechbar. Die Fa. Grimmered bemüht sich jedoch herauszufinden, ob eine 2. Atlantik-sicherung für "Viking Sally" geliefert wurde.

Hamburg, 11.1.98

Werner Hummel

Kvaerner Ships Equipment AB

Anlage 1

KOMMUNIKATIONSDEPARTEMENTET
103 33 STOCKHOLM

ATT: KOMMUNIKATIONSMINISTERN

Er ref. / Your ref. — Vår ref. / Our ref. PR/CAX — Datum / Date 1994-10-13

SÄKERHET PÅ RO-RO FARTYG/FÄRJOR

Vi kontakter Er med anledning av den tragiska olyckan med M/S Estonia och den information som cirkulerar om tillsättande av en arbetsgrupp för att studera RoRo-fartygs säkerhet.

Kvaerner Ships Equipment AB konstruerar, säljer och utför service av fartygsutrustning såsom lastluckor, ramper, portar (bl.a. bogportar och bogvisir), hissbara bildäck, lastelevatorer etc.

Bolaget tillhör norska Kværner koncernen med aktiviteter inom skeppsbyggeri, rederiverksamhet, offshore, skogs- och mekanisk industri. Kværner är idag en av världens ledande fartygsbyggare - och störst i Europa.

Vi vill med detta brev visa vårt intresse för att deltaga som experter i arbetet med att skapa säkrare fartyg och fartygsdrift i framtiden.

Vårt bolags kunskaper inom området är unika och vi har samtidigt tillgång till kunskaper och erfarenheter från koncernens aktiviteter inom områdena skeppsbyggeri, fartygsdrift och offshore.

Vår utrustning sitter i flera färjor som opererar i Nordsjön, Engelska Kanalen och i Irländska Sjön där väderförhållandena kan vara hårdare än de vi upplever i Östersjön.

Hoppas Ni finner denna information intressant och vi ser fram emot att höra från Er.

Med vänliga hälsningar

KVAERNER SHIPS EQUIPMENT AB

Peter Rösholm
Verkställande Direktör

KVÆRNER

Industriområde — Tel +46 31 [illegible] — Internet: [illegible]
S-417 [illegible] Göteborg — Telefax +46 31 [illegible]
Sverige — Telex [illegible]
C:\MSOFFICE\WINWORD\PR\12-10KOM.B

Anlage 2

KOMMUNIKATIONSDEPARTEMENTET
Statsrådet och chefen

1995-02-09 K94/2638/2

Peter Rösholm
Kvaerner Ships Equipment AB
Kilsgatan 4
411 04 GÖTEBORG

Tack för Ditt brev kring säkerhet på Ro-Ro fartyg och färjor. M/S Estonias förlisning har förorsakat mänskliga tragedier. Det återstår mycket arbete för att klarlägga katastrofens orsaker.

Vi måste också medverka till att sjösäkerheten förbättras i framtiden. Regeringen har därför tillsatt en kommitté för att analysera möjligheterna att ytterligare utveckla säkerheten inom sjöfarten. Kommittén skall lämna förslag om hur det nationella och internationella sjösäkerhetsarbetet bör inriktas och bedrivas för att förbättra säkerheten främst i den sjöfart som berör Sverige. Kommittén skall utarbeta ett handlingsprogram för ökad sjösäkerhet med speciell inriktning på passagerartransporter med färjor och redovisa en samlad strategi för det svenska agerandet i Europeiska unionen, IMO och i det övriga internationella samarbetet.

Kommittén skall redovisa sitt arbete senast den 1 november 1995.

Med vänlig hälsning

Ines Uusmann

Enclosure 2.4.2.26

Jos. L. Meyer
Schiffswerft - Maschinenfabrik
2990 Papenburg 1
Postfach 1120

Terminplan

Blatt 5a
Woche 24.

Termin Date	Verantwortlich Responsible	Abnahme Acceptance: Klasse Class.	Abnahme Acceptance: Bauaufs. Build. superv.	Auszuführende Arbeiten work to be carried out
Freitag, 13.6.	Bless RL, MB, EL, Sanea,		X	Ölgefeuerte Hilfskessel in Betrieb nehmen. Heizungsanlage in Betrieb Wärmeabgabe für Maschinenanlage sicherstellen.
	Wecke, SB, Schl.			Bugklappe betriebsbereit
	EL			Maschinenraumreinigung
	Bless			
	Buhl, Schl.	FSS	X	Kontrolle aller Rettungsmittel (Schwimmwesten, Inseln, Rettungsringe Flöße)

06/07 '05 13:11 FAX +49 4961 81300 JL MEYER WERFT 012

Jos. L. Meyer
Schiffswerft - Maschinenfabrik
2990 Papenburg 1
Postfach 1120

Terminplan

Blatt 7
Woche 25

Termin Date	Verantwortlich Responsible	Abnahme Acceptance Klasse Class.	 Bauaufs. Build. superv.	Auszuführende Arbeiten work to be carried out
Mittwoch, 18.6.1980	Bless MB RL	BV	X	Brennstoffseparatoren in Betrieb
	EL Alfa-Laval		X	Spülbetrieb Brennstoff für die Hauptmotore
	Buhl, EL, Ti Buhl, RL, EL, Schl.			Weckanlage betriebsbereit Scheibenwischer, Heizscheiben, Scheibenwaschanlage betriebsbereit
	Bless/Stal-Astra			Klimakompressoren in Betrieb
	Buhl, Zissing EL			Zentralantennenanlage in Betrieb
	Buhl, Elna, EL			Wechselsprechanlage in Betr.
	Buhl, Teleste EL			Musikanlage in Betrieb
	Bless, RL, EL, Hipress			Einregulieren Klimaanlage
Donnerst 19.6.1980	Bless MB RL			Auffüllen des Kühlwasser-systems Hauptmotor
	Bless, MB, RL, EL, MB		X	Inbetriebnahme Anlaßluftkomp.
	Bless, Zissing MB, EL		X	Inbetriebnahme Ruderanlagen
	Wecke, v.Tell, Schl.	FSS	X	Funktionsprobe aller Hängedecks, Seitenpforten, Bug- und Heckrampen, Bugklappe

06/07 '90 13:15 TX+49 4961 81300 SK NEUE BERFT 2017

Jos. L. Meyer
Schiffswerft - Maschinenfabrik
2990 Papenburg 1
Postfach 1120

Terminplan

Blatt 9
Woche 26

Termin Date	Verantwortlich Responsible	Abnahme Acceptance: Klasse Class.	Abnahme Acceptance: Bauaufs. Build. superv.	Auszuführende Arbeiten work to be carried out
Montag, 23.6.80	Bless, MAN, RL, MB, EL		"	Kalte Funktionsproben Hauptmotore
	Abrams			Fahrterlaubnisschein SeeBG
"				nach Programm Herr Abrams
Dienstag, 24.6.	Bless/Abrams MB, MA, EL, RL	BV	X	Standprobe Hauptmotor
	Rosema, Bless Buhl			Schiffsreinigung Stellagen & Werkzeuge von Bord
Mittwoch 25.6.80	Abrams, Bless/Buhl	BV PSS	X	Schiffsüberführung nach Emden mit anschließender Probefahrt

06/07 '95 13:13 ☎+49 4961 81300 SN MEYER WERFT ⑨019

Translation summary of correspondance between von Tell AB and the Finnish Board of Navigation regarding the ramp and visor installation in MV Viking Sally

Letter dated 1979-12-14 from von Tell AB to Sjöfartsstyrelsen, Helsingfors (the Finnish Board of Navigation)

Attn: The Ship Section

Subject: Approval of drawings, our ref no 4911.1

The Sally shipping company, Mariehamn, is building at Jos. L Meyer, Papenburg, a passenger and car ferry for traffic between Sweden and Finland. This ferry is to be built to Bureau Veritas and your approval.

We have got from the yard in Germany the contract to deliver elevating car decks, ramps for stern and bow, visor and side doors. Identical equipment was delivered to the sister vessel DIANA II that was build in 1979 by Meyer with approval by BV and the Swedish National Maritime Administration.

We would like to be informed about the details for which we should submit drawings for your approval.

We look forward with interest to your early reply.

With kind regards,

Letter dated 27.12.1979 from the Finnish Board of Navigation to von Tell AB, Gothenburg

Subject: Newbuilding at Jos. L Meyer

Regarding the bow and stern ramps, the side doors and the visor we assume that the drawings are examined by Bureau Veritas. Only in case the class is uncertain about how any detail in the Load line and SOLAS conventions is interpreted by the Finnish Administration should drawings be sent to this office.

In such case the problem should be clearly defined in order to facilitate dealing with it. The Board is lacking resources for routine examination of all the drawings required in a modern newbuilding.

Also regarding the elevating car decks do we accept the approval by class unless special questions arrise. If it is intended that it should be possible to lift and lower the decks in loaded condition, i.e. with cars, are the devices to be regarded as loading devices and must be approved by the Finnish Board of Labour Safety.

With kind regards,

handwritten remark by F.B.N. Ref. Co.S.
" Supposedly it is regarding drawings concerning LL (Load Line) questions
As long as we stay within LL questions, matter can be dealt with by BV
when it comes to interpretations and/or exemptions, the approving authority is F.B.N.

Mölndal • Sweden

Vårt datum. Our date
1979-12-14
Ert datum. Your date

Vår referens/Our reference
CB/IA
Er referens/Your reference

von Tell

von Tell AB

Sjöfartsstyrelsen
Bergmansgatan 1
HELSINGFORS
Finland

M.

Att.: Fartygssektionen

Betr.: Godkännande av ritningar
vår ref. nr 4911.1

Rederi AB Sally, Mariehamn bygger vid Jos. L Meyer, Papenburg en passagerar- och bilfärja för trafik mellan Sverige och Finland. Denna färja skall byggas till Bureau Veritas och Ert godkännande.

Vi har av varvet i Tyskland erhållit i uppdrag att leverera höj- och sänkbara bildäck, ramper i för och akter, visir och sidoportar. Samma utrustning levererade vi till systerfartyget DIANA II, som byggts 1979 hos Meyer med godkännande av B.V. och Svenska Sjöfartsverket.

Vi önskar veta på vilka detaljen vi skall översända ritningar för Ert godkännande.

Vi avvaktar med intresse Er snabba behandling och svar.

Med vänliga hälsningar

von TELL AB

Conny Bryfors

Conny Bryfors

1. Eklöhman
2. Wiberg
(3. Haatainen) ?
1979-12-20
CB.

Kyseessä tilin koi on LL-luokituksen liittyvät yksityiskohdat.
Niin kauan kun pystytään selvittämä LL-pykälässä asian koskien B kian mitä siinä lähinnä ja/tai poikkeamista, niin hyväksyjä MKH.

Postal address: P. O. Box 472, S-405 27 Göteborg 1, Sweden
Office address: Göteborgsvägen 97, S-431 37 Mölndal, Sweden
Phone: 031-87 00 00
Telex: 20647 vonsella
Telegram: tellrede
Bank: Skandinaviska Enskilda Banken, Göteborg
Bank Giro No. 501-2836
Post Giro No. 240945-4

SJÖFARTSSTYRELSEN

Helsingfors 27.12.1979

Nr KD 3965/79/301
L 1296

Hänvisning CB/IA

Ärende Nybygge fos Jos.L.Meyer

von Tell AB
PB 472
S-40127 Göteborg 1
Sverige

ARKISEO

Beträffande för-och akterramperna, sidoportarna och visiret förutsätter vi att ritningarna i första hand granskas av Bureau Veritas. Endast i det fall att klassen är osäker om hur någon punkt i lastlinje- eller SOLAS-konventionen tolkas av den finska administrationen, skall ritningar sändas till sjöfartsstyrelsen.
För snabb behandling bör i så fall problemet vara klart beskrivet. Sjöfartsstyrelsen saknar kapacitet för rutinmässig genomgång av allt det ritningsmaterial ett modärnt fartyg förutsätter.

Även beträffande de höj- och sänkbara bildäcken nöjer vi oss med att de godkänns av klassen om icke speciella problem uppstår. Om det dock är meningen att bildäcken skall kunna lyftas och sänkas i lastat tillstånd d.v.s. med bilar på, betraktas de som lastningsanordningar och skall godkännas av arbetarskyddsstyrelsen.

Med vänlig hälsning

Byråingenjör Gunnar Edelmann

GE/MS
Lom. 1.A4

ADRESS: Bergmansgatan 1
HELSINGFORS 14

POSTADRESS: PB 158
00141 Helsingfors 14
Finland

TELEFON: 90-650411
TELEX: 121421 mkh sf
POSTGIROKONTO: 3801-6

Enclosure 2.4.2.28

MATERIALLISTE

POS	BENENNUNG	ANZ	SKIZZE	MATERIAL TYP
1	VERSCHLUSSBOLZEN	1	49111-372/1	SIEHE DET.
2	STEUERGEHÄUSE FÜR VERSCHLUSSBOLZ	1	-372/2	ROHR SIS 2172 (ST.52)
3	VERSCHLUSSROHR	1	-372/3	-"- -"-
4	STEUERGEHÄUSE FÜR SICHERUNGSSTIFT	1	-372/4	SIS 1412 (ST.42)
5	SICHERUNGSSTIFT	1	-372/5	SIS 2172 (ST.52)
6	VERSCHRAUBUNG	1	-372/6	SIS 1412 (ST.42)
7	AUGENBOLZEN	1	-372/7	SIS 2172 (ST.52)
8	ACHSE	2	371/4	SIS 2172 (ST.52)
9	ACHSE	1	372/8	-"- 2321 W.NR. 1.4057
10	SCHEIBE	1		ø110/50×20 f.z.v.
11	-"-	2		ø80/51×5 f.z.v.
12	-"-	8		ø52/31×5 f.z.v.
13	TELLERFEDER	10		40×20,4×1 DIN 2093
14	STEUERSCHRAUBE	2		T6SS M10×35 f.z.v.
15	MUTTER	2		M6M M10 f.z.v.
16	"	1		M6M M48×5 f.z.v.
17	SEEGER RING	4		A 30×1,5 DIN 471 f.z.v.
18	SPLINT	2		SP 10×80 f.z.v.
19	SCHMIERNIPPEL	4		DIN 3404 AM 10×1 f.z.v.
20				

Diese Zeichnung und alle dazugehörigen Unterlagen sind geistiges Eigentum der Jos. L. Meyer. Sie dürfen Dritten weder zugänglich gemacht noch in anderer Weise mitgeteilt werden. Widerhandlungen werden gemäß gerichtlich verfolgt.

Jos. L. Meyer

20 NOV. 1979

SHIPYARD: JOS. L. MEYER PAPENBURG	AUTOMATISCHE UND MANUELLE VERSCHLUSSANORDNUNGEN FÜR BUGKLAPPE
OWNER:	
SHIP: S 590 / DRAWN BY: T.K. / DATE: 79.10.03	
CLASS: B.V. / SCALE: 1:10, 1:5	
This document must not be copied without our written permission, and the contents thereof must not be imparted to a third party nor be used for any unauthorized purpose. Contravention will be prosecuted.	vonTell 49111-372

Enclosure 2.4.2.29

MATERIALLISTE

POS	BENENNUNG	ANZ	SKIZZE	MATERIAL TYP
1	VERSCHLUSSBOLZEN	1	49111-373/1	SIEHE DET.
2	STEUERGEHÄUSE FÜR VERSCHL. BOLZ.	1	-372/2	ROHR SIS 2172 (ST.5
3	VERSCHLUSSROHR	1	-373/2	-"- -"- -"- -"-
4	STEUERGEHÄUSE FÜR SICHERUNGSSTIFT	1	-372/4	SIS 1412 (ST.42)
5	SICHERUNGSSTIFT	1	-372/5	SIS 2172 (ST.52)
6	VERSCHRAUBUNG	1	-372/6	SIS 1412 (ST.42)
7	ACHSE	2	-371/4	SIS 2321 W.NR.140
8	SCHEIBE	8		ø 52/31×5 f.z.v.
9	TELLERFEDER	10		40×20,4×1 DIN 20
10	STEUERSCHRAUBE	2		T6SS M10×35 f.z
11	MUTTER	2		M6M M10 f.z.
12	SEEGER RING	4		A 30×1,5 DIN 471 f
13	SCHMIERNIPPEL	4		DIN 3404 AM 10×1 f

60151-1

'Viking Sally'

20 NOV. 1979

SHIPYARD: JOS. L. MEYER PAPENBURG	ATLANTIKSICHERUNG (UND EINWEISER)
OWNER:	
SHIP: 590 / DRAWN BY: T.K. / DATE: 79.10.03	
CLASS: B.V. / SCALE: 1:10, 1:5	
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Enclosure 2.4.2.30

Bureau Veritas

INTERNATIONALE GESELLSCHAFT FÜR DIE KLASSIFIKATION
VON SCHIFFEN UND LUFTFAHRZEUGEN SOWIE ABNAHME VON WERKSTOFFEN
UND INDUSTRIEERZEUGNISSEN

BUREAU VERITAS-DZB Hopfenmarkt 33 D 2000 Hamburg 11

von. Telk G.m.b.H.
Sophienallee 24.
2000 Hamburg 19.

COPIE

DEUTSCHES ZENTRALBÜRO
HOPFENMARKT 33
D 2000 HAMBURG 11

TELEFON 366937-59
TELEGRAMME: BUVER HAMBURG
TELEX: 2 15 426 BUV D

SECTION No. 35387.
Im Antwortschreiben bitte zu wiederholen

Hamburg, den 3 July. 1980.

NR TB 1002 S/DS

Betr.: Neubau 500 der Werft
Jos. L. Meyer, Papenburg.

Ihr Schreiben vom 30. April 1980.

Sehr geehrte Herren,

Sie erhalten in der Anlage die nachstehend aufgeführten Unterlagen mit unserem Sicht - bzw. Genehmigungsvermerk versehen zurück.

Mit freundlichen Grüßen!

Bureau Veritas
Deutsches Zentralbüro

Anlage:
49111 - 373 Atlantiksicherung
49111 - 372 Aut. u. man. Verschlüsse für Bughlappen.

Anzahl: je 2 x
Zu beachtende Bemerkungen: 1- rot

cc mit Anlagen: BV Oldenburg

BANK: DEUTSCHE BANK A.G. HAMBURG, ZWEIGST. MATTENTWIETE, KTO. 37/09664 (BLZ 200 700 00)

Enclosure 2.4.2.31

M/S "VIKING-SALLY"

OPERATION INSTRUCTIONS
SPARE PARTS SPECIFICATION
HYDRAULIC CYLINDERS

von Tell

Operation instructions for hydraulic and mechanical installations on board passenger ferry, yard No 590, built at Jos. L. Meyer, Papenburg, 1980.

The hydraulic and mechanical arrangements are constructed by VON TELL under manufacturing No 4911.1.

I. STERN RAMP page 4:19 - 6:19

1) Construction
2) Maintenance
3) Load capacity
4) Locking device
5) Operation
6) Control

II. BOW VISOR page 6:19 - 8:19

1) Construction
2) Maintenance
3) Locking device
4) Operation
5) Control

III. BOW RAMP page 8:19 - 9:19

1) Construction
2) Maintenance
3) Load capacity
4) Locking device
5) Operation
6) Control

IV. HANGING DECK page 9:19 - 11:19

1) Construction
2) Maintenance
3) Load capacity
4) Locking device
5) Operation
6) Control

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V. DRIVE-ON RAMPS page 11:19 - 14:19

1) Construction
2) Maintenance
3) Load capacity
4) Locking device
5) Operation
6) Control

For I - V in the operation instructions the position Nos in brackets (.) correspond to the hydraulic scheme 49111-801.

VI. PASSENGER BRIDGE page 14:19 - 15:19

1) Construction
2) Maintenance
3) Locking device
4) Operation
5) Control

VII. PASSENGER- AND PILOT DOORS page 15:19 - 16:19

1) Construction
2) Maintenance
3) Locking device
4) Operation
5) Control

For VI and VII in the operation instructions the position Nos in brackets (.) correspond to the hydraulic scheme 49111-802.

DRAWINGS

STERN RAMP, BOW VISOR AND BOW RAMP

49111-230, -260, -304, -330, -360, -361, -371, -372, -373

HANGING DECK, DRIVE-ON RAMPS

49111-101, -161, -162, -163, -164

PASSENGER BRIDGE, PASSENGER- AND PILOT DOORS

49111-781, -423, -426, -427, -428

HYDRAULIC

49111- 287, -387, -401, -785, -801, -802, -804, -805, -806, -821, -822, -823, -824, -825, -826, -827, -828, -830, -831, -871

+ all the hydraulic cylinders

+ 49111-502 Spare parts spec.

I. STERN RAMP (SB and PS)

1) Construction

Dimensions: L = 6500 mm
B = 5500 mm between the tracks

Weight: abt 11,5 tons

The fore-end part of the ramp is provided with 9 sloping flaps of 1,5 m length. Any sloping flap can be moved independent from the others in order to level the incline of the ramp to the quay in case of heeling of the ship (2 degrees max.). The ramp is pivoted to the ship with 4 hinges. The two outer hinges are pivoted with spherical bearings and the inner ones with bronze bushes. The axles are of stainless material.

The ramps are provided with fastenings for preventer stays.

2) Maintenance

All bearings without zerk fittings and sloping flaps must be lubricated with engine oil in space of about two weeks.

The cylinder bearing bolts are provided with zerk fittings type DIN 3404 AM 10 x 1. The lubricating point should be lubricated with seawater consistent grease under use of the grease gun in space of every four weeks.

The axles of the ramp bearings are equipped with "automatic" grease filler. The lifetime for these is 5-6 months. Control at regular intervals that the grease fillers are intact and have lubricant.

All piston-rods and cylinders should be covered during painting. Dry paint spirts upon the surface of the piston-rod would spoil the cylinder packings within short time, what means undesirable leakages.

Check all hoses, hose connections and pipe connections to prevent leakages. Damaged components should be replaced if necessary in order to avoid interruption.

The hose connections should be painted, but not the hydraulic hoses.

The rubber packings should be treated with Tellin or similar mixture containing graphite and tallow in order to reduce the wear of the rubber. When a defect rubber packing is going to be replaced the packing channel has to be sufficiently cleaned before the new packing is fitted with glue. von Tell UK 2 glue or glue of the same quality has to be used.

3) Load capacity

The ramp is constructed to carry an axle load of 18 tons at the distance between the axle of 1,3 m and the distance between the wheels of 2,0 m.

The star board ramp is provided with lugs for emergency operations, designed for normal load (axle load of 18 t).

4) Locking device

In closed position the ramp is locked by 3 wedges on each side and 2 hooks on the upper side. The wedges are operated by one hydraulic cylinder (11) on each side and each hook by one hydraulic cylinder (10).

The hooks on the upper side are first pressing the ramp into the rubber sealing frame and then the ramp is locked by the wedges.

The rubber packing is fixed with bolts.

The pressure reducing valves (32) (33) are reducing the pressure on the cleats, and the valves (28) and (29) are controlling the operating sequence of hooks and wedges.

5) Operation

For operation of the ramp, a hand-operated electric valve (17) is used which guides an operating valve (21) and a relief and by-pass valve (16). The operation itself of the ramp is carried out by two hydraulic cylinders (5) with spherical bearings. Two ice-breaking cylinders (8) assist the opening process. When the locking device of the ramp has been released the ice-breaking cylinders (8) are put under pressure to push the ramp outwardly. The ramp continues lowering by sole weight until it rests upon the quay. The control lever remains in lowering position all through the loading process in order to adjust the ramp inclining according to the actual depth of the quay. The lowering speed is adjustable by throttle non-return valves (40) at the cylinders (5). The throttles are to tune on parallel lowering of both sides. For closing the cylinder (5) is put under pressure and the ramp will close. Speed is adjusted by throttle valve (41). When the ramp is fully closed it is locked with hooks and wedges.

For the operation of the hydraulic cylinders for the hooks and the wedges a manual operating valve (24) is used. The speed is adjusted by the throttle valve (41).

The relief and by-pass valve (16) is reducing the pressure if the ramp is not correctly operated and one forgets to set the operating valve on "floating position", when the ramp rests upon the quay.

6) Control

Opening of the ramp

1) Start one of the pumps.

2) Close the ramp. The control lever will be in UPP position. (The pressure on the wedges is reduced.)

3) Open up the cleats. The control lever will be in position ÖPPNA until red lamp indicates ÖPPEN.

4) Lower the ramp. The control lever will be in position NER until the ramp is resting on the quay. The lever should remain on NER ("floating position") until the ramp will be closed.

5) Switch off the pump.

Closing of the ramp

1) Start one of the pumps.

2) Check that red lamp indicates ÖPPEN for the cleats. If not, open up the cleats.

3) Close the ramp. The control lever in position UPP until green lamp indicates UPPE.

4) Close the cleats. The control lever will be in position LÅSA until green lamp indicates LÅST.

5) Switch off the pump.

II. BOW VISOR

1) Construction

The visor has a weight of abt 54,5 tons and forms the W.T. front closure of the ship. The bow visor is pivoted at the upper deck. It opens in upward direction.

2) Maintenance

Under circumstances when temperature reaches 0° C or below check that the limit switches and other equipment on weather deck are not getting covered with ice. See also item I pos. 2).

3) Locking device (25)

In closed position the visor is locked by two locking pins which are operated by one hydraulic cylinder (12) each. As a reserve the visor can also be locked by two manually operated locking devices. There is also one hydraulic operated "atlantic locking device" (12).

In open position the bow visor is locked by 2 locking pins which are hydraulic operated with one hydraulic cylinder (12) each.

In closed position the rubber packing is compressed by the sole weight of the bow visor. The rubber packing is fixed with bolts.

4) Operation

For the operation of the bow visor a hand-operated electrical valve (pos 17) is used which is guiding an operating valve (19). An electrical blocking is built in to prevent faulty operation between bow visor and bow ramp.

The very operation of the visor is performed by two hydraulic cylinder (2) with spherical bearings. Two ice-breaking cylinders (8) assist the opening process when the visor starts opening. When the locking devices of the bow visor are released the ice-breaking- and operating cylinders are put under pressure and the visor will open. When the visor is fully opened it will be locked.

When lowering the bow visor the top of the cylinder will be put under pressure. In the bottom of the cylinder a valve (15) is fitted which is controlling the lowering when a pressure arises in the cylinder which is higher than the adjusting pressure of the valve. The lowering speed is adjustable by throttle non-return valves (39) and they should also be so adjusted that the cylinders get the same timing.

5) Control

Opening of the bow visor

1) Start both of the pumps.

2) Open the atlantic locking device and the cleats. Put the control levers (one by one) in position ÖPPNA until red lamp indicates ÖPPEN.

If the manual locking device has been used this has to be opened.

3) Check that the lamp for the locking devices indicates ÖPPEN. If not, open up the locking devices which are locked.

4) Open the bow visor. The control lever will be in position UPP until green lamp indicates UPPE.

5) Close the locking device. The control lever will be in position LÅSA until green lamp indicates LÅST.

6) Lower the bow visor and let it rest on the locking device in order to release the hydraulic pressure in the operating cylinder.

7) Switch off the pumps.

Closing of the bow visor

(Check that the bow ramp is closed and locked.)

1) Start the pumps.

2) Check that red lamp indicates ÖPPEN for cleats and the atlantic locking device. If not, open up the cleats and the atlantic locking device.

3) Open up the bow visor. (The load on the locking device is released.)

4) Open up the locking device. Put the control lever on ÖPPNA until red lamp indicates ÖPPEN.

5) Close the bow visor. The control lever will be in position NER until green lamp indicates NERE.

6) Lock the cleats. The control lever will be in position LÅSA until green lamp indicates LÅST.

7) If the atlantic locking device is going to be used this should also be locked.

8) Switch off the pumps.

III. BOW RAMP

1) Construction

Dimensions: L = 8225 mm
B = 5500 mm between the tracks

Weight: abt 12,1 tons

The fore-end part of the ramp is provided with 8 sloping flaps, which automaticly extend when the ramp is opening. Each sloping flap is working independently

from the others in order to compensate for the heeling of the ship (2 degrees max.)

The ramp is pivoted to the ship with 4 hinges. The two outer hinges are provided with spherical bearings and the two inner with bronze bushes. The axles are of stainless steel.

The ramp is equipped with fastenings for preventer stays.

2) Maintenance

See item I. pos. 2).

3) Load capacity

See item I. pos. 4).

4) Locking device

The side cleats consists of 2 hydraulic operated locking pins on each side of the ramp in contrast to the stern ramp which has hydraulic operated wedges. See also the stern ramp (item I).

5) Operation

On the bow ramp an electrical blocking is built in which is preventing faulty operation between bow visor and bow ramp. The bow ramp has no ice-breaking cylinders similar to the stern ramp. In other respects see the stern ramp (item I).

Note: The bow ramp must not be operated until the bow visor is fully opened and in locked position.

6) Control

See item I pos. 6).

IV. HANGING DECK

1) Construction

The hanging decks are constructed for the transport of passenger cars. They are laid out as installation of raisable car decks. The area of decks consists of all together 8 sections, L = 6 x 20 m + 2 x 18,4 m. The sections at port are B = 5,5 m - those at star board B = 8,5 m. At star board side the lowered decks rest

upon consols fixed to the ship. At the port side there are fixed supports to the ship side and towards the centre line of the ship hanging standers (folding standers) which can be folded. Lateral guide rollers prevent the decks to be bent out of line when manoeuvering to stowed position under C-deck.

On port side hanging deck there are hand rails mounted between the folding standers. These are automaticly folded together with the hanging standers when the deck is lifted up to stowed position.

2) See item I. pos. 2).

3) Load capacity

The decks can be loaded with vehicles with the max. load from each wheel of 400 kg, and be stowed close by close. The axle load of the single axle amount to maximum 800 kg. The star board side has the capacity of 4 lines of vehicles and the port side 2 lines.

4) Locking device (25)

In stowed position the hanging decks rest underneath the C-deck where they are locked by means of hooks which are hydraulic operated by hydraulic cylinders (14).

5) Operation (22)

Each section is suspended to four steel wire-ropes which are fixed to the C-deck. They are led over guide rollers to a hydraulic tackle-block in the hanging deck.

Each deck is furnished with a separate control stand with control valves. Over a control valve the deck can be lifted or lowered. The lifting speed and the opening- and closing speed for the locking hooks are adjustable by the installed throttle (41) at the control stand, while the lowering speed is to be adjusted by the throttle (40) at the cylinder (4) on star board and (7) on port side.

6) Control

Lifting of the hanging deck

1) Start one of the pumps (two pumps on P.S.).

2) Check that the red lamp indicates ÖPPEN for the locking device. If not, open up the locking device.

3) Lift the hanging deck to the stop. The control lever in position UPP.

4) Lock the locking device. The control lever will be in position LÅSA, until a green lamp indicates LÅST.

5) Lower the hanging deck to the locking arrangement in order to release the wires.

6) Switch off the pump.

Lowering of the hanging deck

1) Start one of the pumps.

2) Lift the hanging deck to the stop. The control lever in position UPP.

3) Open up the locking device. The control lever will be in position ÖPPNA until the red lamp indicates ÖPPEN.

4) Lower the hanging deck down to the consols. The control lever in position NER.

5) Switch off the pump.

V. DRIVE-ON RAMPS

1). Construction

The end parts of the hanging decks are equipped with drive-on ramps of length 19,8 m each. In horizontal position the decks are supported by folding supports and folding standers which are automaticly folded when the ramps are stowed underneath the C-deck. The supports are manually operated. When the ramp shall be brought into drive-on position from horizontal position the folding standers have to be unshackled. Folding supports for the horizontal position of the ramp are folded away and supports for the lowered position are folded out.

The folding stander for the drive-on position of the port side ramps will always be connected. It is placed on about half the length of the ramp towards the centre line of the ship and is folding in the longitudinal direction.

2) Maintenance

See item I. pos. 2).

3) Load capacity

The decks can be loaded with vehicles with the max. load from each wheel of 400 kg, and be stowed close by close. The axle load of the single axle amount to max. 800 kg. The star board side has the capacity of 4 lines,

and the port side 2 lines of vehicles.

The fully loaded ramps can be hydraulic lifted from drive-on position to horizontal position, where it is locked by folding standers and folding supports.

4) Locking device

See item IV. pos. 4).

5) Operation

For the lifting of the ramp from drive-on position to the horizontal position four points of suspensions are used. The points are connected 2 + 2 with wires, which are guided over a "sledge". The sledge is connected with wires to a hydraulic tackle-block which is placed at the side shell of the ship.

When the ramp is lifted from the horizontal to the stowed position underneath the C-deck the four lifting points mentioned above are used plus 2 more stations at the pivotting end of the ramp.

The control station consists of 3 operation valves:

1 for lifting the loaded ramp from drive-on position to the horizontal position, valve I (22),

1 for lifting the ramp from horizontal position to the stowed position, underneath the C-deck, valve II (22),

1 for the locking of the deck in stowed position (25).

A hydraulic limit switch stops the hydraulic oil to the operation cylinder, when the ramp reaches the horizontal position.

The lifting speed is adjusted by the valve (42) on S.B. (for P.S. it is full pump flow) and the opening- and closing speed of the locking arrangement by valve (41) at the control station. The lowering speed of the ramp is adjusted by a valve (40), which is placed at the bottom of the cylinder (1) S.B. and (3) P.S.

A relief valve (30) is built in in order to reduce the pressure, when the ramp is lifted up against the C-deck.

6) Control

The lifting of the drive-on ramp from the drive-on position to the horizontal position (star board ramp).

1) Start one of the pumps (two pumps on P.S.).

2) Check that the folding supports for the horizontal position are free.

3) Lift the ramp to the horizontal position. The control leverI in position UPP.

4) Connect the folding standers and extend the supports.

5) Lower the ramp so that it rests upon the folding standers and the supports. This will release the wires.

6) Switch off the pump.

Lowering

1) Start one of the pumps.

2) Extend the supports for the inclined position of the ramp.

3) Lift the ramp so that the folding standers and the supports will be free. The control lever I in position UP.

4) Release the folding standers and the supports.

5) Lower the ramp. The control lever I will be in position NER.

6) Switch off the pump.

Lifting of the ramp from the horizontal position to the stowed position.-

1) Start one of the pumps (two pumps on P.S.).

2) Fell the hand rails all way round the ramp.

3) Check that the folding standers are connected.

4) Check that the lamp for the locking arrangement indicates ÖPPEN. If not, open up the locking device.

5) Lift the ramp towards the stops. The control lever II in position UPP.

6) Lock the locking arrangement. Put the control lever in position LÅSA until the green lamp indicates LÅST.

7) Lower the ramp on the locking arrangement. This will release the wires. The control lever II will be in position NER.

8) Switch off the pump.

Lowering

1) Start one of the pumps.

2) Extend the supports for the horizontal position of the ramp.

3) Lift the ramp. The control lever II in position UPP.

4) Open up the locking arrangement. Put the control lever in position ÖPPNA, until red lamp indicates ÖPPEN.

5) Lower the ramp so that it is resting on the supports and folding standers. The control lever II in position NED.

6) Rise the hand rails all round the ramp.

7) Switch off the pump.

For the port side ramp the same operation will take part but this ramp has no folding supports in the inclined position.

VI. PASSENGER BRIDGE

1) Construction

For passenger traffic between the trunk in centre line and the port side hanging deck there are 2 passenger bridges. The bridges are designed by the yard and have the dimensions L X B = abt 6,2 x 1,2 m.

2) Maintenance

See item I. pos. 2).

3) Locking device (7)

The locking of the passenger bridge in lifted position toward the C-deck is arranged by locking devices at both ends. These are hydraulic operated (3).

4) Operation (11)

The lifting operation is arranged by wires, which are connected to a hydraulic tackle-block underneath the C-deck.

The lifting speed is controlled by the valve (9) and the opening- and closing speed of the locking arrangement by the valve (8). For the lowering speed there is a valve (9) which is situated at the bottom of the cylinder (5).

The pressure is reduced for the lifting cylinder by the valve (12).

5) Control

Lifting and lowering (one pump only)

See hanging deck IV, pos. 6)

I. PASSENGER- AND PILOT DOORS

1) Construction

The doors are installed on port side and star board side according to the following numbers and dimensions:

Passenger doors	4 pcs	2,5 x 2,0 m
Pilot doors	2 "	1,2 x 2,0 m

The passenger doors are opened in the aft directions and parallel to the ship side. The pilot doors are opened 90 degrees towards the centre line of the ship.

2) Maintenance

See item I, pos. 2).

3) Locking device (6)

The doors are locked to the ship by wedges, which are compressing the rubber packing in order to give a suitable sealing. The wedges are hydraulic operated (4).

4) Operation (6)

The passenger doors are operated by a hydraulic cylinder(1) and a link system, so that the doors will open parallel to the ship side.

The pilot doors are operated by a hydraulic cylinder (2), which gives the opening direction 90 degrees towards the centre line of the ship.

5) Control

Opening of the doors

1) Start the pump.

2) Release the security for the locking device.

3) Open the locking device. The control lever in position ÖPPNA, until red lamp is indicating ÖPPEN.

4) Open the doors. The control lever in position ÖPPNA.

5) Secure the door.

6) Switch off the pump.

Closing of the doors

1) Start the pump.

2) Check that the red lamp for the locking device indicates ÖPPEN. If not, open the locking device.

3) Release the security for the door.

4) Close the door. The control lever in position STÄNGA.

5) Lock the locking device. The control lever will be on LÅSA until green lamp is indicating LÅST.

6) Secure the locking device.

7) Switch off the pump.

PUMPSTATIONS

There are 3 pumpstations, 2 big ones and 1 small one. The working pressure for the big ones is about 250 bar and for the small one about 150 bar.

1 big pumpstation is placed in the stern part on star board side and is serving the port side stern ramp, the port side drive-on ramps, the port side hanging decks. Drawing No 49111-804,

1 big pump station in the fore part on port side is serving the bow visor, the bow ramp, the star board stern ramp, the drive-on ramps on star board and the star board hanging decks. Drawing No 49111-805.

1 small pumpstation placed in the midship trunk is serving 2 pilot doors, 4 passenger doors and 2 passenger bridges on port side. Drawing No 49111-806.

The big pumpstations consist of 1 oil tank each containing 900 ltrs. The tanks should be filled up to the maximum level only, to be able to receive oil from the other system by emergency operation.

In the pumpstation there are 3 pumps. Normally when the system is operating only two pumps, sometimes only one, should be in service. If the system is served by two pumps instead of one, this will make no difference in capacity as volume limiting valves will protect the hydraulic components. The only disadvantage is that the oil will be warm quicker.

All the pumps should be regularly changed so that all pumps will be frequently used in service. The third pump should be used as a reserve if one of the other pumps is out of order.

The hydraulic system is connected parallally and the pumps are pressure compensated axial piston pumps which deliver only that quantity of oil requiring on every occasion. Required quantity at every user is adjusted with throttle valves. The max. working pressure of the pumpstation is adjusted on the valve (17); this valve is adjusted at delivery and must afterwards not be altered. The valve (18) is a safety valve which is normally not in function but only comes into effect when the pressure exceeds the valid max. working pressure.

The pumpstation is equipped with a level control unit which protects the pumps from breaking down, if the oil reaches a level which is too low.

At the aft pumpstation there is a hydraulic lift connected.

For position No. in brackets ( ) see drawings Nos 49111-804, -805.

The small pumpstation consists of 2 pumps and an oil tank containing 150 ltrs. Normally when the system is operating one pump is working and the other is used as a reserve.

The hydraulic system is connected parallelly. In order to reduce the pressure in the system, when no item is to be served, a hydraulic relief valve (11) will make the oil circulate to the tank. To stop the valve from opening and closing too frequently an accumulator (17) is connected. To reduce the pressure completely, for instance when repairing, a shut-off valve (17) will be opened.

For position No. in brackets ( ) see drwg No 49111-806.

For the service and maintenance of the accumulators see the recommendations from the manufacturer.

Hydraulic oil

Check the oil level of the tank in regular intervals.

Check also the oil cleaner in regular intervals to protect from interruption of the service. Dismantle the filter to check that the filter is intact.

Check the oil in regular intervals and change it according to the recommendations from the oil supplier.

Use NYNÄS TD-17 HVX (Visga 22).

Oil from different manufacturers may not be mixed.

When the filter has to be changed, it is of great importance to be careful when refilling or repairing the system in order to prevent dirt in the hydraulic system.

Emergency, "cross-over", for the big pump stations only

If a pumpstation is put out of operation the other pumpstation can be connected. The two shut-off valves (Avstängningsventiler för "Cross-over körning", orange coloured) of the pumpstation which do not work will then be switched off. Then the "cross-over" between the two hydraulic systems will be opened by the two shut-off valves (Huvudventiler för "Cross-over körning", orange coloured) which are situated in the aft pumpstation, drwg No, 49111-804. The operating time will be slightly longer, if the pumpstation aft is used to serve the forward system. This is valid for the bow visor and drive-on ramps on S.B.

Check the oil level in the tank carefully. Before the pumpstation which broke down, is going to be used again, the items which wereserved before the breaking down, should be in the same positions again in order to put the oil levels of the tanks back to normal. Before going back to normal service don't forget to reset all the shut-off valves for the "cross-over".

von Tell

19:19

SPARE PARTS

When ordering spare parts the following data must be specified:

1) The name of the ship: M/S "VIKING-SALLY"
2) Yard and newbuilding No.: Jos. L. Meyer, Papenburg, No. 590
3) Number, symbol and drawing No.
4) Delivery address.
5) Delivery time.

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Bureau Veritas

Marine Departments

Enclosure 2.4.3.32

Register no: 35P387

REQUEST FOR CLASSIFICATION

The undersigned builder Jos. L. Meyer (1), requests BUREAU VERITAS to proceed with the operations required by their Rules for the purpose of obtaining the classification (2) under special survey of the hull and of the propelling machinery of the ship (3) newbuilding S 590

Class completed (4):

Classification symbols: I 3/3 E

Construction survey mark

and Service notation(s): ☒ passenger ferry

Navigation notation(s): deep sea

Additional mark(s):

Ice Class I A (AUT)

Type and Service: Passenger- and car ferry

Flag: Finish

District where built: Hamburg - sub-district Oldenburg

In making this request the undersigned agrees to comply with the requirements of the Rules of BUREAU VERITAS and in particular of the General Conditions given hereunder.

September 27, 1979

Jos. L. Meyer

Demande de surveillance reçue

GENERAL CONDITIONS OF BUREAU VERITAS

Article I. – Bureau Veritas is a Society established for the purpose of undertaking the Classification of Ships and Autoratts of all categories, the inspection of Materials and equipment as well as supervision and survey reports of construction of Buildings and General Civil Engineering.

Bureau Veritas publishes Construction Regulations and Classification Registers, and issues Certificates, Attestations, Reports or similar Documents which result from its interventions.

Article II. – Requests for interventions shall, as a rule, be submitted in writing. They entail, for the requesting party, the obligation to comply with the Regulations published by Bureau Veritas, as such regulations may exist, except for agreements covering specific cases, and the acceptance without reservation of the present General Conditions and of any special conditions which may be attached thereto.

Bureau Veritas alone is qualified to apply and to interpret its own Regulations.

Any reference to their Regulations connected with other application is strictly forbidden if it does not imply the intervention of Bureau Veritas which is necessary and obligatory.

Article III. – Bureau Veritas does not act as Underwriter, Consulting Engineer, Architect or Naval Architect, nor as Builder or Contractor, and cannot assume the responsibilities inherent to such functions even though the experience of the Society enables it to answer inquiries concerning matters not covered by its own Regulations. Also it cannot act in substitution for Constructional or Engineering Works or Contractors, who retain their full responsibility, whatever its nature may be, notwithstanding the intervention of Bureau Veritas nor can the Society act in lieu of the competent National Authorities, even where legal texts make reference to, name or not, to Bureau Veritas.

The intervention of Bureau Veritas, carried out either in accordance with its own Regulations or according to standards, specifications or similar documents explicitly called for, or at the request of the sponsors of the Society as expressed by the symbols or marks of Classification, Certificates, Attestations, Reports or similar documents, shall not in any case relieve the responsibility of the Society.

Although the utmost care is taken in the drafting of Bureau Veritas publications, particularly in respect to the Register, the Society declines any responsibility for errors or omissions which may be found therein, or in the Certificates, Attestations, or Reports drawn up by its Services or by its Surveyors, and which may be made the subject of observations by the parties concerned. Furthermore, Bureau Veritas declines any responsibility for errors of judgment, mistakes or negligence which may be committed by its technical or administrative staff or by its Agents, in the preparation of such documents and in the performance of the interventions which they cover, nor shall the responsibility of the staff be involved.

Article IV. – Any intervention by representatives of Bureau Veritas whatever may be its nature, and whether it is completed or incomplete for any cause whatsoever, shall entail the payment or fees in accordance with the importance of the services rendered, and the reimbursement of expenses incurred.

The attribution or maintenance of Classification marks, the entry in or Registers, the issuance of Certificates, Attestations and Reports or similar documents, entail the acceptance of the corresponding invoices.

Article V. – Should a technical disagreement arise between the requesting party and the Representative of Bureau Veritas, the Administration, at the request of the interested party, can refer another of its Experts.

Article VI. – All disputes shall come under the exclusive jurisdiction of the Paris Courts, including the case of an appeal under a guarantee or of forced intervention also in the case of a dispute of solidarity.

(1) Builder or owner.
(2) Under special survey, under ordinary survey or after construction.
(3) Name of ship or yard number.
(4) See Chapter 1 of Rules. Select Marks and notations from current Rules edition.

DESCRIPTION OF THE SHIP

Hull No. or Ship's Name S 590 Flag SF

Owner's Name A-B SALLY, MARIEHAM, FINLAND.

Shipyard's Name Jos. L. Meyer

Schedule (1) Keel laying Launching 3 - 80 Delivery 6 - 80

HULL

Length (BP) 137,4 m Breadth (M) 24,20 m Depth (M) 7,65 m Draught 5,55 m

Gross tonnage (approx.) Deadweight (MT or LT)

Type of Ship Passenger- und car ferry Material hull steel-

PROPULSION MACHINERY

No., Type, Model and Licence 4 x, 8 L 40/45, je 4400 kW built by MAN, Augsburg

No., Type, Model and Licence built by

Total power 17.600 KW (23936 BHP) at 600/188,5 rpm

Number of tailshafts 2

AUXILIARY MACHINERIES

No., Type, Model and Licence 4 x, 6 S 28 LU, je 1104 kW built by B + W, Holeby/DK

No., Type, Model and Licence built by

No., Type, Model and Licence built by

Total power 4416 KW (6000 BHP) at 750 rpm

ELECTRIC INSTALLATION (AUT)

No. and Type of Generator KW or KVA Total

BOILER

Main, No.: Type Hamburg - sub-district Oldenburg

Pressure (bar) Heating Surface (m²) Steam Production (t/h)

Auxiliary, No.: Type Thermalöl- Kesselanlage 2 x Glgef. je 2.800 Mcal/h

Auxiliary, No.: Type 4 x Abgaskessel je 1.100 Mcal/h

Pressure (bar) Heating Surface (m²) Steam Production (t/h)

RMC:

AUT: (AUT)

Certificates to be issued by the Society (on behalf of National Authorities):

Loadline: [ ] [x] Other:

Statutory [ ] [ ] Safety Construction [ ] [ ] Safety Equipment [ ] [ ] Safety Radio Other:

Tonnage [ ] [ ] National [ ] [ ] Suez canal [ ] [ ] Panama canal

Cargo Gear documents [ ] [ ] ____ x ____ t. ____ x ____ t.

Please fill in this "minimum information required" for data processing

BUREAU VERITAS

Enclosure 2.4.3.33

INTERNATIONAL REGISTER FOR THE CLASSIFICATION OF SHIPPING AND AIRCRAFT

APPLICATION FOR AN INTERNATIONAL FREEBOARD CERTIFICATE OR FOR AN INTERNATIONAL LOAD LINE EXEMPTION CERTIFICATE WITHIN THE SCOPE OF THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966

The undersigned, ~~owner~~/builder (1) of the vessel described below, hereby applies to the Administration of BUREAU VERITAS for an international freeboard/~~load line exemption~~ certificate ~~with~~/without (1) the special marks for the stowage of timber deck cargo :

Name of ship / Hull No (1) : S. 590 "Vixing Sally"

~~owned by~~/being built for (1) : Roderi A.B. Sally, Marieham, Finland

Port of Registry : Marieham, Finland

Classification { class symbols: I 3/3 +
Marks and notations: Deep Sea Ice A

Length (L) measured in compliance with Article 2 (8) : 138.13 m

Type of ship (1) : type A, type B, type B with reduced freeboard, type B with increased freeboard.

The Certificate is to be set up in compliance with Attachment 1 or with Article 6 of the International Convention on Load Lines, 1966.

The documents listed overleaf are appended to the present application.

The undersigned undertakes to comply with the « General Conditions of BUREAU VERITAS » as quoted below.

Place, date and signature :

Papenburg, 21st April 1980
Jos. L. Meyer

Section No. : 35387

GENERAL CONDITIONS OF BUREAU VERITAS.

ARTICLE I. — Bureau Veritas is a Society established for the purpose of undertaking the Classification of Ships or Aircrafts of all categories, the inspection of Materials and equipment as well as supervision and survey reports of construction of Buildings and General Civil Engineering.

Bureau Veritas publishes Construction Regulations and Classification Registers, and issues Certificates, Attestations, Reports or similar Documents which result from its Interventions.

ARTICLE II. — Requests for interventions shall, as a rule, be submitted in writing. They entail, for the requesting party, the obligation to comply with the Regulations published by Bureau Veritas, as such regulations may exist, except for agreements covering specific cases, and the acceptance without reservation, of the present General Conditions and of any special conditions which may be attached thereto.

Bureau Veritas alone is qualified to apply and to interpret its own Regulations.

Any reference to these Regulations connected with their application is strictly forbidden if it does not imply the intervention of Bureau Veritas, which is necessary and obligatory.

ARTICLE III. — Bureau Veritas does not act as *Underwriter*, Consulting Engineer, Architect or Naval Architect, nor as Builder or Contractor, and cannot assume the responsibilities inherent to such functions, even though the experience of the Society enables it to answer enquiries concerning matters not covered by its own Regulations. Also it cannot act in substitution for Constructional or Engineering Works or Contractors, who retain their full responsibility, whatever its nature may be, notwithstanding the intervention of Bureau Veritas, nor can the Society act in lieu of the competent National Authorities, even where legal texts make reference by name or not, to Bureau Veritas.

The interventions of Bureau Veritas, carried out either in accordance with its own Regulations or according to standards, specifications or similar documents explicitly called for, or alternatively, the opinions of the Society as expressed by the symbols or marks of Classification, Certificates, Attestations, Reports or similar documents, shall not in any case, involve the responsibility of the Society.

Although the utmost care is taken in the drafting of Bureau Veritas publications, particularly in respect to the Register, the Society declines any responsibility for errors or omissions which may be found therein, or in the Certificates, Attestations, or Reports drawn up by its Services or by its Surveyors, and which may be made the subject of observations by the parties concerned. Furthermore, Bureau Veritas declines any responsibility for errors of judgement, mistakes or negligence which may be committed by its technical or administrative staff or by its Agents, in the preparation of such documents and in the performance of the interventions which they cover, nor shall the responsibility of the staff be involved.

ARTICLE IV. — Any intervention by representatives of Bureau Veritas, whatever may be its nature, and whether it is completed or incomplete for any cause whatsoever, shall entail the payment of fees in accordance with the importance of the services rendered, and the reimbursement of expenses incurred.

The attribution or maintenance of Classification marks, the entry in the Register, the issuance of Certificates, Attestations and Reports or similar documents, entail the acceptance of the corresponding invoices.

ARTICLE V. — Should a technical disagreement arise between the requesting party and the Representative of Bureau Veritas the Administration may, at the request of the interested party, designate another of its Experts.

ARTICLE VI. — All disputes shall come under the exclusive jurisdiction of the Paris Courts, including the case of an appeal under a guarantee, or of forced intervention also in the case of a plurality of defendants.

(1) delete where not applicable.

Med. Ad. E 542 a - 5000-3-74

N° 2/2

APPENDED DOCUMENTS (2)

1-fold	Freeboard-Report	
6-fold	Draw.	02/2
6-fold	Draw.	02/3
6-fold	Draw.	02/6
6-fold	Draw.	02/19
6-fold	Draw.	61/1
6-fold	Draw.	61/3

(2) For a newbuilding, a drawing is to be appended to the present application showing the principal dimensions of the ship as well as the basic data needed for the calculation of the preliminary freeboard. Additional information may be obtained trough BUREAU VERITAS Surveyors regarding this drawing.

For a type A ship or for a type B ship with reduced freeboard, a special questionnaire entitled «Data required for the study of subdivision and stability after damage» is to be appended to the present application. The questionnaire may be obtained through BUREAU VERITAS Surveyors.

Where a ship is to carry special marks for timber deck cargo, a drawing showing the stowage arrangements for the timber deck cargo is to be further appended to the present application.

BV - Rules 1977
in force 1980

16 - It is recommended to protect side doors against shocks which can result of cargo mistowage (for instance by use of a net or cables). To be efficient, protection devices re to be at so me distance of the door.

2 - Bow and stern doors

21 - When the ship is equipped with a bow door, to allow access to garage, the collision bulkhead must have a removable part. This design is acceptable only above freeboard deck and only if the removable part has a watertightness and a strength equivalent to these of fixed rule bulkhead.

A movable access ramp may be used for this purpose.

22 - Scantlings of plating and stiffeners of a bow door are to be equivalent to those of adjacent shell structure.

23 - Thickness of a stern door plating is not to be less than :

$$e = 4,75E\sqrt{h}$$

Section modulus of stiffeners is not to be less than :

$$w = 7,7hEl^2$$

where value of h is calculated in 11-42.25.

24 - If stern door is used as access ramp for vehicles, it has also to be checked that scantlings of plating and stiffeners comply with rules of 11-43.

3 - Securing of doors

31 - Doors and screen-doors have to be firmly secured by use of cleats conveniently spaced or other similar devices.

Particularly, it has to be provided one of these devices at each corner of opening.

Structure reinforcements have to be realised on door and adjacent shell plating to attached points of cleats, hinges, jacks, etc.

32 - If door opens to inside of ship, securing devices have to be scantled in way to resist at a load height, in metres, equal to value calculated in 11-42.2.

35P387 DRAWINGS LIST

DRWG N°	HULL N°	DRWG DATE	TITLE	REVIEW	DATE	LOCATION	
02 1	590	28.05.1980	GENERAL ARRANGEMENT				MEYER
49 111 201	590	28.09.1979	HECKRAMPE B.B.	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 202	590	01.10.1979	HECKRAMPE ST.B. (MIT NOTBETATIGUNGSAUGE)	APPROUVE	01.10.1979	HAMBOURG	VON TELL
49 111 203	590	28.09.1979	DETAILS FUR HECKRAMPE ST.B. U BB	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 204	590	04.10.1979	DETAILS FUR HECKRAMPE (VON TELL UEFERUNG WO NICHTS ANDERS GESAGT	APPROUVE	04.10.1979	HAMBOURG	VON TELL
49 111 250	590	03.10.1979	HECKRAMPEN ZUSAMMENSTELLUNG	VU	05.11.1979	HAMBOURG	VON TELL
49 111 260	590	27.09.1979	HYDRAULISCHE VERSCHLUSSANORDNUNG HECKRAMPE ST	VU	05.11.1979	HAMBOURG	VON TELL
49 111 413	590	09.10.1979	SHELL PORT FOR PILOT	APPROUVE	06.11.1979	HAMBOURG	VON TELL
49 111 428	590	30.11.1979	ERECTION OF PILOT PORT WITH HYDR JACK	VU	05.11.1979	HAMBOURG	VON TELL
49 111 427	590	23.11.1979	HYDR. SECURING CLEAT ARR. FOR PILOT SHELL PORT	VU	06.11.1979	HAMBOURG	VON TELL
49 111 412	590	28.08.1979	SHELL PORT FOR PASENGER	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 426	590	30.09.1979	ARR. OF HYDRAULIC SECURING CLEAT FOR PASSENGER SHELL PORT	VU	05.11.1979	HAMBOURG	VON TELL
32 04 1	590	29.08.1979	HAKEN	VU	05.11.1979	HAMBOURG	VON TELL
1321	590	11.09.1979	DOPPELBODEN SPT.23-32	APPROUVE	06.11.1979	HAMBOURG	MEYER
1322	590	11.09.1979	DOPPELBODEN SPT.33-43	APPROUVE	07.11.1979	HAMBOURG	MEYER
1323	590	11.09.1979	DOPPELBODEN SPT.43-53	APPROUVE	06.11.1979	HAMBOURG	MEYER
1331	590	11.09.1979	DOPPELBODEN SPT.54-64	APPROUVE	06.11.1979	HAMBOURG	MEYER
1332	590	11.09.1979	DOPPELBODEN SPT.65-75	APPROUVE	06.11.1979	HAMBOURG	MEYER
1333	590	11.09.1979	DOPPELBODEN SPT.76-86F	APPROUVE	06.11.1979	HAMBOURG	MEYER
1334	590	20.09.1979	DOPPELBODEN SPT.86G-86S	APPROUVE	06.11.1979	HAMBOURG	MEYER
1335	590	25.09.1979	DOPPELBODEN SPT.86T-98	APPROUVE	06.11.1979	HAMBOURG	MEYER
1341	590	18.09.1979	DOPPELBODEN SPT.87-97	APPROUVE	06.11.1979	HAMBOURG	MEYER
1342	590	18.09.1979	DOPPELBODEN SPT.98-108	APPROUVE	06.11.1979	HAMBOURG	MEYER
1343	590	18.09.1979	DOPPELBODEN SPT.109-119	APPROUVE	06.11.1979	HAMBOURG	MEYER
1351	590	17.09.1979	DOPPELBODEN SPT.120-135	APPROUVE	06.11.1979	HAMBOURG	MEYER
1832	590	11.09.1979	HILFSMASCH FUNDAMENTE	APPROUVE	06.11.1979	HAMBOURG	MEYER
1831	590	11.09.1979	FUNDAMENT HAUPTMOTOR	APPROUVE	06.11.1979	HAMBOURG	MEYER
1621	590	15.10.1979	QUERSCHOTT SPT.33	APPROUVE	09.11.1979	HAMBOURG	MEYER
1622	590	13.09.1979	QUERSCHOTT SPT.43	APPROUVE	09.11.1979	HAMBOURG	MEYER
1623	590	13.09.1979	QUERSCHOTT SPT.53	APPROUVE	09.11.1979	HAMBOURG	MEYER
1631	590	13.09.1979	QUERSCHOTT SPT.71	APPROUVE	09.11.1979	HAMBOURG	MEYER
1632	590	05.10.1979	QUERSCHOTT SPT.80E/86H UND LANGSSCHOTT 690GA M.SPT.80E-90H	APPROUVE	09.11.1979	HAMBOURG	MEYER
1633	590	05.10.1979	QUERSCHOTT 80R	APPROUVE	09.11.1979	HAMBOURG	MEYER
1634	590	08.10.1979	QUERSCHOTT SPT.85	APPROUVE	09.11.1979	HAMBOURG	MEYER
1641	590	25.09.1979	QUERSCHOTT SPT.93	APPROUVE	09.11.1979	HAMBOURG	MEYER
1642	590	03.10.1979	QUERSCHOTT SPT.110	APPROUVE	09.11.1979	HAMBOURG	MEYER
1643	590	02.10.1979	QUERSCHOTT SPT.120	APPROUVE	09.11.1979	HAMBOURG	MEYER
1526	590	18.10.1979	A-DECK SPT.43-53	APPROUVE	14.12.1979	HAMBOURG	MEYER
1534	590	15.10.1979	A-DECK V. SPT.54-64	APPROUVE	14.12.1979	HAMBOURG	MEYER
1535	590	17.10.1979	A-DECK VON SPT.65-75	APPROUVE	14.12.1979	HAMBOURG	MEYER
1431	590	12.09.1979	AUBENHAUT V. SPT.54-64 V. DOPPELBOTEN -A- DECK	APPROUVE	14.12.1979	HAMBOURG	MEYER
1432	590	13.09.1979	AUBENHAUT VON SPT.65-75 VON DOPPELBODEN BIS A-DECK	APPROUVE	14.12.1979	HAMBOURG	MEYER
1523	590	23.10.1979	ZWISCHENDECK SPT.43-54	APPROUVE	14.12.1979	HAMBOURG	MEYER
1531	590	14.09.1979	ZWISCHENDECK SPT.54-64	APPROUVE	14.12.1979	HAMBOURG	MEYER
1532	590	14.09.1979	ZWISCHENDECK SPT.65-75	APPROUVE	14.12.1979	HAMBOURG	MEYER
1212	590	13.09.1979	HINTERSCHIFF SPT.10-23	APPROUVE	14.12.1979	HAMBOURG	MEYER
1524	590	20.10.1979	A-DECK VON SPT.24-32	APPROUVE	14.01.1980	HAMBOURG	MEYER
1525	590	17.09.1979	A-DECK VON SPT.33-42	APPROUVE	21.12.1979	HAMBOURG	MEYER
1536	590	19.09.1979	A-DECK VON SPT.76-86F	APPROUVE	21.12.1979	HAMBOURG	MEYER

DRWG N°	HULL N°	DRWG DATE	TITLE	REVIEW	DATE	LOCATION	
1538	590	02.10.1979	A-DECK VON SPT.50G-66	APPROUVE	19.11.1979	HAMBOURG	MEYER
1544	590	10.10.1979	A-DECK VON SPT.67-97	APPROUVE	19.11.1979	HAMBOURG	MEYER
1545	590	12.10.1979	A-DECK SPT.98-108	APPROUVE	19.11.1979	HAMBOURG	MEYER
1546	590	20.10.1979	A-DECK VON SPT.109-119	APPROUVE	19.11.1979	HAMBOURG	MEYER
1552	590	07.11.1979	A-DECK SPT.120-135	APPROUVE	14.01.1980	HAMBOURG	MEYER
1521	590	30.10.1979	ZWISCHENDECK SPT.24-32	APPROUVE	14.01.1980	HAMBOURG	MEYER
1522	590	29.10.1979	ZWISCHENDECK V. SPT.33-42	APPROUVE	21.12.1979	HAMBOURG	MEYER
1533	590	14.09.1979	ZWISCHENDECK V. SPT.76-80F	APPROUVE	21.12.1979	HAMBOURG	MEYER
1537	590	27.09.1979	ZWISCHENDECK SPT.50G-66	APPROUVE	19.11.1979	HAMBOURG	MEYER
1541	590	04.10.1979	ZWISCHENDECK SPT.67-97	APPROUVE	19.11.1979	HAMBOURG	MEYER
1543	590	09.10.1979	ZWISCHENDECK SPT.109-119	APPROUVE	19.11.1979	HAMBOURG	MEYER
1551	590	03.11.1979	ZWISCHENDECK V. SPT.120-135 KOFFERDAMM DECK V. SPT.120-135	APPROUVE	14.01.1980	HAMBOURG	MEYER
3590 587 1	590	22.11.1979	5. DECK (D. DECK)	APPROUVE	10.01.1980	HAMBOURG	AG "WESER"
3590 587 2	590	09.10.1979	6. DECK (E. DECK)	APPROUVE	10.01.1980	HAMBOURG	AG "WESER"
3590 587 3	590	28.11.1979	7. DECK (F. DECK)	APPROUVE	10.01.1980	HAMBOURG	AG "WESER"
3590 587 4	590	24.11.1979	8.(G)DECK	APPROUVE	10.01.1980	HAMBOURG	AG "WESER"
3590 587 5	590	19.11.1979	9.(H)DECK	APPROUVE	11.01.1980	HAMBOURG	AG "WESER"
3590 531 1A	590	20.11.1979	AUBENHAUT 4-7 DECK SPT.6-75 1/2	APPROUVE	10.01.1980	HAMBOURG	AG "WESER"
3590 531 2	590	1979	AUBENHAUT 4-7 DECK SPT.75 1/2-139	APPROUVE	10.01.1980	HAMBOURG	AG "WESER"
1421	590	12.09.1979	AUBENHAUT SPT.23-32	APPROUVE	14.01.1980	HAMBOURG	MEYER
1422		22.10.1979	AUBENHAUT V. SPT.33-43 V. DOPPELBODEN BIS A-DECK	APPROUVE	21.12.1979	HAMBOURG	MEYER
1423		13.09.1979	AUBENHAUT SPT.43-53 VON TANKDECK BIS A-DECK	APPROUVE	21.12.1979	HAMBOURG	MEYER
1433		13.09.1979	AUSSENHAUT V. SPT.50F V. DOPPELBODEN BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1436		21.09.1979	AUSSENHAUT V. SPT.50G-66 V.DOPPELBODEN BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1441		29.11.1979	AUBENHAUT VON SPT.67-97 VON DOPPELBODEN BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1442		15.09.1979	AUBENHAUT SPT.98-108 VON TANKDECK BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1445		15.09.1979	AUBENHAUT SPT.119	APPROUVE	29.11.1979	HAMBOURG	MEYER
1451		19.09.1979	AUBENHAUT SPT.120-135 V. TANKDECK BIS A-DECK	APPROUVE	14.01.1980	HAMBOURG	MEYER
1102		05.10.1979	VORSCHIFF SPT.139-148	APPROUVE	04.12.1979	HAMBOURG	MEYER
588 289		24.10.1979	KA ME WA - STEUERPROPELLER 2000/AS-CP/736KW - 1650/AS-CP/590KW INSTALLATION	VU	09.04.1980	HAMBOURG	K.M.W.
900 200-1/2		05.05.1976	KA ME WA - STEERING PROPELLER 1650/AS - CP/590KW SAMMANSTALLNING ASSEMBLY	VU	09.04.1980	HAMBOURG	K.M.W.
900 200-2/2		05.05.1976	KA ME WA - STEERING PROPELLER 1650/AS - CP/590KW SAMMANSTALLNING ASSEMBLY	VU	09.04.1980	HAMBOURG	K.M.W.
900 297		05.10.1977	WELDING OF PROPELLER UNIT	APPROUVE	09.04.1980	HAMBOURG	K.M.W.
587480-1/2		11.11.1974	STEERING PROPELLER	VU	09.04.1980	HAMBOURG	K.M.W.
587 480-2/2		03.12.1976	STEERING PROPELLER	VU	09.04.1980	HAMBOURG	K.M.W.
531 398		09.02.1972	WELDING OF PROPELLER UNIT	APPROUVE	09.04.1980	HAMBOURG	K.M.W.
3590 531-2B		17.10.1979	FRONTWAND SPT.139	APPROUVE	15.02.1980	HAMBOURG	K.M.W.
1851	590	14.11.1979	QUERSCHOTT SPT.132-133 TANKLANGSWAND V. SPT.120-132	APPROUVE	15.02.1980	HAMBOURG	MEYER
1841	590	11.10.1979	EINBAUWANDE A. D. TANKDECKE	APPROUVE	15.02.1980	HAMBOURG	MEYER
1822	590	03.01.1980	EINBAUWANDE AUF DEM ZWISCHENDECK SPT.23-133	APPROUVE	15.02.1980	HAMBOURG	MEYER
1412	590	14.11.1979	AUBENHAUT A-C-DECK SPT.2 BIS 66	APPROUVE	15.02.1980	HAMBOURG	MEYER
1444	590	20.11.1979	AUBENHAUT SPT.67-139 A-BIS C-DECK	APPROUVE	15.02.1980	HAMBOURG	MEYER
1211	590	17.09.1979	HINTERSCHIFF HINTEN SPT.9	APPROUVE	18.04.1980	HAMBOURG	MEYER
3590 561 1C		10.12.1979	4. (C) - DECK	APPROUVE	05.05.1980	HAMBOURG	AG "WESER"
1053	590	17.04.1980	VERSTARHG. UNT. 4. DECK	APPROUVE	05.05.1980	HAMBOURG	MEYER
1823	590	03.11.1979	SCHACHTWANDE AUF DEM A-DECK VON SPT.23-64	APPROUVE	05.05.1980	HAMBOURG	MEYER
1843	590	05.11.1979	SCHACHTWANDE AU DEM A-DECK VON SPT.65 BIS 86	APPROUVE	05.05.1980	HAMBOURG	MEYER
1853	590	12.11.1979	SCHACHTWANDE AUF DEM A-DECK VON SPT.87-120	APPROUVE	05.05.1980	HAMBOURG	MEYER
1411	590	11.12.1979	HINTERSCHIFF SPT.2 BIS HINTEN VON A-DECK BIS C-DECK	APPROUVE	05.05.1980	HAMBOURG	MEYER

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1028	590	24.09.1979	STUTZENPLAN	VU	02.07.1980	HAMBOURG	MEYER
1003	590	30.01.1980	AUBENHAUTABWICKLUNG	APPROUVE	25.06.1980	HAMBOURG	MEYER
1022	590	16.06.1980	STAHLPLAN D-IE-IF-IG-DECK	APPROUVE	25.06.1980	HAMBOURG	MEYER
1023	590	16.06.1980	STAHLPLAN TD, A-IB-IC-DECK	APPROUVE	25.06.1980	HAMBOURG	MEYER
4110	590	15.09.1979	RUDER	APPROUVE	18.04.1980	HAMBOURG	MEYER
4115	590	30.10.1979	RUDERSCHAFT FINGERLING UND ZUBENOR	APPROUVE	18.04.1980	HAMBOURG	MEYER
4120	590	15.10.1979	RUDERSCHAFTS UND FINGERLINGS ABDICHTUNG	APPROUVE	17.04.1980	HAMBOURG	MEYER
11119445		25.05.1993	STRUCTURAL ARRANGEMENT (VM200)	APPROUVE	06.12.1993	COPENHAGUE	BROWN BROTHERS
1451		19.09.1979	AUBENHAUT SPT.120-135 V. TANKDECK BIS A-DECK	APPROUVE	14.01.1980	HAMBOURG	MEYER
1442		15.09.1979	AUBENHAUT SPT.98-108 VON TANKDECK BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1441		29.11.1979	AUBENHAUT VON SPT.67-97 VON DOPPELBODEN BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1445		15.09.1979	AUBENHAUT SPT.119	APPROUVE	29.11.1979	HAMBOURG	MEYER
1436		21.09.1979	AUSSENHAUT V. SPT.50G-66 V.DOPPELBODEN BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1433		13.09.1979	AUSSENHAUT V. SPT.50F V. DOPPELBODEN BIS A-DECK	APPROUVE	29.11.1979	HAMBOURG	MEYER
1432	590	13.09.1979	AUBENHAUT VON SPT.65-75 VON DOPPELBODEN BIS A-DECK	APPROUVE	14.12.1979	HAMBOURG	MEYER
1431	590	13.09.1979	AUBENHAUT V. SPT.54-64 V. DOPPELBOTEN -A- DECK	APPROUVE	14.12.1979	HAMBOURG	MEYER
1423		13.09.1979	AUBENHAUT SPT.43-53 VON TANKDECK BIS A-DECK	APPROUVE	21.12.1979	HAMBOURG	MEYER
1422		22.10.1979	AUBENHAUT V. SPT.33-43 V. DOPPELBODEN BIS A-DECK	APPROUVE	21.12.1979	HAMBOURG	MEYER
1421	590	12.09.1979	AUBENHAUT SPT.23-32	APPROUVE	14.01.1980	HAMBOURG	MEYER
1832	590	11.09.1979	HILFSMASCH FUNDAMENTE	APPROUVE	05.11.1979	HAMBOURG	MEYER
1831	590	11.09.1979	FUNDAMENT HAUPTMOTOR	APPROUVE	06.11.1979	HAMBOURG	MEYER
1351	590	17.09.1979	DOPPELBODEN SPT.120-139	APPROUVE	06.11.1979	HAMBOURG	MEYER
1343	590	18.09.1979	DOPPELBODEN SPT.109-119	APPROUVE	06.11.1979	HAMBOURG	MEYER
1342	590	18.09.1979	DOPPELBODEN SPT.98-108	APPROUVE	06.11.1979	HAMBOURG	MEYER
1341	590	18.09.1979	DOPPELBODEN SPT.67-97	APPROUVE	06.11.1979	HAMBOURG	MEYER
1335	590	25.09.1979	DOPPELBODEN SPT.50T-66	APPROUVE	06.11.1979	HAMBOURG	MEYER
1334	590	20.09.1979	DOPPELBODEN SPT.50G-50S	APPROUVE	06.11.1979	HAMBOURG	MEYER
1333	590	11.09.1979	DOPPELBODEN SPT.76-80F	APPROUVE	06.11.1979	HAMBOURG	MEYER
1332	590	11.09.1979	DOPPELBODEN SPT.65-75	APPROUVE	06.11.1979	HAMBOURG	MEYER
1331	590	11.09.1979	DOPPELBODEN SPT.54-64	APPROUVE	06.11.1979	HAMBOURG	MEYER
1323	590	11.09.1979	DOPPELBODEN SPT.43-53	APPROUVE	06.11.1979	HAMBOURG	MEYER
1322	590	11.09.1979	DOPPELBODEN SPT.33-43	APPROUVE	07.11.1979	HAMBOURG	MEYER
1321	590	11.09.1979	DOPPELBODEN SPT.23-32	APPROUVE	06.11.1979	HAMBOURG	MEYER
11119445		25.05.1993	STRUCTURAL ARRANGEMENT (VM200)	APPROUVE	10.05.1993	HAMBOURG	BROWN BROTHERS
11319592-1/3		22.07.1993	FIN & CRUXBOX FAB & M/C (PORT)	APPROUVE	10.05.1993	HAMBOURG	BROWN BROTHERS
11319592-2/3		22.07.1993	FIN & CRUXBOX FAB & M/C (PORT)	APPROUVE	10.05.1993	HAMBOURG	BROWN BROTHERS
11319592-3/3		22.07.1993	FIN & CRUXBOX FAB & M/C (PORT)	APPROUVE	10.05.1993	HAMBOURG	BROWN BROTHERS
1001	590	13.06.1980	HAUPTSPANT	APPROUVE	02.07.1980	HAMBOURG	MEYER
1003	590	30.01.1980	AUBENHAUTABWICKLUNG	APPROUVE	25.06.1980	HAMBOURG	MEYER
1002	590	14.06.1980	EISENLANGSSCHNITT	APPROUVE	02.07.1980	HAMBOURG	MEYER
1028	590	24.09.1979	STUTZENPLAN	VU	02.07.1980	HAMBOURG	MEYER
1023	590	16.06.1980	STAHLPLAN TD, A-IB-IC-DECK	APPROUVE	25.06.1980	HAMBOURG	MEYER
1022	590	16.06.1980	STAHLPLAN D-IE-IF-IG-DECK	APPROUVE	25.06.1980	HAMBOURG	MEYER
23 1	590	18.12.1979	BOOTSAUFSTELLUNG	FOR INFO.		HAMBOURG	MEYER
MA. 500	590	15.09.1979	ARRANGEMENT ENGINE ROOM	VU	17.12.1979	PARIS	MEYER
MA. 688 0	590	19.10.1979	DIAGRAM OF THERMAL OIL SYSTEM	VU	27.11.1979	PARIS	MEYER
MA. 514 0	590	20.10.1979	DIAGRAM OF LUBRICATING OIL SYSTEM	APPROUVE	27.11.1979	PARIS	MEYER
MA. 513 0	590	17.10.1979	DIAGRAM OF FUEL OIL SYSTEM	APPROUVE	27.11.1979	PARIS	MEYER
MA. 614 0	590	17.12.1979	BILGE AND BALLAST PIPING	APPROUVE	17.12.1979	PARIS	MEYER

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MA. 515 0	590	25.10.1979	DIAGRAM OFCOOLING WATER SYSTEM	APPROUVE	27.11.1979	PARIS	MEYER
MA. 513 2	590	23.10.1979	DIAGRAM OF SEPARATOR PLANT	APPROUVE	27.11.1979	PARIS	MEYER
B11 70110 8036		05.01.1979	HALBFABRIKAT PRE-PRODUCT SCHWUNGRAD FLYWHEEL	VU	15.11.1979	HAMBOURG	M.A.N.
B11 70110 0844		17.10.1978	SCHWUNGRAD FLYWHEEL	VU	15.11.1979	HAMBOURG	M.A.N.
B11 844 36 0016		18.10.1979	SCHWUNGRADANORDNUNG ARRANGEMENT OF FLYWHEEL	APPROUVE	15.11.1979	HAMBOURG	M.A.N.
MA. 561	590	11.09.1979	LINE SHAFTING	APPROUVE	17.10.1979	HAMBOURG	MEYER
598 294	590	20.08.1979	SHAFTING	APPROUVE	06.11.1979	HAMBOURG	K.M.W.
23605 D		02.10.1979	FLAMSCHWELLE TYPE DIDB 140/315D	VU	29.10.1979	PARIS	A.VAN KAICK
4120	590	15.10.1979	RUDERSCHAFTS UND FINGERLINGS ABDICHTUNG	APPROUVE	17.04.1980	HAMBOURG	MEYER
4110	590	15.09.1979	RUDER	APPROUVE	18.04.1980	HAMBOURG	MEYER
4115	590	30.10.1979	RUDERSCHAFT FINGERLING UND ZUBEHOR	APPROUVE	18.04.1980	HAMBOURG	MEYER
1211	590	17.09.1979	HINTERSCHIFF HINTEN SPT.9	APPROUVE	18.04.1980	HAMBOURG	MEYER
531 395		09.02.1972	KAMEWA STEERINGPROPELLER 800/2000/AS-CP	APPROUVE	09.04.1980	HAMBOURG	K.M.W.
587480 1/2		11.11.1974	KAMEWA STYRPROPELLER 800/2000/AS-CP	VU	09.04.1980	HAMBOURG	K.M.W.
587481		03.12.1976	KAMEWA STYRPROPELLER 800/2000/AS-CP	VU	09.04.1980	HAMBOURG	K.M.W.
900 297		03.10.1977	WELDING OF PROPELLER UNIT	APPROUVE	09.04.1980	HAMBOURG	K.M.W.
900 200-1/2		05.05.1976	KA ME WA - STEERING PROPELLER 1650/AS - CP/590KW SAMMANSTALLNING ASSEMBLY	VU	09.04.1980	HAMBOURG	K.M.W.
900 200-2/2		05.05.1976	KA ME WA - STEERING PROPELLER 1650/AS - CP/590KW SAMMANSTALLNING ASSEMBLY	VU	09.04.1980	HAMBOURG	K.M.W.
588 299		24.10.1979	KA ME WA - STEVERPROPELLER 2000/AS-CP/736KW - 1650/AS-CP/590KW INSTALLATION	VU	09.04.1980	HAMBOURG	K.M.W.
33-03 500 1/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 2/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 3/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 4/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 5/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 6/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 7/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 8/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 9/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
33-03 500 10/10	590	26.11.1979	ELECTRIC SCHEME W.T. DOOR SYSTEM	APPROUVE	04.02.1980	PARIS	SCHOENROK-HYDRAULIK
80106-S294	590	25.08.1980	GENERAL ARR. TANK-DECK DECK 1	APPROUVE	29.07.1980	PARIS	MEYER
80106-S293	590	04.06.1980	GENERAL ARR. DECK 2, 3, 4	APPROUVE	29.07.1980	PARIS	MEYER
80106-S292	590	03.08.1980	GENERAL ARR. DECK 5, 6 ,7	APPROUVE	29.07.1980	PARIS	MEYER
80106-S291	590	07.05.1980	GENERAL ARR. DECK 8, 9, 10	APPROUVE	29.07.1980	PARIS	MEYER
S14,457/02	590	11.12.1979	DIESELSTART AND CONNECTION BOX	APPROUVE	27.12.1979	PARIS	ROLF JANSSEN GMBH
80106-L295	590	04.07.1980	LIST OF LAMPS	VU	29.07.1980	PARIS	SIEMENS AG
FB133-003		24.01.1980	ELECTRIC DIAGRAM FOR POSITION INDICATOR	APPROUVE	19.03.1980	PARIS	CAVO
FB133-004		28.01.1980	ELECTRIC DIAGRAM FOR VALVE CONTROL	APPROUVE	19.03.1980	PARIS	CAVO
MA 688 5		15.04.1979	EXHAUST GAS HEATER GENERAL ARR.	APPROUVE	05.03.1980	PARIS	SAMEA
513189		12.03.1975	PROPELLER PANEL FOR INSTRUMENTS 2 ENGINES LOAD CONTROL II	APPROUVE	03.04.1980	PARIS	K.M.W.
592939		26.10.1978	PROPELLER LOAD SHARING UNIT	APPROUVE	03.04.1980	PARIS	K.M.W.
14037		04.10.1979	PROPELLER COMBINATOR DIAGRAM	APPROUVE	03.04.1980	PARIS	K.M.W.
592974 1&2		14.11.1978	PROPELLER SPARE PARTS ELECTRIC REMOTE CONTROL SYSTEM	APPROUVE	03.10.1980	PARIS	K.M.W.
MA 668 6	590	25.02.1980	ISOLIERUNG THERMAL OL ROHRE	APPROUVE	05.03.1980	PARIS	MEYER
594826		04.10.1979	PROPELLER ELECTRIC REMOTE CONTROL SYSTEME ERC 1	APPROUVE	03.04.1980	PARIS	K.M.W.
594827 1/3		04.10.1979	PROPELLER EL. REMOTE CONTROL CABLE DIAGRAM	APPROUVE	03.04.1980	PARIS	K.M.W.
594827 2/3		04.10.1979	PROPELLER EL. REMOTE CONTROL CABLE DIAGRAM	APPROUVE	03.04.1980	PARIS	K.M.W.
594827-2/3		31.10.1979	PROPELLER EL. REMOTE CONTROL CABLE DIAGRAM	APPROUVE	03.04.1980	PARIS	K.M.W.
594825		04.10.1979	PROPELLER CONNECTION DIAGRAM O.D-BOX	APPROUVE	03.04.1980	PARIS	K.M.W.
594853 1/2		01.11.1979	PROPELLER EL. REMOTE CONTROL SYSTEM CONTROL PANEL BRIDGE	APPROUVE	03.04.1980	PARIS	K.M.W.

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594853-2/2		01.11.1979	PROPELLER EL. REMOTE CONTROL SYSTEM CONTROL PANEL BRIDGE	APPROUVE	03.04.1980	PARIS	K.M.W.
592975 1/2		17.08.1978	PROPELLER EL. REMOTE CONTROL SYSTEM CONTROL PANEL CONTROL ROOM	APPROUVE	03.04.1980	PARIS	K.M.W.
592975-2/2		17.08.1978	PROPELLER EL. REMOTE CONTROL SYSTEM CONTROL PANEL FOR CONTROL ROOM	APPROUVE	03.04.1980	PARIS	K.M.W.
592974 1/2		17.08.1978	PROPELLER EL. REMOTE CONTROL SYSTEM CONTROL PANEL ANNEX	APPROUVE	03.04.1980	PARIS	K.M.W.
592974-2/2		17.08.1978	PROPELLER EL. REMOTE CONTROL SYSTEM CONTROL PANEL ANNEX	APPROUVE	03.04.1980	PARIS	K.M.W.
63 1	590	16.11.1979	ANORDN. DER SPEIGAT. GRAUWASS. TKS AUFBERDT. ANLAG. AUSTRITTE IN DER AUSSENHAUT	APPROUVE	25.01.1980	PARIS	MEYER
63 2	590	12.10.1979	QUERSCHNITTE WAGENDECK SPEIGATTE	APPROUVE	25.01.1980	PARIS	MEYER
64 1	590	01.02.1980	VENTILATION PLAN BLATT 1	APPROUVE	17.09.1980	PARIS	MEYER
64 1	590	14.02.1980	VENTILATION PLAN BLATT 2	APPROUVE	17.09.1980	PARIS	MEYER
MA.281 0	590	09.11.1979	DIAGRAM OF FIRE EXTINGUISHING SYSTEM	APPROUVE	25.01.1980	PARIS	MEYER
MA.516 0	590	13.11.1979	DIAGRAM OF PNEUMATIC SYSTEM	APPROUVE	25.01.1980	PARIS	MEYER
MA.628 0	590	05.11.1979	DIAGRAM OF WATER SUPPLY	VU	25.01.1980	PARIS	MEYER
22014 79 01	590	15.11.1979	ORENCHER SYSTEM WASSER SPRUH SCHEMA	VU	22.01.1980	PARIS	RUD. OTTO MEYER
22014 79 02	590	16.11.1979	ORENCHER SYSTEM OPERATING DIAGRAM	VU	22.01.1980	PARIS	RUD. OTTO MEYER
25015 79 06	590	17.12.1979	GENERAL ARRANGEMENT 1	VU	07.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 07	590	12.12.1979	GENERAL ARRANGEMENT 5	VU	07.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 05	590	10.12.1979	PIPESCHEME CO2 FIRE EXTINGUISHING SYSTEM	VU	07.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 04	590	30.11.1979	CO2 CYLINDERROOM	APPROUVE	07.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 02	590	11.01.1979	CO2 FIRE EXTINGUISHING SYSTEM	APPROUVE	07.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 01		30.11.1979	CALCULATION OF THE CO2 QUTITY	VU	07.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 02	590	29.01.1979	CO2 FIRE EXTINGUISHING SYSTEM	VU	07.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 330	590	27.11.1978	PIPE DIMENSIONS CO2 FIRE EXTINGUISHING SYSTEM	VU	02.01.1980	HAMBOURG	RUD. OTTO MEYER
25015 79 02	590	13.12.1979	LIST OF PIECES FOR CO2 FIRE EXTINGUISHING SYSTEM	VU	07.01.1980	HAMBOURG	RUD. OTTO MEYER
49 111 372	590 *	03.10.1979	AUTOMATISCHE UND MANUELLE VERSCHLUSSANORDNUNGEN FUR BUGKLAPPE	VU *	02.07.1980	HAMBOURG	VON TELL
49 111 330	590	02.10.1979	BUGKLAPPE UND BUGRAMPE ZUSAMMENSTELLUNG	VU	05.11.1979	HAMBOURG	VON TELL
49 111 373	590 *	03.10.1979	ATLANTIKSICHERUNG UN EINWEISER	VU *	02.07.1980	HAMBOURG	VON TELL
49 111 361	590	03.10.1979	VERRIEGELUNG FUR BUGRAMPE	VU	05.11.1979	HAMBOURG	VON TELL
49111 361 A	590	01.10.1979	BUGRAMPE	APPROUVE	05.11.1979	HAMBOURG	VON TELL
32 84 1		29.08.1978	HAKEN	VU	05.11.1979	HAMBOURG	VON TELL
49 111 360	590	02.10.1979	HYDRAULISCHE VERSCHLUSSANORDNUNG BUGRAMPE 5 T	VU	05.11.1979	HAMBOURG	VON TELL
49 111 303	590	04.10.1979	DETAILS FUR BUGRAMPE VON TELL LIEFERUNG WO NICHT ANDERS GESAGG	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 302	590		DETAILS FUR BUGRAMPE	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 230	590	03.10.1979	HECKRAMPEN ZUSAMMENSTELLUNG	VU	05.11.1979	HAMBOURG	VON TELL
49 111 260	590	27.09.1979	HYDRAULISCHE VERSCHLUSSANORDNUNG HECKRAMPE 5 T	VU	05.11.1979	HAMBOURG	VON TELL
49 111 203	590	28.09.1979	DETAILS FUR HECKRAMPE STB U BB	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 204	590	04.10.1979	DETAILS FUR HECKRAMPE VON TELL LIEFERUNG WO NICHTS ANDERS GESAGT	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 202	590	01.10.1979	HECKRAMPE STB MIT NOTBETATIGUNGSAUGE	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 201	590	26.09.1979	HECKRAMPE BB	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 427	590	23.11.1978	HYDR. SECURING CLEAT ARR. FOR PILOT SHELL PORT	VU	05.11.1979	HAMBOURG	VON TELL
49 111 428	590	30.11.1978	ERECTION OF PILOT PORT WITH HYDR JACK	VU	05.11.1979	HAMBOURG	VON TELL
49 111 426	590	30.03.1979	ARRANGEMENT OF HYDRAULIC SECURING CLEAT FOR PASSENGER SHELL PORT	VU	05.11.1979	HAMBOURG	VON TELL
49 111 412	590	26.03.1979	SHELL PORT FOR PASSENGER	APPROUVE	05.11.1979	HAMBOURG	VON TELL
49 111 413	590	09.10.1979	SHELL PORT FOR PILOT	APPROUVE	05.11.1979	HAMBOURG	VON TELL
	590	23.04.1980	RAPPORT DE FRANC-BORD			HAMBOURG	VERITAS
02 19	590	21.03.1980	FREEBOARD PLAN			HAMBOURG	MEYER
	590		GENERAL ARRANGEMENT 1			HAMBOURG	MEYER
	590		GENERAL ARRANGEMENT 2			HAMBOURG	MEYER
	590		GENERAL ARRANGEMENT 5			HAMBOURG	MEYER
61 3	590	24.10.1979	LUFTROHRKOPF AUSFUHRUNG C'			HAMBOURG	MEYER

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61 1	590	19/1079	ANORDNUNG DER LUFT-UND PEILROHRE			HAMBOURG	MEYER
80106-S25	590	14.12.1979	MAIN SWITCHBOARD PANEL 15.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S15	590	11/121/79	MAIN SWITCHBOARD PANEL 5.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S166	590	17.12.1979	EMERG. SWITCHBOARD PANEL 5.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-A151C	590	13.11.1979	EMERG. SWITCHBOARD	VU	19.02.1980	PARIS	SIEMENS AG
80106-S160	590	19.12.1979	SINGLE LINE DIAGRAM	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S162	590	17.12.1979	EMERG. SWITCHBOARD PANEL 2.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S181	590	27.12.1979	EMERG. SWITCHBOARD PANEL 1.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S163	590	17.12.1979	EMERG. SWITCHBOARD PANEL 2.4	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S164	590	17.12.1979	EMERG. SWITCHBOARD PANEL 3	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S165	590		EMERG. SWITCHBOARD PANEL 4.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-L165A	590	12.12.1979	EMERG. SWITCHBOARD	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-A101	590	11.12.1979	220V/MAIN SWITCHBOARD FRONT VIEW	VU	19.02.1980	PARIS	SIEMENS AG
80106-A003	590	11.12.1979	380V/MAIN SWITCHBOARD FRONT VIEW	VU	19.02.1980	PARIS	SIEMENS AG
80106-S110	590	10.01.1980	220V-SWITCHBOARD	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S112A	590	17.12.1979	220V-SWITCHBOARD PANEL 2.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-L117A	590	07.12.1979	220V-SWITCHBOARD	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S111A	590	16.12.1979	220V-SWITCHBOARD PANEL 1.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-A002	590	11.12.1979	380V/MAIN SWITCHBOARD FRONT VIEW	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S10	590	18.12.1979	MAIN SWITCHBOARD PANEL 1.12	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S11	590	11.12.1979	MAIN SWITCHBOARD PANEL 1.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S12	590	11.12.1979	MAIN SWITCHBOARD PANEL 2.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S13A	590	11.12.1979	MAIN SWITCHBOARD PANEL 3.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S14	590	12.12.1979	MAIN SWITCHBOARD PANEL 4.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S17	590	12.12.1979	MAIN SWITCHBOARD PANEL 7.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S18	590	12.12.1979	MAIN SWITCHBOARD PANEL 8.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S19	590	12.12.1979	MAIN SWITCHBOARD PANEL 9.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S20A	590	13.12.1979	MAIN SWITCHBOARD PANEL 10 ALTERNATOR 1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S21	590	13.12.1979	MAIN SWITCHBOARD PANEL 11 ALTERNATOR 2	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S22	590	11.12.1979	MAIN SWITCHBOARD PANEL 12.1 BOW THRUSTER 1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S23A	590	14.12.1979	MAIN SWITCHBOARD PANEL 13 ALTERNATOR 3	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S24A	590	17.12.1979	MAIN SWITCHBOARD PANEL 14 ALTERNATOR 4	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S26	590	12.12.1979	MAIN SWITCHBOARD PANEL 16.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S27	590	12.12.1979	MAIN SWITCHBOARD PANEL 17.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S28	590	12.12.1979	MAIN SWITCHBOARD PANEL 18.13.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S29	590	12.12.1979	MAIN SWITCHBOARD PANEL 19.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S30	590	12.12.1979	MAIN SWITCHBOARD PANEL 20.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-S31	590	13.12.1979	MAIN SWITCHBOARD PANEL 21.1	APPROUVE	19.02.1980	PARIS	SIEMENS AG
80106-L037B	590	07.12.1979	MAIN SWITCHBOARD	APPROUVE	19.02.1980	PARIS	SIEMENS AG
	590		KURZSCHLUSSBERECHNUNG NACH DIN 89013	APPROUVE	23.04.1980	PARIS	SIEMENS AG ??
31-02250	590	26.11.1979	ROHR U. HYDRAULIK SCHEMA	APPROUVE	19.12.1979	HAMBOURG	SCHOENROCK HYRAULIK
30-14200A	590	28.11.1979	SCHOTTSCHEEBETUR SPT 23 2700X2600	APPROUVE	07.01.1980	HAMBOURG	SCHOENROCK HYRAULIK
1651	590	14.11.1979	QUERSCHOTT SPT. 132/133 TANKLANGSWAND V. SPT. 120/132	APPROUVE	15.02.1980	HAMBOURG	MEYER
1641	590	11.10.1979	EINBAUWANDE A. D. TANKDECKE	APPROUVE	15.02.1980	HAMBOURG	MEYER
32-02254	590	26.11.1979	HYDR. SCHEMA SCHOTTUR NR.12 2700X2600MM	APPROUVE	07.01.1980	HAMBOURG	SCHOENROCK HYRAULIK
	590	28.11.1979	GENERAL ARRANGEMENT 1	VU	19.12.1979	HAMBOURG	MEYER
32-02 055/ISD	590	02.01.1979	HYDRAULIC CONTROL SYSTEM FOR W.T. BULKHEAD DOORS RIGHT CLOSING	APPROUVE	19.12.1979	HAMBOURG	SCHOENROCK HYRAULIK
32-02 055/GID	590	02.01.1979	HYDRAULIC CONTROL SYSTEM FOR W.T. BULKHEAD DOORS RIGHT CLOSING	APPROUVE	19.12.1979	HAMBOURG	SCHOENROCK HYRAULIK
31-14000	590	12.10.1966	ZUSAMMENSTELLUNG	APPROUVE	19.12.1979	HAMBOURG	SCHOENROCK HYRAULIK

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1643	590	02.10.1979	QUERSCHOTT SPT. 120	APPROUVE	09.11.1979	HAMBOURG	MEYER
1642	590	03.10.1979	QUERSCHOTT SPT. 110	APPROUVE	09.10.1979	HAMBOURG	MEYER
1641	590	25.09.1979	QUERSCHOTT SPT. 93	APPROUVE	09.10.1979	HAMBOURG	MEYER
1634	590	08.10.1979	QUERSCHOTT SPT. 85	APPROUVE	09.10.1979	HAMBOURG	MEYER
1633	590	05.10.1979	QUERSCHOTT SPT. 80R	APPROUVE	09.10.1979	HAMBOURG	MEYER
1632	590	08.10.1979	QUERSCHOTT SPT. 60E/60H UND LANGSSCHOTT 6900A.M. SPT. 60E/60H	APPROUVE	09.10.1979	HAMBOURG	MEYER
1631	590	13.09.1979	QUERSCHOTT SPT. 71	APPROUVE	09.10.1979	HAMBOURG	MEYER
1622	590	13.09.1979	QUERSCHOTT-SPT. 43	APPROUVE	09.10.1979	HAMBOURG	MEYER
1623	590	13.09.1979	QUERSCHOTT SPT. 53	APPROUVE	09.10.1979	HAMBOURG	MEYER
1621	590	15.10.1979	QUERSCHOTT SPT. 33	APPROUVE	09.10.1979	HAMBOURG	MEYER
40-02153		06.12.1979	ARRANGEMENT LIFT P+2T SPT. 23/28	INFO.		HAMBOURG	SCHOENROCK HYRAULIK
1412	590	14.11.1979	AUBENHAUT A/D-DECK SPT. 28/S 56	APPROUVE	15.02.1980	HAMBOURG	MEYER
40-03150	590	30.11.1979	TUR VOR DEM LIFT	INFO.		HAMBOURG	SCHOENROCK HYRAULIK
1464	590	20.11.1979	AUBENHAUT SPT. 57-135 A BIS C - DECK	APPROUVE	15.02.1980	HAMBOURG	MEYER
1623	590	03.11.1979	SCHACHTWANDE AUF DEM A-DECK VON SPT.23/24	APPROUVE	05.05.1980	HAMBOURG	MEYER
1643	590	08.11.1979	SCHACHTWANDE AUF DEM A-DECK VON SPT.65 BIS 66	APPROUVE	05.05.1980	HAMBOURG	MEYER
1653	590	12.11.1979	SCHACHTWANDE AUF DEM A-DECK VON SPT.87/120	APPROUVE	05.05.1980	HAMBOURG	MEYER
1411	590	11.12.1979	HINTERSCHIFF SPT. 28/S HINTEN VON A-DECK BIS C-DECK	APPROUVE	05.05.1980	HAMBOURG	MEYER
1053	590	17.04.1980	VERSTURKG UNDER 4-DECK	APPROUVE	05.05.1980	HAMBOURG	MEYER
3590-581-1C		15.12.1979	4 C-DECK	APPROUVE	05.05.1980	HAMBOURG	AG "WESER
3590-587-1		22.11.1979	5. DECK D.DECK	APPROUVE	10.01.1980	HAMBOURG	AG "WESER
3590-587-2		09.10.1979	6. DECK E.DECK	APPROUVE	10.01.1980	HAMBOURG	AG "WESER
3590-587-3		28.11.1979	7.DECK F.DECK	APPROUVE	10.01.1980	HAMBOURG	AG "WESER
3590-587-4		24.11.1979	8. G.DECK	APPROUVE	10.01.1980	HAMBOURG	AG "WESER
3590-531-1		20.11.1979	AUBENHAUT 4.-7. DECK SPT. 4/75.1/2	APPROUVE	10.01.1980	HAMBOURG	AG "WESER
3590-531-2		1979	AUBENHAUT 4.-7. DECK SPT.75.1/2 - 139	APPROUVE	10.01.1980	HAMBOURG	AG "WESER
3590-587-5		19.11.1979	9. H -DECK	APPROUVE	11.01.1980	HAMBOURG	AG "WESER
3590-531-3B		17.10.1979	FRONTWAND SPT.139	APPROUVE	15.02.1980	HAMBOURG	AG "WESER
	590	27.03.1980	LIST OF DRAWINGS SUPPLY FOR CONTROL ENGINE, REMOTE CONTROL SAFETY SYSTEM AND MONITORING	APPROUVE	30.07.1980	PARIS	M.A.N.
1080005/8/9/10		02.04.1980	LIST OF MESS + CONTROL DEVICE	WITHOUT AP			M.A.N.
A11,12500-3445			STEUERUNGSSCHEMA FUR ZWEI NICHT UMSTEUERBARE MOTOREN UBER	WITHOUT AP			M.A.N.
			SAMMELUNTERSETZUNGSGETRIEBE AUF VERSTELLPROPELLER	WITHOUT AP			M.A.N.
S11,12560-0013E			CONTROL SYSTEM TWIN-ENGINE PLANT NON REVERSIBLE 40/45	WITHOUT AP			M.A.N.
B11,12500-3572		01.10.1979	OPERATING EQUIPMENT VP-DOUBLE-ENGINES ENGINE	WITHOUT AP			M.A.N.
B11,12500-3574		10.10.1979	OPERATING EQUIPMENT VP-DOUBLE-ENGINES ENGINE	WITHOUT AP			M.A.N.
B11,12500-3511		14.05.1979	KLEMMENPLAN FUR BEDIENUNGSTAND AM MOTOR FUR ZWEI NICHT UMSTEUERBARE MOTOREN MIT	WITHOUT AP			M.A.N.
			SAMMELUNTERSETZUNGSGETRIEBE UND VERSTELLPROPELLER	WITHOUT AP			M.A.N.
B11,12500-3511		14.05.1979	KLEMMENPLAN FUR BEDIENUNGSTAND AM MOTOR FUR ZWEI NICHT UMSTEUERBARE MOTOREN MIT	WITHOUT AP			M.A.N.
			SAMMELUNTERSETZUNGSGETRIEBE UND VERSTELLPROPELLER	WITHOUT AP			M.A.N.
C11,12500-3578		09.01.1980	TETE ADMISSION TRANSMITTER	WITHOUT AP			M.A.N.
B11,12500-3443		03.10.1978	DREHZAHLSTEUERUNG FUR ZWEI NICHT UMSTEUERBARE MOTOREN UBER	WITHOUT AP			M.A.N.
			SAMMELUNTERSETZUNGSGETRIEBE AUF VERSTELLPROPELLER	WITHOUT AP			M.A.N.
F11,12500-3448		06.09.1977	SPEED SETTING FROM ENGINE CONTROL ROOM	WITHOUT AP			M.A.N.
B11,48900-1203			CABLING OF ELECTRICAL MONOTORING UNIT ON ENGINE	WITHOUT AP			M.A.N.
C11,48900-1203		26.09.1979	CABLING OF ELECTRICAL MONOTORING UNIT ON ENGINE	WITHOUT AP			M.A.N.
A11,12500-4366		14.03.1980	CONNECTION DIAGRAM FOR REMOTE CONTROL CLUTCH AND ENGINE MONITORING	WITHOUT AP			M.A.N.
A11,12500-4366		14.03.1980	CONNECTION DIAGRAM FOR REMOTE CONTROL CLUTCH AND ENGINE MONITORING	WITHOUT AP			M.A.N.
A11,12500-4366		26.03.1980	CONNECTION DIAGRAM FOR REMOTE CONTROL CLUTCH AND ENGINE MONITORING	WITHOUT AP			M.A.N.
A11,12500-4366		14.03.1980	CONNECTION DIAGRAM FOR REMOTE CONTROL CLUTCH AND ENGINE MONITORING	WITHOUT AP			M.A.N.

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A11,12500-4366		14.03.1980	CONNECTION DIAGRAM FOR REMOTE CONTROL CLUTCH AND ENGINE MONITORING	WITHOUT AP			M.A.N.
A11,12500-4366		14.03.1980	CONNECTION DIAGRAM FOR REMOTE CONTROL CLUTCH AND ENGINE MONITORING	WITHOUT AP			M.A.N.
513189		12.03.1975	PROPELLER PANEL FOR INSTRUMENTS 2 ENGINES	APPROUVE	08.04.1980	HAMBOURG	KMW
592959		28.10.1978	PROPELLER LOAD SHARING UNIT	APPROUVE	08.04.1980	HAMBOURG	KMW
594626		04.10.1979	PROPELLER CONNECTION DIAGAM O.D. BOX	APPROUVE	08.04.1980	HAMBOURG	KMW
594627-3/3		31.10.1979	PROPELLER EL REMOTE CONTROL CABLE DIAGAM	APPROUVE	08.04.1980	HAMBOURG	KMW
594627-2/3		04.10.1979	PROPELLER EL REMOTE CONTROL CABLE DIAGAM	APPROUVE	08.04.1980	HAMBOURG	KMW
594627-1/3		04.10.1979	PROPELLER EL REMOTE CONTROL CABLE DIAGAM	APPROUVE	08.04.1980	HAMBOURG	KMW
594626		04.10.1979	PROPELLER EL REMOTE CONTROL SYSTEM ERC1	APPROUVE	08.04.1980	HAMBOURG	KMW
902975-1/2		17.08.1978	PROPELLER EL REMOTE CONTROL SYSTEM CONTROL PANEL CONTROL ROOM	APPROUVE	08.04.1980	HAMBOURG	KMW
902975-2/2		17.08.1978	PROPELLER EL REMOTE CONTROL SYSTEM CONTROL PANEL CONTROL ROOM	APPROUVE	08.04.1980	HAMBOURG	KMW
902974-1/2		17.08.1978	PROPELLER EL REMOTE CONTROL SYSTEM CONTROL PANEL ANNEX	APPROUVE	08.04.1980	HAMBOURG	KMW
902974-2/2		17.08.1978	PROPELLER EL REMOTE CONTROL SYSTEM CONTROL PANEL ANNEX	APPROUVE	08.04.1980	HAMBOURG	KMW
594653-1/2		01.11.1979	PROPELLER EL REMOTE CONTROL SYSTEM CONTROL PANEL BRIDGE	APPROUVE	08.04.1980	HAMBOURG	KMW
594653-2/2		01.11.1979	PROPELLER EL REMOTE CONTROL SYSTEM CONTROL PANEL BRIDGE	APPROUVE	08.04.1980	HAMBOURG	KMW
18037	590		PROPELLER COMBINATOR DIAGRAM	APPROUVE	08.04.1980	HAMBOURG	KMW
65114.366.01		05.03.1980	UBERWACHUNG-SCHIFF (US) 24V	WITHOUT AP		HAMBOURG	STRUVER
1212	590	13.08.1979	HINTERSCHIFF SPT.18/23	APPROUVE	14.12.1979	HAMBOURG	MEYER
1521	590	30.10.1979	ZWISCHENDECK SPT. 24/32	APPROUVE	14.01.1980	HAMBOURG	MEYER
1522	590	29.10.1979	ZWISCHENDECK SPT. 33 - 42	APPROUVE	21.12.1979	HAMBOURG	MEYER
1523	590	23.10.1979	ZWISCHENDECK SPT. 43 - 54	APPROUVE	14.12.1979	HAMBOURG	MEYER
1524	590	20.10.1979	A-DECK VON SPT.24 - 32	APPROUVE	14.01.1980	HAMBOURG	MEYER
1525	590	17.09.1979	A-DECK VON SPT. 33 - 42	APPROUVE	21.12.1979	HAMBOURG	MEYER
1526	590	18.10.1979	A-DECK VON SPT. 43 - 53	APPROUVE	14.12.1979	HAMBOURG	MEYER
1531	590	14.09.1979	ZWISCHENDECK V. SPT. 54 - 64	APPROUVE	14.12.1979	HAMBOURG	MEYER
1532	590	14.09.1979	ZWISCHENDECK V. SPT. 65 - 75	APPROUVE	14.12.1979	HAMBOURG	MEYER
1533	590	14.09.1979	ZWISCHENDECK V. SPT. 76 - 80F	APPROUVE	21.12.1979	HAMBOURG	MEYER
1534	590	15.10.1979	A-DECK V. SPT. 54 - 64	APPROUVE	14.12.1979	HAMBOURG	MEYER
1535	590	17.10.1979	A-DECK V. SPT. 65 - 75	APPROUVE	14.12.1979	HAMBOURG	MEYER
1536	590	19.09.1979	A-DECK V. SPT. 76 - 80F65 - 75	APPROUVE	21.12.1979	HAMBOURG	MEYER
1537	590	27.09.1979	ZWISCHENDECK SPT. 80G - 88	APPROUVE	19.11.1979	HAMBOURG	MEYER
1538	590	02.10.1979	A-DECK V. SPT. 80G - 88	APPROUVE	19.11.1979	HAMBOURG	MEYER
1541	590	04.10.1979	ZWISCHENDECK SPT. 87 - 97	APPROUVE	19.11.1979	HAMBOURG	MEYER
1543	590	03.10.1979	ZWISCHENDECK SPT. 109 - 119	APPROUVE	19.11.1979	HAMBOURG	MEYER
1544	590	10.10.1979	A-DECK V. SPT. 87 - 97	APPROUVE	19.11.1979	HAMBOURG	MEYER
1545	590	12.10.1979	A-DECK V. SPT. 93 - 108	APPROUVE	19.11.1979	HAMBOURG	MEYER
1546	590	20.10.1979	A-DECK V. SPT. 109 - 119	APPROUVE	19.11.1979	HAMBOURG	MEYER
1551	590	03.11.1979	ZWISCHENDECK V. SPT. 120 - 133 KOFFERDAMM DECK V. SPT. 120 - 133	APPROUVE	14.01.1980	HAMBOURG	MEYER
1552	590	07.11.1979	A-DECK SPT. 120 - 133	APPROUVE	14.01.1980	HAMBOURG	MEYER
1822	590	03.01.1980	EINBAUWANDE AUF DEM ZWISCHENDECK SPT. 23 - 133	APPROUVE	15.02.1980	HAMBOURG	MEYER
911,12500-4366		14.03.1980	CONNECTION DIAGRAM FOR REMOTE CONTROL CLUTCH AND ENGINE MONITORING	WITHOUT AP		HAMBOURG	M.A.N.
D1015-3CE		15.05.1975	ENGINE POWER RANGES OF WITH CONTROLABLE PITCH PROPELLER	WITHOUT AP		HAMBOURG	M.A.N.
		24.09.1979	DATENSLATT FUR WOODWARD REGLER BESTELLUNG MIT EINSTELLWERTEN	WITHOUT AP		HAMBOURG	M.A.N.
F11,12500-4038	590	24.04.1979	FUEL OF THE ENGINE FOR THE LOAD CURVE WITH LOAD CONTROL	WITHOUT AP		HAMBOURG	M.A.N.
911,12500-3563		29.07.1977	STEUERGERATESCHRANK Z	WITHOUT AP		HAMBOURG	M.A.N.
F11,12500-3503		23.05.1977	TERVINAL DIAGRAM FOR CONTROL UNIT CABINET "Z" WITHOUT PTO	WITHOUT AP		HAMBOURG	M.A.N.
C11,12500-1820			EINS TELTUNGEN UND ANSCHLUSSE AM WOOD WARDREGLER TYP PS-A	WITHOUT AP		HAMBOURG	M.A.N.
			TECHNICAL NOTE Maut 43/70 PAGES 1 - 10	WITHOUT AP		HAMBOURG	M.A.N.
511,12500-1059			PIPE SPECIFICATION AND INSTRUCTIONS FOR INSTALLING PNEUMATIC DEVICES	WITHOUT AP		HAMBOURG	M.A.N.

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A11,12500-3965		18.11.1978	CONTROL FOR ADMISSION DEPENDENT LUB. OIL PREHEATING FOR TURBO CHARGER	WITHOUT AP		HAMBOURG	M.A.N.
A11,12500-3445		12.07.1977	CONT. SCH. FOR TWO NON REVERS. ENG. WITH MULTIPLE GEARBOX AND CONTROLABLE PITCH PROPELLE	WITHOUT AP		HAMBOURG	M.A.N.
C11,12500-4365		18.03.1980	SWITCHING PROPOSED FOR STARTING OF STAND-BY PUMP FOR THE LUB. OIL SUPPLY OF EACH ENGINE	WITHOUT AP		HAMBOURG	M.A.N.
C11,18200-0148		25.11.1977	MAIN STARTING VALVE NW 80	WITHOUT AP		HAMBOURG	M.A.N.
C11,99002-0079		09.05.1978	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	M.A.N.
E11,99003-0147		26.11.1975	3 WAY VALVE	WITHOUT AP		HAMBOURG	M.A.N.
F11,99003-0147		26.11.1975	3 WAY VALVE	WITHOUT AP		HAMBOURG	M.A.N.
E11,99003-0042		15.04.1975	FINE REGULATING VALVE	WITHOUT AP		HAMBOURG	M.A.N.
D11,99003-0040		22.11.1974	SCHAFTVENTIL	WITHOUT AP		HAMBOURG	M.A.N.
D11,99003-0181		02.05.1977	3/2 WAY SOLENOID VALVE	WITHOUT AP		HAMBOURG	M.A.N.
D11,99003-0182		04.05.1977	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	M.A.N.
D11,99003-0002			THREE WAY VALVE	WITHOUT AP		HAMBOURG	M.A.N.
D11,99003-0068		18.05.1968	3/2 WAY MAGNET VALVE	WITHOUT AP		HAMBOURG	M.A.N.
B11,99003-0202		18.03.1978	3/2 WAY SOLENOIDE VALVE OPEN CIRCUIT	WITHOUT AP		HAMBOURG	M.A.N.
D11,99004-0091		03/13/75	DRUCKMINDER VENTIL	WITHOUT AP		HAMBOURG	M.A.N.
F11,99004-0056		17.12.1968	DOUBLE NON-RETURN VALVE	WITHOUT AP		HAMBOURG	M.A.N.
E11,99004-0055		09.10.1968	WATER SEPERATOR	WITHOUT AP		HAMBOURG	M.A.N.
D11,99004-0079		31.05.1972	DRUCKREGELVENTIL	WITHOUT AP		HAMBOURG	M.A.N.
D11,99005-0059		05.11.1975	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0060		14.11.1975	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0062		06.11.1975	TIME DELAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0062		13.03.1973	TIME DELAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0099		06.11.1975	PRESSURE SWITCH	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0099		11.11.1975	PRESSURE SWITCH	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
E11,99005-0077		06.09.1972	DRUCKMINDERVENTIL	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
E11,99005-0077		27.02.1978	DRUCKMINDERVENTIL	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0066		28.10.1975	WECHSELVENTIL	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0066		11.11.1975	WECHSELVENTIL	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
E11,99003-0152		25.07.1972	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
E11,99003-0152		25.07.1972	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0068		04.11.1975	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99005-0068		11.11.1975	3/2 WAY VALVE	WITHOUT AP		HAMBOURG	WABCO WESTINGHOUSE
D11,99006-0002		15.09.1975	PRESSURE REDUCING STATION	WITHOUT AP		HAMBOURG	M.A.N.
C11,99006-0002		15.09.1975	PRESSURE REDUCING STATION	WITHOUT AP		HAMBOURG	M.A.N.
AE1011			FLUSH TYPE ILLUMINATED ON/OFF PUSHBUTTON SWITCH TYP KI06U4	WITHOUT AP		HAMBOURG	M.A.N.
E11,99007-0742		01.04.1977	LIMIT SWITCH	WITHOUT AP		HAMBOURG	M.A.N.
E11,99007-0569		31.10.1975	ILLUMINATED KEY	WITHOUT AP		HAMBOURG	M.A.N.
E11,99007-0544		31.10.1975	ILLUMINATED SWITCH	WITHOUT AP		HAMBOURG	M.A.N.
D11,40092-0003		21.01.1957	SEL D.C. SPEED TRANSMITTER	WITHOUT AP		HAMBOURG	M.A.N.
E11,99013-0169		12.01.1977	EL SPEED INDICATING INSTRUMENT	WITHOUT AP		HAMBOURG	M.A.N.
E11,99013-0171		14.01.1977	ELEKTRISCHER DREHZAHLANZEIGER	WITHOUT AP		HAMBOURG	M.A.N.
F11,50252-0045		02.09.1972	SPEED TRANSMITTER READY FOR INSTALLATION	WITHOUT AP		HAMBOURG	M.A.N.
E11,99013-0174		15.02.1977	EL SPEED INDICATOR (TURBOLADER)	WITHOUT AP		HAMBOURG	M.A.N.
E11,99007-0771		09.03.1977	MULTIPLE LIMIT SWITCH	WITHOUT AP		HAMBOURG	M.A.N.
E11,99012-0103		22.04.1977	PRESSURE SWITCH	WITHOUT AP		HAMBOURG	M.A.N.
E11,99011-0267		21.01.1977	TEMPERATURFUHLER FUR KURBELWELLENLAGER	WITHOUT AP		HAMBOURG	M.A.N.
E11,-99012-0028		18.04.1968	PRESSURE DIFFERENTIAL SWITCH	WITHOUT AP		HAMBOURG	M.A.N.
218931-002		12.03.1980	UNIVERSAL MONITORING SYSTEM 213 MAIN BEARING SUPERVISION DIAGRAM	WITHOUT AP		HAMBOURG	SCRENT. LYNGSO
E11,99011-0189		26.02.1979	TEMPERATURE SENSOR	WITHOUT AP		HAMBOURG	M.A.N.

DRWG N°	HULL N°	DRWG DATE	TITLE	REVIEW	DATE	LOCATION	
E11.99011-0188		26.02.1979	MODULAR SWITCHGEAR	WITHOUT AP		HAMBOURG	M.A.N.
E11.99011-0246		26.02.1979	MODULAR SWITCHGEAR	WITHOUT AP		HAMBOURG	M.A.N.
E11.99011-0115		22.05.1972	RESISTANCE THERMOMETER	WITHOUT AP		HAMBOURG	M.A.N.
E11.99011-0106		13.05.1971	SWITCHGEAR FOR MONITORING FUEL TEMPERATURE	WITHOUT AP		HAMBOURG	M.A.N.
E11.99011-0106		19.07.1971	SWITCHING DEVICE FOR CONTROL OF FUEL TEMPERATURE	WITHOUT AP		HAMBOURG	M.A.N.
F11.64001-0175		11.01.1972	F.O. LEAKAGE COLLECTING TANK WITH BAR-TYPE PROBE	WITHOUT AP		HAMBOURG	M.A.N.
F11.60001-0065		27.09.1975	CONDENSATE WATER COLLECTING TANK WITH BAR TYPE PROBE	WITHOUT AP		HAMBOURG	M.A.N.
E11.99016-0025		30.04.1974	BAR TYPE PROBE WITH ELECTRONIC INSERT	WITHOUT AP		HAMBOURG	M.A.N.
E11.99007-0005		30.04.1974	NIVOTESTER	WITHOUT AP		HAMBOURG	M.A.N.
E11.99011-0218		17.09.1975	DOUBLE TUERMO COUPLE WITH PROTECTING WELL	WITHOUT AP		HAMBOURG	M.A.N.
A11.12500-3964		09.11.1978	ARRANGEMENT OF PRESSURE SWITCHES	WITHOUT AP		HAMBOURG	M.A.N.
C11.12500-3965		09.11.1978	TERMINAL DIAGRAM OF MOUNTING OF PRESSURE SWITCHES	WITHOUT AP		HAMBOURG	M.A.N.
C11.12500-3920		15.03.1978	MOUNTING OF PRESSURE SWITCHES	WITHOUT AP		HAMBOURG	M.A.N.
C11.12500-3434		25.04.1977	MOUNTING OF PRESSURE SWITCHES	WITHOUT AP		HAMBOURG	M.A.N.
E11.12500-1420		15.02.1971	ATTACH TESTING DEVICE FOR PRESURE SWITCH	WITHOUT AP		HAMBOURG	M.A.N.
F11.12591-1018		09.10.1975	SCHILD 220X150mm (BESTELLZEICHNUNG)	WITHOUT AP		HAMBOURG	M.A.N.
F11.12591-1019		09.10.1975	SCHILD 220X150mm (BESTELLZEICHNUNG)	WITHOUT AP		HAMBOURG	M.A.N.
F11.12591-1020		09.10.1975	SCHILD 220X150mm (BESTELLZEICHNUNG)	WITHOUT AP		HAMBOURG	M.A.N.
D11.99016-0019		14.09.1971	OILMISTDETECTOR	WITHOUT AP		HAMBOURG	M.A.N.
E11.99016-0020		09.11.1971	TERMINAL BOX AND TERMINAL DIAGRAM TO OIL MIST DETECTOR MK4	WITHOUT AP		HAMBOURG	M.A.N.

Enclosure 2.4.3.36

DRAWING N°	TITLE	DATE OF APPROVAL
Bow visor		
590/1103 rev.6	Bugklappe	20.06.80
590/1106 rev.G	BUgklappeverriegelung	20.06.80
49111-373	Atlantiksicherung	02.07.80
590/1101 a	Vorschiff spt 149 - vorne	04.12.79
49111-372	Automatische und manuelle verschlussanordnungen für bugklappe	02.07.80
49111-330	Bugklappe und bugrampe zusammenstellung	05.11.79
Bow ramp		
49111-301 a	Bugrampe	05.11.79
49111-303	Details für bugrampe (von Teil lieferung)	05.11.79
49111-360	Hydraulische verschlussanordnungen bugrampe	05.11.79
49111-302	Details für bugrampe	05.11.79
49111-361	Verriegelung für bugrampe	05.11.79

Section : 35 387

Enclosure 2.4.3.37

BUREAU VERITAS
Marine Division
T.N. DT1/N° 95/00136/SEG

Paris La Défense, 10 January 1995

M/V ESTONIA
Summary of class and statutory interventions

Contents

A Classification

A1 Review of drawings

A11 Bureau Veritas rules

A111 Requirements for bow doors in the 1977 rules
A112 Rules evolution since 1977
A113 Implementing Solas requirements in Bureau Veritas rules

A12 Examination of locking devices

A121 Remarks put on the reviewed drawings

A2 Appraisal of the selection of materials

A3 Survey during construction of the ship

A31 Survey of bow visor welds

B Issuance of statutory certificates

B1 Certificates issued by Bureau Veritas in 1980

B2 Certificates issued by the National Authorities in 1980

C Implementing Retrofit requirements according to IMO

C1 Stability

C2 Monitoring of bow locking

D Change of flag in February 1993

D1 Bureau Veritas authorizations for Estonian flag vessels

D2 Surveys carried out by Bureau Veritas

E Renewal of certificates as from 1993.

A Classification

A1 Review of drawings

A11 Bureau Veritas Rules

M/V Estonia has been classed by Bureau Veritas since newbuilding under special survey.

The request for classification (Annex 1) was signed 27 September 1979.

The class rules in force at that time were the 1977 issue.

A complete set of these rules is annexed to this summary.

A111 Requirements for bow doors in the 1977 rules

These requirements are given in para. 11-44, indentation 2 & 3:

- the scantlings of door plating and stiffeners are those of the adjacent shell structure;
- local reinforcements are required in way of cleats, hinges, and jacks attachments;
- the removable extension of the collision bulkhead above the bulkhead deck is to be made weathertight, however its position is not specified (see also 6-62.14 of the Bureau Veritas rules)

A112 Rules evolution since 1977

The 1980 set of rules is identical to the 1977, for bow doors requirements.

The June 1981 amendments contained a rule calculation method for bow visor securing devices, similar to the S8 unified requirement of IACS, except for the pressure criteria. The distance from the inner door to the fore perpendicular is required to be within the limits specified in Solas 1974, as amended 1981.

No change made in the 1982 issue.

In the 1985 issue, slight modifications were made to the rule calculation of forces on bow visor to be considered for securing devices.

In the November 1987 issue, the requirements were consolidated in full compliance with the IACS S8 unified requirement.

In January 1991, the minimum thickness of bow door plating was increased. The strength of large flared bow doors was to be specially considered.

A113 Implementing Solas requirements in Bureau Veritas rules

The 1960 Solas convention was in force at the time the Estonia was built. Chapter II, reg. 9 requests a weathertight extension of the collision bulkhead to be located aft of the forward perpendicular by 5 percent of the ship's length, at least.

This requirement was maintained in the Solas 1974.

The 1981 amendments to the convention mentioned for the first time bow ramps and specifically allowed the part higher than 2.3 meter above the bulkhead deck to be outside the limit for the location of the extension of the collision bulkhead. (relevant excerpts are enclosed as annex 3).

After the entry into force of the 1981 amendments, in September 1984, most internal sloped bow ramps could be located within the limit. Operational constraints made it difficult to comply with the previous requirement which was not aimed at this arrangement.
Bureau Veritas implemented this new requirement in its rules as from adoption at IMO, in june 1981, thus anticipating the September 1984 entry into force. No requirement was implemented to this end in the Bureau Veritas rules prior to this date.

A12 Examination of locking devices

The bow door drawings of the M/V Estonia were reviewed by the Hamburg local office of Bureau Veritas which was in charge of the review. List of reviewed drawings is given as annex 4.

The drawings were checked against the Bureau Veritas 1977 rules which did not contain formula for the rule strength of securing devices of shell doors opening outwards.

Information was received from the bow door designer, Messrs Von Tell, which stated in their telex dated 18 march 1980 (annex 5) to the local Bureau Veritas office in Hamburg that they had designed according to the Lloyd's Register rules.

A121 Remarks put on the reviewed drawings

Bow visor drawing (590/1103)
The remarks conform strictly to the rule requirements:

Rule requirements	Remarks on the drawing
15- The closing of doors is to be watertight. The thickness of plating is not to be less than for adjacent side shell.	1) Arrangements of locking devices subject to the approval of the national Authorities. 2) Watertightness of the ramp and local reinforcements of the ship's structures in way of locking devices, cylinders and hinges to Surveyor's satisfaction.
31- Doors and screen-doors have to be firmly secured by use of cleats conveniently spaced or other similar devices. Particularly, it has to be provided one of these devices at each corner of opening. Structure reinforcements have to be realised on door and adjacent shell plating to attached points of cleats, hinges, jacks, etc.	3) Jack lifting eye on arms, atlantic lock eye, side lock eyes, requested in steel grade St 52-3. 4) Local reinforcements requested and indicated under the side blocks active in y-direction (transverse).

General arrangement drawing of bow visor and ramp (49111-330)
Similar remarks were made:

Remarks on the drawing
1) Arrangement of locking devices and protection against shifting cargoes subject to the approval of the National Authorities.
2) Watertightness of the ramp and bow visor to Surveyor's satisfaction.
3) Local reinforcement of the ship's structure in way of - locking devices - cylinders - hinges to Surveyor's satisfaction.
4) High pressure flexible pipes must be approved by BV .

By the remark concerning the National Authorities it was made clear that locking devices were considered as an item subject to the examination and approval of the Finnish Authorities issuing the Passenger Ship Safety Certificate of the vessel.

A2 Appraisal of the selection of materials

The Bureau Veritas rule requirements are set out in chapters 3 and 25 of the 1977 issue.

For grade A steel, a ladle anlysis and a tensile test is required for each 50 tons batch (para. 25-32 of the 1977 rules).

Grade A steel is acceptable for all plates under 20 mm thickness.

A3 Survey during construction

The survey of the construction of the bow visor and ramp was done by the Oldenburg field office of Bureau Veritas.

Due consideration was given to the classification remarks put on the drawings .

A translated extract of the field Surveyor remarks appearing in his note book is given in annex 6.

Concerning the reinforcements under locks, two flat bars 230x22 mm were fitted under the side locks (visor side).

A31 Survey of bow visor welds

The control of welds is carried out according to the requirements of section 3-3 of the 1977 issue of the rules.

It includes a visual inspection of the line of welding to check aspect and uniformity.

The Surveyor carries out random close up surveys and requests non destructive testing where specified on the drawing or by the rules, and in case of doubt.

B Issuance of statutory certificates

B1 Certificates issued by Bureau Veritas in 1980

The certificates issued by Bureau Veritas to the newbuilding are listed in the request of classification (annex 1, second page).

Bureau Veritas issued the International Load Line certificate to the vessel, in accordance with the request of classification and on behalf of the Finnish Authorities.

In relation with the issuance of this certificate, the field Surveyor checked the watertightness of the bow visor (rubber packing) during construction and at sea trials. (remarks dated 23 April, 11 and 26 June 1980 of the Surveyor notebook, in annex 6)

B2 Certificates issued by the National Authorities in 1980

The Finnish Authorities issued the Passenger Ship Safety Certificate pursuant to Solas 1960 Convention.

The stability file was approved by the Finnish Authorities in 1981.

C Implementing Retrofit requirements according to IMO

C1 Stability

In 1991, a file modified further to the new IMO requirements was re-examined and approved by the Finnish Authorities.

C2 Monitoring of bow locking

Also in 1991-1992, the bow door and bow ramp control and monitoring devices were checked by the Finnish Authorities against the new IMO requirements.

The bow door cleating and monitoring consisted of:

- 2 side cleats hydraulically operated with limit switches on bolts (open & closed positions);

- 1 central lower cleat ("Atlantic") with separate hydraulic control with limit switches on bolts (open & closed positions);

- 2 manually operated fasteners for heavy weather with limit switches on bolts (open & closed positions) .

The ramp cleating consisted of:

- 2 jack operated hooks;
- 4 horizontal cleats;
all hydraulically controlled and provided with limit switches for open and closed positions.

The overall cleating was surveyable from a mimic panel (red and green lamps for each cleating group) both at the local control station and on the navigating bridge; video monitoring of the car deck included a view of the ramp closure.

D- Change of flag in February 1993

D1 Bureau Veritas authorizations for Estonian flag vessels

Bureau Veritas received as of 18 August 1992 authorisation from the Government of Estonia to issue certificates pursuant to the following conventions:

Load Line 1966
SOLAS 1974
MARPOL 1973
Tonnage 1969

The following documents were issued to the vessel:

International Load Line Certificate
Passenger Ship Safety Certificate
International Oil Pollution Prevention Certificate
International Tonnage Certificate 1969

Attestation pursuant to the Helsinki convention 1974
(prevention of pollution by sewage).

D2 Surveys carried out by Bureau Veritas

The vessel had valid International Certificates and kept the Bureau Veritas class when applying to fly the Estonian flag.

A periodical survey pursuant to SOLAS 1974, consolidated edition 1992, Chapter I, Part B, Regulation 7 (b) (ii) was carried out by Bureau Veritas on behalf of the Estonian Government according to the transfer of flag clauses of the Agreement signed 18 August 1992 between the Estonian Maritime Administration and Bureau Veritas.

The Exemption Certificate granted by the Finnish Authorities for radiotelegraphy (hours of listening by operator) was not re-issued under Estonian flag.

In the course of the periodical survey carried out by Bureau Veritas, a few anomalies were detected and notified to the Finnish Authorities.

E Renewal of certificates as from 1993.

The ship was surveyed and certificates renewed during the period 1993-1994.

The Passenger Ship Safety Certificate was kept Interim pending completion of the vessel new loading cases.

J.-F. SECRETAIN

BUREAU VERITAS HULL DIVISION PARIS 1828 DT1 INTERNATIONAL SERVICES

List of annexes

Annex 1

Request for classification
dated 27 September 1979

Annex 2

Extracts of Bureau Veritas Rules

June 1980
June 1981
June 1982
August 1985
November 1987

Annex 3

Solas 1960, Reg. 9, Chapter II-1

Solas 1974, as amended 1981, Reg. 10, Chapter II-1

Annex 4

List of reviewed drawings.

Annex 5.

Copy of telex dated 18 March 1980
received from Messrs Von Tell,
designers of the bow visor and ramp.

Annex 6

Translated extract of the field Surveyor Notebook

EXTRACT of inspections acc. to Surveyor's Notebook

carried out on the NC. 590 (BV-Reg.-No. 35 P 387) of the shipyard Messrs. Jos. Lürsen at Papenburg during building.-

28-03-80 GLo

Bugklappenanschluß an Hinterkante

Inspection of HULL-Construction acc. to the remarks made on drawings of Messrs. TELL during approval.

23-04-80 JD

Allgemeine Besichtigung Freibord

Checking of closing arrangements for the FREEBOARD REPORT on Form Mod. 195

11.06-80

Kontrolle des Seitenhauses vorn und achtern, sowie des achtern Mittelhauses auf dem Hauptdeck - Geringe Restarbeiten.

Checkings in way of the CARDECK forewards including bowramp and bow visor - resting and connection.

Remark: Condition and fitting of packings in closed position checked by means of chalk.-

26-06-80

Fortsetzung des Programms vom 25. Juni 1980 in See u.a. Kontrolle des Bugvisors.

During trials at sea under normal running conditions the space between bow visor and bowramp has been inspected for tightness.

NOTE: For inspections, tests and trials yard-protocols are made from the yard and signed by the parties concerned.-

G. Lohmann

Made out at Oldenburg on Nov. 23-1994

Enclosure 2.4.3.39

BUREAU VERITAS

REGISTRE INTERNATIONAL DE CLASSIFICATION DE NAVIRES ET D'AÉRONEFS
INTERNATIONAL REGISTER FOR THE CLASSIFICATION OF SHIPPING AND AIRCRAFT

RAPPORT DE FRANC-BORD
SURVEY FOR FREEBOARD

Etabli en vue de la délivrance d'un certificat de franc-bord international
In view of delivery of an international freeboard certificate

- Nom du navire *(Name of ship)* : "VIKING - SALLY"
- Port d'immatriculation *(Port of registry)* : Mariehamn, Finland
- Nationalité *(Nationality)* : Finnish
- Numéro ou lettres distinctifs *(Distinctive number or letters)* :
- Constructeurs du navire *(Ship builders)* : Jos. L. Meyer, Papenburg/Ems
- Numéro du chantier *(Yard number)* : S. 590
- Date de la construction/conversion *(Date of build/conversion)* : 1980
- Franc-bord assigné au titre d'un navire du type *(Freeboard assigned as a ship of type)* : B
- Classification *(Classification)* : I 3/3 E. DEEP SEA, Ice Class I A (AUT) Passenger Ferry
- Date et lieu de la visite initiale *(Date and place of initial survey)* : Papenburg/Ems April 1980

- Numéro de registre *(Register number)* : 35 P 387
- Catégorie *(Kind of ship)* : new
- Armateur *(Owner)* : Rederi Aktiebolaget Sally, Finland
- Lieu de construction *(Place of build)* : Papenburg, W. Germany
- Visite effectuée par *(Survey made by)* : J. Drasenovic

Le constructeur doit établir un plan plié au format 210 x 297 mm sur lequel doivent être indiquées les dimensions principales en tenant compte des règles de la Convention de 1966 sur les lignes de charge, ainsi que la description du type des ouvertures dans le bordé extérieur, dans les parois latérales et les cloisons d'extrémités des superstructures.

Le constructeur doit également fournir un dossier séparé pour permettre d'étudier la possibilité d'attribuer à un navire un franc-bord " A " ou " B réduit ".

(The builder should draw a plan fold in the dimensions 210 x 297 mm on which should be indicated the principal dimensions taking into account the regulations of the 1966 load line Convention as well as the description of the type of the openings in the sides of the ship, in the side plating and in the end of bulkheads of the superstructures.

The builder should equally submit a separated file in order to allow considering the possibility of assigning a freeboard to " type A " ships or a reduced freeboard to " type B " ships.

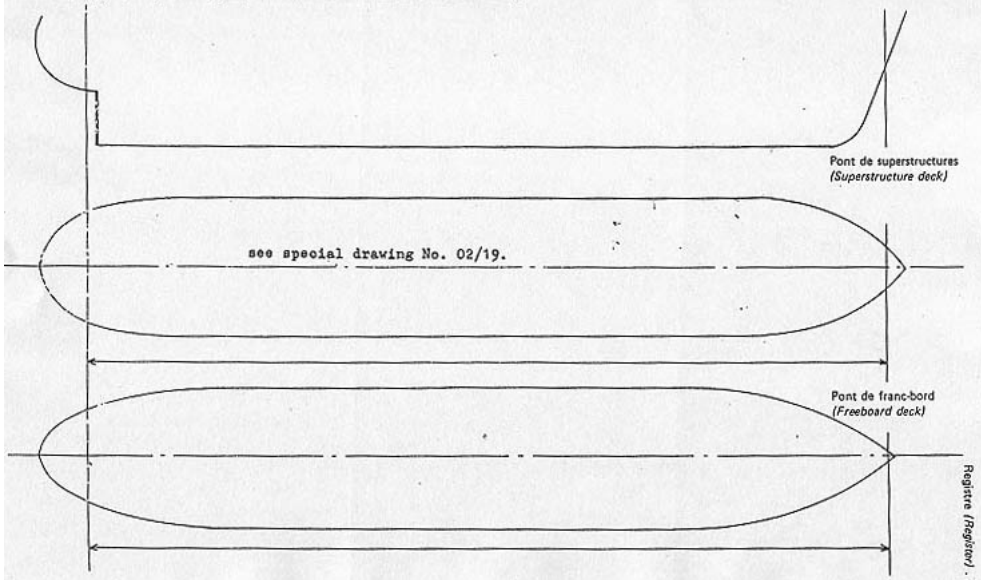
Mod. Ad. N° 193

Un plan aux dimensions appropriées peut être joint au présent rapport de préférence aux schémas figurant dans cette page.
(A plan of suitable size may be attached to this report in preference to sketches on this page)

Agencement et dimensions des superstructures, trunks, roufles, encaissement des machines, hauteur des pavois, rambardes et bordages en bois sur le pont exposé, à insérer dans les diagrammes et tableaux qui suivent, ainsi que l'emplacement des écoutilles, passerelles et autres moyens destinés à la protection de l'équipage ; écoutilles de chargement, portes à l'avant et à l'arrière, hublots, sabords de décharge, manches à air, tuyaux de dégagement d'air, capots de descentes et autres éléments qui affecteraient la navigabilité du navire.

(Disposition and dimensions of superstructures, trunks, deckhouses, machinery casings ; extent of bulwarks, guard rails and wood sheathing on exposed deck, to be inserted in the diagrams below and tables following ; together with positions of hatchways, gangway, cargo ports, bow and stern doors, side scuttles, scuppers, ventilators, air pipes, companionways, etc.., which would affect the seaworthiness of the ship).

Page 2



Registre *(Register)* .....

PORTES DES SUPERSTRUCTURES, ENCAISSEMENTS EXPOSÉS DES MACHINES ET ROUFLES PROTÉGEANT LES OUVERTURES SITUÉES SUR LES PONTS DE FRANC-BORD ET DE SUPERSTRUCTURES (REGLES 12, 17 et 18)

(DOORWAYS IN SUPERSTRUCTURES, EXPOSED MACHINERY CASINGS AND DECKHOUSES PROTECTING OPENINGS IN FREEBOARD AND SUPERSTRUCTURE DECKS (REGULATIONS 12, 17 and 18))

Emplacement *(Location)*	N° de référence sur le schéma ou le plan *(Ref. No on sketch or plan)*	Nombre et dimensions des ouvertures *(Number and size of openings)*	Hauteur des seuils *(Height of sills)*	Dispositifs de fermeture *(closing appliances)*	
				Type et matériau *(Type and material)*	Nombre de tourniquets de serrage *(Number of clips)*
Dans la cloison du gaillard *(In forecastle bulkhead)*					
Dans la cloison de château avant *(In bridge forward bulkhead)*	"D1" on 4th deck p. & s.	2 x (1370 x 620)	600	steel	4
Dans la cloison de château arrière *(In bridge after bulkhead)*					
Dans la cloison de pont surélevé *(In raised quarter deck bulkhead)*					
Dans la cloison de dunette *(In poop bulkhead)*					
Dans les encaissements exposés des machines situés sur les ponts de franc-bord ou de demi-dunette. *(In exposed machinery casings on freeboard or raised quarter decks).*					

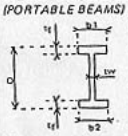
PORTES DES SUPERSTRUCTURES, ENCAISSEMENTS EXPOSÉS DES MACHINES ET ROUFLES PROTÉGEANT LES OUVERTURES SITUÉES SUR LES PONTS DE FRANC-BORD ET DE SUPERSTRUCTURES (Suite)

DOORWAYS IN SUPERSTRUCTURES, EXPOSED MACHINERY CASINGS AND DECKHOUSES PROTECTING OPENINGS IN FREEBOARD AND SUPERSTRUCTURE DECKS (Continued)

Emplacement *(Location)*	N° de référence sur le schéma ou le plan *(Ref. No on sketch or plan)*	Nombre et dimensions des ouvertures *(Number and size of openings)*	Hauteur des seuils *(Height of sills)*	Dispositifs de Fermeture *(closing appliances)*	
				Type et matériau *(Type and material)*	Nombre de tourniquets de serrage *(Number of clips)*
Sur les encaissements exposés des machines situés sur les ponts de superstructures *(In exposed machinery casings on superstructure decks)*					
Sur les encaissements des machines situés à l'intérieur des superstructures ou roufles sur le pont de franc-bord. *(In machinery casings within superstructures or deckhouses on freeboard deck).*	D 7 on 2nd deck	1 x (1670 x 1600)	200	steel	2
Sur les roufles situés dans un emplacement de la catégorie 1 entourant des ouvertures donnant accès sous le pont de Franc-bord. *(In deckhouses in position 1 enclosing openings leading below freeboard deck).*	D 2 D 6 D 8 D 9 D 10 D 11	2 x (1370 x 680) (4th deck) 2 x (1450 x 670) (2nd deck) 12 x (1830 x 800) (2nd deck) 4000 x 2600 (2nd deck) 3 x (1700 x 2150) (2nd deck) ~~2 x (1250 x 2150) (2nd deck)~~	600 600 230 - - -	steel steel pneumat. doors hydr. door lift doors ~~lift doors~~	4 2 - - - -
Sur les roufles situés dans un emplacement de la catégorie 2 entourant des ouvertures donnant accès sous le pont de franc-bord ou à l'intérieur de superstructures fermées. *(In deckhouses in position 2 enclosing openings leading within enclosed superstructures or below freeboard deck).*	D 3 D 4 D 5	2 x (1970 x 1350) (2nd deck) 1370 x 620 (2nd deck) 1970 x 850 (2nd deck)	- 600 -	wire steel wire	- 2 -
Sur les encaissements exposés de la chambre des pompes. *(In exposed pump room casings).*					

ÉCOUTILLES SITUÉES DANS DES EMPLACEMENTS DES CA...
PANNEAUX MOBILES ET RENDUES ÉTANCHES AUX INTEMPÉRIES PAR DES PRÉLARTS ET DES DISPOSITIFS À TRINGLES ...

HATCHWAYS AT POSITIONS 1 AND 2 CLOSED BY PORTABLE COVERS A[illegible] SECURED WEATHERTIGHT BY TARPAULINS AND BATTENING DEVICES (Regulation 15)

Emplacement et N° de référence sur le schéma ou le plan *(Position and reference No. on sketch or plan)*						
Dimensions du clair de l'ouverture au sommet du surbau *(Dimensions of clear opening at top of coaming)*						
Hauteur des surbaux au-dessus du pont *(Height of coamings above deck)*						
BARROTS MOBILES *(PORTABLE BEAMS)* Nombre *(Number)*						
Écartement *(Spacing)*						
 b1 x tf						
D x tw						
b2 x tf						
Surface de portage *(Bearing surface)*						
Moyens d'assujettissement de chaque barrot *(Means of securing each beam)*						
PANNEAUX MOBILES *(HATCH COVERS)* Matériau *(Material)*						
Épaisseur *(Thickness)*						
Sens dans lequel ils sont installés *(Direction fitted)*						
Surface de portage *(Bearing surface)*						
Écartement des taquets *(Spacing of cleats)*						
PRÉLARTS *(TARPAULINS)* Nombre d'épaisseurs *(No. of layers)*						
Matériau *(Material)*						

Moyens d'assujettissement de chaque élément transversal de panneau :
(Means of securing each section of covers) :

Les panneaux en bois sont-ils munis à leurs extrémités de bandes en acier galvanisé ?
(Are wood covers fitted with galvanized end bands ?)

ÉCOUTILLES SITUÉES DANS L[illegible] EMPLACEMENTS DES CATÉGORIES 1 ET 2 FERM[illegible]ES PAR DES PANNEAUX ÉTANCHES AUX INTEMPÉRIES, EN ACIER (OU AUTRE MATÉRIAU ÉQUI[illegible]LENT), DOTÉES DE GARNITURES ET DE DISPOSITIFS DE SERRAGE (Règle 16)

HATCHWAYS AT POSITION 1 AND 2 CLOSED BY WEATHERTIGHT COVERS OF STEEL (OR OTHER EQUIVALENT MATERIAL) FITTED WITH GASKETS AND CLAMPING DEVICES (Regulation 16)

Emplacement et N° de référence sur le schéma ou le plan *(Position and reference No. on sketch or plan)*	4th deck fr. 167 A 1	2nd deck fr. 146 2x A 2	2nd deck fr. 6 2 x A3			
Dimensions du clair de l'ouverture au sommet du surbau *(Dimensions of clear opening at top of coaming)*	820 x 820	1000 x 690	800 x 800			
Hauteur des surbaux au-dessus du pont *(Height of coamings above deck)*	800	800	600			
Type du panneau ou marque de fabrique *(Type of cover or patent name)*	6 bow nuts	2 clips	2 clips			
Matériau *(Matériel)*	steel	steel	steel			

Emplacement et N° de référence sur le schéma ou le plan *(Position and reference No. on sketch or plan)*						
Dimensions du clair de l'ouverture au sommet du surbau *(Dimensions of clear opening at top of coaming)*						
Hauteur des surbaux au-dessus du pont *(Height of coamings above deck)*						
Type du panneau ou marque de fabrique *(Type of cover or patent name)*						
Matériau *(Material)*						

OUVERTURES SITU[illegible] DANS LA TRANCHE DES MACHINES ET OUVE[illegible]URES DIVERSES DANS LES PON[illegible]S DE FRANC BORD ET DE SUPERSTRUCTURES [illegible]gles 17 et 18)

MACHINERY SPACE OPENINGS AND MISCELLANEOUS OPENINGS IN FREEBOARD AND SUPERSTRUCTURE DECKS (Regulations 17 and 18)

Emplacement et N° de référence sur le schéma ou le plan *(Position and reference No on sketch or plan)*	2nd deck fr. 147 CL F 1	2nd deck fr. 141 CL F 2	2nd deck fr. 66 P.S. F 3	2nd deck fr. 0 P.S. F 4	2nd deck fr. 0 St.b. F 5	
Dimensions *(Dimensions)*	1580x2280	1580x2280	2260x2280	3500x2300	3500x2300	
Hauteur du surbau *(Height of coaming)*	flush deck	flush deck	flush deck	flush deck	flush deck	
PANNEAU *(COVER)* — Matériau *(Material)*	steel	steel	steel	steel	steel	
PANNEAU *(COVER)* — Moyen d'attache *(How attached)*	by screws	by screws	by screws	by screws	by screws	
Nombre et écartement des cabillots *(Number and spacing of toggles)*	28 screws spacing=300	28 screws spacing=300	28 screws spacing=300	38 screws spacing=300	38 screws spacing=300	

Emplacement et N° de référence sur le schéma ou le plan *(Position and reference No on sketch or plan)*						
Dimensions *(Dimensions)*						
Hauteur du surbau *(Height of coaming)*						
PANNEAU *(COVER)* — Matériau *(Material)*						
PANNEAU *(COVER)* — Moyen d'attache *(How attached)*						
Nombre et écartement des cabillots *(Number and spacing of toggles)*						

MANCHES A AIR SITU[illegible] SUR LES PONTS DE FRANC BORD ET DE SUP[illegible] STRUCTURES (EMPLACEM[illegible]TS DES CATÉGORIES 1 ET 2) (Règle 19)

VENTILATORS ON FREEBOARD AND SUPERSTRUCTURE DECKS (POSITION 1 AND 2) (Regulation 19)

Pont sur lequel elles sont installées *(Deck on which fitted)*	Nombre de manches à air installées *(Number fitted)*	Surbau *(Coaming)* Dimensions *(Dimensions)*	Surbau *(Coaming)* Hauteur *(Height)*	Type (Préciser la marque de fabrique s'il y en a une) *(Type) (state patent name if any)*	Moyens de fermeture *(Closing appliances)*
4th deck V 1	6	400x200	900	Goosenock	steelcover with one bow nut
4th deck V 2	2	Ø 810	1700	EMA-VS-SLD	Fireflap
)	6	1200x1300	700	Jalousies	Jalousies with closing laminae
4th deck V 3)	2	1200x800	1120	"	" " " "
)	2	1000x1100	840	"	" " " "
4th deck V 4	12	1000x1400	700	"	" " " "
4th deck V 5	2	500x600	700	"	" " " "
2nd deck V 6	24	600x500	4950	"	Fireflap

TUYAUX DE DÉGAGEMENT D'AIR [illegible]UÉS SUR LES PONTS DE FRANC BORD ET DE S[illegible]RSTRUCTURES (Règle 20)

AIR PIPES ON FREEBOARD AND SUPERSTRUCTURE DECKS (Regulation 20)

Pont sur lequel ils sont installés *(Deck on which fitted)*	Nombre de tuyaux installés *(Number fitted)*	Surbau *(Coaming)* Dimensions *(Dimensions)*	Surbau *(Coaming)* Hauteur *(Height)*	Type (Préciser la marque de fabrique s'il y en a une) *(Type) (state patent name if any)*	Moyens de fermeture *(Closing appliances)*
2nd deck	1	ø 200x5,9	915	Air pipes	39 with opening in shell without closing appliance. acc. to draw. 61/1.
2nd deck	16	150x4,5	915	" "	
2nd deck	8	100x4,5	915	" "	
2nd deck	16	90x4,5	915	" "	31 with manuell closing acc. to drawing No. 61/3
2nd deck	25	65x4,5	915	" "	
2nd deck	5	50x4,0	915	" "	
2nd deck	11	40x4,5	300	sounding pipes	screw closing
2nd deck	7	40x4,5	fl.deck	" "	screw closing
2nd deck	15	ø50-ø150 x4; 4,5	800-950	filling- and band over pipes	flange closing

SABORD DE CHARG[illegible]ENT ET AUTRES OUVERTURES ANALOGUES (R[illegible]e 21)

CARGO PORT AND OTHER SIMILAR OPENINGS (Regulation 21)

Emplacement du sabord *(position of port)*	Dimensions de l'ouverture *(Dimensions of opening)*	Distance du can inférieur au pont de franc-bord *(Distance of lower edge from freeboard deck)*	Dispositifs d'assujettissement *(Securing devices)*	Observations *(Remarks)*
Bow part	1 x(5500 x 5150)	-	hydr. closing	by von Tell
Stern parts	2 x (7000x5100)	-	" "	" " "
Fr. 123 D 12	2 x (600x1700)	200 above 2nd deck	6 toggle-bolts	-
Fr. 80 D 13	2 x (2000x1200)	500 above 2nd deck	hydr. closing	by von Tell
Fr. 1 D 14	2 x (600x1700)	200 above 2nd deck	6 toggle-bolts	-
Fr. 80a D 15	2 x (2800x2200)	100 above 4th deck	hydr. closing	by von Tell

All parts with rubber-packing and according to approved drawings.

SCUPPERS, INLETS AND DISCHARGES (Regulation 22)

Préciser s'il s'agit de dalot ou de décharge *(State if scupper or discharge)*	Nombre *(Number)*	Tuyau *(Pipe)* Diamètre *(Diameter)*	Épaisseur *(Thickness)*	Matériau *(Material)*	Provenant de *(From)*	Distance verticale au-dessus de la quille *(Vertical distance above top of keel)* Décharge *(Discharge)* Sortie dans la coque *(outlet in hull)*	Extrémité du tuyau de décharge à l'intérieur du navire *(Inboard end)*	Clapet situé à l'emplacement le plus élevé *(Uppermost valve)*	Nombre, type et matériau des clapets de décharge *(Number, type and material of discharge valve)*	Emplacement des commandes *(Position of controls)*
D	1	Ø 50	7,5	MS	Bilge-pump	4650	4650	4650	Remote-controlled cast steel	engine control-room
D	2	Ø300	17,5	MS	Main-engine	4300	4300	7000		
D	1	Ø200	17,5	MS	Bilge-pump	4300	4300	4300		
D	1	Ø200	17,5	MS	Aux.-engine	4590	4590	4590		
D	1	Ø200	17,5	MS	Ballast-pp.	4580	4580	4580		
D	1	Ø200	17,5	MS	Ball.-system	4550	4550	4550		
D	1	Ø150	17,5	MS	Bilge-pump	3200	3200	3200		
D	1	Ø200	17,5	MS	Em.bilge-p.	3200	3200	3200		
D	1	Ø200	17,5	MS	Bilge-pump	2500	2500	2500		
D	1	Ø250	17,5	MS	Coolw.aggr.	4500	4500	4500		
D	4	Ø150	17,5	MS	KaMeWa-plant	3000	3000	3000		
D	2	Ø100	17,5	MS	Sewage-plant	5700	2200	5700		
D	2	Ø100	17,5	MS	DW-tanks	5700	5700	5700		
D	1	Ø150	17,5	MS	Prov.cool.pl.	4500	4500	4500	spring loaded	at outlet
S	24	Ø150	12,5	MS	2nd deck	5700	2nd deck	5700	" "	2nd deck
S	8	Ø100	11,0	MS	4th deck	5700	4th deck	5700	no valve	-

S – Dalot *(Scupper)*
D – Décharge *(Discharge)*

MS – Acier doux *(Mild steel)*
CS – Acier moulé *(Cast steel)*
GM – Bronze industriel *(Gun metal)*
Indiquez tout autre matériau approuvé, le cas échéant
(Any other approved material to be designated)

SD – Soupape à clapet attelé *(Screw down)*
ANR – Clapet automatique de non retour *(Automatic non-return)*
SD ANR – Clapet automatique de non retour avec moyen de fermeture direct *(Screw down automatic non-return)*

HUBLOTS (Règle 23)
SIDE SCUTTLES (Regulation 23)

Emplacement *(Position)*	Nombre de hublots installés *(Number fitted)*	Dimensions de la surface nette du verre *(Clear glass size)*	Fixe ou ouvrable *(Fixed or opening)*	Matériau *(Material)* Cadre *(Frame)*	Contre-hublot *(Dead-light)*	Type et épaisseur du verre *(Type of glass and thickness)*	Normes utilisées et type N° *(Standards used) and type No)*
2nd deck	6	Ø 300	fixed	steel	steel	15 mm	150 Type B
2nd deck	12	Ø 300	opening	steel	steel	15 mm	150 Type B
3rd deck	14	Ø 300	fixed	steel	steel	15 mm	150 Type B
3rd deck	2	Ø 300	opening	steel	steel	15 mm	150 Type B
4th deck	30	600x1500	fixed	steel	no dead-light	10 mm	150
4th deck	75	400x800	fixed	steel	no dead-light	10 mm	150
4th deck	4	400x800	opening	steel	no dead-light	10 mm	150
4th deck	4	400x800	fixed	steel	steel	10 mm	150
4th deck	4	400x800	opening	steel	steel	10 mm	150

Indiquer la distance verticale entre le pont de franc-bord et le can inférieur du hublot situé à la plus grande distance verticale au-dessous du pont de franc-bord.

(Indicate the vertical distance between the freeboard deck and the lower sill of the side scuttle positioned at the greatest vertical distance below the freeboard deck).

SABORDS DE DÉCHARGE (Règle 24)
FREEING PORTS (Regulation 24)

	Longueur du pavois *(Lenght of bulwark)*	Hauteur du pavois *(Height of bulwark)*	Nombre et dimensions des sabords de décharge de chaque bord *(Number and size of freeing ports each side)*	Section totale de chaque bord *(Total area each side)*	Section requise de chaque bord *(Required area each side)*
Puits arrière sur le pont de franc-bord *(Freeboard deck after well)*					
Puits avant *(Forward well)*	26,4 m	1,75-2,85m	1 x (5,65 m x 0,10 m) 1 x (3,70 m x 0,10 m)	0,935 m^2	0,924 m^2
Pont de superstructures *(Superstructure deck)*					

Préciser l'emplacement arrière et avant de chaque sabord de décharge par rapport aux cloisons d'extrémités de superstructures
(State fore and aft position of each freeing port in relation to superstructure end bulkheads)

Puits arrière *(After well)* —

Puits avant *(Forward well)* —

Détails sur les volets battants, barres ou tringles dont sont munis les sabords de décharge
(Particulars of shutters, bars or rails fitted to freeing ports) none

Hauteur du seuil inférieur du sabord de décharge au-dessus du pont
(Height of lower edge of freeing port above deck) 100 mm

PROTECTION DE L'ÉQUIPAGE (Règles 25 et 26)
PROTECTION OF THE CREW (Regulations 25 and 26)

Donner des détails sur les pavois ou rambardes installés sur les ponts de franc-bord ou de superstructures :
(State particulars of bulwarks or guardrails on freeboard and superstructure decks :)

As per drawing No. 02/19

Donner des détails sur les filières, passages, passerelles ou passages sous pont, lorsqu'ils sont prescrits :
(State details of lifelines, walkways, gangways or underdeck passageways where required to be fitted :)

—

DISPOSITIF D'ARRIMAGE DES CHARGEMENTS DE BOIS EN PONTÉE (Règle 44)
TIMBER DECK CARGO FITTINGS (Regulation 44)

Donner des détails sur les montants, sabots, saisines, rambardes et filières :
(State particulars of uprights, sockets, lashings, guardrails and lifelines :)

—

AUTRES CARACTÉRISTIQUES PARTICULIERES
OTHER SPECIAL FEATURES

Les conditions d'assignation figurant dans le présent recueil correspondent aux aménagements et installations prévus à bord du navire et sont conformes aux dispositions des règles pertinentes de la Convention Internationale de 1966 sur les lignes de charge.

(The conditions of assignment shown on this form are a record of the arrangements and fittings provided on the ship and are in accordance with the requirements of the relevant regulations of the International Convention on Loadlines, 1966).

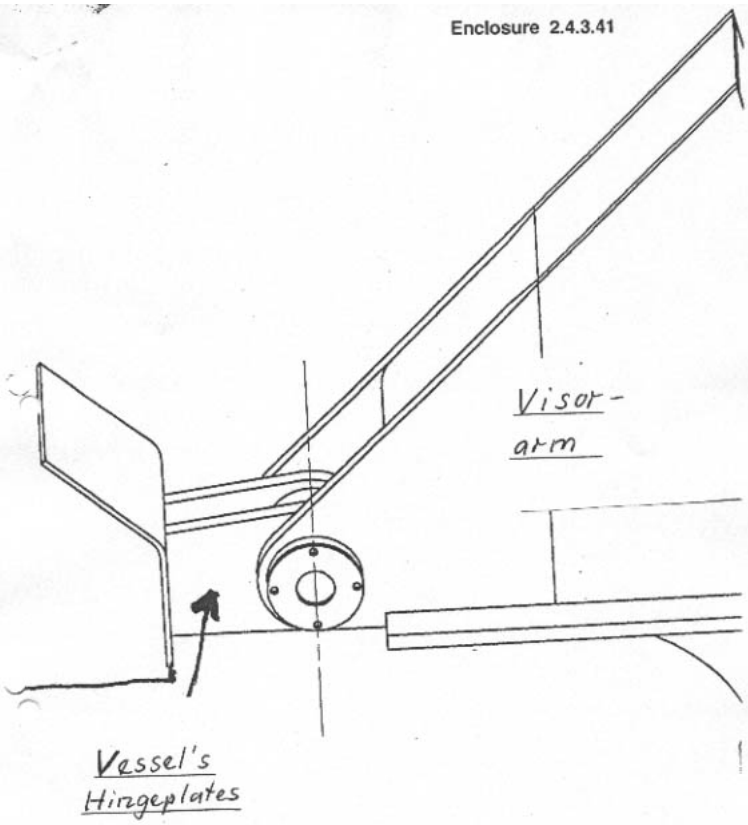
A Oldenburg, le April 23, 1980
(Place) *(Date)*

J. Brazenovic
(Signature)

Expert du BUREAU VERITAS
(Surveyor to BUREAU VERITAS)

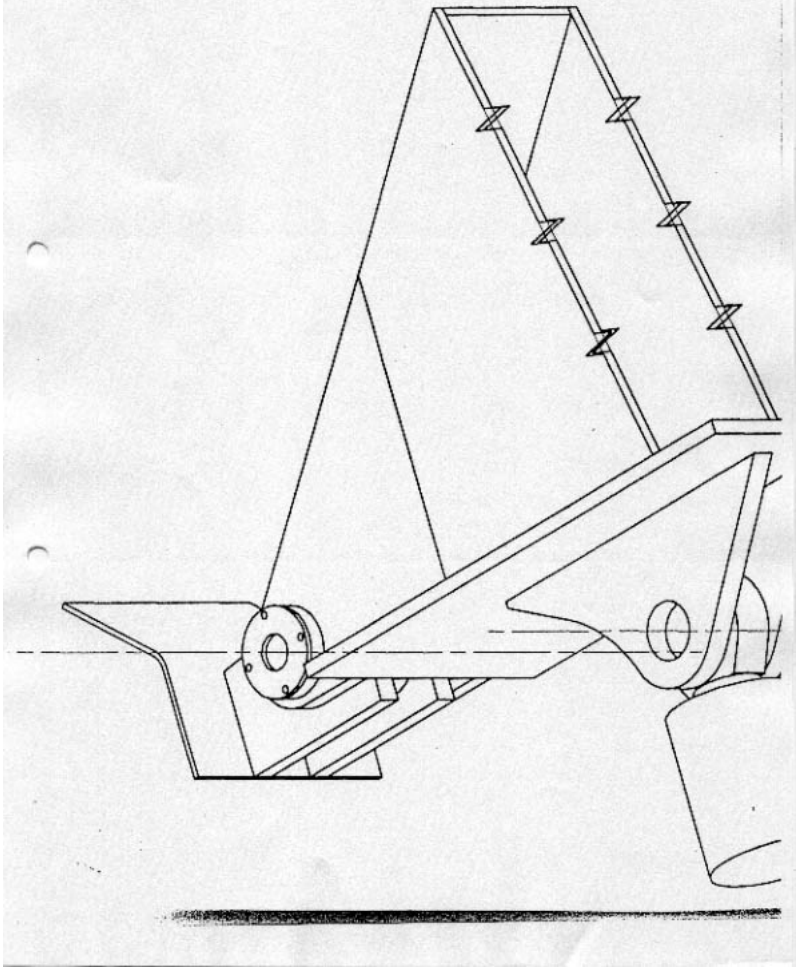
Enclosure 2.4.3.40

Enclosure 2.4.3.41



VIEW "X"

VIEW "X"



Enclosure 2.4.3.42

Nr.	Art der Änderung	Datum	Name
3			
2	Scharnierbleche geändert	21.80	Se
1	geprüft: von Tell	22.11.79	Se

Maßstab: 1:10	Jos. L. Meyer Papenburg (Ems) Schiffswerft, Maschinenfabrik, Dockbetrieb
Datum: 31.10.79 Se	Bugklappenverriegelung

Gewerk.	Schiffs Nr.	Sektions Nr.	Zeichn. Nr.	Archiv Nr.
	590		1106	

Enclosure 2.4.3.43

Von Tell GmbH
Sophienallee 24

2000 Hamburg 19

T35/Se/Sk -257 09.01.1980

Ihre Komm. Nr. 4911.1/60.151.1
Mein Neubau S. 590

Sehr geehrte Herren,

anliegend erhalten Sie 2 Pausen der Zeichnung

1106 Bugklappenverriegelung .

In dieser Zeichnung ist das Bugklappenscharnier in der geänderten Form (gegenüber S. 591) dargestellt.

Bitte prüfen Sie die Zeichnung und senden Sie mir eine Pause, mit Ihrem Genehmigungsvermerk versehen, zurück.

Mit freundlichem Gruß

J O S. L. M E Y E R

Anlage

Enclosure 2.4.3.44

Bureau Veritas
Hopfenmarkt 33

2000 Hamburg 11

TBS/De/Sk -257 9.01.1980

Mein Neubau S. 590

Sehr geehrte Herren,

anliegend erhalten Sie 4 Pausen der Zeichnung

1106 Bugklappenverriegelung.

In dieser Zeichnung ist das Bugklappenscharnier in der geänderten Form (gegenüber S 592) dargestellt.

Bitte prüfen Sie die Zeichnung und senden Sie mir eine Pause, mit Ihrem Genehmigungsvermerk versehen, zurück.

Mit freundlichem Gruß

J O S. L. M E Y E R

Anlage

Bureau Veritas
Marine Division

14.06.1995

SURVEYS BY BUREAU VERITAS DURING CONSTRUCTION OF M/S ESTONIA

Survey dates	Locations, subjects & items surveyed
1979 09 25	Informal meeting with Mr Zerrahn.
1979 10 04	Inspection of double bottom sections iwo gear foundations.
1979 10 09	Meeting with yard and owner in drawing office.
1979 10 10	Meeting with Mr Brück of Seebeckwerft at Bremerhaven, supplier of deck house sections.
1979 10 12	Inspections on building berth and in shops.
1979 10 24	Meeting and inspection.
1979 11 05	Inspections on building berth and in shops. Meeting with yard managers, X ray program made.
1979 11 08	Inspections and discussions at the yard.
1979 11 13	Meeting at Bremerhaven Seebeckwerft.
1979 11 14	Inspections at Bremerhaven; Messrs Rickmerswerft & Tileman.
1979 11 16	Inspections of sections at Messrs Rickmerswerft & Tileman. Inspection of double bottom tanks at the yard.
1979 11 23	Pressure test and inspection of tanks. Meeting with owners rep. & yard
1979 11 28	Inspection and pressure test of tanks.
1979 12 04	Inspection of sections at Bremerhaven - Rickmerswerft.
1979 12 05	Pressure test and inspections of tanks. Inspection of tweendeck spaces before painting and insulation.
1979 12 06	Seebeckwerft, Bremerhaven, inspections.
1979 12 11	Air test of void spaces. Inspections of db tanks and engine rooms.
1979 12 13	Inspection of tanks, cofferdams as well as pressure tests.
1979 12 14	Seebeckwerft Bremerhaven, inspections and meeting.
1979 12 17	Seebeckwerft Bremerhaven, inspection of superstructures.
1979 12 18	Meeting and inspections.
1979 12 19	Pressure test of tanks. Rickmerswerft, Bremerhaven, inspection of bulbous bow sections.
1979 12 20	Pressure test of heeling tanks (tk 14). Discussion in yard offices.
1980 01 06	Pressure test and inspections of tanks.
1980 01 08	Seebeckwerft Bremerhaven, inspection of superstructures.

Enclosure 2.4.3.44.1

SURVEYS BY BUREAU VERITAS DURING CONSTRUCTION OF M/S ESTONIA

Survey dates	Locations, subjects & items surveyed
1980 01 14	Air test of both heeling tanks. Inspection of tween deck spaces. All 4 aux. units in the aux. eng. room. First sections from Bremen have arrived in Papenburg.
1980 01 16	Pressure tests witnessed by owners representatives.
1980 01 18	Seebeckwerft & Rickmerswerft, bremerhaven; insp. of sections. Pressure test of small tanks at old facilities.
1980 01 29	Inspection and pressure tests.
1980 01 30	Tests of small tanks -at old facilities-
1980 02 01	Inspection of tanks, spaces and tweendeck spaces.
1980 02 04	Seebeckwerft, Bremerhaven, inspection of superstructure sections.
1980 02 05	AUT meeting with MM Trousse & Lavaine. Pressure tests and inspections according to programme.
1980 02 07	Inspections and discussions with owners rep. and yard.
1980 02 08	Inspection of tanks and tweendeck spaces. Start of freeboard report survey.
1980 02 12	Inspection and pressure tests of tanks and cofferdams.
1980 02 15	Continuation of insp. and pressure tests.
1980 02 19	Inspection of both rudders and identification of materials in the workshops - at old facilities-
1980 02 21	Pressure test of tanks and inspection of several spaces.
1980 02 26	Inspection and pressure tests of tanks and void spaces. Inspection of staircases. Viewing of X ray films.
1980 02 29	Inspection and pressure tests of tanks.
1980 03 04	Inspection and supervision.
1980 03 05	Seebeckwerft, Bremerhaven, inspections and supervisions with owner and yard.
1980 03 06	Inspections of tanks, cofferdams and staircases
1980 03 11	Inspection of cofferdam iwo: swimming pool; prov. stores and steering gear compartment. Check of fire protection insulation.

SURVEYS BY BUREAU VERITAS DURING CONSTRUCTION OF M/S ESTONIA

Survey dates	Locations, subjects & items surveyed
1980 03 14	Pressure tests of tanks. Inspection of shell plating. Pressure tests of starting air lines and hydraulic lines.
1980 03 18	Pressure tests of cofferdams and inspection of bulkhead on frame 133. check of shaft struts.
1980 03 28	Internal inspection of fresh water tanks. Check of bow ramp connections. Check of armatures for the Sanea pump units. Inspection of section butts of the upper superstructures.
1980 03 31	Check of fwd draught marks. Discussion about Superfos hydraulic control room and inspection of Sanea pump units.
1980 04 01	Completion of recording for inspection on 25 March 1980. Checks of rudder main pieces and pintles with nuts and bearings. Freeboard record with drawings examined.
1980 04 02	Inspection of trim tank N° 2 WB and starboard side "C" deck. Recommendations made.
1980 04 09	Fitting of pintle bushes in both skegs verified. Checking of PS rudder main piece. Pressure tetst of freshwater tanks N° 56 & 57. Checking of bow thruster motor foundation forward. Checking of X ray films.
1980 04 11	Pressure tests of sea chests and void spaces. Inspection of fresh water tanks N° 56 & 57
1980 04 15	Fitting of shaft bushes checked. Draught marks aft examined.
1980 04 17	Fitting of propeller shaft stbd witnessed. Surveys for freeboard report.
1980 04 18	Fitting of shaft bushes.
1980 04 21	Fitting of propellershaft ps witnessed. Meetings with Messrs Zerrahn & Watermann.
1980 04 22	Check of fitting of starboard side rudder. Inspection of insulation. Bottom inspection.

SURVEYS BY BUREAU VERITAS DURING CONSTRUCTION OF M/S ESTONIA

Survey dates	Locations, subjects & items surveyed
1980 04 23	Surveys for freeboard report.
1980 04 24	Check of fitting of port side rudder.
	General hull survey. Discussion with Mr Zerrahn about Sanea plant
	inspections. Air test of fore peak.
1980 05 05	Surveys in the car deck area "C" deck.
1980 05 09	Informal visit with Mr Arpe. Visit of Sanea plant parts.
1980 05 12	Air test of stern tank. Pressure tests of piping systems.
	Check of car deck insulation. Pressure test of Sanea boiler.
1980 05 14	General survey. Pressure test sprinkler system
	Inspection of Sanea thermal oil boiler plants.
1980 05 16	Pressure test of two Sanea collectors. Informal visit with Mr Kranz.
1980 05 21	Check of alignment of both shaft lines up to gears.
	Inspections in engine room.
1980 05 22	Surveys and meetings in different offices.
1980 05 27	Continuation of meetings 22 May 1980.
1980 05 28	Load test of car deck sections. Surveys and meetings.
	Discussion about insulation of thermal oil piping systems with Mr Bless.
1980 05 29	Load tests of car deck sections, insulation as before discussed.
1980 05 30	Load tests of car deck sections.
1980 06 02	Alignment of both main engines checked.
	Pressure test of thermal oil boilers (th. oil side).
1980 06 03	Different surveys. Meeting with Mr Breitschneider Siemens
	about load tests.
1980 06 04	Different surveys. Meeting with Mr Zerrahn.
	Pressure tests of thermal oil lines.
1980 06 05	Check of insulation below "C" deck. Further check of alignment of MEs.
	Check of water tight doors. Electrical load tests.
1980 06 06	Inspection of double bottom tanks for check of bottom plating after
	launching. Pressure test of steam lines in forward air cond. rooms.
	Air test of thermal oil lines. Load tests with all four auxiliary engine

SURVEYS BY BUREAU VERITAS DURING CONSTRUCTION OF M/S ESTONIA

Survey dates	Locations, subjects & items surveyed
1980 06 09	Discussion about freeboard marks.
1980 06 10	Pressure test of CO2 lines. Check of free board marks.
1980 06 11	Inspection of side and centre houses on cardeck.
	Loads tests of boats and davits. Test of quick closing valves.
	Tel. conv. with Mr Lavaine about trials.
1980 06 12	Pressure test of CO2 lines. Boat and davit tests.
	Test of bilge lines and pumps.
1980 06 13	Test of bilge systems. Boat and davit tests.
	Load test of port side forward crane.
	Load test of starboard side forward car ramp.
1980 06 16	Load test of portside forward car ramp.
1980 06 18	Load test of car deck sections. Boat and davit tests.
	Load test of port side aft crane.
	Pressure test of different pipings.
1980 06 19	Load tests of boats and davits. Load tests of crane rails in ER.
	Load test of starboard side aft car ramp.
1980 06 20	Load test of crane rails. Test of emergency Diesel unit.
	Boat tests. Hose test of port side stern door.
1980 06 21	Inclining experiment with Mr Engelmann of FSS.
	Pressure test of starting air lines. Load tests of container lifts.
1980 06 23	Hose and function tests of passenger shell doors
	on C and D decks, port and starboard sides.
1980 06 25	Trip from Papenburg to Leer.
	Tests of watertight doors. Start of tests.
1980 06 26	Continuation of sea trials with tightness tests.
	Check of bow visor. Check of alarms.
1980 06 27	Start manoeuvers of main engines.
	Function tests of watertight doors from bridge console.
	Test of quick closing systems from car deck.
1980 06 28	Sea trials.

SURVEYS BY BUREAU VERITAS DURING CONSTRUCTION OF M/S ESTONIA

Survey dates	Locations, subjects & items surveyed
1980 06 29	Sea trials and arrival at Emden.
1980 06 30	Checks of main engines before departure from Emden for Mariehamm through Kiel canal. Tests according to trial programme.
1980 07 01 until 1980 07 07	Tests according to trial programme.
	ditto
1980 07 30 until 1980 08 02	Several AUT checks and tests during voyages between Finland and Sweden. AUT trials not completed.
1980 11-12	Several AUT trials after completion of remaining work on voyages between Stockholm and Turku. AUT Certificate handed over.

Enclosure 2.4.3.44.2

The German Group of Experts investigating the sinking of M/V "ESTONIA"

c/o AHLERS & VOGEL · Schaartor 1 D-20459 Hamburg · Telephone 49-40-371075

Confidential Memo

cc : Dr. Holtappels
T. Wilkendorf

Meeting with principal surveyor of B.V. Stockholm office,
Lars Olof Ålander on 19th June 1995

---

1. BV Organisation in Sweden/Finland up to 1990

   Head office for Sweden was and is Gothenburg.

   Manager: Hans Olsson

   Stockholm and Trelleborg/Malmö report to Gothenburg,

   Gothenburg reports to Paris.

   B.V.'s office for Finland was and is in Helsinki (plays no part in the "ESTONIA" matter),

   as of 1990 - Head office for the northern countries established in Copenhagen

   as of 1995 – B.V. office in Tallinn.

2. Reporting procedure

   - Hull
   - Machinery
   - Automatic systems (AUT)

   The system consists of surveys totalling 1500 items over a period of 5 years, i.e. 300 items every year.

3. Load Line Survey (annually)

Was executed for F.B.N. resp. Sjöfartsverket and consisted of survey resp. determining condition of car deck doors, staircases, scuppers, valves, etc. visor/bow ramp and stern ramps as well as the locking devices and rubber seals of same.

(The locking devices are not part of the Load Line Survey, although they should be).

The B.V. Report Form did not include the visor at that time because it was considered to be more of a breakwater.

It was clear to everyone that the bow ramp on all older ferries would not fulfil the SOLAS Regulation 10 requirement as upper extension of the collision bulkhead. However, it was not and is not the field surveyor's business to criticise this construction characteristic - evidently approved by the head office. The rubber sealings - also of the visor - are part of the L.L. Surveys. As the final item of an L.L. Inspection, the closed and locked visor should be hose tested.

4. Role of the F.B.N. and Sjöfartsverket Ship Safety Inspectors

- Examine all certificates
- Inspect social rooms / cabins / passenger accommodations
- Inspect life-saving and fire-fighting equipment
- Inspect navigation instruments
- Issue (PC) Passenger Ship Safety Certificate (annually), and thereby confirming that the vessel meets SOLAS requirements, although this is not the case.

5. The upper extension of the collision bulkhead above freeboard deck

- After the "ESTONIA" catastrophe the seasafety director of Sjöfartsverket, Bengt-Erik Stenmark, ordered an investigation within Sjöfartsverket to find out how many ferries on the Baltic did not meet the SOLAS Regulation 10 requirement for the upper extension of the collision bulkhead. There were a

total of 40 vessels. The list with the names of these vessels is kept confidential within Sjöfartsverket, however, reportedly a copy was sent by fax to the Finnish Commission in Helsinki.

- Upon searching for an explanation for the above-mentioned it was discovered that apparently the bow ramp had been approved for the first time by a National Maritime Administration as the upper extension of the collision bulkhead for the ferries "PRINS BERTIL" and "PRINSESSAN CHRISTINA", built in Aarhus in 1960/61 - although the position of the upper extension of the collision bulkhead above bulkhead deck was already determined by SOLAS 1948 (probably with the restriction of no further than 20 sm away from the nearest land).
- In the course of the following years the National Maritime Administration of the countries surrounding the Baltic developed a practice by which this deviation from SOLAS Regulation 10 was accepted even on larger ferries, i.e. the far too short distance between the bow ramp as upper extension of the collision bulkhead and the forward perpendicular, of course mainly in compliance with owners' request.

6. "VIKING SALLY" - "WASA KING"

- Chief engineer Lars Karlsson was onboard from time of commissioning until the sale of the vessel and is the person best acquainted with this ship (now onboard "BIRKA PRINCESS").
- On repeated occasions the visor was closed with locking devices already in closed position. This led to damages of the lugs and bolts (also on "DIANA II").

  Visor and ramp always belong to the Chief Mate's duties on Swedish/Finnish ferries (on "ESTONIA" it was the boatswain's duty).
- He supervised the "VIKING SALLY" in Stockholm and took care of the normal survey items. She sometimes called at the yard Finnboda, Stockholm and sometimes at the Naantali or Turku yards. In latter case he left the surveys up to the BV Helsinki office.

He was not part of the building supervision (that belonged to Lohmann and Axe).

- When the ship came to Stockholm for the first time the Passenger Ship Safety Certificate (Interim) was issued by the F.B.N.
- He was onboard the "WASA KING" for the last time in 1992 to do a boiler survey. At this time a Nordström & Thulin captain was already onboard as a trainee because N&T did not have personnel with ferry experience.
- He knows that the sensors of the Atlantic lock had been changed several times. Also Anders Wirstam knows this. However, B.V. Paris had instructed them not to talk about it.

  If the class symbol would have contained the unrestricted AUT the sensors would be a class item. "VIKING SALLY" however only had a restricted (AUT), therefore it is not clear. Under no circumstances are the sensors a matter for the F.B.N.

  The class should have inspected the sensors, however this was never done in practice.
- All electrical systems were subjected to annual megger testing, therefore also the sensors of the bow visor locking devices.
- In his opinion the correct functioning of the sensors / control lamps are a pre-condition for the seaworthiness of the vessel.
- In his opinion the manual locking devices of the bow visor are "heavy weather securings", which have to be engaged in case heavy weather should be forecasted. Locking devices are a class item and not the responsibility of the F.B.N.
- The officers were not allowed to do any manoeuvres without the approval of the master on the "ESTONIA", especially no engine manoeuvres. Up to now, i.e. including the "MARE BALTICUM", they had not learned how to handle 2 x 12000 hp.
- From talks with Anders Wirstam he knows as well that from the time of taking over no further maintenance of the vessel had been carried out. They only painted for "the eye".

- At the time of the casualty the vessel did not have a valid stability manual (was completed only in April 1995).
- Due to the "Continuous Survey of Hull and Machinery" procedure - 58 tanks were to be inspected among others - Anders Wirstam was on board on the following days in addition to the taking over: 31.01.94; 17.03.94; 06.04.94; 11.05.94; 30.08.94; 21.09.94.
- One day before the disaster occurred Anders Wirstam went on his honeymoon. The first he heard upon arrival was about the sinking. He returned immediately and was afterwards 3 months in psychiatric treatment.
- During a meeting at Bureau Veritas head office in Paris Anders Wirstam and Hans Olsson expressed their opinion that the vessel had been too large and too complicated for the inexperienced crew.
- He has collected 20.000 negatives in the course of his job-life which he will now check for photographs of "VIKING SALLY".
- He was asked by the claims manager Sverker Jonasson of Trygg Hansa - the leading hull underwriter of "ESTONIA" - if there would be reasons to justify that the insurance amount of USD 60 million should not or not yet be paid, because he was pressed by Bergmann from N&T for payment already since shortly after the sinking. His reply was NO because the ship had clean certificates. Based on his knowledge of today, however, his reply would have been to the contrary.
- In his view "ESTONIA" departed from Tallinn on her last voyage with "suspended class" because she had problems to close the visor correctly. (When Lars Olof Ålander stated this, he still did not know our points).

  He has based his above conclusion on the statement of pilot Gerhard Stenhammar, who had observed - a few weeks before the catastrophe occurred - that only after about 15 minutes of opening and closing the visor - combined with hard shocks of visor and the entire foreship - the crew was able to close the visor. According to his view and the interpretation of the pilot this indicates that the visor must have been completely "out of geometry".

- After we had submitted the results of our investigation he was shocked in his capacity as representative of the class. He stressed that the following points - each separately – did affect respectively have affected the class:
  - condition of the sternpost
  - condition of the rubber packings
  - cracks in the visor hinges
  - poor repairs of the foundation of the port actuator of the visor
  - severe old damage at forward part and port side of the visor's shell plating
  - missing sensors at the Atlantic lock
  - missing/weak weldings at the lugs/bushings of the Atlantic lock
  - a not properly operated securing bolt of the bow ramp and consequently missing indicator lights on the bridge
  - changes of the visor lug of the Atlantic lock

  All these points should have been presented to the class. The repairs of the cracked lugs at the port cylinder on B-deck should have been carried out by a skilled shore company under the supervision of the class.

7. "ESTONIA"

- Upon instructions of Hans Olsson - chief executive Gothenburg office - Anders Wirstam exclusively looked after the "ESTONIA" in respect of her class and the safety matters for the Estonian Board of Navigation. This was also the case when the vessel had been in the shipyard at Turku. Wirstam reported directly to Hans Olsson, i.e. without using the official channel, viz. Lars Olof Ålander.
- He knew about the contract between Bureau Veritas/Estonian Board of Navigation, but the contents are strictly confidential.
- During taking over the "ESTONIA" in January 1993 Hans Olsson, Anders Wirstam and one borrowed Sjöfartsverket inspector were present. The ship was checked and found to be in order. However, he was excluded from all activities concerning the taking over of the "ESTONIA". The reason could

have been his aversion against Ulf Hobro, the technical Inspector of Nordström & Thullin in charge of the "ESTONIA".

- Already from the beginning it was known that the Estonian crew was very inexperienced and that Nordström & Thullin had to use a lot of Swedish advisers on board. Hans Olsson and Anders Wirstam as well as the surveyor for the hull and P&I underwriters accepted the crew more or less, at least no one raised any objections.
- He knows from talks with Anders Wirstam that he and Hans Olsson had spent a lot of thoughts on the total incompetence of the crew, especially of the navigators (2nd and 4th Officer were playing pinball machine on the bridge, 1st Officer was so immovable that he was not able to put on/take off a T-shirt without help).

8. Other Information

- The surviving passenger Pierre Thiger reported that he has been at the bar with his colleagues, when - at 23.47 hours (Swedish time) i.e. 00.47 hours Estonian and board time - the vessel was shaking seriously and "a sharp metallic bang" was heard. About 60 seconds later the same occurred again. After the 2nd shock the vessel fell into a wave trough and came up again, then heavy rolling started which finally ended with a starboard list.

  The passenger could not decide to go over board with the others and stayed on the port boat deck (more forward than amidships) as long as possible. He was probably one of the last to leave the ship. At this time the vessel was totally on her starboard side and seriously trimmed by the stern which, he believes, was already aground whilst the foreship was still afloat. This is possible due to the length of the ship and the water depth.

- On 05.06.95 in the morning broadcast of Radio 1 (presenter: Helena Groll; reporters: Erik Ridderstolpe and Lars Greipe) it was reported that the chairman of the Masters and Ship Officers Association, Christer Lindvall, had stated that the indications that the "ESTONIA" had left Tallinn in unseaworthy condition were becoming stronger. Cracks in the collision bulkhead below car deck and bow thruster room were mentioned.
- The key persons knowing everything about the condition of the "ESTONIA" are Anders Wirstam, the surveyor of Bureau Veritas and Åke Sjöblom, chief inspector of Sjöfartsverket's Malmö office, who had been temporarily lent to the Estonian Board of Navigation and trained apprentices. The training took place on board the "ESTONIA" until shortly before her last departure. Since the casualty occurred Sjöblom has been pressed by his superiors and the public to make a report. Up to now he has refused this with the argument that he worked for the Estonians. He is becoming more and more a drinker and also during the day shall not sober up anymore.

20.06.95 - Werner Hummel

Enclosure 2.4.3.45

Bureau Veritas

INTERNATIONAL REGISTER FOR CLASSIFICATION OF SHIPS - ESTABLISHED 1828
REGISTRO INTERNACIONAL PARA LA CLASIFICACION DE BUQUES - FUNDADO EN 1828

CERTIFICATE OF CLASSIFICATION
CERTIFICADO DE CLASIFICACION

Certificate / *Certificado* No. 037015

No. 35 P 387 in Register Book / *en el Registro*

"W A S A K I N G"
HULL / *CASCO*

This is to certify that the above named steel motor ship has been / *El abajo firmante certifica que el buque* *ha sido*
surveyed for renewal of the certificate at/*en* Stockholm in/*en* June/July 1990
by Surveyors to the Society, in accordance with the requirements of the Rules.
por el personal técnico de la Sociedad, de acuerdo con las prescripciones de Reglamento.

Owners/*Armador* : Wasa Line Oy Ab

Flag/*Bandera* : Finnish Port of Registry/*Puerto de matrícula* : (Vasa) Vaasa

Registered tonnage, Gross/*Arqueo bruto* : 15 566,89 RT Net/*Neto* : 8 372,46 RT

Built at/*Construido en* : Papenburg by/*por* : Jos. L. Meyer

Completed in/*Acabado en* : July 1980

The ship has been entered in the Register Book with the classification symbols :
El buque ha sido inscrito en el Registro con los símbolos de clasificación :

I 3/3 E

and the marks and notations : / *y las marcas y menciones*
PASSENGER FERRY
DEEP SEA
ICE CLASS I A
(AUT)

This certificate, issued within the scope of the Bureau Veritas Marine Branch General Conditions, is valid
Este certificado, expedido con arreglo a las Condiciones Generales de la Rama Naval del Bureau Veritas, es válido
until / *hasta* JULY 15, 1995

The hull of the ship is surveyed under the continuous survey system
El casco del buque está sometido a la reclasificacion

Date of the two last periodical bottom surveys/*Fecha de las dos ultimas visitas periodicas de la carena* :
in drydock/*en dique seco* : May 1990 in water/*submarina* : May 1989

The validity of the present class is conditioned upon due compliance with the requirements of Chapter 2 of the Rules regarding maintenance of class.
La validez de la presente Clase depende de la aplicación de las prescripciones del Capitulo 2 del Reglamento relativas al mantenimiento de Clase.

Issued / *Expedido en* Stockholm on/*el* July 16, 19 90

For/*por el* Bureau Veritas,
By order of the Secretary
(Signature and stamp)
Firma y sello

See VISA No. 2

Helsinki 4.2.1991
Tony Patterson
T. Patterson

Hans Olsson
Chief Surveyor - Jefe Perito

BV Mod. Ad. MEH 407 b

2.021

08/07 95 13:46 ☎-49 4061 81300 SK MEYER WERFT

TELEX SNOW WHITE TELEX SNEEL

27113a meypo d
6315 algot sfo
27113a meypo d
6315 algot sf
13.9.1979 10.57 hrs pau/bl

newbuilding

re meeting with finnish board of navigation.

preliminary following arranged:
mr. janson and mr. hautainen will arrive at hamburg by air 25th september at 12.15 hrs. and return 27th at 19.30 hrs.

it is not possible to arrange an earlier visit as mr. janson will be in spain next week.

please confirm whether acceptable.

regards
rhederiaktiebolaget sally
lea ouartanson

6315 algot sfo
27113a meypo d

Enclosure 2.4.4.46

57. Jensen — H. Rodtegen — 22.9.79
H. Helmers — H. Gerdes
H. Brons
R. Eo.

Enclosure 2.4.4.47

1.) Bemerkung für Kollegen Brinckmann
Vorschriften S. 82 Regel 35 und solche

2.) H. Jensen gibt zusammenfassend Überblick
ob IMCO-Empfehlungen zur Erfüllung
von SOLAS 74 (Kapitel III) erfüllt
werden müssen

3.) Sicherung φ-Stahl im Bereich der
Straken.

4.) Gibt es Vorschriften für Klappsitzen
im Bereich der Boote? Kommt Nachricht

5.) Wasserdichtenanzüge 1 Stck für 3 Mann
Kommt Nachr.

6.) Erforderliche Ein Bootsmannsplätze: Kommt
Nachricht.

7.) Welche Abmaßnahmen während der Bau-
zeit von B.O.N. gefordert werden sind aufzu-
zeichnen.

8.) Welche Sicherungen eingebaut werden
müssen kommt Liste.

9.) C-Deck vorn: 150 Pax
+ 208 " C-Deck
358 u.a.

10.) Zweiter Rettungsweg müssen entsprechend
einer für 2628 Personen passend
1840 Mitteln

Im Treppenhäusern 2 Stck fehlen.

(3)

Tagebuch Wahrer

Enclosure 2.4.4.48

MERENKULKUHALLITUKSEN

TIEDOTUSLEHTI

23.10.1978 Helsinki No 10/78

APPLICATIONS FOR APPROVAL FOR INDIVIDUAL VESSELS

This information bulletin lists the data that shall be included when submitting to the Board of Navigation applications for approval concerning individual vessels.

Contents

1. Data to be included in the application 1
2. Accommodation of crew 2
3. Bridge 2
4. Magnetic compasses 3
5. Navigating lights 3
6. Life-saving equipment 3
7. Fire protection 4
8. Stability 5
9. Carriage of grain 6
10. Load line certificates 6
11. Tonnage certificates 6

1. DATA TO BE INCLUDED IN THE APPLICATION

The applications for approval shall be addressed to the Board of Navigation - not to a named person - and shall include the following data:

a) Name and address of applicant, and addressee of the resolution (if not the applicant himself).
b) Name of reference person for possible consultation.
c) The character of the application (i.e. what the approval would concern) shall be expressed in the heading.
d) In the text part the character of the application shall be specified.
e) If the application is in any way special or exceptional, this has to be mentioned.
f) All appendices and the number of them have to be mentioned, and, if necessary for clarity, also in what way they pertain to the application.
g) The application shall include the names of appliances for which the approval of the Board of Navigation is required and if the said appliance has not earlier been approved of by the Board of Navigation, test certificates and other documents on the basis of which approval can be granted

shall be attached.

h) Applications shall not be made for equipment not expressly mentioned in this information bulletin.

i) If a ship has been in correspondence with the Board of Navigation it has been given a code, which should be mentioned in the application.

j) Other data to be included in the application will be specified in the following.

The applications shall be sent under the address:

Board of Navigation
P.O. Box 158
00141 HELSINKI 14

2. ACCOMMODATION OF CREW

The following drawings of crew accommodation spaces shall be provided:

- General arrangement, showing also the deepest loadline
- Detailed drawing of accommodation spaces (on the scale 1:50, 1:25 or 1:20)
- Ventilation
- Heating
- Lighting

The general arrangement of the vessel shall be provided in one copy, other drawings in triplicate.

Several arrangements may be shown in the same drawing if this can be done without causing confusion.

The drawings and data provided shall provide information of the location of accommodation and other spaces, of the free height, the total and free floor space, breadth and area of free rectangular floor space, dimensions of berths and wardrobes and number and volume of drawers for each person. The furnishing of accommodation, eating and other living spaces shall also appear from the drawings. The scale used shall be indicated in the drawings.

The manning plan shall be attached to the drawings.

The Decree No. 518/76 (given on June 16, 1976) provides for the accommodation standards for crews. In the cases mentioned in Article 39 ("old vessels") of this Decree the old Accommodation Decree (Decree on the Accommodation of Seamen in Ships, No. 794/48, given on November 20, 1948) may be applied.

3. BRIDGE

A general arrangement of the bridge shall be provided in duplicate and it shall show the location of the manoeuvring and navigation equipment and other devices.

4. MAGNETIC COMPASSES

The positioning drawings of the magnetic compasses shall be provided in duplicate along with a specification of building materials and electrical appliances and cables located near to the compasses.

5. NAVIGATING LIGHTS

Positioning drawings of the navigating lights showing that the navigating lights and other lights (towing lights, manoeuvring lights a.s.o.) are placed so as to comply with the International Convention on the International Regulations fo Preventing Collisions at Sea, 1972, shall be provided in duplicate.

6. LIFE-SAVING EQUIPMENT

The following drawings shall be provided in duplicate:

6.1 Passenger ships

- general arrangement
- lifeboats and liferafts (name, number, volume, location)
- other life-saving equipment, location
- drawings showing the assembling spaces needed for use of the life-saving appliances
- spaces intended for the passengers (scale 1:50, 1:25, 1:20) for determining the number of passengers
- drawing showing exits and their marking
- general arrangement of alarm system
- other elucidating drawings and explanations

6.2 Cargo vessels falling under the Safety Convention

- general arrangement
- lifeboats and liferafts (name, number, volume, location)
- other life-saving appliances, location
- exits and their marking
- general arrangement of alarm system
- body plan of ships, in which one or several lifeboats are not situated in the midship section
- other elucidating drawings and explanations

6.3 Vessels not falling under the Safety Convention

- general arrangement
- lifeboats and liferafts (name, number, volume, location)
- exits and their marking
- general arrangement of alarm system
- other life-saving appliances, location
- other elucidating drawings and explanations

7. FIRE PROTECTION

The following information on the fire-fighting system on board shall be provided:

- general arrangement showing the main dimensions of the ship (L_{OA}, B, T, D, H, P_B), the volumes of the biggest spaces (engine room, cargo holds, car deck), and the names of the spaces
- method of protection
- main vertical and horizontal zones
- presentation of construction and fire classes of divisions which are

fire-classified (decks, bulkheads, doors)
- construction of openings in fire-classified divisions
- means of escape (exits, emergency exits)
- ventilation arrangements (ducts, fans, closing arrangements, stopping arrangements, through-runs)
- fire detection systems, fire alarm systems and explosive gas detection systems (names, location, functional description, main and emergency sources of power)
- presentation of remote control of closing devices of ventilation fans and ducts, fire-doors, fuel valves and other similar devices
- fire piping diagram showing fire hydrants, pipe bores and materials, closing devices, and location, pressure, and capacity of pumps, as well as fire hoses (name, length) and nozzles (name)
- fixed extinguishing systems: arrangement drawing, functional description, alarm devices, operating instructions, maintenance instructions
- portable and transportable fire extinguishers: name, size, fire class, location, also spare charges
- fireman's outfits (names, locations)
- fire control plan (text in Finnish, Swedish and English)

In the fire control plan, markings according to the standard TES 8091 shall be used.

Drawings and descriptions shall be provided in duplicate except for the fire control plan, which shall be provided in triplicate.

8. STABILITY

The following information shall be submitted in duplicate.

8.1 Ship, at least 24 Metres in Length

a) lines plan
b) general arrangement
c) capacity plan, or information on the weight and coordinates, of centre of gravity for light ship and volumes and centres of gravity for holds and tanks
d) hydrostatic curves or tables
e) cross curves or $\overline{MS}$ curves or corresponding tables
f) flooding angle as function of the draught
g) moment of ice as a function of the draught
h) corrections to $\overline{GM}$ for the effect of free liquid surfaces in tanks
i) $\overline{KM}$ as function of draught, and of trim if the figures essentially change with the trim, as diagrams or tables
j) inclining test report
k) $\overline{GZ}$ curves and calculations for the in § 5 of stability provisions for ships, 1972, mentioned loading conditions
l) minimum $\overline{GM}$ curves or tables as function of draught, and of trim if the figures essentially change with the trim, with and without taking into account the possibility of icing.

8.2 Ship, at least 24 but not more than 70 Metres in Length

In addition to the in 8.1 above mentioned information, the following:
a) maximum rolling period curves or tables as function of draught, with

9.2 Regulation 12 of Chapter VI of SOLAS-60

When applying for a grain certificate with observance of regulation 12 of Chapter VI of SOLAS-60 Convention the following information shall be submitted to the Board of Navigation:

a) The information according to paragraph 9.1 as applicable
b) Information in accordance with the IMCO Resolution A.49 (III).

9.3 IMCO Grain Rules or SOLAS-74 Chapter VI

When applying for a grain certificate with observance of the IMCO Grain Rules, the following information shall be submitted to the Board of Navigation (SOLAS-74 Chapter VI Regulation 11):

1) curves or tables of grain heeling moments for every compartment, filled or partly filled, or combination thereof, including the effect of temporary fittings
2) tables of maximum permissible heeling moments or other information sufficient to allow the master to demonstrate compliance with the requirements of Regulation 4 (c)
3) details of the scantlings of any temporary fittings and where applicable the provisions necessary to meet the requirements of Section I(E) of Part C
4) typical loaded service departure and arrival conditions and where necessary, intermediate worst service condition
5) a worked example for the guidance of the master
6) loading instructions in the form of notes summarizing the requirements of this Chapter
7) ship's particulars
8) lightship displacement and the vertical distance from the intersection of the moulded base line and midship section to the centre of gravity ($\overline{KG}$)
9) table of free surface corrections
10) capacities and centres of gravity

10. LOAD LINE CERTIFICATES

a) Documents: "International Load Line Certificate (1966)", "International
b) Load Line Exemption Certificate (1966)"
The load line certificates are issued by the Board of Navigation on receipt of a provisionary certificate from the classification society, toghether with the calculations on which the data of the certificate are based.
c) For a ship not classified the data listed under item 10.1 c) shall, as far as possible, be sent to the Board of Navigation, in addition to those normally sent by the hull surveyor to be inspected at the Board.

11. TONNAGE CERTIFICATES

11.1 The Convention of 1947 for a Uniform System of Tonnage Measurement of Ships

a) Documents: Tonnage certificates 1, 1 A, 1 B, and the "Special Tonnage Certificate".
b) The tonnage certificate is issued when the ship has been measured and the measurement forms filled in by a ship admeasurer, and these

forms have been approved at the Board of Navigation.

c) The following data* shall be appended to the measurement forms which are sent to the Board of Navigation:

1) capacity plan
2) general arrangement
3) midship section
4) description of frames
5) steel structure drawing, profile and plan, drawings presenting the forepeak and afterpeak, the floor plates in the engine room, and that part of the ship which is fitted with a double bottom
6) body plan (possibly lines drawing)
7) laying-out tables, deck, tank top, waterlines, verticals and possible diagonals
8) accommodation plan
9) engine room arrangement
10) plans showing details of the conditions upon which the deduction of water ballast spaces is claimed:
   a. piping arrangement: bilge, ballast, fresh water, and fuel oil
   b. pumping installations
   c. manholes to water-ballast spaces outside the double bottom.
11) plans showing details of the conditions upon which the exemption of certain spaces is claimed, for instance drawings of the second deck (openings and closing arrangements).

11.2 The Constantinople Tonnage Measurement Regulations of 1873

a) Documents: The tonnage certificate "Suez Canal Special Tonnage Certificate"

b) The certificate is issued when the ship has been measured and a measurement form filled in by the tonnage surveyor, and approved by the Board of Navigation.

c) The data listed under item 11.1 c) shall be appended to the measurement documents which are sent to the Board of Navigation, if such data have not been delivered in connection with earlier measurements.

11.3 The Tonnage Measurement Regulations of the Panama Canal Authorities

a) Documents: The tonnage certificate "Panama Canal Tonnage Certificate"

b) As under item 11.2 b)

c) As under item 11.2 c)

11.4 The Decree No. 306/1955 on the Tonnage Measurement of Ships

a) Documents: The tonnage certificate "Tonnage Document of a Foreign Ship". The certificate is issued after necessary measurements by a ship admeasurer to certain foreign ships calling at Finnish ports. Further information concerning the issue of this certificate is to be

— — —

* In view of the transition to the new tonnage measurement system (TM 69) it is advisable at this stage to determine the moulded volume in cubic metres below the uppermost complete deck of the ship.

found in the Board of Navigation information bulletin No. 5/78 (dated June 20, 1978).

— — — — —

This information bulletin shall supersede bulletin No. 3/69 (dated March 13, 1969), "Drawings to be submitted to the Board of Navigation".

Head of Maritime Division
Counsellor of Navigation Oso Siivonen

Mechanical Engineer Pertti Haatainen

KD 3841/78/301

Enclosure 2.4.4.50

FIRE PROTECTION
APPROVED WITH
REMARKS NOTED
BUREAU OF SHIPS, 25 7, 1980
See the Board of Navigation
letter 1380-04-25 L346
KD 5865/79/301-005

11. 10. 1979

Nr.	Art der Änderung	Datum	Name
3			
2			
1			

Maßstab: 1:200

Jos. L. Meyer Papenburg (Ems)
Schiffswerft, Maschinenbau, Dockbetrieb

Datum: 11.10.78

FIRE PROTECTION PLAN 1

KD 5865/79/3

Gewerk	Schiffs Nr.	Sektions Nr.	Zeichn. Nr.	Archiv Nr.
	590		021.8	G.1

Enclosure 2.4.4.51

BEGRENZUNGSHALLITUS
TARKASTETTU
17.12.1979
SIJOITUSTUTKIMUS

17. 10. 1979

Nr.	Art der Änderung	Datum	Name
3			
2			
1			

Maßstab: 1:200

Jos. L. Meyer Papenburg (Ems)
Schiffswerft, Maschinenbau, Dockbetrieb

Datum: 7.10.79

EVACUATION PLAN 1

Gewerk	Schiffs Nr.	Sektions Nr.	Zeichn. Nr.	Archiv Nr.
	590		021.14	G.1

Enclosure 2.4.4.52

20. 2. 1980

Nr.	Art der Änderung	Datum	Name

Maßstab 1:100	Jos. L. Meyer Papenburg (Ems) Schiffswerft, Maschinenfabrik, Dockbetrieb			
Datum 20.2.80	LATERNENPLAN SIGNAL LIGHTS			
Gewerk	Schiffs Nr. 590	Sektions Nr.	Zeichn. Nr. 5113	Archiv Nr. G.1

Enclosure 2.4.4.53

Jos. L. Meyer, Papenburg-Ems
Schiffswerft, Maschinenfabrik, Dockbetrieb

Anl. 6.

YARD NO. 590

MS VIKING SALLY

TRIM AND STABILITY BOOKLET

Owner: Rederiaktiebolaget SALLY
Strandgatan 7

SF-22100 Mariehamn

Builders: Schiffswerft JOS. L. MEYER
Industriegebiet Süd

D-2990 Papenburg/EMS

HERRENKULKUHALLITUS SIÖFARTSSTYRELSE

APPROVED ~~WITH REMARKS NOTED~~
BUREAU OF SHIPS, 11. 2. 1980

Enclosure 2.4.4.54

The German Group of Experts investigating the sinking of M/V "ESTONIA"

c/o AHLERS & VOGEL · Schaartor 1 D-20459 Hamburg · Telephone 49-40-371075

Memo for Dr. Holtappels

re: 2nd Meeting with F.B.N. on 27.10.95

- Attendants:

Muttilainen	- Deputy General Manager
Valkonen	- Head of Maritime Dept.
Makkonen	- Head of Legal Dept.
Fabritius	- Naval Architect employed by F.B.N.
H. Gahmberg	- Lawyer Bützow & Co., Helsinki (HG)
Dr. Holtappels	-
Werner Hummel (WH)	

- Up-date by Dr. Holtappels on legal situation.

- HG: It was agreed to have a presentation of the facts.

- Dr. Holtappels

  : We want an open discussion about the situation in 1980 as to issuance of PSSC: a) Why no Exemption Certificate?

  b) Why not reported to IMO?

  : What does F.B.N. know about "Mariella" and "Viking Saga" incidents?

  : What is the F.B.N. opinion on the IHK?

  (Dr. Holtappels immediately submits his own opinion, viz. that IHK does not want to put the facts on the table) and also mentions the meeting with the EU Commission which is considering to constitute its own commission).

- Presentation of investigation results by WH and subsequent discussion

- Valkonen

  : F.B.N. has all the right to know the procedure of the IHK and this was expressed in writing to Kari Lethola together with copies of documents relating to "Viking Sally", "Silja Star", "Wasa King" (3-5 cm thick).

  : F.B.N. had no official knowledge of "Mariella" incident and have up-to-day not heard from "Viking Saga". They later found out that the course went over shallow water and right there she was struck. It has been established that around this shoal the waves rise tremendously under SW-ly wind conditions.

  As a consequence of the "Estonia" casualty they have issued a navigation warning to the effect that shoals might create enormous wave height and steepness. Soundings, however, subsequently revealed that the shoal effect did not play a role in the "Estonia" casualty.

- It turned out that the naval architect Fabritius had been working with Wärtsilä Shipyard in Turku - the builders of "Mariella" - at that time and knows lots of details about damage, repairs, etc. He stated that the vessel did not return to Helsinki - as we were told earlier - but proceeded to Stockholm at 3 kn, where the visor was temporarily repaired before next sailing.

- Upon presentation of the correspondence between von Tell AB/F.B.N. in connection with newbuilding "Viking Sally" and the F.B.N. requirements for drawings, etc. Mr. Valkonen confirmed that the reply of F.B.N. demonstrated exactly the attitude of those years. At that time there were 3 men in the technical department, who were basically busy with their own (F.B.N.) vessels. Valkonen was then head of the inspection department.

They never calculated required strength of locking devices, they had no means to do so at that time, it was part of the class responsibility and also of the yard.

- Valkonen confirmed that the bow ramp was the collision bulkhead in "Viking Sally".

F.B.N. 1980

Technical Bureau	Inspection Bureau
Edelmann	Valkonen
Haateinen	Jan Jansson
Wibeck	

- PSSC was at first issued temporarily for voyage Yard to Mariehamn, and thereafter the vessel got a restricted PSSC because not all passenger cabins were ready. The certificates were issued by his office and then submitted to the General Manager - then Muttilainen - for approval.

- He and Muttilainen signed an agreement to the effect that the trading area of "Viking Sally" was restricted to "not more than 20 nm from the nearest land" until all outstanding work would have been completed.

- When the vessel came the first time to Turku he and Gunnar Peper, their local surveyor from Kotka (now retired), had a severe car accident on the way to Turku, whereby both were injured. Finally in Turku they marked on a respective drawing all parts not to be used by passengers and limited the number of passengers to 700 stating that the 20 nm limit was valid until the vessel was totally completed. At a meeting on 19.7.80 it was decided that the vessel was now completed and the first real PSSC was issued, however, restricted to "Kustfart mellan Finland och Sverige" which related to manning requirements only, not to structural parts. The same PSSC was issued in 1982 and in 1983. Thereafter the term "Kustfart" disappeared.

- Valkonen stated that they were not aware that "Viking Sally" did not comply with SOLAS 1974, because all structural parts are - in their view - based on the 'Copenhagen Convention 1924' the responsibility of the class. According to Valkonen the recognised classification societies - DnV, LR, ABS, GL, but also BV - have to approve all structural matters including the SOLAS requirements as otherwise the Maritime Authorities would be forced to have own staff and equipment available to be able to carry out necessary calculations and inspections which the classification societies have anyway.

- Valkonen drew attention to the "Finnhansa" incident when half of the sliding doors were lost in heavy weather and to the "Fennia", which was built in Sweden 1964 with bow ramp - collision bulkhead and ever since has been sailing in unchanged condition.
  He also pointed out that the bow ramp is a very strong part because 40-ts trucks can drive over it.

- "Viking 4" / "Earl of Granville" conversion discussed.

- F.B.N.. was not informed by owners and/or BV that "Wasa King" would be respectively was sold. They got if from the registrar after she was sold and renamed "Estonia". There have not been any discussions whatsoever between F.B.N. and BV concerning the take-over, also not concerning the new role of BV representing the flag state authority a/o in SOLAS matters.

- F.B.N. also carries out port-state-inspections onboard of Estonian vessels when in Finnish ports and not seldom have they found deficiencies onboard vessels which had just passed a special survey of the BV surveyor.

- Upon being confronted with the remarks, which the BV plan approver Desouza had made on drawing 1103, Valkonen stated: It is out of the

question that they could ever have been able to calculate strength of locking devices or the like and they have to rely on the Copenhagen Convention.

- They promised to check the drawings they have for possible remarks.

- Jukka Häkämies is attending the meetings of the Finnish Commission and also attends the full Commission meetings at Tallinn. He keeps the informatin he obtaines confidential.

- Valkonen informs about rumours saying that the locking devices were constructed on basis of wrong drawings and therefore were under-dimensioned. WH explained actual situation based on recently taken statements from yard workers.

- Valkonen confirmed that due to the so-called "pumping effect" the water quantity inside the visor was continuously increasing due to the up-and-down movement of the bow in headseas and that model tests had confirmed that this effect was much larger with smaller openings compared to larger holes.

Werner Hummel

MATKUSTAJA-ALUKSEN TURVALLISUUSKIRJA
SÄKERHETSCERTIFIKAT FÖR PASSAGERARFARTYG

SUOMI
FINLAND

~~kansainvälisellä~~ lyhyelle kansainväliselle matkalle.

Enclosure 2.4.4.55

för ~~en~~ kort internationell resa.

Annettu ihmishengen turvallisuudesta merellä vuonna 1960 tehdyn kansainvälisen yleissopimuksen määräysten mukaisesti
Utfärdat enligt bestämmelserna i internationella konventionen om säkerhet för människoliv till sjöss, 1960

Aluksen nimi Fartygets namn	Tunnuskirjaimet Igenkännningsbokstäver	Kotipaikka Hemort	Bruttovetoisuus Bruttodräktighet	Tiedot III luvun 27 säännön c) 7 kohdan mukaan ehkä sallituista matkoista Detaljer beträffande eventuella resor, tillåtna enl. kapitel III, regel 27 c) 7	Kölinlaskemispäivä Datum, då kölen sträcktes
VIKING SALLY	OXIH	Mariehamn	15566,39		1979

Minä, allekirjoittanut, todistan:

I. Että kysymyksessä oleva alus on asianmukaisesti katsastettu edellä mainitun sopimuksen määräysten mukaisesti.

II. Että katsastuksessa todettiin aluksen täyttävän sanottuun sopimukseen liittyvien sääntöjen vaatimukset, siksi kuin kysymyksessä on:

1. aluksen rakenne, pää- ja apukattilat ja muut paineastiat sekä koneisto;
2. vedenpitävän osastoimisen järjestely ja yksityiskohdat;
3. seuraavat osastoimislastiviivat:

Jag, undertecknad, bestyrker:

I. Att ovan angivna fartyg undergått vederbörlig besiktning enligt bestämmelserna i ovannämnda konvention.

II. Att besiktningen utvisade, att fartyget uppfyllde fordringarna i de regler, som äro bifogade nämnda konvention, i vad avser:

1. konstruktionen, huvud- och hjälpångpannor och andra tryckkärl samt maskineri;
2. anordning och detaljer av den vattentäta rumsindelningen;
3. följande indelningsvattenlinjer:

Alukselle määrätyt ja sen kyllkoon pituuden keskikohdalle merkityt osastoimislastiviivat (II luvun 11 sääntö) För fartyget fastställda och midskepps å fartygssidorna utmärkta indelningsvattenlinjer (Kap. II regel 11)	Varalaita Fribord	Käytettävä milloin matkustaja kuljetetaan seuraavissa vaihtoehtoisesti lastitiloina käytettävissä tiloissa Gäller då passagerare föras i följande, jämväl för last användbara rum
C. 1	2062 mm	
C. 2		
C. 3		

III. Että pelastusvälineitä oli riittävästi enintään 1288 henkilöä varten, nimittäin

10 pelastusvenettä (niihin luettuina 10 moottoripelastusvenettä), joihin mahtuu 692 henkilöä, ja – radiosähköttyslaitteilla ja valonheittimellä varustettua moottoripelastusvenettä (mitkä sisältyvät edellä mainittuun pelastusveneiden kokonaismäärään) ja – vain valonheittimellä varustettua moottoripelastusvenettä (mitkä myös sisältyvät edellä mainittuun pelastusveneiden kokonaismäärään), joissa veneissä tulee olla – hyväksyttyä pelastusvenemiestä;

12 pelastuslauttaa, joita varten vaaditaan hyväksytyt vesillelaskulaitteet ja joille mahtuu 300 henkilöä; ja

51 pelastuslauttaa, joita varten ei vaadita hyväksyttyjä vesillelaskulaitteita ja joille mahtuu 1275 henkilöä;

III. Att livräddningsredskapen voro tillräckliga för högst 1288 personer, nämligen

10 livbåtar (däri inräknade 10 motorlivbåtar) tillräckliga för 692 presoner, och – motorlivbåtar försedda med radiotelegrafinstallation och strålkastare (inräknade i det ovan angivna sammanlagda antalet livbåtar) ävensom – motorlivbåtar utrustade endast med strålkastare (också inräknade i ovan angivna sammanlagda antalet livbåtar), fordrande – godkända livbåtmän;

12 livflottar, för vilka fordras godkända sjösättningsanordningar, tillräckliga för 300 personer; och

51 livflottar, för vilka godkända sjösättningsanordningar icke fordras, tillräckliga för 1275 personer;

6 kellumavälinettä, jotka kykenevät kannattamaan 120 henkilöä;

18 pelastusrengasta;

2291 pelastusliivi.

6 flytredskap, tillräckliga för 120 personer;

18 livbojar;

2293 livvästar.

IV. Että pelastusveneet ja pelastuslautat oli varustettu säintöjen määräysten mukaisesti.

V. Että aluksessa oli säintöjen määräysten mukainen suoranheittolaite sekä pelastusveneiden ja pelastuslauttojen siirrettävä radiolaite.

VI. Että alus täytti radiosähköttyslaitteita koskevat säintöjen vaatimukset seuraavasti:

IV. Att livbåtarna och livflottarna voro utrustade enligt bestämmelserna i dessa regler.

V. Att fartyget var försett med linkastningsapparat och bärbar radioapparat för livbåtar och livflottar enligt bestämmelserna i dessa regler.

VI. Att fartyget uppfyllde fordringarna i dessa regler i vad avser radiotelegrafinstallationer, som följer:

	Säintöjen vaatimukset Fordringar enligt reglerna	Todellisuudessa I verkligheten
Radiosähköttäjän kuuntelutuntien määrä Lyssningstimmar för radiotelegrafist	168	168
Radiosähköttäjien lukumäärä Antal radiotelegrafister	1	1
Onko automaattinen hälytin Finnes autoalarm	1	1
Onko pääradiolaitteet Finnes huvudinstallation	1	1
Onko vararadiolaitteet Finnes reservinstallation	erilliset separata	erilliset separata
Ovatko päälähetin ja varalähetin sähköisesti erilliset vai yhdistetyt Äro huvudsändare och reservsändare elektriskt separata eller kombinerade	1	1
Onko radiosuuntimislaite Finnes radiopejlapparat	1	1
Sallittu matkustajamäärä Tillåtet antal passagerare	lyhyillä kansainvälisillä matkoilla för kort internationell resa	1100 ~~1100~~

VII. Että moottoripelastusveneiden radiosähköttyslaitteet ja pelastusveneiden ja pelastuslauttojen siirrettävä radiolaite, milloin sellainen on, toimivat säintöjen määräysten mukaisesti.

VIII. Että alus täytti tulipalon havaitsemis- ja sammutuslaitteita koskevat säintöjen vaatimukset ja että siinä oli valot ja merkkikuviot, luotsitikkaat sekä laitteet ääni- ja hätämerkkien antamista varten näiden säintöjen määräysten ja kansainvälisten meriteiden säintöjen mukaisesti.

IX. Että alus kaikissa muissa suhteissa täytti säintöjen vaatimukset, mikäli ne ovat siihen sovellettavissa.

VII. Att radiotelegrafinstallationer i motorlivbåtar och bärbar radioapparat för livbåtar och livflottar, om sådan finnes, fungerade i överensstämmelse med föreskrifterna i dessa regler.

VIII. Att fartyget uppfyllde fordringarna i dessa regler i vad avser anordningar för upptäckande och släckning av brand samt var försett med ljus och signalfigurer, lotsledjare ävensom med anordningar för avgivande av ljudsignaler och nödsignaler enligt bestämmelserna i dessa regler och i de internationella sjövägsreglerna.

IX. Att fartyget i alla övriga hänseenden uppfyllde fordringarna i dessa regler, i den mån de äro tillämpliga å fartyget.

Tämä todistuskirja on annettu Suomen hallituksen puolesta.
Detta certifikat är utfärdat på finska regeringens vägnar.

Todistuskirja on voimassa 21 päivään heinäkuuta/juli 19 80 saakka.
Certifikatet gäller intill den

Annettu Helsingissä 27 päivänä juni/kesä kuuta 19 80
Utfärdat i Helsingfors den

Allekirjoittanut ilmoittaa olevansa mainitun hallituksen asianmukaisesti valtuuttama antamaan tämän todistuskirjan.
Undertecknad förklarar sig vara av nämnda regering behörigen bemyndigad att utfärda detta certifikat.

Leima 10,-
Stämpel mk.

HD N:o
HD N:r

Merenkulun tarkastaja
Sjöfartsinspektör Jan Jansen

PASSENGER SHIP SAFETY CERTIFICATE

FINLAND

Enclosure 2.4.4.56

for ~~an~~ a short international voyage.

Issued under the provisions of the
International Convention for the Safety of Life at Sea, 1960

Name of Ship	Distinctive Number or Letters	Port of Registry	Gross Tonnage	Particulars of voyages, if any, sanctioned under Regulation 27 (c) (VIII of Chapter III	Date on which keel was laid
VIKING SALLY	OIKW	Mariehamn	15566,39		1979

I, the undersigned certify:

I. That the above-mentioned ship has been duly surveyed in accordance with the provisions of the Convention referred to above.

II. That the survey showed that the ship complied with the requirements of the Regulations annexed to the said Convention as regards:
1. the structure, main and auxiliary boilers and other pressure vessels and machinery;
2. the watertight subdivision arrangements and details;
3. the following subdivision loadlines:

Subdivision loadlines assigned and marked on the ship's side at amidships (Regulation 11 of Chapter II)	Freeboard	To apply when the spaces in which passengers are carried include the following alternative spaces'
C. 1	2062 mm	
C. 2		
C. 3		

III. That the life-saving appliances provide for a total number of 1280 persons and no more, viz.:

10 lifeboats (including 10 motor lifeboats) capable of accommodating 692 persons, and – motor lifeboats fitted with radiotelegraph installation and searchlight (included in the total lifeboats shown above) and – motor lifeboats fitted with searchlight only (also included in the total lifeboats shown above), requiring – certificated lifeboatmen;

12 liferafts, for which approved launching devices are required, capable of accommodating 360 persons; and

51 liferafts, for which approved launching devices are not required, capable of accommodating 1275 persons;

6 buoyant apparatus capable of supporting 120 persons;

18 lifebuoys;

2298 lifejackets.

IV. That the lifeboats and liferafts were equipped in accordance with the provisions of the Regulations.

V. That the ship was provided with a line-throwing appliance and portable radio apparatus for survival craft in accordance with the provisions of the Regulations.

VI. That the ship complied with the requirements of the Regulations as regards radiotelegraph installations, viz.:

	Requirements of Regulations	Actual provision
Hours of listening by operator	H8	H8
Number of operators	1	1
Whether auto alarm fitted	1	1
Whether main installation fitted	1	1
Whether reserve installation fitted	1	1
Whether main and reserve transmitters electrically separated or combined	separated	separated
Whether direction-finder fitted	1	1
Number of passengers for which certificated	for a short international voyage	1100

VII. That the functioning of the radiotelegraph installations for motor lifeboats and/or the portable radio apparatus for survival craft, if provided, complied with the provisions of the Regulations.

VIII. That the ship complied with the requirements of the Regulations as regards fire-detecting and fire-extinguishing appliances and was provided with navigation lights and shapes, pilot ladder, and means of making sound signals and distress signals, in accordance with the provisions of the Regulations and also the International Collision Regulations.

IX. That in all other respects the ship complied with the requirements of the Regulations, so far as these requirements apply thereto.

This certificate is issued under the authority of the Finnish Government.

It will remain in force until the 21st day of July 19 80

Issued at Helsinki the 27th day of June 19 80

The undersigned declares that he is duly authorised by the said Government to issue this certificate.

Inspector of Navigation

Jan Janson

Stamp 10,- mk.

HD N:o

MATKUSTAJA-ALUKSEN TURVALLISUUSKIRJA
SÄKERHETSCERTIFIKAT FÖR PASSAGERARFARTYG

SUOMI
FINLAND

Enclosure 2.4.4.57

~~kansainväliselle~~
lyhyelle kansainväliselle matkalle.

för ~~långt~~ kort internationell resa.

Annettu ihmishengen turvallisuudesta merellä vuonna 1960 tehdyn kansainvälisen yleissopimuksen määräysten mukaisesti
Utfärdat enligt bestämmelserna i internationella konventionen om säkerhet för människoliv till sjöss, 1960

Aluksen nimi Fartygets namn	Tunnuskirjaimet Igenkännningsbokstäver	Kotipaikka Hemort	Bruttovetoisuus Bruttodräktighet	Tiedot III luvun 27 säännön c) 7 kohdan mukaan ehkä sallituista matkoista Detaljer beträffande eventuella resor, tillåtna enl. kapitel III, regel 27 c) 7	Kölinlaskemispäivä Datum, då kölen sträcktes
VIKING SALLY	OHJ	Maariahamina Mariehamn	15566,99		1975

Minä, allekirjoittanut, todistan:

Jag, undertecknad, bestyrker:

I. Että kysymyksessä oleva alus on asianmukaisesti katsastettu edellä mainitun sopimuksen määräysten mukaisesti.

II. Että katsastuksessa todettiin aluksen täyttävän sanottuun sopimukseen liittyvien sääntöjen vaatimukset, sikäli kuin kysymyksessä on:
   1. aluksen rakenne, pää- ja apukattilat ja muut paineastiat sekä koneisto;
   2. vedenpitävän osastoimisen järjestely ja yksityiskohdat;
   3. seuraavat osastoimislastiviivat:

I. Att ovan angivna fartyg undergått vederbörlig besiktning enligt bestämmelserna i ovannämnda konvention.

II. Att besiktningen utvisade, att fartyget uppfyllde fordringarna i de regler, som äro bifogade nämnda konvention, i vad avser:
   1. konstruktionen, huvud- och hjälpångpannor och andra tryckkärl samt maskineri;
   2. anordning och detaljer av den vattentäta rumsindelningen;
   3. följande indelningsvattenlinjer:

Alukselle määrätyt ja sen kylkeen pituuden keskikohdalle merkityt osastoimislastiviivat (II luvun 11 sääntö) För fartyget fastställda och midskepps å fartygssidorna utmärkta indelningsvattenlinjer (Kap. II regel 11)	Varalaita Fribord	Käytettävä milloin matkustajia kuljetetaan seuraavissa vaihtoehtoisesti lastitiloina käytettävissä tiloissa Gäller då passagerare föras i följande, jämväl för last användbara rum
C. 1	3262 mm	
C. 2		
C. 3		

III. Että pelastusvälineitä oli riittävästi enintään ..... henkilöä varten, nimittäin
12 pelastusvenettä (niihin luettuina 10 moottoripelastusvenettä), joihin mahtuu 692 henkilöä, ja ..... radiosähköt.laitteilla ja valonheittimellä varustettua moottoripelastusvenettä (mitkä sisältyvät edellä mainittuun pelastusveneiden kokonaismäärään) ja ..... vain valonheittimellä varustettua moottoripelastusvenettä (mitkä myös sisältyvät edellä mainittuun pelastusveneiden kokonaismäärään), joissa venoissa tulee olla ..... hyväksyttyä pelastusvenemiestä;
12 pelastuslauttaa, joita varten vaaditaan hyväksytyt vesillelaskulaitteet ja joille mahtuu 300 henkilöä; ja
51 pelastuslauttaa, joita varten ei vaadita hyväksyttyjä vesillelaskulaitteita ja joille mahtuu 1275 henkilöä;

III. Att livräddningsredskapen voro tillräckliga för högst 2267 personer, nämligen
10 livbåtar (däri inräknade 10 motorlivbåtar) tillräckliga för 692 presoner, och ..... motorlivbåtar försedda med radiotelegrafinstallation och strålkastare (inräknade i det ovan angivna sammanlagda antalet livbåtar) ävensom ..... motorlivbåtar utrustade endast med strålkastare (också inräknade i ovan angivna sammanlagda antalet livbåtar), fordrande ..... godkända livbåtmän;
12 livflottar, för vilka fordras godkända sjösättningsanordningar, tillräckliga för 300 personer; och
51 livflottar, för vilka godkända sjösättningsanordningar icke fordras, tillräckliga för 1275 personer;

6 kellumavälineitä, jotka kykenevät kannattamaan 120 henkilöä;
18 pelastusrengasta;
2298 pelastusliivi. + 200 lapsille

6 flytredskap, tillräckliga för 120 personer;
18 livbojar;
2298 livvästar. + 200 för barn

IV. Että pelastusveneet ja pelastuslautat oli varustettu sääntöjen määräysten mukaisesti.
V. Että aluksessa oli sääntöjen määräysten mukainen muoranheittolaite sekä pelastusveneiden ja pelastuslauttojen siirrettävä radiolaite.
VI. Että alus täytti radiosähköttyslaitteita koskevat sääntöjen vaatimukset seuraavasti:

IV. Att livbåtarna och livflottarna voro utrustade enligt bestämmelserna i dessa regler.
V. Att fartyget var försett med linkastningsapparat och bärbar radioapparat för livbåtar och livflottar enligt bestämmelserna i dessa regler.
VI. Att fartyget uppfyllde fordringarna i dessa regler i vad avser radiotelegrafinstallationer, som följer:

Tuvva 9 – 3	Sääntöjen vaatimukset Fordringar enligt reglerna	Todellisuudessa I verkligheten
Radiosähköttäjän kuuntelutuntien määrä Lyssningstimmar för radiotelegrafist	168	168
Radiosähköttäjien lukumäärä Antal radiotelegrafister	1	1
Onko automaattinen hälytin Finnes autoalarm	1	1
Onko pääradiolaitteet Finnes huvudinstallation	1	1
Onko vararadiolaitteet Finnes reservinstallation	1	1
Ovatko päälähetin ja varalähetin sähköisesti eriliset vai yhdistetyt Äro huvudändare och reservsändare elektriskt separata eller kombinerade	erilliset separata	erilliset separata
Onko radiosuuntimislaite Finnes radiopejlapparat	1	1
Sallittu matkustajamäärä Tillåtet antal passagerare	rannikkoliikenteessä Suomen ja Ruotsin välillä 2000 i kustfart mellan Finland och Sverige ; 2000	

VII. Että moottoripelastusveneiden radiosähköttyslaitteet ja pelastusveneiden ja pelastuslauttojen siirrettävä radiolaite, milloin sellainen on, toimivat sääntöjen määräysten mukaisesti.
VIII. Että alus täytti tulipalon havaitsemis- ja sammutuslaitteita koskevat sääntöjen vaatimukset ja että siinä oli valot ja merkkikuviot, luotsitikkaat sekä laitteet ääni- ja hätämerkkien antamista varten näiden sääntöjen määräysten ja kansainvälisten meriteiden sääntöjen mukaisesti.
IX. Että alus kaikissa muissa suhteissa täytti sääntöjen vaatimukset, mikäli ne ovat siihen sovellettavissa.

VII. Att radiotelegrafinstallationer i motorlivbåtar och bärbar radioapparat för livbåtar och livflottar, om sådan finnes, fungerade i överensstämmelse med föreskrifterna i dessa regler.
VIII. Att fartyget uppfyllde fordringarna i dessa regler i vad avser anordningar för uppläckande och släckning av brand samt var försett med ljus och signalfigurer, lotsledjdare ävensom med anordningar för avgivande av ljudsignaler och nödsignaler enligt bestämmelserna i dessa regler och i de internationella sjövägsreglerna.
IX. Att fartyget i alla övriga hänseenden uppfyllde fordringarna i dessa regler, i den mån de äro tillämpliga å fartyget.

Tämä todistuskirja on annettu Suomen hallituksen puolesta.
Detta certifikat är utfärdat på finska regeringens vägnar.

Todistuskirja on voimassa 26 päivään kesäkuuta/juni 19 82 saakka.
Certifikatet gäller intill den

Annettu Helsingissä 1 päivänä juni/heinä kuuta 19 82
Utfärdat i Helsingfors den

Allekirjoittanut ilmoittaa olevansa mainitun hallituksen asianmukaisesti valtuuttama antamaan tämän todistuskirjan.
Undertecknad förklarar sig vara av nämnda regering behörigen bemyndigad att utfärda detta certifikat.

Leima 10,– mk.
Stämpel
HD N:o
HD N:r

Merenkuluntarkastaja
Sjöfartsinspektör

Heimo Suikki

PASSENGER SHIP SAFFTY CERTIFICATE

Enclosure 2.4.4.58

FINLAND

for an/a short international voyage.

Issued under the provisions of the
International Convention for the Safety of Life at Sea, 1960

Name of Ship	Distinctive Number or Letters	Port of Registry	Gross Tonnage	Particulars of voyages, if any, sanctioned under Regulation 27 (c) (VII) of Chapter III	Date on which keel was laid
VIKING SALLY	OYKU	Harfehamn	13566,89		1979

I, the undersigned certify:

I. That the above-mentioned ship has been duly surveyed in accordance with the provisions of the Convention referred to above.

II. That the survey showed that the ship complied with the requirements of the Regulations annexed to the said Convention as regards:
1. the structure, main and auxiliary boilers and other pressure vessels and machinery;
2. the watertight subdivision arrangements and details;
3. the following subdivision loadlines:

Subdivision loadlines assigned and marked on the ship's side at amidships (Regulation 11 of Chapter II)	Freeboard	To apply when the spaces in which passengers are carried include the following alternative spaces*
C. 1	2062 mm	
C. 2		
C. 3		

III. That the life-saving appliances provide for a total number of 2267 persons and no more, viz.:

10 lifeboats (including 10 motor lifeboats) capable of accommodating 692 persons, and – motor lifeboats fitted with radiotelegraph installation and searchlight (included in the total lifeboats shown above) and – motor lifeboats fitted with serachlight only (also included in the total lifeboats shown above), requiring – certificated lifeboatmen;

12 liferafts, for which approved launching devices are required, capable of accommodating 300 persons; and

51 liferafts, for which approved launching devices are not required, capable of accommodating 1275 persons;

6 buoyant apparatus capable of supporting 120 persons;

18 lifebuoys;

2298 lifejackets + 200 for children

IV. That the lifeboats and liferafts were equipped in accordance with the provisions of the Regulations.

V. That the ship was provided with a line-throwing appliance and portable radio apparatus for survival craft in accordance with the provisions of the Regulations.

VI. That the ship complied with the requirements of the Regulations as regards radiotelegraph installations, viz.:

	Requirements of Regulations	Actual provision
Hours of listening by operator	H6	H6
Number of operators	1	1
Whether auto alarm fitted	1	1
Whether main installation fitted	1	1
Whether reserve installation fitted	1	1
Whether main and reserve transmitters electrically separated or combined	separated	separated
Whether direction-finder fitted	1	1
Number of passengers for which certificated	For a short international voyage between Finland and Sweden	2000

VII. That the functioning of the radiotelegraph installations for motor lifeboats and/or the portable radio apparatus for survival craft, if provided, complied with the provisions of the Regulations.

VIII. That the ship complied with the requirements of the Regulations as regards fire-detecting and fire-extinguishing appliances and was provided with navigation lights and shapes, pilot ladder, and means of making sound signals and distress signals, in accordance with the provisions of the Regulations and also the International Collision Regulations.

IX. That in all other respects the ship complied with the requirements of the Regulations, so far as these requirements apply thereto.

This certificate is issued under the authority of the Finnish Government.

It will remain in force until the ~~26th~~ 30 day of June 19 81

Issued at Helsinki the ~~4th~~ 4th day of ~~June~~ July 19 80

The undersigned declares that he is duly authorised by the said Government to issue this certificate.

Inspector of Navigation

~~Heimo Sulkki~~

Stamp ~~10,-~~ 10,- mk.

HD N:o

Finnish Maritime Administration

27 June 1995

03. Juli 1995

Enclosure 2.4.4.59

Dr. Peter Holtappels
Ahlers & Vogel
Schaartor 1
20459 Hamburg
Germany

Dear Sir,

Referring to our discussions on 21 June 1995 I send a few certificate copies concerning Viking Sally.

The first certificate for short international voyage had a validity of one month in order to permit sailing from Germany to Finland. The following full period certificates have a note under para VI (number of passengers) 'for short international voyage between Finland and Sweden'. The opposite side of the certificate, which is in the official language of the flag state, says 'i kustfart mellan Finland och Sverige'. 'Kust-fart' was definition as not south of latitude N 59 deg 30 min.

In 1983 we got a new decree on surveys of ships, where coastal traffic was limited to the domestic waters only. After that the certificates state 'på korta internationella resor mellan Finland och Sverige'. The change does not mean that a new traffic area was constituted.

After 1984 the certificates remain unchanged except the reference to the radiotelegraphy exemption and the change of the name of the ship to 'Wasa King'.

Yours Sincerely,

Head of Division Jukka Häkämies

Visiting Address
Vuorimiehenkatu 1
00140 Helsinki

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P.O. Box 158
SF - 00141 Helsinki
Finland

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+ 358 0 18081

Fax
+ 358 0 1808 355

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121 471 mkh sf

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Account
3801-4

Statement

Lars Karlsson, born 11.9.43 states :

I obtained the Chief Engineers License in May 1965 at the Technical School in Mariehamn/Aland Islands. My time with AB Sally commenced during the summer vacation in 1963 when I sailed as 3rd engineer on a tanker. After obtaining the license I sailed on cargo vessels and tankers of AB Sally; since 1969 as Chief Engineer. In August 1970 I became 1st engineer onboard of "Viking 1" and from summer 1971 I was again chief engineer and remained in that position ever since on Viking 3, 4, 5, and finally on "Viking Sally".

For "Viking Sally" I was newbuilding supervisor as I had been already for "Viking 3, 4, 5". As I knew the yard - and classification people already from these 3 newbuildings and also speak some German - I was nominated "coordinator" of owners' supervisors.

Three days after signing of the contract I came to Papenburg together with Capt. Brunström (was relieved after 5 weeks by Lars Mäkki), 1st engineer Stig Strömberg and electrician Lars Sjögren. At the beginning I had only 1 small Ga-plan. Deck and Engine specification were shown to me.

Due to pressure of time we had to make a lot of compromises. In my opinion and experience the Meyer Werft was the only yard in Europe able to do such a job because of so little bureaucracy. This has, in my opinion, nothing to do with the catastrophe. Meyer Werft has very much experience. They have built all ships very strong, i.e. they were usually heavy. It is a well known fact that Meyer ships were stronger and behaved better in ice compared to e.g. Wärtsila ships.

With my team of supervisors I checked everything including, and in particular, weldings in close cooperation with BV surveyor Lohmann and his colleague. As far as I remember Lohmann was more active on Viking 1-5, whilst on "Viking Sally" he was the boss and the other one did the routine work. Anyway Lohmann was always present when major items, such as ramp and visor, were presented by the yard and tested.

My best contacts were Mr. Motikat and Mr. Wahnes. F.B.N representatives came from time to time, however, all paperwork was done by the Sally office in Mariehamn directly with F.B.N. Helsinki.

I did some inspections with F.B.N. representatives in Papenburg, e.g.

- stairways, lifts;
- boats, liferafts, etc.
- fire doors, fire-fighting equipment, etc.

Chief officer Lindström came about 3 months before delivery.

I also inspected visor/ramp etc. I checked the visor during building together with the 1st engineer. It was very hectic during the last days before launching because there were delays in delivery of equipment from Sweden due to a strike in this country. After launching the visor was lifted ashore again. It was before only welded to the vessel by steel-bars. At present I do not remember details of the bearing/bushing system of visor hinges.

In 1987 the upper bearing of the port side lifting cylinder was changed by MacGregor, Turku during normal operation. They started in the evening and finished next morning. The change of this bearing became necessary because during opening operations there was a squeaking noise which was reported to me by the deck officer on watch.

Probably in 1986 we experienced twice that the Nirosta bolt of one of the visor hinges, I believe the port side, broke the securing plate screws and moved out by ca. 1 cm. This was noted by the deck officer being on forecastle deck for berthing because he found the broken off screws. The bolt was hammered back into position, the screw holes in the steel bushing drilled out and the securing plate refitted. If it would have happened again we would have investigated the cause, however, during my time, it did not occur again.

We never had greasing problems. Once per month grease was pressed into the bolts.
We never welded at the lifting cylinders or visor hinges. I have never seen the bolts out.

After every stormy cruise I inspected all the parts in the bow area. Four times a year I inspected in detail all safety relevant parts. This included visual inspection of the visor hinges, its weldings, etc. and also the inside of the visor including locking devices and its welding seams.

During one such inspection I found cracks in way of the foundations of the hydraulic cylinders for the ramp bolts which were of fatique nature and not due to overload. We welded strengthening plates to the foundations to stop the crack development.

I never found such cracks in way of Atlantic lock or side locks.

The rubber packings of the visor were changed once a year. The packings were mainly damaged on A-deck and 1 m upwards front bulkheads because the final movement before closure is backwards - not downwards - which destroys the packings due to the rubbing effect. Therefore we have put grease (same as used for the hinges) on the packings and it became better.

At some time, probably after the strong ice winter 1985/86, we increasingly had problems with electrical failures, short circuits, etc. caused by the sensors for the indicator lights of the Atlantic lock. So I checked with other vessels, e.g. "Viking Song" and "Viking Saga" and also the market, and finally bought rather expensive magnetic limit switches which were installed by electrician Sjögren instead of the mechanical sensors, and we never had problems again. I have been many times with B.V. surveyor Lars Olaf Ålander inside the closed visor when water or light tests were made during loadline survey. I believe that at the same time also the indicator lights were checked.

I have made at least 1000 cruises and more than 100 times reduced the engine output by myself in the engine room when I considered it necessary in heavy weather. Last time was in July 1991 when the vessel was already sailing as "Wasa King" between Waasa and Umea/Sundsvall when we arrived once 1 ½ hours late and another time 2 ½ hours late, both due to bad weather and the fact that I had reduced the engine output.

It has to be remembered that "Viking Sally" has been built for the archipelago, not for open sea. This refers in particular to the flare of her bow. In heavy seas the bow is shaking strongly sideways. This is created by the recess in the shell plating aft of the visor which results in a very strong setting-in. When the vessel is proceeding against headseas the pressure on the visor is in the aft direction. (Force direction is aft.)

We were all the time running in a very tight schedule with all 4 main engines at 90% output.

Reduction of speed in heavy headseas is not only a question of reduction of stress on vessel's and visor's structure and fixing points, but also the comfort of passengers has to be taken into account. We never had complaints to the best of my knowledge.

Officers and engineers have their accommodation directly in front of the superstructure overlooking the forecastle deck including the visor and I feel it difficult to believe that on the night of the catastrophe none of them looked out of their windows. I have sailed on "Viking 5" for 5 years between Helsinki and Stockholm and met quite some heavy weather.

In the engine control room (ECR) there were 2 output regulators for the main engines which were normally at 90%. Output could by these regulators be changed from ECR without any pitch change from the bridge.

The engines could be run on "Combinator" or on "Constant Revolutions". In all my 12 years onboard, however, it was always "Combinator" except during yard trials in 1980.

If the main engines are on "Combinator" and pitch of the propellers is reduced the revolutions are being reduced automatically. In other words, if the revolutions have not been reduced also the pitch cannot have been reduced from the bridge.

The bow ramp was considered to be the collision bulkhead same as on all the predecessors built by Meyer Werft, but also the same as on e.g. Turella, Rosella, Viking Song, Viking Saga, and many other ferries.

All 3 hydraulic pumps broke down one after the other (normal pressure 185 bar) which was apparently not enough. We built in stronger pumps and operated them at 240 bar pressure. The 2 big pumps could produce 400 bar pressure whilst the smaller one could produce 280 bar.

In winter we had problems to open the visor.
It is easy to increase the pressure by just turning a wheel at the hydraulic pump (axial piston pump - make: Vickers). There was a lock nut to regulate the pressure.

In case of difficulties to open the visor, e.g. due to being frozen fast, it is the easiest thing to increase the hydraulic pressure.

Although impossible due to the electrical system the visor can be closed if the ramp is open when the valves are operated manually. In case the rails of the ramp should be deformed this is due to the lowered down visor for working purposes.

The observation of pilot Stenhammar, i.e. that the crew was opening and quickly closing the visor in short intervals (to make it fit over the pyramide most likely) is difficult to believe. There were valves directly at the lifting cylinders by means of which the speed of the oil flow could be regulated. This must be absolutely identical at both sides otherwise one side will open or close faster than the other side and the visor will get out of alignment. These regulating valves are fitted at the outside of the lifting cylinders at the lower side (B-deck).

When the vessel was sailing between Turku - Stockholm there had to be 2 officers + 1 AB on the bridge. When she was shifted to the Waasa/Umea trade, owners wanted to save 1 officer which was accepted by F.B.N. under the condition that the control panel for the indicator lights for visor and bow ramp was moved to the large operation panel in front of the bridge where the lights could be seen from the seats of master and watch officer. This was done some time in 1991.

The light on the steering aid on the forecastle was mostly out.

To my knowledge the manual sidelocks were never used. They were more for open sea, Atlantic or the like. I have no particular memory about any play between bolts and hinges of Atlantic lock and/or sidelocks.
Opening/closing of visor was always and only done by Chiefmate and boatswain together.

I do not know whether ever the visor was opened with still closed locking devices respectively closed with already closed locking devices.

Upon being shown some underwater pictures from the damaged hinge remains I am of the opinion that the rust on the Nirosta bolt could have been caused by the disappearance of the bronze bushing, i.e. steel bushing in contact with Nirosta bolt. Also in case of bad greasing a bronze bushing will disappear more quickly.

On cardeck there were 4 cameras installed i.e. 1 forward to the forward ramp, 2 at the sides and 1 looking aft to the stern ramp. The cameras could be moved and had also zoom ability.

Monitors were on the bridge (located at port side of the entrance to the chart room) and in the ECR above the instrument panel. The camera picture shown on the monitor could be changed to another camera either manually or automatically. The monitors on bridge and in ECR were showing the same picture. The main monitor with operating sticks was in the ECR, i.e. the bridge could not change to another camera.

After the "Estonia" catastrophe I have heard from a former colleague engineer who had trained "Estonia's" engineers after they had taken over the vessel that they had problems with water in the visor which caused short circuits in the no more watertight magnetic switches for the indicator lights of the Atlantic lock. As the electrical system for these switches and the indicator lights are switched to the same fuse also securing the controls for all hydraulic installations on the cardeck, i.e. ramps, visor, movable decks, etc, such a short circuit caused a general black-out on the cardeck. Thus if the fuse (located on 9th deck) is out you have no power and the cause has to be removed if such a problem occurs frequently, which it apparently did.

Consequently they removed the magnetic limit switches from the plate near the Atlantic lock and there was only the indicator light for open/closed visor left active. (It is unknown what happened to the sidelock indicators.)

We never had problems with hydraulic power in the aft, only forward. There were 3 hydraulic pumps port side forward, 3 starboard aft. One of the aft pumps got power from the emergency generator (when in operation).

The 30.4.90 was the last day as "Viking Sally". On 7.5.90 she commenced sailing as "Silja Star". She kept this name only for ½ year and then became "Wasa King". I left the vessel on 30.3.92, but returned in November 1992 for one week upon instructions of Ulf Hobro, Nordström & Thulin. I checked the inventory of the engine department, the maintenance - and spare part - computer system and took a copy of the computer program.

Finally I would like to mention that a vessel sailing for 20 months at full speed in the Baltic will have a lot of cracks everywhere.

The electricians sailing with me were Sjögren and Märtensen.

Mariehamn, 15.10.95

.....

Lars Karlsson

Enclosure 2.4.5.61

Jos. L. Meyer
Schiffswerft - Maschinenfabrik
2990 Papenburg 1
Postfach 1120

DELIVERY - CERTIFICATE

this is to certify, that on this 29th day of June, 1980,

at 23^{30} hours local time,

the shipyard Jos. L. Meyer of Papenburg,
Federal Republic of Germany,

has delivered at the port of Emden, Federal Republic of Germany,
to the

Rederiaktiebolaget Sally,
Mariehamn/Finland,

the Car/Passenger Ferry

"VIKING SALLY"

(Newbuilding S. 590)

as per terms and conditions of the contract signed in Mariehamn/
Finland, on 11th September, 1980.

On behalf of the Purchaser:

Rederiaktiebolaget Sally,
Mariehamn/Finland

.....

On behalf of the Builder:

Jos. L. Meyer
Shipyard
Papenburg 1
Federal Republic of Germany

.....

Papenburg, 29th June, 1980

06/07 '95 13:34 ☎+49 4961 81300 SK MEYER VERFT ☎002

Jos. L. Meyer
Schiffswerft - Maschinenfabrik
2990 Papenburg 1
Postfach 1120

Jos. L. Meyer Schiffswerft as Builders, on the one part, and Rederiaktiebolaget Sally as Owners, on the other part, have at the delivery of the vessel "VIKING SALLY" on this day agreed on the following points:

1. The extra and minor costs have been finally settled as far as the scope of delivery is concerned. The deadweight according to contract will be 2740 t.

2. The uncompleted work on the vessel will be completed by the Builders at their cost as soon as it is practically possible according to contract, specification, drawings and subsequent agreements between the parties.

3. The question of penalties or premiums for speed and deadweight of the vessel will be settled according to the relevant clauses in the contract when results of the speed trials can be presented and the light weight of the vessel has been determined upon completion of the deliveries of specified inventories etc.

4. This agreement does not affect the scope of the contract in any respect not mentioned here or the scope of the guarantee.

Emden on the 29th day of June, 1980.

Rederiaktiebolaget Sally

Jos. L. Meyer
as Builders

Sven-Erik Johansson
for the Owners

06/07 '95 13:37 ☎+49 4961 81300 SK XEREX WERFT 001

Jos. L. Meyer, Papenburg-Ems
Schiffswerft, Maschinenfabrik, Dockbetrieb

Car and Passenger Ferry "VIKING SALLY"
S. 590

Handing-Over Report

The car and passenger ferry "VIKING SALLY" will be handed over to the owner company AB SALLY, Mariehamn, by shipyard JOS. L. MEYER, Papenburg, on 29th June, 1980. The vessel will sail for the VIKING-LINE between Finland and Sweden, also serving the Aaland islands. The VIKING-LINE is operated by the Finnish owner AB SALLY, the Swedish owner AB SLITE and the Finnish owner company SP-LINE.

From 1970 to 1974, JOS. L. MEYER already delivered 6 car and passenger ferries to the VIKING-LINE, 4 of this series for owner AB SALLY and 2 for AB SLITE. Moreover the "DIANA II" was handed over to owner AB SLITE on June, 1979.

The confidence in the shipyard created by the good cooperation was the decisive criteria for the owner to conclude the contract for this modern and high-sophisticated vessel. Despite keen and in some cases government-subsidized competition the yard could book this order as a result of short delivery terms, an interesting design worked out by yard's engineers and high flexibility in meeting the owner's requirements.

On request of the Owners the ship was delivered on 29th June in order to be able to put the vessel into service within the scheduled time although some areas of the accommodation were not completed. The time for the voyage from Papenburg to Mariehamn as well as for the outfitting of the ship by the owner should be used to complete the unfinished areas. The yard agreed to this solution although they would have had the right due to the late supplies of the materials from Sweden and Finland on account of the strike situation in these countries to keep the ship at the outfitting quay of the yard for some more time.

The owner's decision to order this vessel in Papenburg was in principle dependent on the very short construction and building period of approx. 9 months. In case of the 7 previous newbuildings JOS. L. MEYER showed their ability to strictly observe the delivery times stipulated by contract.

The main data of the vessel are as follows:

Length over all	155.40 m
Breadth	24.20 m
Draught, loaded	5.55 m
Deadweight	2,800 t
Tonnage	15,500 GRT
4 main engines (6,000 HP each)	24,000 HP
Speed	21.20 kn
Capacities	2,000 passengers
	1,186 cabin places
	110 officers and crews
	1,650 seats in restaurants, bars, clubs, etc.
	52 lorries w. trailers (18 m)
	or 460 passenger cars

06/07 '95 13:41 ☎+49 4961 81300 SE MEYER WERFT 007

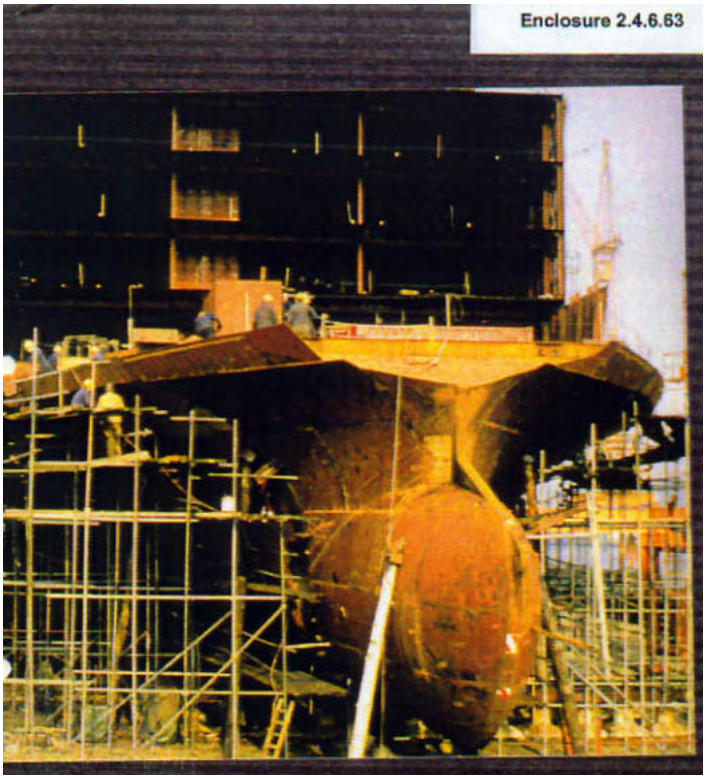
The following facts may give an idea of the expenditure of work involved in the construction of such a big ferry:

- About 280 km cables were laid out, i.e. 1.6 km cable/m of ship.
- About 30,000 m^2 areas were insulated, as much as 6 football fields or a small farm.
- 460 passenger cars can be transported on this vessel, i.e. a 2.1 km long line of cars.
- 1,300 beds and more than 1500 doors were installed.
- In addition to a main engine output of 17,600 kW, a generator capacity of 4,416 kW was provided - enough to supply a town with about 8,000 inhabitants.

To sum up it can be said that this ship is hotel, basement garage, power plant, means of transportation, canalisation, supermarket and place of entertainment in one.

06/07 '95 13:41 ☎+49 4961 81300 SK MEYER WERFT ☎005

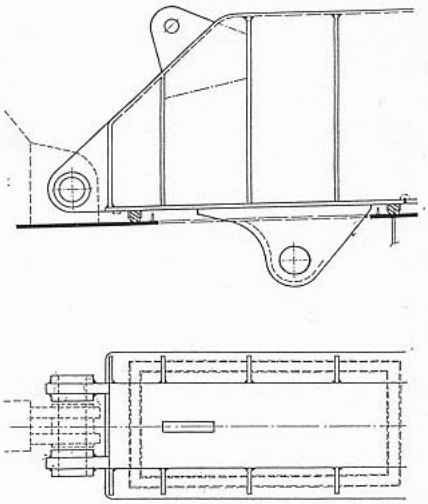
Enclosure 2.4.6.63



Enclosure 2.4.6.64

Enclosure 2.4.6.65

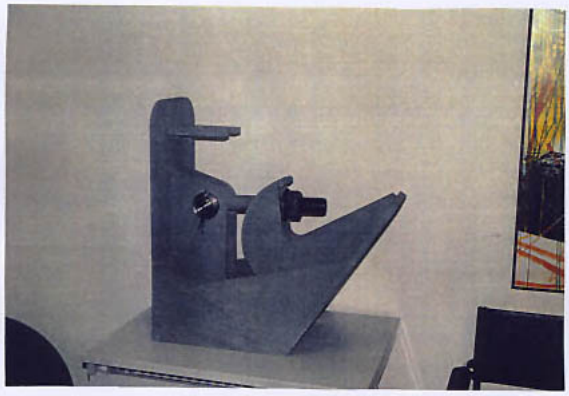
Enclosure 2.4.6.66



Arrangement of deck hinges

Enclosure 2.6.2.67

Enclosure 2.6.2.68



II. BOW VISOR

1) Construction

The visor has a weight of abt 54,5 tons and forms the W.T. front closure of the ship. The bow visor is pivoted at the upper deck. It opens in upward direction.

2) Maintenance

Under circumstances when temperature reaches 0° C or below check that the limit switches and other equipment on weather deck are not getting covered with ice. See also item I pos. 2).

All piston-rods and cylinders should be covered during painting. Dry paint spirts upon the surface of the piston-rod would spoil the cylinder packings within short time, what means undesirable leakages.

Check all hoses, hose connections and pipe connections to prevent leakages. Damaged components should be replaced if necessary in order to avoid interruption.

The hose connections should be painted, but not the hydraulic hoses.

The rubber packings should be treated with Tellin or similar mixture containing graphite and tallow in order to reduce the wear of the rubber. When a defect rubber packing is going to be replaced the packing channel has to be sufficiently cleaned before the new packing is fitted with glue. von Tell UK 2 glue or glue of the same quality has to be used.

3) Locking device (25)

In closed position the visor is locked by 2 locking pins which are operated by one hydraulic cylinder (12) each. As a reserve the visor can also be locked by two manually operated locking devices. There is also one hydraulic operated "atlantic locking device" (12).

In open position the bow visor is locked by 2 locking pins which are hydraulic operated with one hydraulic cylinder (12) each.

In closed position the rubber packing is compressed by the sole weight of the bow visor. The rubber packing is fixed with bolts.

4) Operation

For the operation of the bow visor a hand-operated electrical valve (pos 17) is used which is guiding an operating valve (19). An electrical blocking is built in to prevent faulty operation between bow visor and bow ramp.

The very operation of the visor is performed by two hydraulic cylinder (2) with spherical bearings. Two ice-breaking cylinders (8) assist the opening process when the visor starts opening. When the locking devices of the bow visor are released the ice-breaking- and operatin cylinders are put under pressure and the visor will open. When the visor is fully opened it will be locked.

When lowering the bow visor the top of the cylinder will be put under pressure. In the bottom of the cylinder a valve (15) is fitted which is controlling the lowering when a pressure arises in the cylinder which is higher than the adjusting pressure of the valve. The lowering speed is adjustable by throttle non-return valves (39) and they should also bo so adjusted that the cylinders get the same timing.

5) Control

Opening of the bow visor

1) Start both of the pumps.

2) Open the atlantic locking device and the cleats. Put the control levers (one by one) in position ÖPPNA until red lamp indicates ÖPPEN.

   If the manual locking device has been used this has to be opened.

3) Check that the lamp for the locking devices indicates ÖPPEN. If not, open up the locking devices which are locked.

4) Open the bow visor. The control lever will be in. position UPP until green lamp indicates UPPE.

5) Close the locking device. The control lever will be in position LÅSA until green lamp indicates LÅST.

6) Lower the bow visor and let it rest on the locking device in order to release the hydraulic pressure in the operating cylinder.

7) Switch off the pumps.

Closing of the bow visor

(Check that the bow ramp is closed and locked.)

1) Start the pumps.

2) Check that red lamp indicates ÖPPEN for cleats and the atlantic locking device. If not, open up the cleats and the atlantic locking device.

3) Open up the bow visor. (The load on the locking device is released.)

4) Open up the locking device. Put the control lever on ÖPPNA until red lamp indicates ÖPPEN.

5) Close the bow visor. The control lever will be in position NER until green lamp indicates NERE.

6) Lock the cleats. The control lever will be in position LÅSA until green lamp indicates LÅST.

7) If the atlantic locking device is going to be used this should also be locked.

8) Switch off the pumps.

III. BOW RAMP

1) Construction

Dimensions: L = 8225 mm
B = 5500 mm between the tracks

Weight: abt 12,1 tons

The fore-end part of the ramp is provided with 8 sloping flaps, which automaticly extend when the ramp is opening. Each sloping flap is working independently

from the others in order to compensate for the heeling of the ship (2 degrees max.)

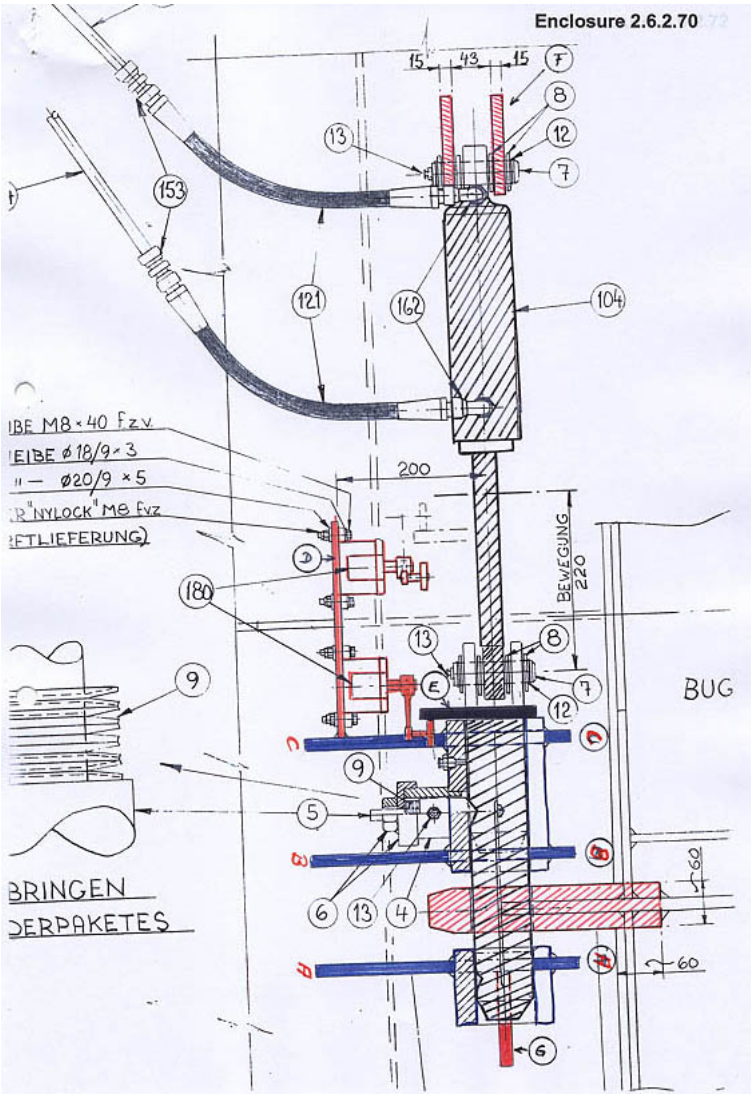
The ramp is pivoted to the ship with 4 hinges. The two outer hinges are provided with spherical bearings and the two inner with bronze bushes. The axles are of stainless steel.

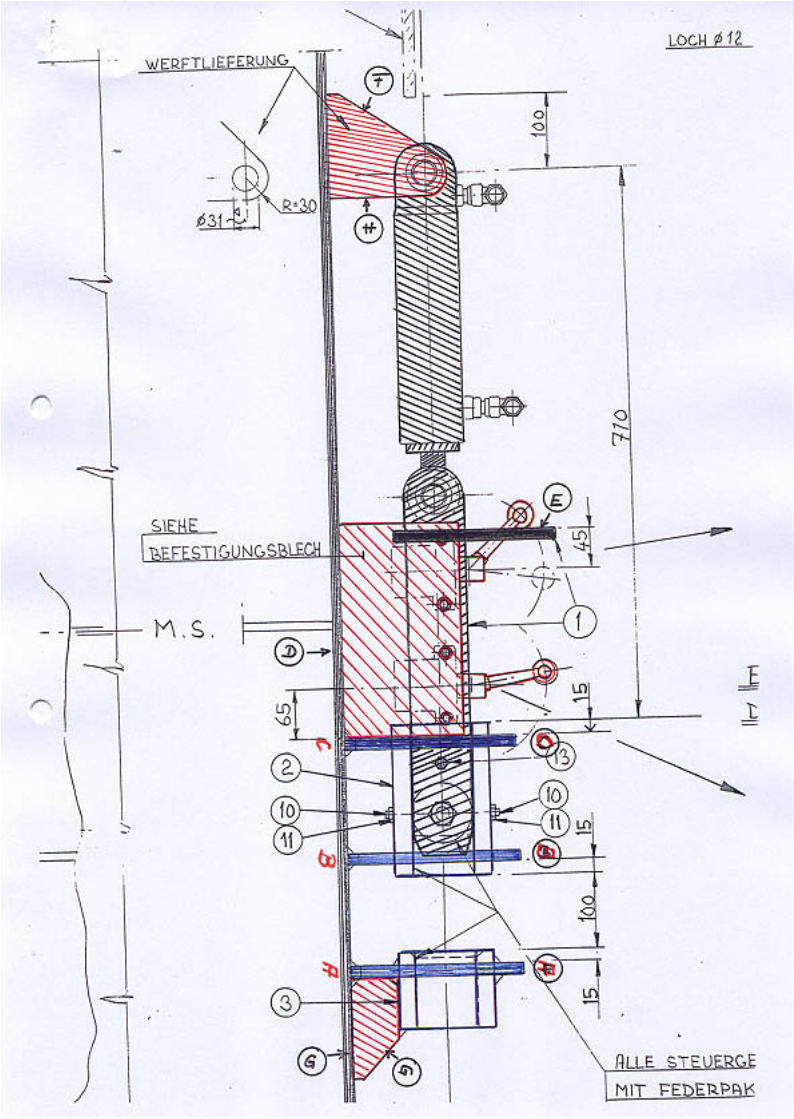
The ramp is equipped with fastenings for preventer stays.

2) Maintenance

See item I. pos. 2).

Enclosure 2.6.2.70




WERFTLIEFERUNG
LOCH ø12
SIEHE
BEFESTIGUNGSBLECH
M.S.
ALLE STEUERGE
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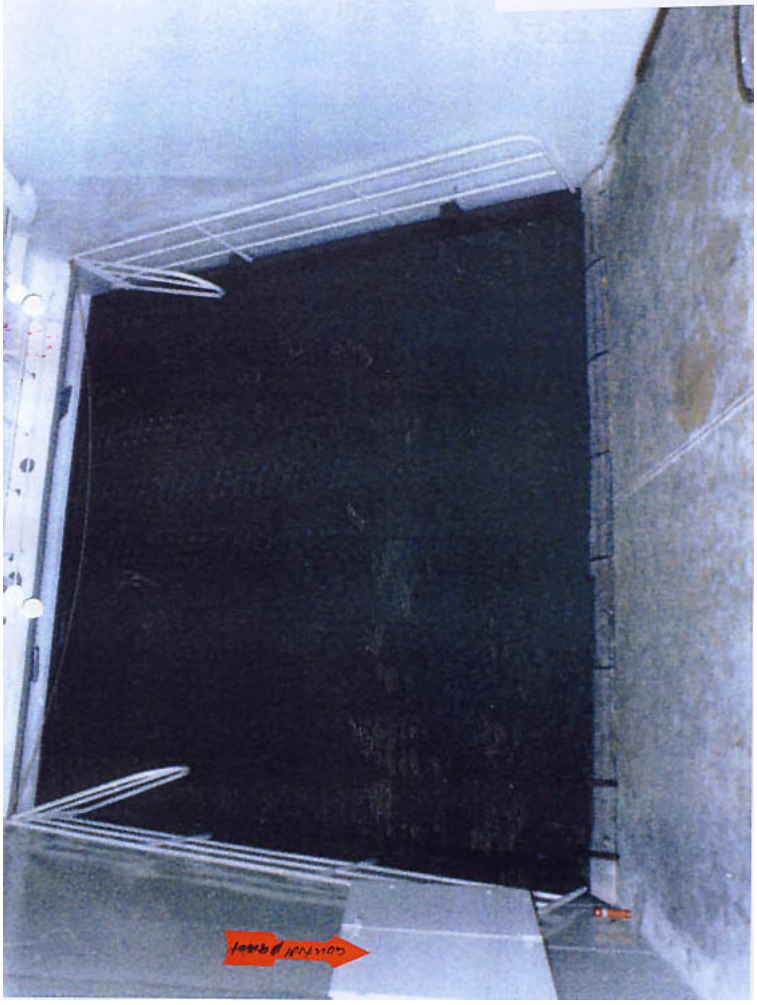
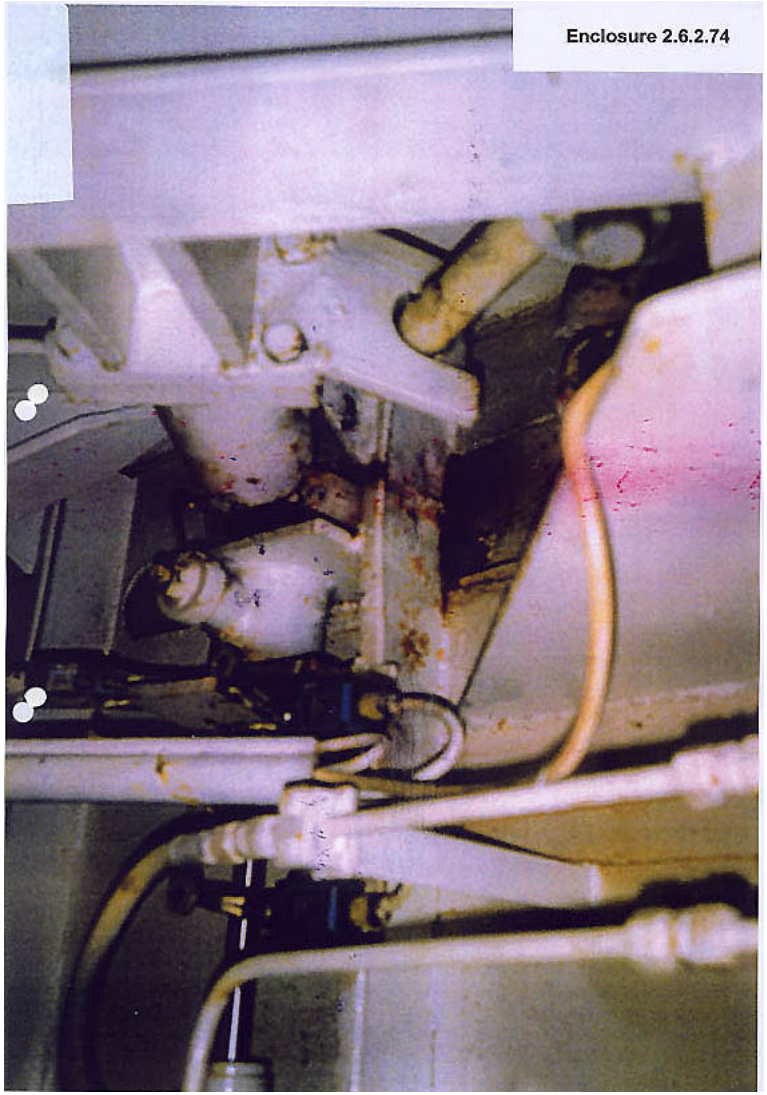
Enclosure 2.6.2.71

Enclosure 2.6.2.72





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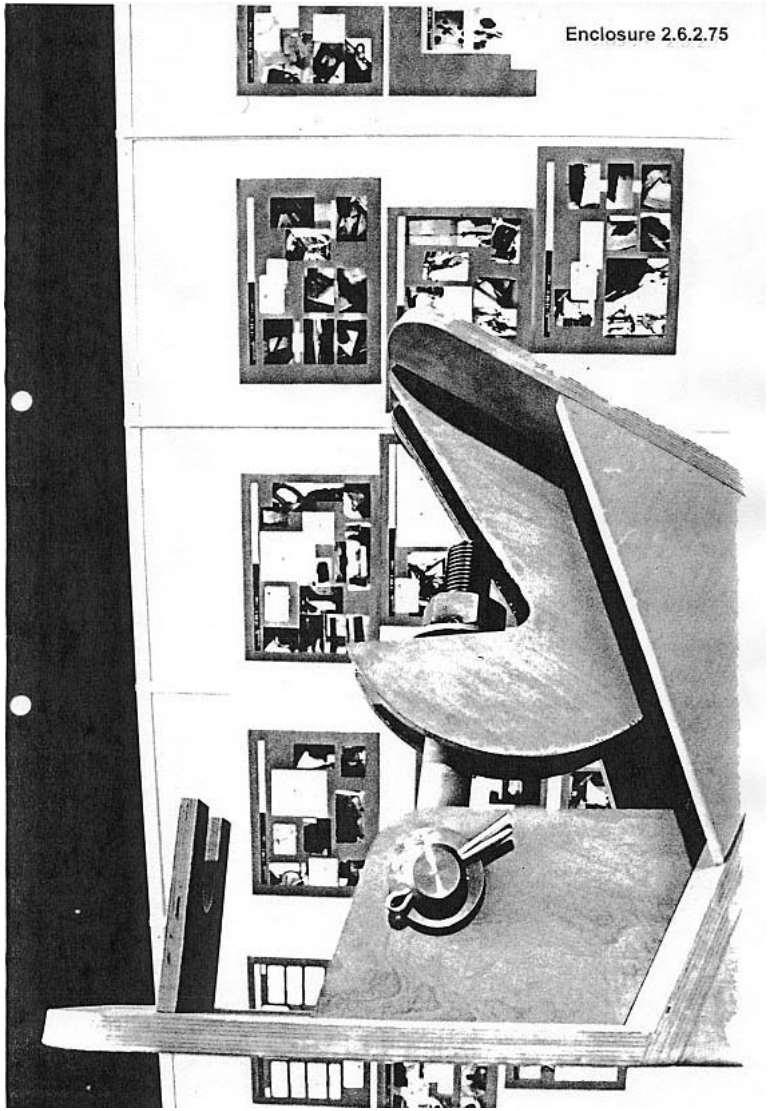

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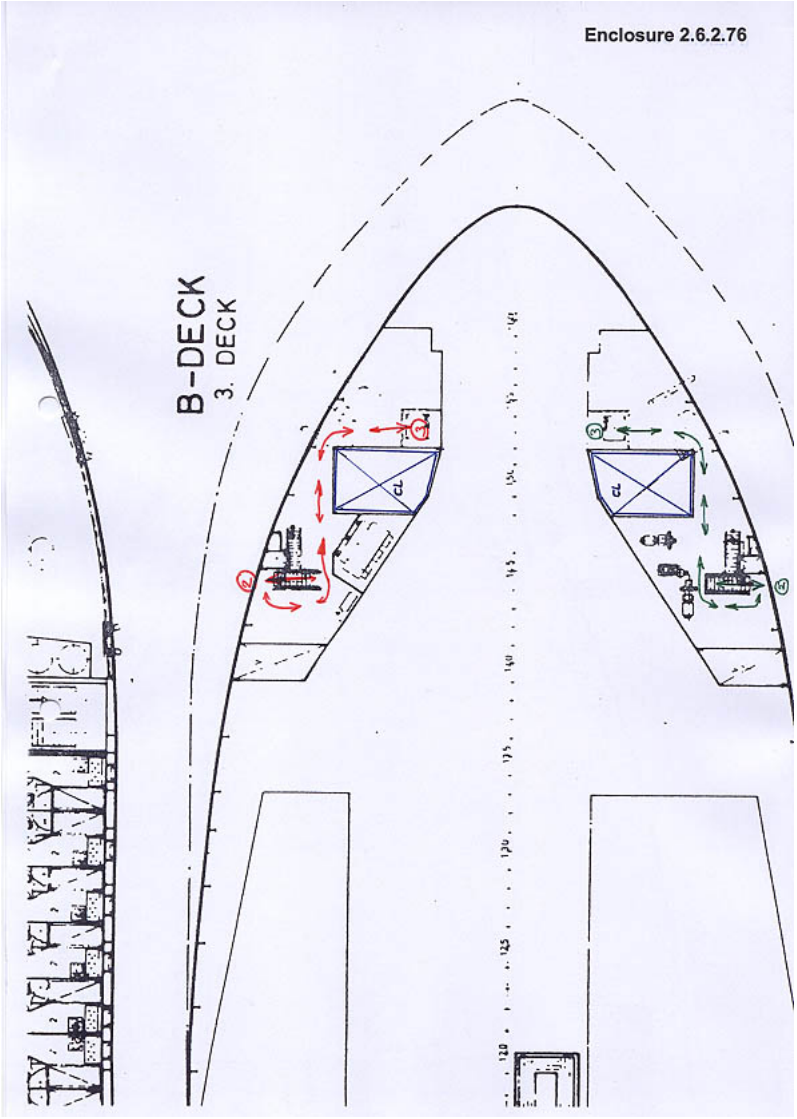

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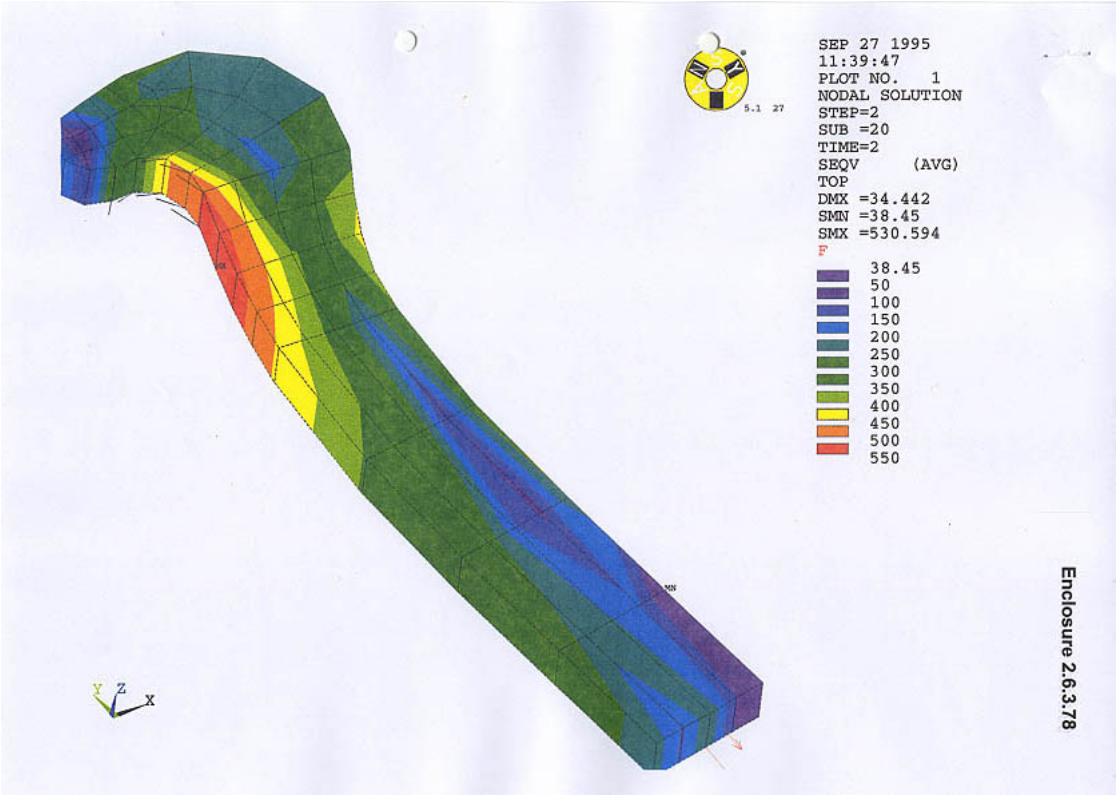

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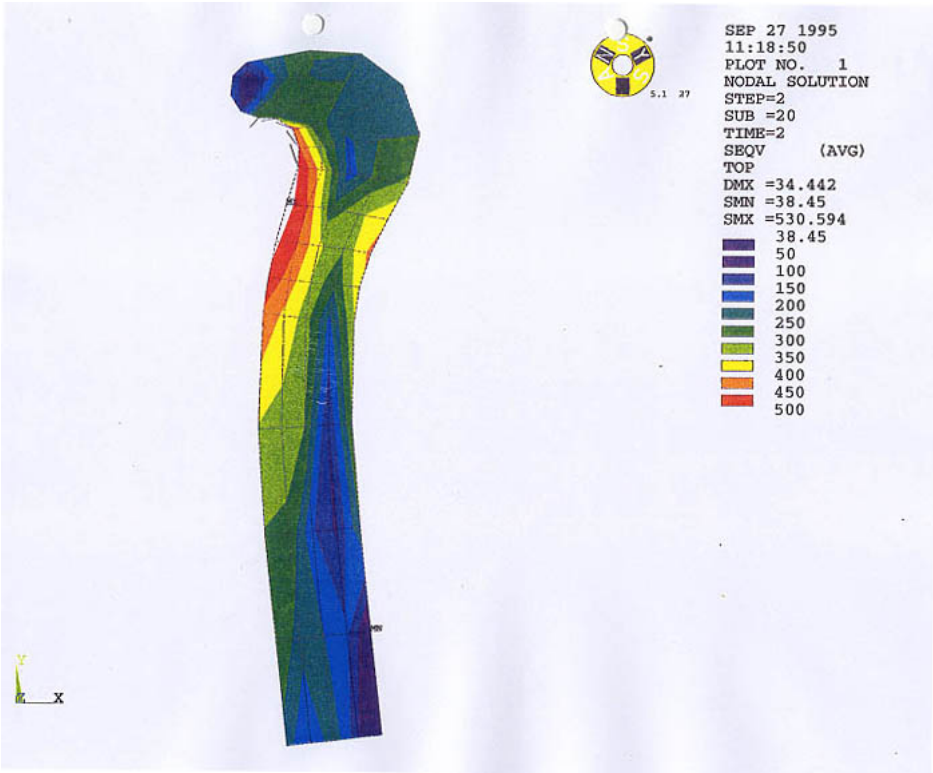

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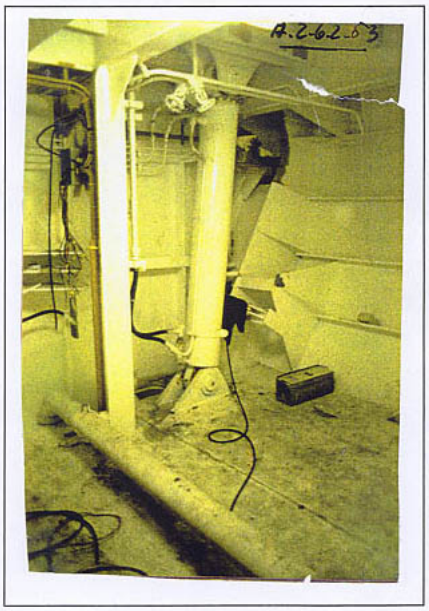

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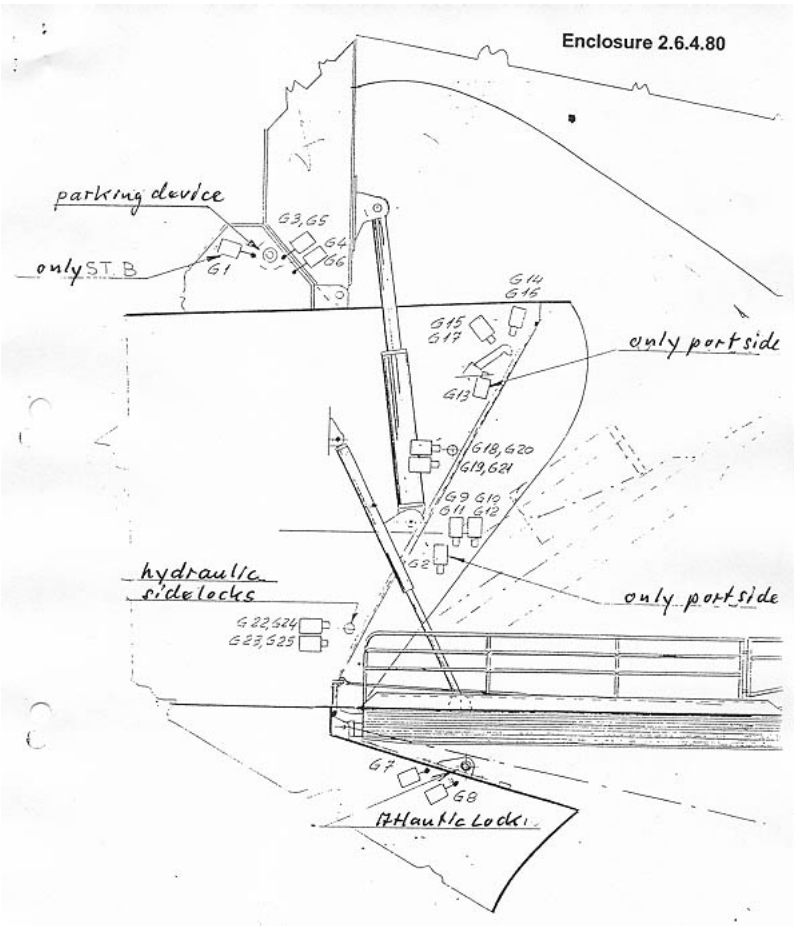
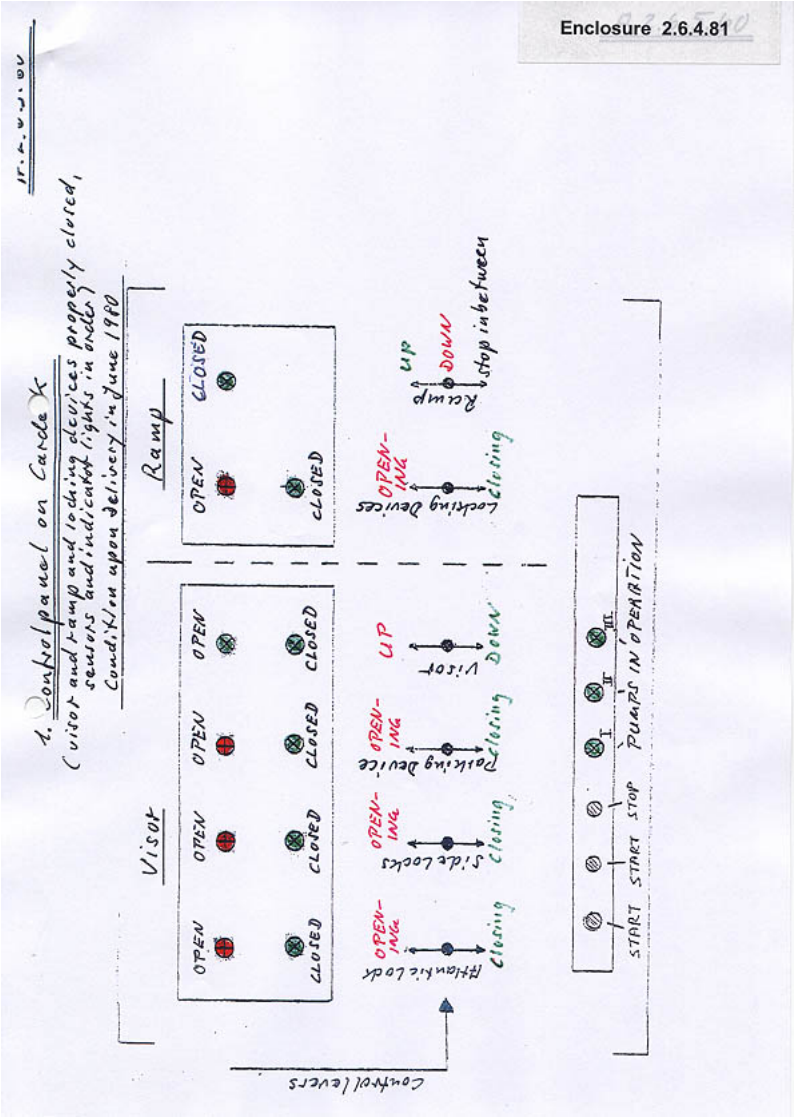


Bowvisor and Ramp

Part of drawing
49111-871

Enclosure 2.6.4.81



Enclosure 3.2.3.82

SOLAS

Consolidated Edition, 1992

INTERNATIONAL MARITIME ORGANIZATION

(d) Forecasts, warnings, synoptic and other meteorological reports intended for ships shall be issued and disseminated by the national service in the best position to serve various zones and areas, in accordance with mutual arrangements made by the Contracting Governments concerned.

Regulation 5
Ice patrol service

(a) The Contracting Governments undertake to continue an ice patrol and a service for study and observation of ice conditions in the North Atlantic. During the whole of the ice season the south-eastern, southern and south-western limits of the regions of icebergs in the vicinity of the Grand Banks of Newfoundland shall be guarded for the purpose of informing passing ships of the extent of this dangerous region; for the study of ice conditions in general; and for the purpose of affording assistance to ships and crews requiring aid within the limits of operation of the patrol ships. During the rest of the year the study and observation of ice conditions shall be maintained as advisable.

(b) Ships and aircraft used for the ice patrol service and the study and observation of ice conditions may be assigned other duties by the managing Government, provided that such other duties do not interfere with the primary purpose or increase the cost of this service.

Regulation 6
Ice patrol: Management and cost

(a) The Government of the United States of America agrees to continue the management of the ice patrol service and the study and observation of ice conditions, including the dissemination of information received therefrom. The Contracting Governments specially interested in these services undertake to contribute to the expense of maintaining and operating these services; each contribution to be based upon the total gross tonnage of the vessels of each contributing Government passing through the regions of icebergs guarded by the ice patrol; in particular, each Contracting Government specially interested undertakes to contribute annually to the expense of maintaining and operating these services a sum determined by the ratio which the total gross tonnage of that Contracting Government's vessels passing during the ice season through the regions of icebergs guarded by the ice patrol bears to the combined total gross tonnage

season through the regions of icebergs guarded by the ice patrol. Non-contracting Governments specially interested may contribute to the expense of maintaining and operating these services on the same basis. The managing Government will furnish annually to each contributing Government a statement of the total cost of maintaining and operating the ice patrol and of the proportionate share of each contributing Government.

(b) Each of the contributing Governments has the right to alter or discontinue its contribution, and other interested Governments may undertake to contribute to the expense. The contributing Government which avails itself of this right will continue to be responsible for its current contribution up to 1 September following the date of giving notice of intention to alter or discontinue its contribution. To take advantage of the said right it must give notice to the managing Government at least six months before the said 1 September.

(c) If, at any time, the United States Government should desire to discontinue these services, or if one of the contributing Governments should express a wish to relinquish responsibility for its pecuniary contribution, or to have its contribution altered, or another Contracting Government should desire to undertake to contribute to the expense, the contributing Governments shall settle the question in accordance with their mutual interests.

(d) The contributing Governments shall have the right by common consent to make from time to time such alterations in the provisions of this regulation and of regulation 5 of this chapter as appear desirable.

(e) Where this regulation provides that a measure may be taken after agreement among the contributing Governments, proposals made by any Contracting Government for effecting such a measure shall be communicated to the managing Government which shall approach the other contributing Governments with a view to ascertaining whether they accept such proposals, and the results of the enquiries thus made shall be sent to the other contributing Governments and the Contracting Government making the proposals. In particular, the arrangements relating to contributions to the cost of the services shall be reviewed by the contributing Governments at intervals not exceeding three years. The managing Government shall initiate the action necessary to this end.

Regulation 7
Speed near ice

When ice is reported on or near his course the master of every ship at night is bound to proceed at a moderate speed or to alter his course

Enclosure 3.3.83

The German Group of Experts investigating the sinking of M/V "ESTONIA"

c/o AHLERS & VOGEL · Schaartor 1 D-20459 Hamburg · Telephone 49-40-371075

Memo for Dr. Holtappels

re: Interview of Juhani Luttunen, ex boatswain of "Viking Sally", "Silja Star" and "Wasa King" from June 1980 to November 1992 on 6.9.96

1. Lutttunen had killed another ex crew member of "Viking Sally", etc., the engine repairman Christer Koivisto, by shooting him twice into the head onboard M.V. "Fennia" on the 12th June of this year whilst in the port of Wasa. This is why the interview took place in the prison of Wasa where Luttunen has been ever since. The interview, in the course of which also the underwater videos concerning the Atlantic lock area were viewed, took 4 hours. Participants were

   Daniel Allén - lawyer of Luttunen
   Henrik Gahmberg - Bützow & Co., Helsinki
   the Undersigned.

2. Christer Koivisto had been an engine repairman and 'ombudsman' (union representative) from the take-over of "Viking Sally" in Papenburg until June 1993 when the vessel was "Estonia, whilst Luttunen had been boatswain from the take-over in June 1980 to November 1992 when the vessel was "Wasa King". According to L., Koivisto had a very dominant/convincing personality, and we got the impression that there had been a certain rivalry between the two over the years. The exact times of Luttunen, Koivisto as well as of Göran Lindström and Bo Wesander, nominated by Luttunen as witnesses, can be taken from the attached copy of the crew register of the Finnnish Board of Navigation.

3. L. is believed to be schizophrene and/or paranoid and will undergo mental examination shortly. During the interview, however, he made a completely normal impression on us, very calm and concentrated, only once did he become slightly excited, viz. when we could confirm that the visor lug possibly showed indications of manipulation which could not be explained by normal wear and tear, and elongation/stretching in service.

4. L. explained in detail:
   - his function as boatswain in connection with operating visor/bow ramp, i.e. standing at the control panel, he explained the different handles and also the indicator lights, remembered clearly the 2 hooks and 4 bolts of the bow ramp as well as
   - the sidelocks, the Atlantic lock, and also explained that they had never engaged the manual sidelocks.
   - At some time in 1982 they realized that the visor was no more closing properly because it was in a misaligned condition athwortships, he believes that the starboard corner was standing a bit up. It was for this reason that the Atlantic lock bolt could no more move through the visor lug. The matter was discussed with the engine people and it was considered what could be done. Engine repairman Koivisto considered himself to be the visor expert and offered to rectify the Atlantic lock to the effect that the bolt would fit again. L. believes that Koivisto was even called back from vacation to do the modification.
   - In the presence of L. and Göran Lindström Koivisto cut off the upper part of the lugs of the Atlantic lock and took off the bushings. Thereafter he welded extended parts on the lug remains and the holes in the lugs now looked like an ellipse (see drawing attached an enclosure no. 2), the bushings did not fit any more and were left out as still the bolt would not go smoothly through the visor lug, which was extending apparently too much aft or too much forward. In any event Koivisto cut something off

the inside of the visor lug, whereby L. is of the opinion it was from the forward part (see drawing attached as enclosure no. 3). After the repairs were completed by Koivisto L. together with Lindström looked at the result and realized at once that it was impossible. They decided to contact the inspector from shore, he does not recall the name, is however sure that it was not Röblom (whom he knows). He is very careful with names since Lindström and Wesander, whom he had called as witnesses, had testified that they did not remember. It was their intention to call in the inspector who normally inspected the visor.

Somebody came and realized the poor modification. About one week later Swedish speaking people came from the company von Tell AB, totally cut off all 3 lugs of the Atlantic lock and welded new ones to the A-Deck with bushings inserted. He believes also that it was then realized that there was something wrong with the hydraulic, which was adjusted. The visor lug remained - as far as he remembers - unchanged, i.e. should still be the original.

When the repairs were completed the von Tell people expressly prohibited Koivisto or anybody else from board to ever manipulate the Atlantic lock again.

5. We have promised to send photos of bolts and lugs from the Atlantic lock as well as from the visor lug and will also attach photos from the poorly welded fundament of the port actuator and the hinges, although he has already said that he does not remember anything in this respect.

6. The information from Luttunen will be cross-checked with von Tell and some people in Mariehamn.

7. According to L. Koivisto has repeated the poor modification of the Atlantic lock again on "Estonia" which might have caused the catastrophe.

8. L. has spoken several times to T. Karppinen before and after the murder, the first time in December 1995 when he visited the Finnish Commission on his own initiative. According to Karppinen, however, he did not express himself very clearly at the beginning and spoke more in a coded manner, which was confirmed by L. when we asked him respectively.

9. In summary it has to be concluded that in case it can be proved that L. is right the 3 lugs at vessel's side are not original which would explain the good looking but too thin welds at centre and port lugs, whilst the starboard lug had subsequently been repair welded. It would also explain the longer support bracket at the starboard lug when comparing it with the drawing.

Hamburg, 09.09.96 Werner Hummel

Encl.

Enclosure 3.4.86

WASA KING

TRIM AND STABILITY BOOKLET

approved by FBA
Eckelu
23.1.91

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LC3	Ballast condition at arrival	9-11
LC4	Ship with full bunkers and stores + 2000 passengers at departure	12-14
LC5	Ship with full bunkers and stores + 2000 passengers at arrival	15-17
LC6	Fully loaded to draught 5.567 m, 47 trailers and 2000 passengers at departure	18-20
LC7	As case 6 but 50 % of bunkers and stores	21-23
LC8	As case 6 but 10 % of bunkers and stores	24-26

Appendix
Damage stability diagram 6891.01-1115.600
Hydrostatic particulars 6891.06-171.120
Stability Cross Curves values 6891.01-171.200
Report of inclining experiment 11.01 1991

G E N E R A L P A R T I C U L A R S

SHIP'S NAME :	WASA KING ex Silja Star ex Viking Sally	
SIGNAL LETTERS :	OIKW	
PORT OF REGISTRY :		
OWNERS NAME :		
BUILDERS NAME AND ADDRESS :	Jos. L. Meyer, Papenburg-Ems	
SHIP'S NUMBER :	590	
DATE OF KEEL LAID :		
MAIN DIMENSIONS :	Length over all	157.02 m
	Length between perp.	137.40 m
	Breadth mld	24.20 m
	Depth to A deck	7.65 m
	Draught	5.567 m
BLOCK COEFFICIENT :		0.681
DISPLACEMENT (1.025 t/m^3) : T = 5.567 M		12708 T

GENERAL

This Trim and Stability Booklet is based on Maierform's Hydrostatic Particulars 6891.06-171.120, Cross Stability Curves Values 6891.01-171.200 and Damage Stability Diagram 6891.01-115.600 and Inclining experiment 11.01. 1991.

The difference of Light Ship Weight between the two inclining experiments was 313 t. The largest parts in additional weights were 'Duck tail' and additional insulation between passenger cabins.

The Duck tail's volume and effect to KM is not included in hydrostatic particulars. (Reduced trim and give more stability). During inclining experiment the Duck tail was over water surface all the time.

In loading cases 4 and 5 there has been shown stability curve and GM-values in various numbers of passengers. In loading cases 6, 7 and 8 there has been shown GM-values in various numbers of trailers.

The damage stability diagram has been calculated with the following criterions:

- GM at least 0.05 m
- Max. heel in unsymmetrical cases not more than 7°
- Margin line not immersed in the final stage of flooding.

The following tanks and spaces are connected with cross-flooding ducts:

- Heeling tanks (Tank 13 and 14)
- Sauna fr 110 - 120 from CL-side P & S
- Fresh water tanks fr 120 - 132 P & S

COMBINATION TABLE FOR LOADING CASES

CASE NO	LOADING CONDITION	HFO T	FW T	PASS T	CARGO T	WB T	DWT T	MEAN DRAUGHT M	TRIM M	GM' M	GM_{REQ} M
1	LIGHT SHIP	-	-	-	-	-	-	4.47	-2.28	0.44	-
2	BALLAST CONDITION AT DEPARTURE	807	644	-	-	479	2307	5.33	-0.64	1.51	0.64
3	BALLAST CONDITION AT ARRIVAL	94	68	-	-	993	1248	4.95	-0.50	1.04	0.92
4	FULL BUNKERS +2000 PASS. AT DEPARTURE	807	644	200	-	479	2607	5.44	-0.51	1.49	0.62
5	FULL BUNKERS +2000 PASSENG. AT ARRIVAL	94	68	200	-	993	1555	5.06	-0.42	0.96	0.83
6	47 TRAILER & 2000 PASS. AT DEPARTURE	417	287	200	1692	-	2975	5.57	-0.84	1.14	0.66
7	47 TRAILER & 2000 PASS. 50 % B & S	208	137	200	1692	176	2658	5.46	-0.75	0.84	0.63
8	47 TRAILER & 2000 PASS. AT ARRIVAL	42	38	200	1692	567	2694	5.47	-0.12	0.85	0.63

LOAD CASE 1

LIGHT SHIP

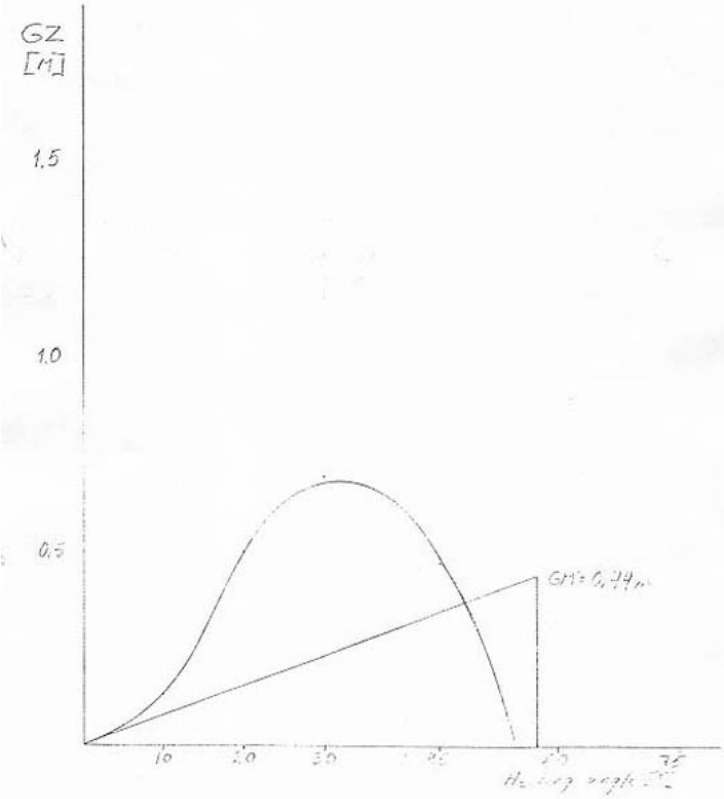
	Weight t	VCG from BL m	Mom tm	LCG from A_{PP} m	Mom tm	Free surf tm
Light ship weight	9733	11.56	112513	60.76	591377	-
Dead weight	-					
Displacement	9733	11.56	112513	60.76	591377	

Mean draught	4.47 m	KM	12.00 m
Trim	-2.28 m	KG	11.56 m
Draught aft	5.41 m	GM	0.44 m
Draught forw	3.13 m	MM'	0.00 m
		GM'	0.44 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.14	4.45	6.47	8.64	9.53	9.13
KG'*sin	2.01	3.95	5.78	8.17	10.01	11.17
GZ	0.13	0.50	0.69	0.47	-0.48	-2.04

Ship Consulting Turku Finland	LOAD CASE 1 LIGHT SHIP	WASA KING 20.01. 1991/VM



LOAD CASE 2

BALLAST CONDITION AT DEPARTURE

	Weight t	VCG from BL m	Mom tm	LCG from A_{PP} m	Mom tm	Free surf tm
Light ship weight	9733	11.56	112513	60.76	591377	
Crew + effects	20	22.00		55.00		
Provisions + stores	20	10.00		46.00		
Heavy Fuel Oil						
DB tank 9	69	0.60		86.60		
H tank 10	162	2.70		74.20		
H tank 11	162	2.70		74.20		
DB tank 15	127	0.60		72.20		434
DB tank 16	127	0.60		72.20		434
DB tank 19	66	0.51		58.30		
Day tank 36	24	2.82		36.23		
Day tank 37	18	2.81		36.62		
Settling tank 38	30	2.90		32.20		
Settling tank 39	22	2.86		33.84		
Total of HFO	807	1.70		68.70		868
Diesel Oil						
DB tank 8	65	0.60		86.60		
DB tank 18	60	0.51		58.30		
DB tank 20	18	0.57		59.87		
DB tank 47	39	0.65		26.62		248
DB tank 48	41	0.65		26.51		249
Day tank 41	13	2.91		31.03		
Total of DO	236	0.72		53.95		497
Lubric. Oil						
Thermal oil tank 24	16	0.67		45.78		
Lubr oil tank 25	13	0.55		45.40		
Lubr oil tank 26	13	0.55		45.40		
Lubr oil tank 27	13	0.55		45.40		
Lubr oil tank 28	13	0.55		45.40		
Lubr oil supply t 30	10	0.55		50.15		
Lubr oil tank 32	12	0.55		44.57		
Kamewa tank 50	2	0.60		24.60		
Kamewa tank 51	2	0.60		23.40		
Kamewa tank 52	2	0.60		23.40		
Stern tube oil 55a	5	0.71		15.06		
Total of LO	101	0.58		43.05		

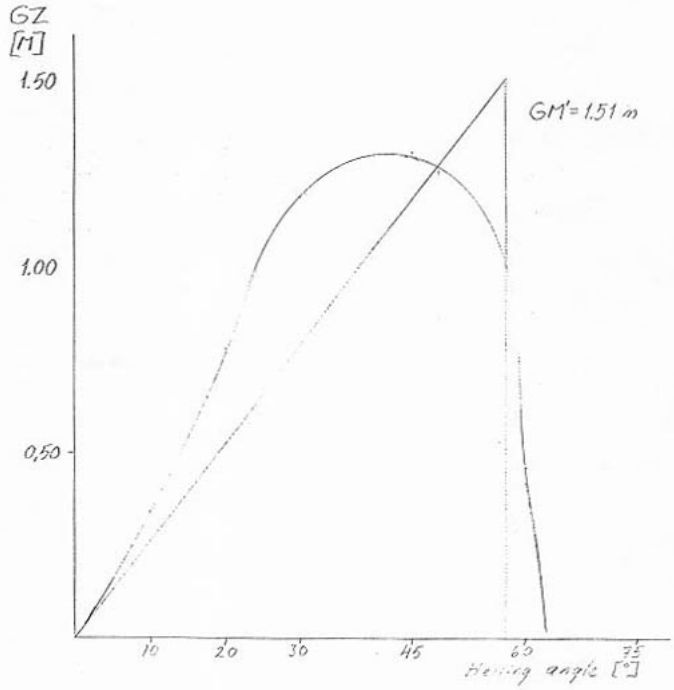
Fresh Water						
Tank 4a	75	2.79		114.25		
Tank 4b	75	2.79		114.25		
Tank 5	145	2.79		113.65		
Tank 56	156	3.07		9.46		353
Tank 57	156	3.07		9.46		353
Circulating tank 17	18	0.60		58.30		
Cool water tank 22	3	0.57		55.40		
Cool water tank 29	16	0.67		45.80		
Total of FW	644	2.80		59.82		706
Water Ballast						
Fore peak tank 1	176	4.45		133.92		
Trim tank 2	303	4.69		121.40		2260
Total of WB	479	4.60		126.00		2260
Dead weight	2307	2.71	6247	75.17	173419	4331
Displacement	12040	9.86	118760	63.52	764796	4331

Mean draught	5.33 m	KM	11.73 m
Trim	-0.64 m	KG	9.86 m
Draught aft	5.65 m	GM	1.87 m
Draught forw	5.01 m	MM'	0.36 m
		GM'	1.51 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.11	4.28	6.30	8.54	9.31	8.95
KG'*sin	1.77	3.50	5.11	7.23	8.85	9.87
GZ	0.34	0.78	1.19	1.31	0.46	-0.92

Ship Consulting Turku Finland	LOAD CASE 2 BALLAST AT DEPARTURE	WASA KING 20.01. 1991/VMJ



LOAD CASE 3

BALLAST CONDITION AT ARRIVAL

	Weight	VCG from BL	Mom	LCG from A_{pp}	Mom	Free surf
	t	m	tm	m	tm	tm
Light ship weight	9733	11.56	112513	60.76	591377	
Crew + effects	20	22.00		55.00		
Provisions + stores	15	10.00		46.00		
Heavy Fuel Oil						
Day tank 36	24	2.82		36.23		
Day tank 37	18	2.81		36.62		
Settling tank 38	30	2.90		32.20		
Settling tank 39	22	2.86		33.84		
Total of HFO	94	2.85		34.46		105
Diesel Oil						
DB tank 20	11	0.57		59.87		
Day tank 41	13	2.91		31.03		
Total of DO	24	1.74		45.45		39
Lubric. Oil						
Lubr oil tank 25	6	0.55		45.40		
Lubr oil tank 26	6	0.55		45.40		
Lubr oil tank 27	6	0.55		45.40		
Lubr oil tank 28	6	0.55		45.40		
Lubr oil supply t 30	5	0.55		50.15		
Kamewa tank 50	1	0.60		24.60		
Kamewa tank 51	1	0.60		23.40		
Kamewa tank 52	1	0.60		23.40		
Stern tube oil 55a	2	0.71		15.06		
Total of LO	34	0.56		42.41		
Fresh Water						
Tank 5	45	2.79		113.65		
Circulating tank 17	10	0.60		58.30		
Cool water tank 22	3	0.57		55.40		
Cool water tank 29	10	0.67		45.80		
Total of FW	68	2.06		92.96		166
Water Ballast						
Fore peak tank 1	176	4.45		133.92		
Trim tank 2	303	4.69		121.40		
DB tank 6	88	0.64		104.84		
Heeling tank 13	183	2.63		77.53		
Heeling tank 14	183	2.63		77.53		
DB tank 54	60	0.66		19.14		
Total of WB	993	3.29		99.80		

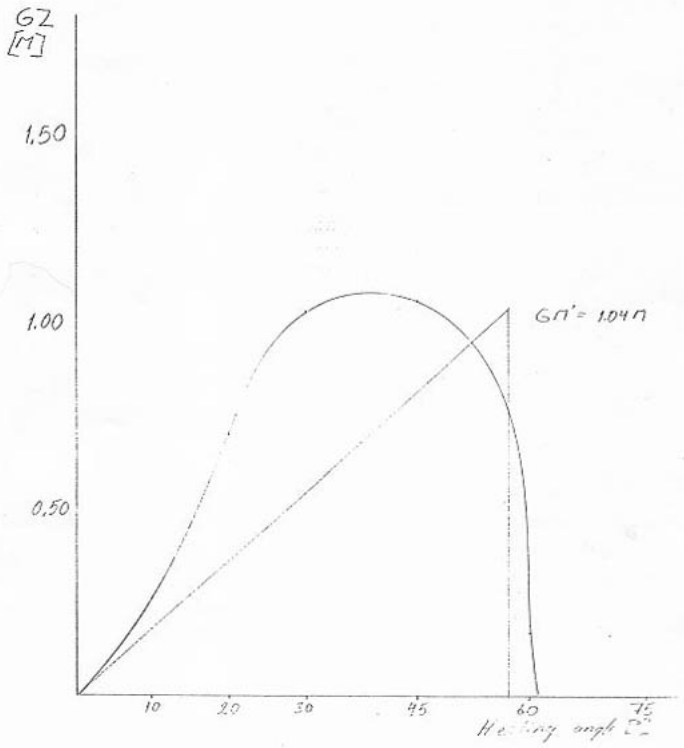
Dead weight	1248	3.46	4322	90.54	112988	310
Displacement	10981	10.64	116835	64.14	704365	310

Mean draught	4.95 m	KM	11.71 m
Trim	-0.50 m	KG	10.64 m
Draught aft	5.20 m	GM	1.07 m
Draught forw	4.70 m	MM'	0.03 m
		GM'	1.04 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.11	4.35	6.37	8.60	9.41	9.03
KG'*sin	1.85	3.65	5.34	7.54	9.24	10.31
GZ	0.26	0.70	1.03	1.06	0.17	-1.28

Ship Consulting Turku Finland	LOAD CASE 3 BALLAST AT ARRIVAL	WASA RHS 20.01 1991/VMJ



LOAD CASE 4

SHIP WITH FULL BUNKERS & STORES + 2000 PASSENGER AT DEPARTURE

	Weight	VCG from BL	Mom	LCG from A_{pp}	Mom	Free surf
	t	m	tm	m	tm	tm
Light ship weight	9733	11.56	112513	60.76	591377	
Crew + effects	20	22.00		55.00		
Provisions + stores	80	10.00		46.00		
Heavy Fuel Oil						
DB tank 9	69	0.60		86.60		
H tank 10	162	2.70		74.20		
H tank 11	162	2.70		74.20		
DB tank 15	127	0.60		72.20		434
DB tank 16	127	0.60		72.20		434
DB tank 19	66	0.51		58.30		
Day tank 36	24	2.82		36.23		
Day tank 37	18	2.81		36.62		
Settling tank 38	30	2.90		32.20		
Settling tank 39	22	2.86		33.84		
Total of HFO	807	1.70		68.70		868
Diesel Oil						
DB tank 8	65	0.60		86.60		
DB tank 18	60	0.51		58.30		
DB tank 20	18	0.57		59.87		
DB tank 47	39	0.65		26.62		248
DB tank 48	41	0.65		26.51		249
Day tank 41	13	2.91		31.03		
Total of DO	236	0.72		53.95		497
Lubric. Oil						
Thermal oil tank 24	16	0.67		45.78		
Lubr oil tank 25	13	0.55		45.40		
Lubr oil tank 26	13	0.55		45.40		
Lubr oil tank 27	13	0.55		45.40		
Lubr oil tank 28	13	0.55		45.40		
Lubr oil supply t 30	10	0.55		50.15		
Lubr oil tank 32	12	0.55		44.57		
Kamewa tank 50	2	0.60		24.60		
Kamewa tank 51	2	0.60		23.40		
Kamewa tank 52	2	0.60		23.40		
Stern tube oil 55a	5	0.71		15.06		
Total of LO	101	0.58		43.05		

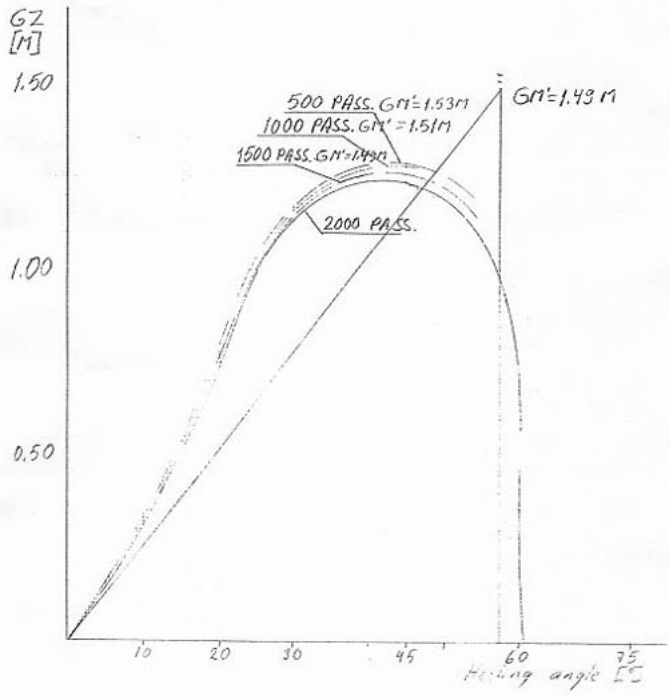
Fresh Water						
Tank 4a	75	2.79		114.25		
Tank 4b	75	2.79		114.25		
Tank 5	145	2.79		113.65		
Tank 56	156	3.07		9.46		353
Tank 57	156	3.07		9.46		353
Circulating tank 17	18	0.60		58.30		
Cool water tank 22	3	0.57		55.40		
Cool water tank 29	16	0.67		45.80		
Total of FW	644	2.80		59.82		706
Water Ballast						
Fore peak tank 1	176	4.45		133.92		
Trim tank 2	303	4.69		121.40		2260
Total of WB	479	4.60		126.00		2260
2000 PASSENGER+LUGG	200	16.40		71.50		
Swimming pool	40	2.00		97.50		
Dead weight	2607	3.92	10207	74.56	194379	4331
Displacement	12340	9.94	122720	63.68	785756	4331

Mean draught	5.44 m	KM	11.78 m
Trim	-0.51 m	KG	9.94 m
Draught aft	5.70 m	GM	1.84 m
Draught forw	5.19 m	MM'	0.35 m
		GM'	1.49 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.11	4.27	6.28	8.52	9.27	8.92
KG'*sin	1.79	3.52	5.15	7.28	8.91	9.94
GZ	0.32	0.75	1.13	1.24	0.36	-1.02

Ship Consulting Turku Finland	LOAD CASE 4 FULL BUNKERS + 2000 PASS. AT DEPARTURE	WASA KING 20.01. 1991/VM



LOAD CASE 5

SHIP WITH FULL BUNKERS AND STORES + 2000 PASSENGERS AT ARRIVAL

	Weight	VCG from BL	Mom	LCG from A_{pp}	Mom	Free surf
	t	m	tm	m	tm	tm
Light ship weight	9733	11.56	112513	60.76	591377	-
Crew + effects	20	22.00		55.00		
Provision + stores	60	10.00		46.00		
Heavy Fuel Oil						
Day tank 36	24	2.82		36.23		
Day tank 37	18	2.81		36.62		
Settling tank 38	30	2.90		32.20		
Settling tank 39	22	2.86		33.84		
Total of HFO	94	2.85		34.46		105
Diesel Oil						
DB tank 20	11	0.57		59.87		
Day tank 41	13	2.91		31.03		
Total of DO	24	1.74		45.45		39
Lubric. Oil						
Lubr oil tank 25	6	0.55		45.40		
Lubr oil tank 26	6	0.55		45.40		
Lubr oil tank 27	6	0.55		45.40		
Lubr oil tank 28	6	0.55		45.40		
Lubr oil supply t 30	5	0.55		50.15		
Kamewa tank 50	1	0.60		24.60		
Kamewa tank 51	1	0.60		23.40		
Kamewa tank 52	1	0.60		23.40		
Stern tube oil 55a	2	0.71		15.06		
Total of LO	34	0.56		42.41		
Fresh Water						
Tank 5	45	2.79		113.65		
Circulating tank 17	10	0.60		58.30		
Cool water tank 22	3	0.57		55.40		
Cool water tank 29	10	0.67		45.80		
Total of FW	68	2.06		92.96		166
Bilge water 33	22	0.55		35.83		

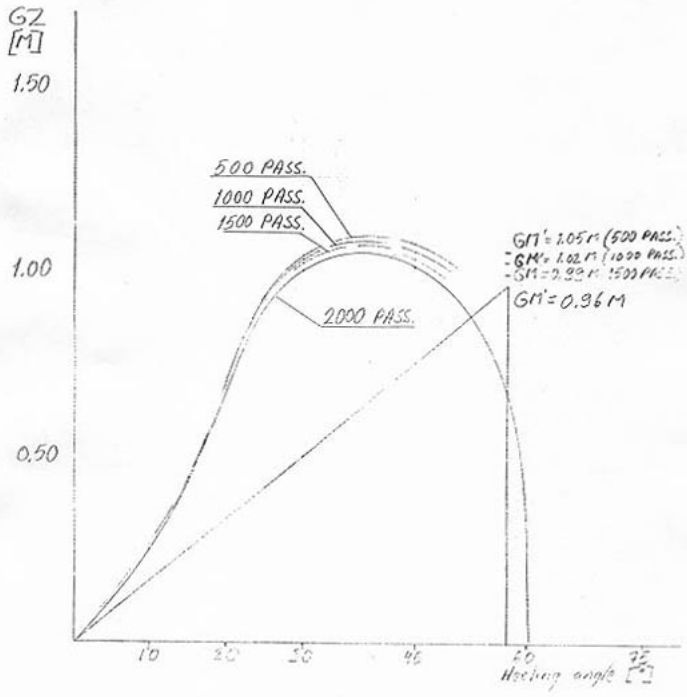
Water Ballast						
Fore peak tank 1	176	4.45		133.92		
Trim tank 2	303	4.69		121.40		
DB tank 6	88	0.64		104.84		
Heeling tank 13	183	2.63		77.53		
Heeling tank 14	183	2.63		77.53		
DB tank 54	60	0.66		19.14		
Total of WB	993	3.29		99.80		
2000 passenger+lugg	200	16.40		71.50		
Swimming pool	40	2.00		97.50		160
Dead weight	1555	5.23	8132	85.72	133294	470
Displacement	11288	10.69	120646	64.20	724671	470

Mean draught	5.06 m	KM	11.69 m
Trim	-0.42 m	KG	10.69 m
Draught aft	5.27 m	GM	1.00 m
Draught forw	4.85 m	MM'	0.04 m
		GM'	0.96 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.11	4.35	6.37	8.60	9.41	9.03
KG'*sin	1.86	3.67	5.37	7.59	9.29	10.36
GZ	0.25	0.68	1.00	1.01	0.12	-1.33

Ship Consulting Turku Finland	LOAD CASE 5 FULL BUNKER + 2000 PASS. AT ARRIVAL	WASA KING 20.01 1991/VMJ



LOAD CASE 6

FULLY LOADED TO DRAUGHT 5.567 47 TRAILERS AND 2000 PASSENGES AT DEPARTURE

	Weight	VCG from BL	Mom	LCG from λ_{PP}	Mom	Free surf
	t	m	tm	m	tm	tm
Light ship weight	9733	11.56	112513	60.76	591377	
Crew + effects	20	22.00		55.00		
Provisions + stores	80	10.00		46.00		
Heavy Fuel Oil						
DB tank 9	69	0.60		86.60		
DB tank 15	127	0.60		72.20		434
DB tank 16	127	0.60		72.20		434
Day tank 36	24	2.82		36.23		
Day tank 37	18	2.81		36.62		
Settling tank 38	30	2.90		32.20		
Settling tank 39	22	2.86		33.84		
Total of HFO	417	1.11		66.08		868
Diesel Oil						
DB tank 8	65	0.60		86.60		
DB tank 18	60	0.51		58.30		245
Day tank 41	13	2.91		31.03		
Total of DO	138	0.78		69.06		245
Lubric. Oil						
Thermal oil tank 24	16	0.67		45.78		
Lubr oil tank 25	13	0.55		45.40		
Lubr oil tank 26	13	0.55		45.40		
Lubr oil tank 27	13	0.55		45.40		
Lubr oil tank 28	13	0.55		45.40		
Lubr oil supply t 30	10	0.55		50.15		
Lubr oil tank 32	12	0.55		44.57		
Kamewa tank 50	2	0.60		24.60		
Kamewa tank 51	2	0.60		23.40		
Kamewa tank 52	2	0.60		23.40		
Stern tube oil 55a	5	0.71		15.06		
Total of LO	101	0.58		43.05		

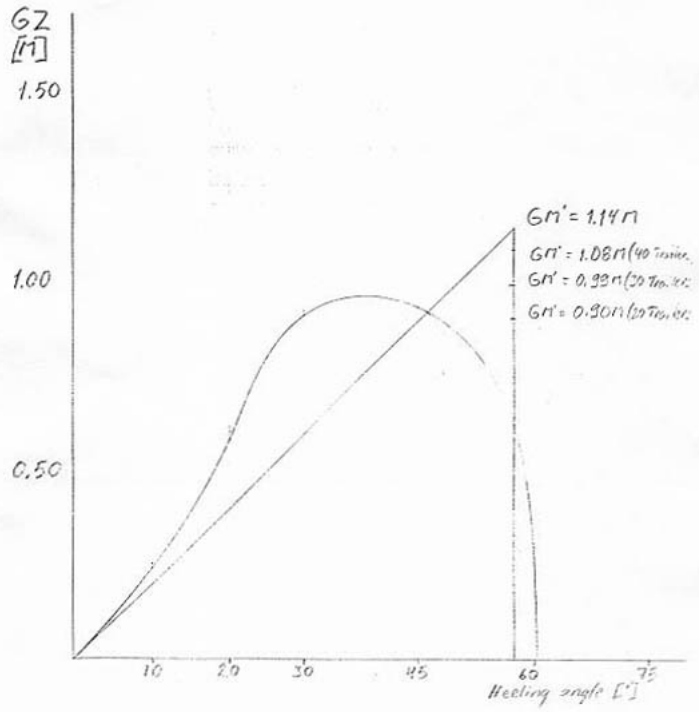
Fresh Water						
Tank 4a	75	2.79		114.25		
Tank 4b	75	2.79		114.25		
Tank 5	100	2.79		113.65		138
Circulating tank 17	18	0.60		58.30		
Cool water tank 22	3	0.57		55.40		
Cool water tank 29	16	0.67		45.80		
Total of FW	287	2.51		106.10		138
2000 PASSENGER+LUGG	200	16.40		71.50		
Swimming pool	40	2.00		97.50		
47 trailers a' 36 t	1692	9.50		66.50		
Dead weight	2975	7.40	22022	69.71	207381	1251
Displacement	12708	10.59	134536	62.85	798758	1251

Mean draught	5.57 m	KM	11.83 m
Trim	-0.84 m	KG	10.59 m
Draught aft	5.99 m	GM	1.24 m
Draught forw	5.15 m	MM'	0.10 m
		GM'	1.14 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.11	4.24	6.26	8.49	9.22	8.89
KG'*sin	1.86	3.66	5.35	7.56	9.26	10.33
GZ	0.25	0.58	0.91	0.93	-0.04	-1.44

Ship Consulting Turku Finland	LOAD CASE 6 FULLY LOADED TO DRAUGHT 5.567 M AT DEPARTURE	WASA KING 20.01 1991/VM



LOAD CASE 7

AS CASE 6 BUT 50 % OF BUNKERS AND STORES

	Weight t	VCG from BL m	Mom tm	LCG from A_{PP} m	Mom tm	Free surf tm
Light ship weight	9733	11.56	112513	60.76	591377	
Crew + effects	20	22.00		55.00		
Provisions + stores	65	10.00		46.00		
Heavy Fuel Oil						
DB tank 9	69	0.60		86.60		
DB tank 16	45	0.60		72.20		434
Day tank 36	24	2.82		36.23		
Day tank 37	18	2.81		36.62		
Settling tank 38	30	2.90		32.20		
Settling tank 39	22	2.86		33.84		
Total of HFO	208	1.62		58.76		434
Diesel Oil						
DB tank 8	56	0.60		86.60		236
Day tank 41	13	2.91		31.03		
Total of DO	69	1.04		76.13		236
Lubric. Oil						
Thermal oil tank 24	8	0.67		45.78		
Lubr oil tank 25	6	0.55		45.40		
Lubr oil tank 26	6	0.55		45.40		
Lubr oil tank 27	6	0.55		45.40		
Lubr oil tank 28	6	0.55		45.40		
Lubr oil supply t 30	10	0.55		50.15		
Kamewa tank 50	2	0.60		24.60		
Kamewa tank 51	2	0.60		23.40		
Kamewa tank 52	2	0.60		23.40		
Stern tube oil 55a	3	0.71		15.06		
Total of LO	51	0.58		42.07		

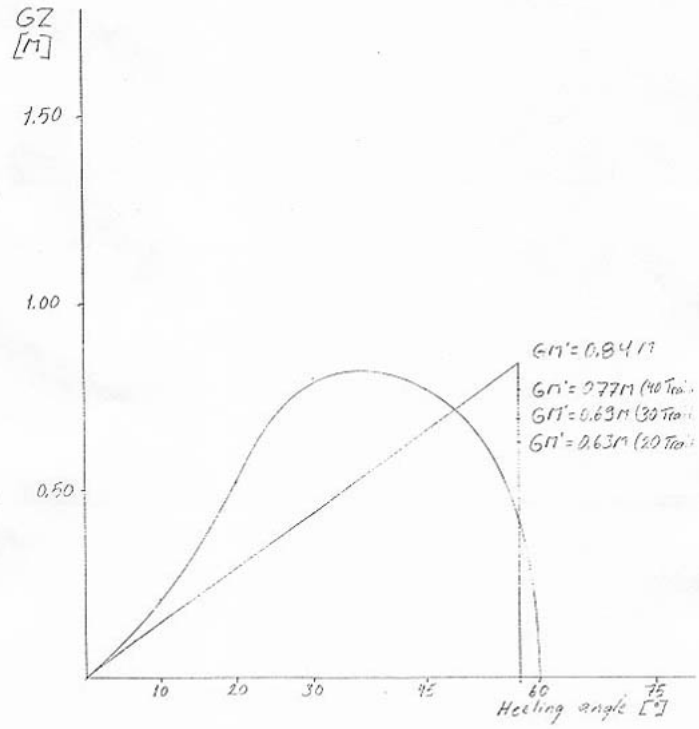
Fresh Water						
Tank 5	100	2.79		113.65		138
Circulating tank 17	18	0.60		58.30		
Cool water tank 22	3	0.57		55.40		
Cool water tank 29	16	0.67		45.80		
Total of FW	137	2.21		97.18		138
2000 PASSENGER+LUGG	200	16.40		71.50		
Swimming pool	40	2.00		97.50		160
47 trailers a' 36 t	1692	9.50		66.50		
Water Ballast						
Fore peak tank 1	176	4.45		133.92		
Dead weight	2658	8.29	22047	71.98	191311	968
Displacement	12391	10.86	134560	63.17	782688	968

Mean draught	5.46 m	KM	11.78 m
Trim	-0.75 m	KG	10.86 m
Draught aft	5.84 m	GM	0.92 m
Draught forw	5.09 m	MM'	0.08 m
		GM'	0.84 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.11	4.26	6.27	8.51	9.27	8.92
KG'*sin	1.90	3.74	5.47	7.74	9.47	10.57
GZ	0.21	0.52	0.80	0.77	-0.20	-1.65

Ship Consulting Turku Finland	LOAD CASE 7 FULLY LOADED TO DRAUGHT 5.567M BUT 50% BUNKERS	WASA KING 20.01 1991/VMJ



LOAD CASE 8

AS CASE 6 BUT 10 % OF BUNKERS AND STORES AT ARRIVAL

	Weight	VCG from BL	Mom	LCG from A_{pp}	Mom	Free surf
	t	m	tm	m	tm	tm
Light ship weight	9733	11.56	112513	60.76	591377	
Crew + effects	20	22.00		55.00		
Provision + stores	60	10.00		46.00		
Heavy Fuel Oil						
Day tank 36	24	2.82		36.23		
Day tank 37	18	2.81		36.62		
Total of HFO	42	2.82		36.40		105
Diesel Oil						
Day tank 41	13	2.91		31.03		
Total of DO	13	2.91		31.03		39
Lubric. Oil						
Lubr oil tank 25	6	0.55		45.40		
Lubr oil tank 26	6	0.55		45.40		
Lubr oil tank 27	6	0.55		45.40		
Lubr oil tank 28	6	0.55		45.40		
Lubr oil supply t 30	5	0.55		50.15		
Kamewa tank 50	1	0.60		24.60		
Kamewa tank 51	1	0.60		23.40		
Kamewa tank 52	1	0.60		23.40		
Stern tube oil 55a	2	0.71		15.06		
Total of LO	34	0.56		42.41		
Fresh Water						
Tank 5	15	2.79		113.65		
Circulating tank 17	10	0.60		58.30		
Cool water tank 22	3	0.57		55.40		
Cool water tank 29	10	0.67		45.80		
Total of FW	38	1.48		76.63		166
Bilge water 33	22	0.55		35.83		

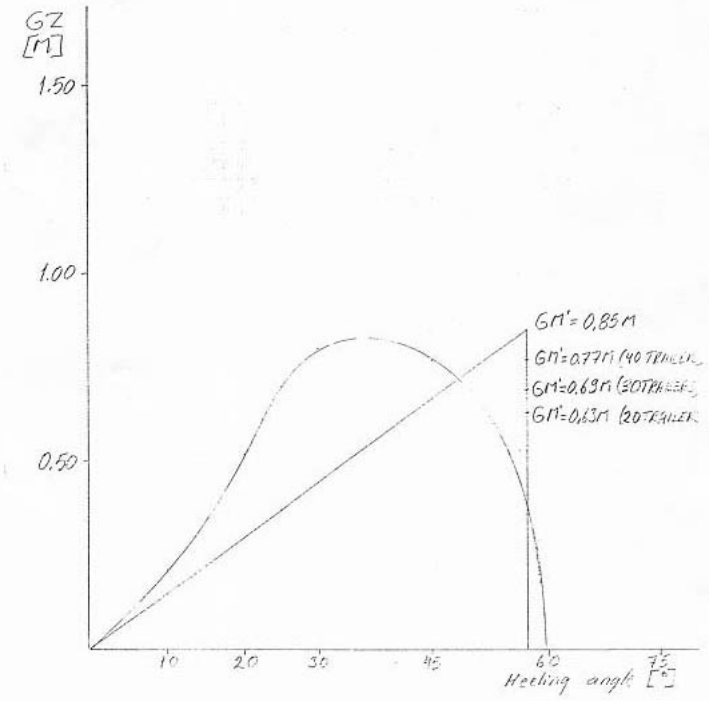
Water Ballast						
Fore peak tank 1	176	4.45		133.92		
Trim tank 2	303	4.69		121.40		
DB tank 6	88	0.64		104.84		
Total of WB	567	3.99		122.72		
2000 passenger+lugg	200	16.40		71.50		
Swimming pool	40	2.00		97.50		160
47 trailers a' 36 t	1692	9.50		66.50		
Dead weight	2694	8.52	22959	77.87	209790	470
Displacement	12427	10.90	135473	64.47	801167	470

Mean draught	5.47 m	KM	11.79 m
Trim	-0.12 m	KG	10.90 m
Draught aft	5.53 m	GM	0.89 m
Draught forw	4.41 m	MM'	0.04 m
		GM'	0.85 m

Calculation of curve of statical stability

Heeling	10°	20°	30°	45°	60°	75°
sin	0.1736	0.3420	0.5000	0.7071	0.8660	0.9659
KN	2.11	4.26	6.27	8.51	9.26	8.91
KG'*sin	1.90	3.74	5.47	7.74	9.47	10.57
GZ	0.21	0.52	0.80	0.77	-0.21	-1.66

Ship Consulting Turku Finland	LOAD CASE 8 FULLY LOADED TO DRAUGHT 5.567 M AT ARRIVAL	WASA KING 20.01 1991/VMJ



YARD NO. 590

VIKING SALLY

Information for the master of the ship

YARD NO. 590

1. General

1.1 Type and purpose of the ship
Car and passenger ferry

1.2 Short international voyage

1.3 Principal dimensions:

Length overall	155,40 m	
Length between pp.	137,40 m	
Breadth moulded	24,20 m	
Draught	5,567 m	
Lightship	~~9419,67 t~~	9733 t
KG from basis	~~11,31 m~~	11.56 m
LCG from AP	~~61,68 m~~	60.76 m

Determination of stability on board

1. General

With the stability blank forms 1 - 3 and 5 - 7 it is possible, to effect a stability calculation at altered loading compared with the loading conditions calculated in advance.

The documents are composed that way, that the stability calculation may be effected schematically.

The forms 1-3 include in tables all necessary basic data for the calculations which have to be done on forms 5 and6

After calculation has been done, it may be controlled by means of form 7 whether the ascertained stability data are sufficient.

2. Instruction for calculation of stability according to these blank forms

2.1. Weight- and moment calculations, Form 5

a) Enter the individual weights (light ship, crew and provision, tank contents, cargo weights) into the column WEIGHT.

b) Ascertainment of the c.g. above base line of the individuel weights (see enclosed documents) and enter in the colums ΘH

c) Multiplication of individual weight with the belonging to centers of gravity. Enter into column M_H.

d) Addition of the individual weights. Enter into column $\sum G = ①$

e) Addition of the vertical moments. Enter into column $\sum M_H = ②$

f) Division of $\frac{②}{①} = ⑤ = KG$. Enter into column 5.

KG = C.g. above baseline of the loaded vessel.

g) Ascertainment of the longitudinal C.G.'s of the individual weights (see enclosed documents) and insert in column ⊖L.

h) Multiplication of individual weight with the belonging to longitudinal c.g. Insert in column ML.

i) Additional of the longitudinal moments. Enter into column $\sum$ ML = ③

k) Division of $\frac{③}{①}$ = ⑥ = ⊖L

Insert in column ⑥

⊖L = longitudinal center of gravity of the loaded vessel.

2.1.1. Explanation for ascertainment of the centers of gravity for loading and consumable tank contents

a) Totally filled consumable tanks:

Weight, vertical- and longitudinal moments directly to be taken from form 1

b) Partly filled consumable tanks:

Weight of tank contents to be ascertained, c.g. above base line to be estimated on the basis of the position of the center of gravity of the completely filled tank. Longitudinal c.g. of the totally filled tank to be taken.

2.1.2. Influence of free surfaces

a) For partly filled consumable tanks the value $i_b \times \gamma$ of form 1 to be overtaken on form 5 in the column $i_b \times \gamma$

b) Addition of the values $i_b \times \gamma$. Insert in the line $\Sigma\, i_b \times \gamma$ = ④

c) Division of $\frac{③}{①}$ = Δ MG = ⑦

Insert in the line.
Δ MG = Stability loss due to free durfaces.

2.2. Stability- and trim calculation/Form 6

2.2.1. Stability calculation

a) Overtake of weight of the loaded vessel from column ① Form 5 in one of the columns ① of Form 6, depending on the spec. density of water.

γ = 1,00 fresh water
γ = 1,025 seawater

b) Overtake KG column ⑤ and Δ MG column ⑦ of form 5 into form 6.

c) In the tabulated curves sheet Form 2 the displacement ① according to Form 6 to be ascertained and the value "T" and "KM" belonging to to be inserted on Form 6.
If a trim calculation shall be carried out, the belonging to values

displacement - Δ (of Form 2)
Weight - Δ_L (of Form 5)
D/MCT Values (of form 2)

will also have to be overtaken.

d) Calculation of MG and MG' according to the scheme stated on Form 6. The valves of MG' should always lie above the limit curve shown in the damage stability diagram.

e) Calculation of the leverarm curve

From Form 3 "Cross-curves(W-values)", the cross curves data available for the medium draught column ⑧ to be overtaken to Form 6 column ⑰. Calculation of the lever-arm values $h\ell$ (column ⑲) according to the scheme on form 6
The lever arm values $h\ell$ (column ⑲) to be reduced by Δ MG to $h\ell'$ (column ㉑) according to the scheme stated on form 6
For partly filled tanks, the lever arm values $h\ell$ (column ⑲) to be reduced according to scheme by Δ MG free surfaces of the consumable tanks.

f) Drawing of the lever arm curve according to e)

MG from column ⑩ and MG' on the hatched MG-line to be drawn in from the base and the final points to be connected with 0° (MG-straight line resp. MG'-straight line). The lever arm values calculated according to e) $h\ell$ to be drawn in on the degree lines of the diagram and to be connected by a curve line. Curve line and MG-straight line must touch each other at small inclinations. The MG'-straight line states the actual available initial stability.

JOS. L. MEYER PAPENBURG EMS	BUILDING Nº 590	MAIERFORM 6891.01-171.200

STABILITY CROSS CURVES VALUES

MAIN DIMENSIONS

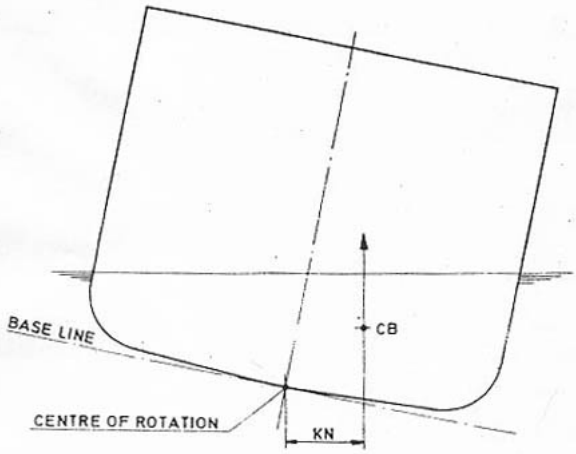
LENGTH OVER ALL	÷ m
LENGTH BETWEEN P.P.	137,40 m
BREADTH MOULDED A-DECK	24,20 m
DEPTH TO A-DECK	7,65 m
DESIGN DRAUGHT	5,55 m

REMARK:

THIS CALCULATION WAS CARRIED OUT WITH
MAIERFORM PROGRAM -PANTOBO-
ON COMPUTER SYSTEM CONTROL DATA CYBER 175
IT HAS BEEN CALCULATED WITH 49 FRAMES,
MEASURED ACCORDING TO CORRECTED LINES PLAN OF NB. Nº 592
DRAWG. Nº 6764.51-161.100
THE HULL HAS BEEN CONSIDERED UP TO C-DECK.

BREMEN 20TH SEPT. 1979

JOS.L.MEYER PAPENBURG EMS	BUILDING NO 590	MAIERFORM 6891.01-171.200 -1-



JOS.L.MEYER
PAPENBURG EMS
BUILDING NO.590

-CROSS CURVES OF STABILITY-
(KN-VALUES)
SMOOTH WATER

DRAFT BK (M)	DISPL. SEA-W. (T)	INCLINATION (DEGREES) 10	20	30	45	60	75
3.50	7256.	2.33	4.73	6.68	8.66	9.66	9.31
3.55	7377.	2.32	4.71	6.67	8.66	9.66	9.30
3.60	7498.	2.30	4.70	6.66	8.65	9.66	9.30
3.65	7619.	2.29	4.68	6.65	8.65	9.65	9.29
3.70	7741.	2.28	4.66	6.63	8.65	9.65	9.28
3.75	7863.	2.26	4.65	6.62	8.65	9.64	9.27
3.80	7985.	2.25	4.63	6.61	8.65	9.64	9.26
3.85	8108.	2.24	4.62	6.60	8.65	9.63	9.25
3.90	8231.	2.23	4.60	6.59	8.65	9.63	9.24
3.95	8355.	2.22	4.59	6.58	8.65	9.62	9.23
4.00	8479.	2.21	4.57	6.56	8.65	9.61	9.22
4.05	8604.	2.20	4.56	6.55	8.65	9.61	9.21
4.10	8729.	2.19	4.54	6.54	8.65	9.60	9.20
4.15	8854.	2.18	4.53	6.53	8.65	9.59	9.19
4.20	8980.	2.17	4.52	6.52	8.65	9.58	9.18
4.25	9106.	2.16	4.50	6.51	8.65	9.57	9.18
4.30	9233.	2.16	4.49	6.50	8.65	9.56	9.17
4.35	9360.	2.15	4.48	6.49	8.65	9.55	9.16
4.40	9487.	2.15	4.47	6.48	8.65	9.54	9.15
4.45	9615.	2.14	4.45	6.47	8.64	9.53	9.13
4.50	9743.	2.14	4.44	6.46	8.64	9.52	9.12
4.55	9872.	2.13	4.43	6.45	8.64	9.51	9.11
4.60	10001.	2.13	4.42	6.44	8.64	9.50	9.10
4.65	10131.	2.13	4.41	6.43	8.63	9.49	9.09
4.70	10262.	2.12	4.40	6.42	8.63	9.47	9.08
4.75	10394.	2.12	4.39	6.41	8.62	9.46	9.07
4.80	10526.	2.12	4.38	6.40	8.62	9.45	9.06
4.85	10659.	2.12	4.37	6.39	8.61	9.44	9.05
4.90	10793.	2.11	4.36	6.38	8.61	9.42	9.04
4.95	10927.	2.11	4.35	6.37	8.60	9.41	9.03
5.00	11063.	2.11	4.34	6.36	8.59	9.40	9.02
5.05	11198.	2.11	4.33	6.35	8.59	9.38	9.00
5.10	11335.	2.11	4.32	6.34	8.58	9.37	8.99
5.15	11472.	2.11	4.31	6.33	8.57	9.35	8.98
5.20	11610.	2.11	4.30	6.32	8.56	9.34	8.97
5.25	11749.	2.11	4.29	6.31	8.55	9.32	8.96
5.30	11888.	2.11	4.28	6.30	8.54	9.31	8.95
5.35	12028.	2.11	4.27	6.29	8.53	9.29	8.93
5.40	12169.	2.11	4.27	6.28	8.52	9.27	8.92
5.45	12311.	2.11	4.26	6.27	8.51	9.26	8.91

JOS.L.MEYER
PAPENBURG EMS
BUILDING NO.590

-CROSS CURVES OF STABILITY-
(KN-VALUES)
SMOOTH WATER

DRAFT (M)	DISPL. (T)	INCLINATION (DEGREES) 10	20	30	45	60	75
5.50	12455.	2.11	4.25	6.26	8.50	9.24	8.90
5.55	12599.	2.11	4.24	6.26	8.49	9.22	8.89
5.60	12744.	2.11	4.23	6.25	8.48	9.21	8.87
5.65	12889.	2.11	4.23	6.24	8.47	9.19	8.86
5.70	13035.	2.11	4.22	6.23	8.46	9.17	8.85
5.75	13182.	2.10	4.21	6.22	8.44	9.16	8.83
5.80	13330.	2.10	4.20	6.21	8.43	9.14	8.82
5.85	13478.	2.10	4.20	6.21	8.42	9.12	8.81
5.90	13627.	2.10	4.19	6.20	8.40	9.10	8.80
5.95	13776.	2.10	4.18	6.19	8.39	9.09	8.78
6.00	13926.	2.10	4.17	6.18	8.38	9.07	8.77
6.05	14077.	2.10	4.16	6.17	8.36	9.05	8.76
6.10	14229.	2.10	4.16	6.16	8.35	9.03	8.74
6.15	14381.	2.10	4.15	6.16	8.33	9.01	8.73
6.20	14534.	2.10	4.14	6.15	8.32	9.00	8.72
6.25	14688.	2.10	4.14	6.14	8.30	8.98	8.70
6.30	14842.	2.10	4.13	6.13	8.29	8.96	8.69
6.35	14997.	2.10	4.13	6.12	8.27	8.94	8.68
6.40	15153.	2.10	4.12	6.11	8.26	8.92	8.66

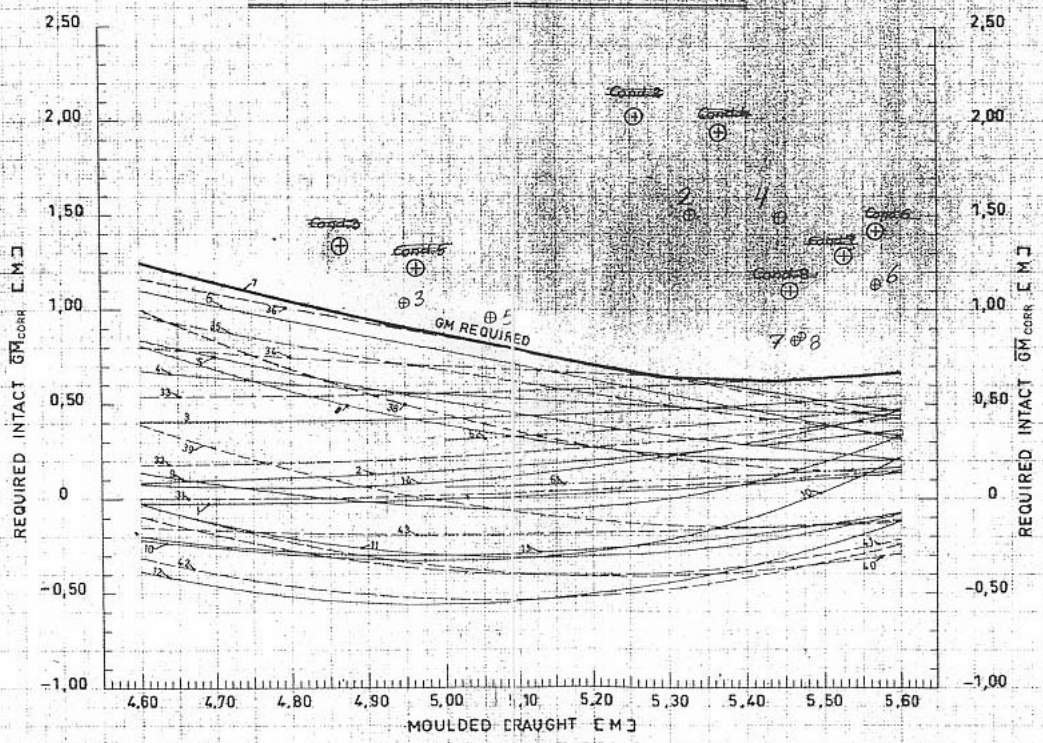
JOS.L.MEYER
PAPENBURG EMS
BUILDING NO.590

-CROSS CURVES OF STABILITY-
(KN-VALUES)
SMOOTH WATER

DRAFT (M)	DISPL. (T)	INCLINATION (DEGREES) 10	20	30	45	60	75
5.50	12455.	2.11	4.25	6.26	8.50	9.24	8.90
5.55	12599.	2.11	4.24	6.26	8.49	9.22	8.89
5.60	12744.	2.11	4.23	6.25	8.48	9.21	8.87
5.65	12889.	2.11	4.23	6.24	8.47	9.19	8.86
5.70	13035.	2.11	4.22	6.23	8.46	9.17	8.85
5.75	13182.	2.10	4.21	6.22	8.44	9.16	8.83
5.80	13330.	2.10	4.20	6.21	8.43	9.14	8.82
5.85	13478.	2.10	4.20	6.21	8.42	9.12	8.81
5.90	13627.	2.10	4.19	6.20	8.40	9.10	8.80
5.95	13776.	2.10	4.18	6.19	8.39	9.09	8.78
6.00	13926.	2.10	4.17	6.18	8.38	9.07	8.77
6.05	14077.	2.10	4.16	6.17	8.36	9.05	8.76
6.10	14229.	2.10	4.16	6.16	8.35	9.03	8.74
6.15	14381.	2.10	4.15	6.16	8.33	9.01	8.73
6.20	14534.	2.10	4.14	6.15	8.32	9.00	8.72
6.25	14688.	2.10	4.14	6.14	8.30	8.98	8.70
6.30	14842.	2.10	4.13	6.13	8.29	8.96	8.69
6.35	14997.	2.10	4.13	6.12	8.27	8.94	8.68
6.40	15153.	2.10	4.12	6.11	8.26	8.92	8.66

JOS. L. MEYER PAPENBURG EMS	BUILDING Nº 590	MAIERFORM 6891.01-115.600

DAMAGE STABILITY DIAGRAM



NOTES:
THE VESSEL'S CALCULATED AVAILABLE GM_{CORR} MUST ALWAYS BE ABOVE OF THE CURVE OF "GM-REQUIRED"
⊕ = GM VALUES AVAILABLE FOR INTACT VESSEL OF REPORT.

JOS. L. MEYER PAPENBURG EMS	BUILDING Nº 590	MAIERFORM 6891.06-171.120

HYDROSTATIC PARTICULARS

MAIN DIMENSIONS:

LENGTH OVER ALL	÷ m
LENGTH BETW. PP.	137.40 m
BREADTH MLD. A-DECK	24,20 m
DEPTH TO A-DECK	7,65 m
DRAUGHT	5,55 m

REMARK:

THIS CALCULATION WAS CARRIED OUT WITH MAIERFORM PROGRAM – KUBLENG – ON COMPUTER SYSTEM CONTROL DATA CYBER 175 IT HAS BEEN CALCULATED WITH 46 FRAMES, MEASURED ACCORDING TO CORRECTED LINES PLAN OF NB. Nº 592 DRAWG. Nº 6764.51-161.100

THE CORRECTED BOW THRUSTERS AND BULBOUS BOW HAVE BEEN CONSIDERED IN THE CALCULATION.

BREMEN 26TH JUNE 1980

HYDROSTATIC PARTICULARS

SPEC.GRAVITY OF SEA W. = 1.025 T/CBM
COEFF.FOR DISPL.OF SHELL PL.= 1.007
TRIM = 0.000 M ON EVEN KEEL
KEEL-THICKNESS = 0.000 MM
DRAUGHTS INDICATED OR LPP/2

DRAFT BK	MOULDED VOLUME	DISPLACEM. FRESH-W.	DISPLACEM. SEA-W.	LCB	VCB	KM(T	KM(L)	WL-AREA	LCF	IMI	LMI	MCT BP	D/MCT	TPCI	AL-PHA (BP)	DEL-TA (BP)
METRES	M**3	METRIC-T.	METRIC-T.	METRES	METR.	METRE	METRES	M**2	METRES	M**4	M**4	MT/M	-	T/CM	-	-
4.30	8999.63	9062.63	9289.19	-3.19	2.30	12.1	298.81	2461.35	-4.73	88197.7	2668554.	19421.8	.478	25.41	.772	.656
4.35	9122.99	9186.85	9416.52	-3.21	2.32	12.0	297.31	2470.60	-4.84	88730.2	2691188.	19586.5	.481	25.50	.774	.657
4.40	9246.85	9311.58	9544.37	-3.23	2.35	12.0	295.90	2480.08	-4.96	89274.8	2714409.	19755.5	.483	25.60	.777	.658
4.45	9371.16	9436.76	9672.68	-3.25	2.38	11.9	294.60	2489.81	-5.08	89832.4	2738436.	19930.4	.485	25.70	.779	.659
4.50	9495.92	9562.39	9801.45	-3.28	2.41	11.9	293.41	2499.79	-5.20	90403.3	2763347.	20111.7	.487	25.80	.782	.660
4.55	9621.15	9688.50	9930.71	-3.30	2.43	11.8	292.34	2510.06	-5.32	90988.6	2789265.	20300.3	.489	25.91	.785	.661
4.60	9746.88	9815.11	10060.49	-3.33	2.46	11.8	291.41	2520.65	-5.45	91589.1	2816362.	20497.5	.491	26.02	.787	.662
4.65	9873.12	9942.23	10190.79	-3.36	2.49	11.8	290.63	2531.58	-5.59	92205.9	2844811.	20704.6	.492	26.13	.790	.663
4.70	9999.91	10069.91	10321.65	-3.39	2.52	11.8	290.00	2542.90	-5.72	92840.2	2874778.	20922.7	.493	26.25	.793	.664
4.75	10127.27	10198.16	10453.11	-3.42	2.55	11.8	289.53	2554.62	-5.86	93493.3	2906415.	21152.9	.494	26.37	.796	.665
4.80	10255.24	10327.02	10585.20	-3.45	2.57	11.5	289.24	2566.79	-6.00	94166.8	2939851.	21396.3	.495	26.49	.799	.665
4.85	10383.85	10456.54	10717.95	-3.48	2.60	11.4	289.12	2579.41	-6.14	94862.4	2975179.	21653.4	.495	26.62	.803	.666
4.90	10513.14	10586.73	10851.40	-3.52	2.63	11.2	289.18	2592.53	-6.29	95582.8	3012559.	21925.5	.495	26.76	.806	.667
4.95	10643.15	10717.65	10985.59	-3.55	2.66	11.1	289.39	2606.09	-6.44	96327.0	3051757.	22210.7	.495	26.90	.810	.668
5.00	10773.88	10849.29	11120.53	-3.59	2.69	11.0	289.71	2620.00	-6.58	97095.9	3092329.	22506.0	.494	27.04	.814	.669

SPEC.GRAVITY OF SEA-W. = 1.025 T/CBM
COEFF.FOR DISPL.OF SHELL PL.= 1.007
TRIM = 0.000 M ON EVEN KEEL
KEEL-THICKNESS = 0.000 MM
DRAUGHTS INDICATED FOR LPP/2

DRAFT BK METRES	MOULDED VOLUME M**3	DISPLACEM. FRESH-W. METRIC-T.	DISPLACEM. SEA-W. METRIC-T.	LCB METRES	VCB METR.	KM(T) METRES	KM(L) METRES	WL-AREA M**2	LCF METRES	TMI M**4	LMI M**4	MCT BP MT/M	D/MCT -	TPCI T/CM	AL-PHA (BP) -	DEL-TA (BP) -
5.00	10773.88	10849.29	11120.53	-3.59	2.69	11.70	289.71	2620.00	-6.58	97095.9	3092329.	22506.0	.494	27.04	.814	.669
5.05	10905.32	10981.66	11256.20	-3.63	2.71	11.69	290.11	2634.29	-6.73	97896.8	3134192.	22810.7	.493	27.19	.818	.670
5.10	11037.49	11114.75	11392.62	-3.66	2.74	11.69	290.64	2649.05	-6.89	98739.3	3177634.	23126.9	.493	27.34	.822	.671
5.15	11170.43	11248.62	11529.83	-3.70	2.77	11.69	291.30	2664.35	-7.05	99629.3	3223043.	23457.4	.492	27.50	.826	.672
5.20	11304.15	11383.28	11667.87	-3.75	2.80	11.69	292.10	2680.17	-7.22	100566.2	3270288.	23801.2	.490	27.66	.830	.673
5.25	11438.69	11518.76	11806.73	-3.79	2.83	11.70	292.98	2696.38	-7.40	101548.4	3318932.	24155.3	.489	27.83	.835	.674
5.30	11574.04	11655.06	11946.43	-3.83	2.86	11.72	293.91	2712.90	-7.57	102573.9	3368652.	24517.1	.487	28.00	.839	.675
5.35	11710.21	11792.18	12086.99	-3.88	2.88	11.73	294.86	2729.63	-7.75	103639.6	3419080.	24884.1	.486	28.17	.844	.677
5.40	11847.21	11930.14	12228.40	-3.92	2.91	11.75	295.79	2746.45	-7.92	104741.6	3469822.	25253.4	.484	28.35	.848	.678
5.45	11985.04	12068.94	12370.66	-3.97	2.94	11.78	296.68	2763.24	-8.09	105874.7	3520473.	25622.1	.483	28.52	.853	.679
5.50	12123.70	12208.56	12513.78	-4.02	2.97	11.80	297.49	2779.87	-8.25	107033.4	3570630.	25987.1	.482	28.69	.857	.680
5.55	12263.17	12349.01	12657.73	-4.07	3.00	11.82	298.19	2796.24	-8.40	108211.6	3619913.	26345.8	.480	28.86	.862	.681
5.60	12403.44	12490.27	12802.52	-4.12	3.03	11.85	298.77	2812.27	-8.53	109404.2	3668155.	26696.9	.480	29.03	.866	.682
5.65	12544.52	12632.33	12948.14	-4.17	3.06	11.88	299.19	2827.82	-8.65	110604.3	3714850.	27036.8	.479	29.19	.870	.683
5.70	12686.37	12775.17	13094.55	-4.22	3.09	11.90	299.42	2842.72	-8.75	111801.4	3759327.	27360.5	.479	29.34	.874	.685

SPEC.GRAVITY OF SEA-W. = 1.025 T/CBM
COEFF.FOR DISPL.OF SHELL PL.= 1.007
TRIM = 0.000 M ON EVEN KEEL
KEEL-THICKNESS = 0.000 MM
DRAUGHTS INDICATED FOR LPP/2

DRAFT BK METRES	MOULDED VOLUME M**3	DISPLACEM. FRESH-W. METRIC-T.	DISPLACEM. SEA-W. METRIC-T.	LCB METRES	VCB METR.	KM(T) METRES	KM(L) METRES	WL-AREA M**2	LCF METRES	TMI M**4	LMI M**4	MCT BP MT/M	D/MCT -	TPCI T/CM	AL-PHA (BP) -	DEL-TA (BP) -
5.70	12686.37	12775.17	13094.55	-4.22	3.09	11.90	299.42	2842.72	-8.75	111801.4	3759327.	27360.5	.479	29.34	.874	.685
5.75	12828.95	12918.76	13241.73	-4.27	3.12	11.92	299.44	2856.98	-8.83	112986.1	3801461.	27667.1	.479	29.49	.878	.686
5.80	12972.23	13063.04	13389.61	-4.32	3.15	11.95	299.29	2870.71	-8.90	114154.5	3841657.	27959.7	.479	29.63	.882	.687
5.85	13116.18	13208.00	13538.20	-4.37	3.18	11.97	299.03	2884.05	-8.96	115308.3	3880521.	28242.5	.479	29.77	.885	.688
5.90	13260.80	13353.62	13687.46	-4.42	3.21	11.99	298.69	2897.06	-9.00	116449.3	3918322.	28517.6	.480	29.90	.889	.689
5.95	13406.06	13499.90	13837.40	-4.47	3.23	12.00	298.26	2909.74	-9.04	117576.7	3955110.	28785.4	.481	30.03	.892	.691
6.00	13551.95	13646.81	13987.98	-4.52	3.26	12.02	297.76	2922.15	-9.06	118691.9	3991054.	29047.0	.482	30.16	.895	.692
6.05	13698.46	13794.35	14139.21	-4.57	3.29	12.04	297.22	2934.34	-9.08	119796.9	4026322.	29303.7	.483	30.29	.898	.693
6.10	13845.59	13942.51	14291.07	-4.62	3.32	12.05	296.64	2946.34	-9.09	120893.8	4061078.	29556.6	.484	30.41	.901	.694
6.15	13993.31	14091.27	14443.55	-4.67	3.35	12.07	296.03	2958.19	-9.09	121985.5	4095480.	29807.0	.485	30.53	.904	.696
6.20	14141.63	14240.63	14596.64	-4.72	3.38	12.09	295.40	2969.94	-9.09	123074.5	4129674.	30055.9	.486	30.65	.907	.697
6.25	14290.55	14390.58	14750.34	-4.76	3.41	12.10	294.78	2981.62	-9.08	124163.4	4163798.	30304.2	.487	30.78	.910	.698
6.30	14440.04	14541.12	14904.65	-4.81	3.44	12.12	294.15	2993.21	-9.07	125250.7	4197841.	30552.0	.488	30.90	.913	.699
6.35	14590.12	14692.25	15059.56	-4.85	3.47	12.13	293.55	3004.85	-9.05	126348.4	4232255.	30802.4	.489	31.02	.916	.700
6.40	14740.80	14843.98	15215.08	-4.89	3.50	12.15	293.00	3016.65	-9.03	127468.1	4267519.	31059.1	.490	31.14	.919	.702

SHIP CONSULTING

REPORT ON INCLINING EXPERIMENT

Ship : M S W A S A K I N G

Owner: SALLY LINE AB MARIEHAMN

Main dimensions:

LENGTH OVER ALL	155.40 m
LENGTH BETWEEN PERP.	137.40 m
BREADTH MOULDED	24.20 m
DEPTH TO A DECK	7.65 m
DEPTH TO C DECK	13.40 m

Date: 11.01 1991 betw. 16.00-19.00 o'clock

Place: MASA YARDS TURKU

- SPEC. GRAVITY OF SEAWATER 1.004 t/M^3
- TEMPERATURE abt.-6 centigrade
- TEMPERATURE OF WATER abt. 0 centigrade
- WIND no wind

Present:

MR ALF ANDERSSON	MS WASA KING
MR CARL GUNNAR EKSTRAND	MS WASA KING
MR BO HENRIK STOLPE	MS WASA KING
MR TIM R. E. AUTERO	Finnish Board of Navication
MR VELI-MATTI JUNNILA	Ship Consulting

SHIP CONSULTING

READED DRAUGHTS

	DRAUGHT MARK		DISTANCE TO SEA-LEVEL		DRAUGHT	MEAN
d_{AP}				=		5.07
d_{ASB}				=		
d_{MP}	5.567	-	0.61	=	4.957	5.082
d_{MSB}	7.667	-	2.46	=	5.207	
d_{FP}	5.20	-	0.08	=	5.12	5.12
d_{FSB}	5.20	-	0.08	=	5.12	

TRIM $d_F - d_A = 5.12 - 5.07 = +0.05$ m

HOGGING CORRECTIONS

$Fo = d_M - \frac{1}{2}(d_F + d_A) =$
$= 5.082 - \frac{1}{2}(5.12 + 5.07) = 0.013$ m

CORRECTED MEAN DRAUGHT $= d_M + Cb \times Fo$
$= 5.082 + 0.667 \times 0.013 = 5.091$ m

Cb = block coefficient at draught of 5.10 m

Displacement at draught 5.091 m is 11132 t and LCG -3.657 m

TANKS TO BE SUBTRACTED

TK8	DB-TANK 8	53,55	86,60	0,00	0,55	236
TK41	DO DAY TANK	11,56	31,03	0,00	2,85	4
TK 45	OVERFLOW TANK 45	1,19	35,78	0,00	0,10	8
TK20	DB-TANK 20	3,49	59,87	0,00	0,25	27
TK10	H-TANK 10	42,75	74,20	0,00	1,30	150
TK11	H- TANK 11	27,55	74,20	0,00	1,28	150
TK38	SETTLING TANK 38	21,38	32,20	0,00	2,30	10
TK39	SETTLING TANK 39	13,59	33,84	0,00	1,85	7
TK36	HFO DAY TANK 36	17,29	36,23	0,00	2,20	8
TK37	HFO DAY TANK 37	19,79	36,62	0,00	2,81	6
TK40	OVERFLOW TANK	3,04	34,38	0,00	0,11	74
TK4A	TANK 4A	70,00	114,25	0,00	2,72	48
TK4B	TANK 4B	65,00	114,25	0,00	2,65	48
TK5	TANK 5	135,00	113,65	0,00	2,70	138
TK44	SLUDGE OIL	5,50	32,20	0,00	0,11	123
TK33	BILGE WATER	21,00	35,83	0,00	0,53	50
TK42	DIRTY OIL	6,20	33,85	0,00	0,35	12
TK17	FRESH WATER CIRCUL.	13,70	58,30	0,00	0,52	14
TK22	COOLING WATER	1,00	55,40	0,00	0,35	3
TK29	COOLING WATER	7,00	59,82	0,00	0,32	11
TK6	DB-TANK 6	87,95	104,84	0,00	0,64	0
TK2	TRIM TANK 2	303,06	121,40	0,00	4,69	0
TK1	FORE PEAK TANK 1	175,98	133,92	0,00	4,45	0
TK24	THERMAL OIL TANK 24	5,13	45,78	0,00	0,25	13
TK25	LUBR OIL TANK 25	11,88	45,40	0,00	0,45	3
TK26	LUBR OIL TANK 26	9,00	45,40	0,00	0,40	3
TK27	LUBR OIL TANK 27	9,90	45,40	0,00	0,42	3
TK28	LUBR OIL TANK 28	9,72	45,40	0,00	0,41	3
TK30	LUBR OIL SUPPLY TANK 30	5,85	50,15	0,00	0,32	7
TK32	LUBR OIL TANK 32	7,74	47,40	0,00	0,55	3
TK50	KAMEWA TANK 50	0,88	24,60	0,00	0,25	2
TK51	KAMEWA TANK 51	1,71	23,40	0,00	0,50	0
TK52	KAMEWA TANK 52	1,71	23,40	0,00	0,50	0
TK55A	STERN TUBE OIL	0,99	15,06	0,00	0,20	5
TK55	STERN TUBE TANK	0,59	15,10	0,00	0,30	1
	GEAR OIL STORAGE	1,35	39,40	0,00	3,50	0
TK13	HEELING TANK SB	28,60	78,10	0,00	0,52	193
TK14	HEELING TANK P	129,90	77,60	0,00	1,91	73
	TOTAL OF TANKS	1331,52	98,42	0,00	2,73	1436

SHIP CONSULTING

SUBTRACTED WEIGHT

CODE NUM.	WEIGHT T	NAME	FRAME NO	FROM DECK	FROM CL	DECK NO
	0.3	FORK LIFT PLATFORMS	5	0.2	0	2
	1.3	FORK LIFT	10	0.7	0	2
	0.5	VENEER	59	0.6	0	2
	16.0	WASTE CONTAINERS	53	0.8	0	2
	1.5	EMPTY CONTAINER	122	2.4	0	2
	0.1	CLEANING EQUIPMENTS	105	0.2	0	0
	0.1	CLEANING EQUIP.	100	0.2	0	1
	0.8	INSULATION MATERIALS	45	0.5	0	8
	1.5	FUEL FOR EMER. GENER.	76	0.9	0	8
	1.9	STEEL PLATES	57	0.6	0	8
	1.75	CARPETS	8	1.0	0	1
	1.0	GLASS	8	0.3	0	1
	0.5	MATERIALS	7	0.2	0	1
	2.8	MATERIALS	13	1.2	0	1
	1.0	FORK LIFT	25	0.5	0	1
	0.25	TOOLS	26	0.2	0	1
	1.5	PROVISIONS	35	0.8	0	1
	3.5	PROVISIONS	37	0.8	0	1
	0.05	CLEANING EQUIP.	118	0.2	0	9
	0.1	COPY MACHINE	110	0.7	0	7
	0.15	LINEN STORE	117	1.0	0	7
	0.1	OFFICERS DAY ROOM	110	0.8	0	7
	0.4	MISCELLANEOUS	95	0.5	0	7
	0.05	HOSPITAL	90	0.6	0	7
	1.3	MATERIALS	81	0.3	0	7
	2.0	MISCELLANEOUS	80	0.7	0	7
	0.15	MATERIALS	54	0.3	0	7
	0.3	MESS ROOMS	25	0.5	0	7
	0.15	SPORT ROOM	10	0.8	0	8
	0.4	MATERIALS	73	0.3	0	7
	0.2	LINEN STORE	28	0.7	0	6
	0.4	GALLEY	47	1	0	6
	0.24	CARPETS	81	0.4	0	6
	2.9	CARPETS	80	0.5	0	5
	0.15	WELDING MACHINE	40	0.5	0	5
	1.3	CARPETS	81	0.6	0	4
	0.6	INSULATION MATERIALS	82	0.8	0	4
	0.42	CARPETS	82	0.6	0	4
	0.1	STORES	42	0.6	0	4
	0.6	WASTE	75	0.3	0	4
	0.1	REFRIGERATOR	122	0.6	0	4
	5.6	PROPELLER SPARE PLADES	15	0.4	0	2
	0.2	U-PROFILES	25	0.2	0	2
	0.8	I-PROFILES	25	0.2	0	2
	0.3	WASTE	24	0.2	0	2
	0.9	WASTE	70	0.4	0	2
	1.1	ICE AND SNOW	80	0.0	0	7
	0.9	ICE AND SNOW	85	0.0	0	8
	0.1	ICE AND SNOW	120	0.0	0	10

SHIP CONSULTING

SUBTRACTED WEIGHT

CODE NUM.	WEIGHT T	NAME	FRAME NO	FROM DECK	FROM CL	DECK NO
	3.2	MATERIALS IN ENG ROOM	60	0.2	0	1
	1.65	22 PERSONS IN SHIP	80	1.1	0	5
	3.75	CREW'S PERS. GOODS	70	1.0	0	7
	66.96	TOTAL OF SUBTRACTED WEIGHT	40.12		12.22	

SHIP CONSULTING

PENDEL NUMBER 1 LENGTH OF PENDEL 4455 MM

NAME OF OBSERVERS: TOMI JUNNILA

LOCATION OF PENDEL: ON CARDECK AFTER

CASE NO	NUMB. OF OBS.	1	2	3	4	5	6	7	8	9	10	SUM	MEAN VALUE	LIST
I	1	2330											2330	0.00
II	1	2252											2252	1.00
III	1	2226											2226	1.34
IV	1	2324											2324	0.08
V	1	2388											2388	0.75
VI	1	2454											2454	1.59
VII	1	2511											2511	2.33
VIII	1	2415											2415	1.09
IX	1	2343											2343	0.17

SHIP CONSULTING

PENDEL NUMBER 2 LENGTH OF PENDEL 4470 MM

NAME OF OBSERVERS: BO HENRIK STOLPE

LOCATION OF PENDEL: ON CARDECK AFTER

CASE NO	NUMB. OF OBS.	1	2	3	4	5	6	7	8	9	10	SUM	MEAN VALUE	LIST
I	1	728											728	0.00
II	1	650											650	1.00
III	1	622											622	1.36
IV	1	723											723	0.06
V	1	788											788	0.77
VI	1	853											853	1.60
VII	1	910											910	2.33
VIII	1	813											813	1.09
IX	1	742											742	0.18

SHIP CONSULTING

HEELING TANK SOUNDINGS AND VOLUMES

CASE NO	LIST	PORT SIDE SOUN cm	CORR cm	VOL m^3	WEIG t	TCG m	SB-SIDE SOUN cm	COR cm	VOL. m^3	WEIG. t	TCG m
I	.6°SB	450	452	129.7	129.9	-8.69	121	119	28.5	28.6	7.57
II	.4°P	485	483	141.8	142.3	-8.74	68	70	16.4	16.5	7.34
III	.7°P	491	494	146.1	146.8	-8.75	47	50	11.8	11.8	7.20
IV	.5°SB	453	455	130.9	131.4	-8.70	116	114	27.2	27.3	7.54
V	1.3°SB	422	427	120.0	120.5	-8.67	161	155	38.1	38.3	7.69
VI	2.2°SB	391	399	109.3	109.7	-8.59	206	199	48.6	48.8	7.95
VII	2.8°SB	365	375	100.2	100.6	-8.54	246	235	57.9	58.1	8.13
VIII	1.7°SB	411	417	116.2	116.7	-8.63	179	171	41.7	41.9	7.79
IX	.8°SB	446	449	128.5	129.0	-8.72	126	123	29.6	29.6	7.59

SHIP CONSULTING

D U R I N G E X P E R I M E N T

MEAN MOULDED DRAUGHT	5.091	m
TRIM	+0.05	m
SEAWATER DENSITY	1.004	ton/m³
DISPLACEMENT	11132	t
HEIGHT OF METACENTER ABOVE BL	11.69	m

CASE NO	WEIGHT (TON)	INCLINING MOMENT (TONM)	TOTAL MOM (TONM)	INCLINING ANGLE DIFFER. (DEG)	TOTAL (DEG)	METACENTRIC HEIGHT GMI (M)
II	12.14	196.30	196.30	1.00	1.00	1.011
III	4.47	71.55	267.86	0.35	1.35	1.021
IV	15.36	-247.24	20.62	-1.28	0.07	0.994
V	10.94	-178.38	-157.76	-0.83	-0.76	1.068
VI	10.64	-174.96	-332.72	-0.84	-1.595	1.073
VII	9.24	-153.38	-486.10	-0.73	-2.33	1.073
VIII	16.16	267.44	-218.66	1.24	-1.09	1.032
IX	12.24	200.45	-18.21	0.92	0.17	1.127

METACENTRIC HEIGHT DURING EXPERIMENT	GM = 1.050 M
FREE SURFACE CORRECTION	GMC = 0.129 M
CORRECTED METACENTRIC HEIGHT	GMO = 1.179 M
HEIGHT OF METACENTER ABOVE BL	KM =11.690 M
CENTRE OF GRAVITY ABOVE BL	KG =10.511 M

L I G H T S H I P

	WEIGHT (TON)	CENTRE OF GRAVITY FROM LPP/2 (M)	CL (M)	BL (M)
DURING EXPERIMENT	11132	-3.553	0.00	10.511
WEIGHTS TO BE ADDED	0	-0.000	0.00	0.00
WEIGHTS TO BE SUBTRACTED	67	-28.58	0.00	12.22
TANKS TO BE SUBTRACTED	1332	+29.72	0.00	2.73
LIGHT SHIP	9733	-7.934	0.00	11.564
INCLINING TEST 21.6 1980	9420	-7.02	0.00	11.31
DIFFERENCE	313	-0.914	0	+0.254

Bureau Veritas
Marine Division

15.08.1995

SURVEYS CARRIED OUT BY BUREAU VERITAS ON M/S "ESTONIA"

Place	Intervention dates	Class surveys	Statutory surveys	Observations
Papenburg	1980 07 01		ISLL	Issuance of Class and Load Line certificates to
				Messrs Meyerwerft Newbuilding S 590 VIKING SALLY
Hamburg	1981 02 12	OS AUT		Issuance of definitive AUT certificate
Stockholm	1981 04 13	CSH CSM		
Turku	1981 05 04 - 08	AS DOK CSH CSM	ASLL	
Stockholm	1981 4 23	CSM		
Turku	1981 9 3	OSAB		
Turku	1981 09 21 - 22	CSM ASAUT		
Turku	1981 10 20	OSH		Survey after minor collision
Turku	1982 5 13	ASM CSM		
Turku	1982 5 17	CSM		
Stockholm	1982 05 24 - 25	ASH CSH CSM		
Stockholm	1982 05 25 - 06 07	CSH AB	ASLL	
Turku	1982 11 8	ASAUT		
Turku	1982 12 9	OSAB		
Stockholm	1983 01 07	CSM		
Stockholm	1983 03 04	CSH		
Turku	1983 04 25 - 29	AS DOK CSH CSM	ASLL	CSH item Bow Door credited
Stockholm	1983 05 02 - 16	OSM		
Turku	1983 05 25	OSM CSM		
Stockholm	1983 10 24 - 1984 01 02	ASAUT		
Turku	1984 04 02	CSM		
Stockholm	1984 05 07	CSM		
Stockholm	1984 05 18	AS UWS CSH CSM ASAB	ASLL	
Mariehamn	1984 05 25	OSH		Survey after grounding ,voyage to Helsinki for repairs
Helsinki	1984 05 25 - 26	OSH		Temporary repairs of grounding damages
Turku	1984 11 23	OSM		Extension of tailshaft survey periodicity
Turku	1984 12 10	ASAUT		

Enclosure 3.4.87

Place	Intervention dates	Class surveys	Statutory surveys	Observations
Stockholm	1984 12 17	OSH		Diver survey,postponement of grounding repairs
Turku	1985 02 15	OSM		
Stockholm	1985 03 25	OSH		Diver survey, postponement of grounding repairs
Helsinki	1985 04 22 - 05 06	DOK CSH TS CSM		Permanent repairs, stem modification
Stockholm	1985 05 24 - 07 15	AS CSH CSM ASAB ASAUT	PSLL	Renewal of class term and load line certificate
Turku	1986 04 10	CSM		
Stockholm	1986 04 25	CSH CSM		
Stockholm	1986 05 27		ASLL	
Stockholm	1986 08 18	CSM		
Stockholm	1986 09 01	CSM		
Stockholm	1986 09 24	AS UWS		
Stockholm	1986 09 24 - 12 08	ASAUT		
Turku	1987 01 13 - 21	DOK CSH		Repairs of cracks in rudder plating
Turku	1987 04 06 - 08	OSH OSM OSAB CSH		Bottom of bow door repaired/strengthened (ice
				damage)
Turku	1987 04 23 - 05 08	OSM		Repairs to main engine n°1
Stockholm	1987 05 10	CSM		
Stockholm	1987 07 23	AS ASAUT ASAB	ASLL	
Stockholm	1988 02 08	CSH ASAB		
Turku	1988 03 14	CSM		
Turku	1988 03 28	CSM		
Stockholm	1988 05 10	AS CSH CSM	ASLL	CSH item Bow Door credited
Stockholm	1988 05 25	CSH CSM		
Turku	1988 09 15	DOK CSM		
Turku	1988 09 26	ASAUT		
Stockholm	1988 11 06 - 12 09	DOK TS		Surveys after grounding and periodical surveys
Turku	1989 05 02 - 03	DOK ASAUT CSH CSM		
Turku	1989 05 29 - 30	AS CSH CSM	ASLL	
Turku	1990 04 30 - 05 07	DOK CSH CSM		Change of name to "SILJA STAR"

Place	Intervention dates	Class surveys	Statutory surveys	Observations
Stockholm	1990 06 14 - 07 03	AS CSH CSM ASAB AUT	PSLL	Renewal of class term and load line certificate
Turku	1990 11 21 - 12 14	DOK		
Turku	1991 02 04	OS		Change of name to "WASA KING"
Holmsund	1991 04 13 - 15	AS CSH CSM	ASLL	
Holmsund	1991 09 23	ASAUT CSM		
Holmsund	1992 06 17 - 18	AS ASAUT CSH CSM	ASLL	
Holmsund	1992 11 28	ASAB CSM		
Abo	1993 01 04 - 14	DOK TS CSH	PSLL IOPP PSCONS	Change of name to "ESTONIA" and of Owners/Flag
			PSEQ PSRAD	Issuance of: interim LL certif.; interim cargoship
				safety certificates.
Tallinn	1993 01 16 - 28		PSPS	Issuance of interim PSSC certificate (passenger ship)
Stockholm	1993 03 15	CSH CSM	OSIOPP	Issuance of interim IOPP certif.(definitive certificate
				issued on 07/04/1993)
Abo	1993 03 22 - 04 03	OSM		Change of outboard tailshaft sealings
Stockholm	1993 05 22 - 24	CSH CSM		Postponement of CSH/CSM items
Stockholm	1993 06 14		OSLL OSPS	Renewal of interim LL & PSSC certificates
Stockholm	1993 08 12 - 13	AS ASAUT	ASIOPP	
Stockholm	1993 10 18	CSH CSM		CSH item Bow Door credited
Stockholm	1993 11 11		OSLL OSPS	Renewal of interim LL & PSSC certificates
Stockholm	1993 11 16	ASAB		
Nadendal	1994 01 10 - 14	DOK		Installation of Stabiliser units
Stockholm	1994 01 27		PSPS	Periodical survey and renewal of interim PSSC certif.
Stockholm	1994 03 16	CSH CSM		
Stockholm	1994 04 11		OSLL	Renewal of interim LL certificate
Stockholm	1994 05 09 - 11	CSH CSM		
			Issuance of definitive PSSC (clerical mishandling) 23 june 1994	
Stockholm	1994 06 26		OSPS	Renewal of interim PSSC certificate
Stockholm	1994 08 23 - 25	AS ASAUT ASAB CSM	ASLL ASIOPP	
Stockholm	1994 09 09		OSLL	Renewal of interim LL certificate

SURVEY CODES USED IN THE TABLE				
	CLASS SURVEY CODES			STATUTORY SURVEY CODES
AS	Annual survey (Hull & Machinery)		ISLL	Initial survey Load Line
ASAB	Annual survey Boilers		ASLL	Annual survey Load Line
ASAUT	Annual survey Automated installation		PSLL	Periodical survey Load Line
CSH	Continuous survey Hull		ASIOPP	Annual survey Marpol
CSM	Continuous survey Machinery		IOPP	Periodical survey Marpol
DOK	Periodical bottom survey in drydock		PSPS	Periodical survey Passenger ship
UWS	Underwater survey		PSCONS	Periodical survey Saf. construction
TS	Tailshaft survey		PSEQ	Periodical survey Saf. equipment
OSH	Occasional survey Hull		PSRAD	Periodical survey Saf. radio
OSM	Occasional survey Machinery		OSLL	Occasional survey Load Line
OSAB	Occasional survey Boilers		OSIOPP	Occasional survey Marpol
OSAUT	Occasional survey AUT installation		OSPS	Occasional survey Passenger ship

01/02/95 16:14 MERENKULKUOS. 358 0 1808500 → 05593584

Enclosure 3.4.88

KATSASTUS-/TARKASTUSPÖYTÄKIRJA

Sini ja ent. nimi: Wasa King / Sinja Star
Rek.paikka ja -nro: Vaasa 283
Kotipaikka: Vaasa
Tunnuskirjaimet: OIKW
Aluksen laji: Autolautta

Rakentamisvuosi: 1980 aloc: Teras paikka: Trapesunda Pituus: 157,0x m Leveys: 24,22 m

Alus on avoin ☐ kannellinen ☒ Br.vetoisuus: 15598 Päikoneiden lukumäärä: 4 Kokonaisteho: 17650 kW

Milloin viimeksi telakoitu: 11/90 Missä viimeksi telakoitu: Naantali

Laivanisäntä: Wasa Line Oy

Isännän postiosoite: Kaivanvarustajankatu 12 65170 Vaasa

HUOMAUTUKSIA: SIKU 13 TUTKA RAY TYKON 1650 12 X2
POISTETTU SINK:K SIKAMATK/DECCA POISTETTU
SAS KOM. VAITK. GPS ASENNETTU
LOPULLINEN TARKASTUS 27.1.92

Kyseessä oli:	Perus-	Määräaikainen	Väli-	Vuosi-	Ylimääräinen katsastus
Merikelpoisuudenkatsastus		X			
Koneistonkatsastus					
Rungonkatsastus					
Radiolaitteidenkatsastus					
Marpol-katsastus					

Katsastus/Tarkastus on toimitettu 27.5 / 19 92

01/02/95 16:14 MERENKULKUOS. 358 0 1008500 → 05593584

Enclosure 3.4.88

KATSASTUS-/TARKASTUSPÖYTÄKIRJA

Nimi ja ent. nimi: VAASA KING / SINJA STAR — Rek.paikka ja -nro: VAASA 283 — Kotipaikka: VAASA — Tunnuskirjaimet: OIKW — Aluksen laji: AURIALUSTA

Rakennusvuosi: 1980 — aloa: TEräs — paikka: PAJA-BUZO — Pituus: 15,02 m — Leveys: 24,23 m

Alus on avoin ☐ kannellinen ☒ — Br.vetoisuus: 15598 — Pääkoneiden lukumäärä: 4 — Kokonaisteho: 1760 kW

Milloin viimeksi telakoitu: 11/90 — Missä viimeksi telakoitu: NAANTALI

Laivanisäntä: WASALINE Oy — Isännän postiosoite: LAIVANVARUSTAJANK. 12 65170 VAASA

HUOMAUTUKSIA: SINU 13 TUTKA RAYTHEON 1680 12 X 2 POISTETTIN SINA:K SIRIUSTE/DECCA POISETTIN SASWAN LAITE GPS ASENNETTIN KOTEKYK TÄYDENNETTIN 27.1.92

Kyseessä oli:	Perus-	Määräaikainen	Väli-	Vuosi-	Ylimääräinen katsastus
Merikelpoisuudenkatsastus		X			
Koneistonkatsastus					
Rungonkatsastus					
Radiolaitteidenkatsastus					
Marpol-katsastus					

Katsastus/Tarkastus on toimitettu 25.5 / 1992

Office translation

REPORT OF INSPECTION

Name of the vessel:	M/S Wasa King
Port of Registry:	Vaasa
Call sign:	OIKW
Former name:	Silja Star
Home port:	Vaasa
Ship type:	Car Ferry
Date of build:	1980
Material:	Steel
Place of build:	Papenburg
Length:	157,02 m
Breadth:	24,22 m
The vessel is Open/decked:	Decked
Gross tonnage:	15598
Number of Main Engines:	4
Total power:	17600 kW
Last drydocked:	11/90 in Naantali
Shipowner:	Wasaline Oy
Address:	Laivanvarustajankatu 1, 65170 Vaasa
Remarks:	Page: 13 Radar Raytheon 1650 12 x? removed. Page: 11 Shipmate/Decca removed. Satellite Navigation Device GPS installed. Medicines inspected 27.1.92.

Periodical Inspection of Seaworthiness.

Inspection carried out: 22.5.1992

KATSASTUSTODISTUS

Aluksen nimi: M/S WASAKING — Kotipaikka: VAASA — Tunnuskirjaimet: OIKW

Rakennusvuosi: 1980. Paikka: PORSGRUNN Aika: TEL Br.vetoisuus: 1558 Pituus: 1703

Päätoneiden lukumäärä: 4 Kokonaistehe: 17600 kW Liikennealue: kaikki kelmut

Suurin sallittu henkilömäärä/matkustajamäärä .....

Rajoitukset .....

Katsastuksessa todetut puutteet .....

Puutteet korjattava ..../.... 19.... mennessä. (enintään 1 kk)

Puutteet todettu korjatuiksi ..../.... 19.... .....
Tarkastaja/katsastaja

Alus on tässä perus- ☐ määräaikais- ☒ väli- ☐ ylimääräisessä ☐ katsastuksessa hyväksytty käytettäväksi 28.1.5. 1992. saakka edellytyksellä, että vuosikatsastukset toimitetaan säädetyin välein.

Paikka	Aika	Katsastaja	Katsastuspiiri
VAASA	28.1.5. 1992	[illegible]	VAASA

VUOSIKATSASTUKSET / NIIDEN SISÄLTÖISET KATSASTUKSET

Vuosikatsastus / sen sisältöinen katsastus on toimitettu

Paikka	Aika	Katsastaja	Katsastuspiiri
	..../..... 19.....		

Vuosikatsastus / sen sisältöinen katsastus on toimitettu

Paikka	Aika	Katsastaja	Katsastuspiiri
	..../..... 19.....		

Vuosikatsastus / sen sisältöinen katsastus on toimitettu

Paikka	Aika	Katsastaja	Katsastuspiiri
	..../..... 19.....		

Vuosikatsastus / sen sisältöinen katsastus on toimitettu

Paikka	Aika	Katsastaja	Katsastuspiiri
	..../..... 19.....		

Aluksella on luokituslaitoksen tai MOTin todetus ilman jäänkulkurajoituksia ☐ Ei ole ☐

Alus on hyväksytty talviliikenteeseen

		Paikka	Aika	Katsastaja
talvikautena	19.... - 19....		..../..... 19.....	
talvikautena	19.... - 19....		..../..... 19.....	
talvikautena	19.... - 19....		..../..... 19.....	
talvikautena	19.... - 19....		..../..... 19.....	
talvikautena	19.... - 19....		..../..... 19.....	

Office translation

CERTIFICATE OF INSPECTION

Name of the vessel:	M/S Wasa King
Port of Registry:	Vaasa
Call sign:	OIKW
Date of build:	1980
Place of build:	Papenburg
Material:	Steel
Gross tonnage:	15598
Length:	157,02 m
Number of Main Engines:	4
Total power:	17600 kW
Traffic area:	Near traffic

The vessel has approved in this Periodical Inspection fit for use till 28/5 1993 subject to Yearly Inspection as required by the Rules.

Place and date:	Vaasa 22/5 1992
Inspector:	Signature
Inspection District:	Vaasa

Ote

Valvontakansio nro

Sivu nro 15

Aluksen nimi	Kotipaikka
M/S VAASA KING	VAASA

Varustamo (nimi, osoite) WAMILINES OY LAIVANVARUSTAJANK. 1 65100 VAASA

Päällikkö O. HOLKANEN

VAASA 22.5.92

SUORITETTU MÄÄRÄAIKAINEN KERIKSEYSTUTKIMUS

VAIKASTUS SEURAAVA MÄÄRÄAIKAINEN

VAIKUTUS 28.5.93 (-3KK) 1 KÄYNTI 2360,-

VAASA 22.5.1992

Suoritettu määräaikainen konciston katsastus

Seuraava määräaikainen konciston katsastus 28.5.1993-3kk

2 käyntiä 3540:-

Office translation

Extract

CONTROL FILE NO.

Name of the vessel: M/S Wasa King

Port of Registry: Vaasa

Shipowner (name, Address): Wasaline Oy
Laivanvarustajankatu 1, 65170 Vaasa

Master: O.Hokkanen

Vaasa 22.5.92

Carried out Periodical Inspection. Next Periodical Inspection
28.5.93 (- 3 months) 1 visit 2.300,-.

Signature

Vaasa 22.5.1992

Carried out Periodical Machinery Inspection. Next Periodical
Machinery Inspection 28.5.1993 - 3 months.
2 visits 3.540,-.

Signature

Enclosure 3.4.89

TEKNOS

TELEFAX

PAGE 1 +

TO	ANDREW RAYNER
COMPANY	INTERNATIONAL PAINT
FAX NO.	000-44-101 438 3977
FROM	JARMO LAHTI
DATE	31.7.1995

RE: YOUR FAX TO BENGT SJÖBLUM 28 JULY

1.
ESTONIA, ex Viking Sally, Silja Star, Vasa King

-91 no docking report
-90 primered with INERTA 160 , viking blue

No other reports available.

2.
Specification done according the following

Inlet ducts for waterjets PRELIMINARY

Preparation:

- Aluminium work grade: D5
- Degreasing, followed by fresh water cleaning to remove contamination
- Sandaweeping or grinding (sand papering)
- Surface roughness requirement. Coarse, according to ISO 8503-2.
- Abrasive material: Quartz sand, nickel slag or aluminium silicate

Product	Colour	Layers	DFT/µm
Balloflake*	green	(1x)	1000
Intershield Newbuilding ENA301/ENA303 aluminium	alum.	(1x)	150
Intertuf JXA464/JXA465	black	(1x)	75
Interspeed water BWA001	black	(2x)	150
			1000+375 µm

* In vicinity of the waterjet unit in inlet duct Balloflake to be replaced with Belzona Ceramic K-metal DFT 2000 +500 µm. Prior application of the subsequent coat Belzona surface to be sandaweeped. Exact defination for Belzona application areas to be done, when work will be carried out. (total protection area ab. 5 sqm/ vessel).

0280E001 A

Best regards

Jarmo Lahti

TEKNOS WINTER OY
FOUNDING, LABORATORY & TECHNICAL SERVICE: FAX +358 0 508 095 00
PHONE +358 0 500 001
P.O. BOX 107
FIN-00371 HELSINKI, FINLAND

SHIP DETAILS — SILVA STAR

OWNER/MANAGER	SALLY REDERI AB
SHIP TYPE	FERRY
TONNAGE	15566
LLOYDS NO.	7921033
EXECUTIVE POINT	HELSINKI
DELIVERY DATE	1 JUN 80
SERVICE SPEED	19 KNOTS

DIMENSIONS (METRES) :-

LENGTH B/P	137.42
BEAM MOULDED	24.21
ANTIFOULING HT (FWD)	5.60
ANTIFOULING HT (AFT)	5.60
BOOTTOP HT (AFT)	
BOOTTOP HT (FWD)	

SURFACE AREAS (SQ METRES)

HULL BELOW WATER	3850
FLATS	2300
BOOTTOP	
TOPSIDES	

DRYDOCK SUMMARY

DATE	LOCATION	MFR	%	TYPE OF REPORT
8808	FINLAND	HEM	100	DRYDOCK (M/S)
8106	KVAERNER MASA YARDS-TURKU	HEM	100	DRYDOCK (M/S)
8304	FINLAND	HEM	100	DRYDOCK (M/S)
8505	VALMET VUOSAARI	IMC	100	DRYDOCK (M/S)
		HEM	100	
		IMC		DRYDOCK
870'	KVAERNER MASA YARDS-TURKU	IMC	100	DRYDOCK (M/S)
		IMC		DRYDOCK
8809	KVAERNER MASA YARDS-TURKU	IMC	100	DRYDOCK (M/S)
		IMC		DRYDOCK
9005	KVAERNER MASA YARDS-TURKU	IMC	100	DRYDOCK (M/S)
		IMC		DRYDOCK

COATING APPLICATION — DRYDOCK:- MAY 95 VALMET VUOSAARI FHIS

AREA OF SHIP	C	TYPE	DFT	PRODUCT & NAME	
*FLATS	1	T/U	80	JVA003 INTERTUF	VINYL TAR HS TINTED
	2	T/U	100	JVA007 INTERTUF	VINYL BLACK
*FLATS	1	T/U	500	ERA165 INTERSHIELD	HS BLUE-INERTA 160 BASE
PORT SIDE U/W STARBOARD SIDE U/W	1	FULL	500	ERA165 INTERSHIELD	HS BLUE-INERTA 160 BASE
PORT BOOTTOP					
STARBOARD BOOTTOP					

**SPLIT AREA

PRODUCT & NAME		LITRES
ERA165 INTERSHIELD	HS BLUE-INERTA 160 BASE	2360
JVA003 INTERTUF	VINYL TAR HS TINTED	0
JVA007 INTERTUF	VINYL BLACK	0

SHIP DETAILS SILVA STAR

OWNER/MANAGER : SALLY REDERI AB
SHIP TYPE : FERRY
TONNAGE : 15586
LLOYDS NO. : 7921033
EXECUTIVE POINT : HELSINKI
DELIVERY DATE : 1 JUN 80
SERVICE SPEED : 18 KNOTS

DIMENSIONS (METRES) :-

LENGTH B/P : 137.42
BEAM MOULDED : 24.21
ANTIFOULING HT (FWD) : 5.60
ANTIFOULING HT (AFT) : 5.60
BOOTTOP HT (AFT) :
BOOTTOP HT (FWD) :

SURFACE AREAS (SQ METRES)

HULL BELOW WATER : 3850
FLATS : 2300
BOOTTOP :
TOPSIDES :

DRYDOCK SUMMARY

DATE	LOCATION	WPR	%	TYPE OF REPORT
8008	FINLAND	HEM	100	DRYDOCK (M/S)
8108	KVAERNER MASA YARDS-TURKU	HEM	100	DRYDOCK (M/S)
8304	FINLAND	HEM	100	DRYDOCK (M/S)
8505	VALMET VUOSAARI	INC	100	DRYDOCK (M/S)
		HEM	100	
		INC		DRYDOCK
8701	KVAERNER MASA YARDS-TURKU	INC	100	DRYDOCK (M/S)
		INC		DRYDOCK
8809	KVAERNER MASA YARDS-TURKU	INC	100	DRYDOCK (M/S)
		INC		DRYDOCK
9005	KVAERNER MASA YARDS-TURKU	INC	100	DRYDOCK (M/S)
		INC		DRYDOCK

COATING APPLICATION DRYDOCK:- JAN 87 KVAERNER MASA YARDS-TURKU FH04

AREA OF SHIP	C	TYPE	DFT	PRODUCT & NAME
FLATS	1	FULL	500	ERA165 INTERSHIELD HS BLUE-INERTA 160 BASE
STERN	1	T/U	500	ERA165 INTERSHIELD HS BLUE-INERTA 160 BASE
	2	T/U	500	ERA163 INTERSHIELD INERTA 160 BLACK BASE

PRODUCT & NAME		LITRES
BLA110 INTERSPEED	PREMIUM A/F RED	40
ERA163 INTERSHIELD	INERTA 160 BLACK BASE	120
ERA165 INTERSHIELD	HS BLUE-INERTA 160 BASE	1500

SHIP DETAILS SILVA STAR

OWNER/MANAGER : SALLY REDERI AB
SHIP TYPE : FERRY
TONNAGE : 15586
LLOYDS NO. : 7921033
EXECUTIVE POINT : HELSINKI
DELIVERY DATE : 1 JUN 80
SERVICE SPEED : 18 KNOTS

DIMENSIONS (METRES) :-

LENGTH B/P : 137.42
BEAM MOULDED : 24.21
ANTIFOULING HT (FWD) : 5.60
ANTIFOULING HT (AFT) : 5.60
BOOTTOP HT (AFT) :
BOOTTOP HT (FWD) :

SURFACE AREAS (SQ METRES)

HULL BELOW WATER : 3850
FLATS : 2300
BOOTTOP :
TOPSIDES :

DRYDOCK SUMMARY

DATE	LOCATION	WPR	%	TYPE OF REPORT
8008	FINLAND	HEM	100	DRYDOCK (M/S)
8108	KVAERNER MASA YARDS-TURKU	HEM	100	DRYDOCK (M/S)
8304	FINLAND	HEM	100	DRYDOCK (M/S)
8505	VALMET VUOSAARI	INC	100	DRYDOCK (M/S)
		HEM	100	
		INC		DRYDOCK
8701	KVAERNER MASA YARDS-TURKU	INC	100	DRYDOCK (M/S)
		INC		DRYDOCK
8809	KVAERNER MASA YARDS-TURKU	INC	100	DRYDOCK (M/S)
		INC		DRYDOCK
9005	KVAERNER MASA YARDS-TURKU	INC	100	DRYDOCK (M/S)
		INC		DRYDOCK

COATING APPLICATION DRYDOCK:- SEP 88 KVAERNER MASA YARDS-TURKU FH04

AREA OF SHIP	C	TYPE	DFT	PRODUCT & NAME
PORT SIDE U/W	1	T/U	500	ERA165 INTERSHIELD HS BLUE-INERTA 160 BASE
STARBOARD SIDE U/W				
PORT BOOTTOP	1	FULL	330	ERA165 INTERSHIELD HS BLUE-INERTA 160 BASE
STARBOARD BOOTTOP				
STERN	1	FULL	500	ERA165 INTERSHIELD HS BLUE-INERTA 160 BASE

PRODUCT & NAME		LITRES
ERA165 INTERSHIELD	HS BLUE-INERTA 160 BASE	0

SHIP DETAILS SILVA STAR

OWNER/MANAGER : SALLY REDERI AB
SHIP TYPE : FERRY
TONNAGE : 15566
LLOYDS NO. : 7321033
EXECUTIVE POINT : HELSINKI
DELIVERY DATE : 1 JUN 80
SERVICE SPEED : 19 KNOTS

DIMENSIONS (METRES) :-

LENGTH B/P : 137.47
BEAM MOULDED : 24.21
ANTIFOULING HT (FWD) : 5.60
ANTIFOULING HT (AFT) : 5.60
BOOTTOP HT (AFT) :
BOOTTOP HT (FWD) :

SURFACE AREAS (SQ METRES)

HULL BELOW WATER : 3850
FLATS : 2300
BOOTTOP :
TOPSIDES :

DRYDOCK SUMMARY

DATE	LOCATION	MFR	%	TYPE OF REPORT
8006	FINLAND	HEM	100	DRYDOCK (N/S)
8106	KVAERNER MASA VARDS-TURKU	HEM	100	DRYDOCK (N/S)
8304	FINLAND	HEM	100	DRYDOCK (N/S)
8506	VALMET VUOSAARI	IMC	100	DRYDOCK (N/S)
		HEM	100	
		IMC		DRYDOCK
8701	KVAERNER MASA VARDS-TURKU	IMC	100	DRYDOCK (N/S)
		IMC		DRYDOCK
8809	KVAERNER MASA VARDS-TURKU	IMC	100	DRYDOCK (N/S)
		IMC		DRYDOCK
9005	KVAERNER MASA VARDS-TURKU	IMC	100	DRYDOCK (N/S)
		IMC		DRYDOCK

COATING APPLICATION DRYDOCK:- MAY 90 KVAERNER MASA VARDS-TURKU FHD4

AREA OF SHIP	C TYPE OFT	PRODUCT & NAME
FLATS	1 T/U	500 ERAMES INTERSHIELD HS BLUE-INERTA 160 BASE
PORT SIDE U/W		
STARBOARD SIDE U/W		

PRODUCT & NAME		LITRES
BJ445C INTERSPEED	EXTRA A/F RED	0
ERAMES INTERSHIELD	HS BLUE-INERTA 160 BASE	0

WÄRTSILÄ MARINE
Åbo reparationsvarv
Avdelning

Handläggare

FAKTURA
Datum
19.10.1987

24 1858

Köparens referens
Insp. Y. Röblom

Säljarens referens
AEP/lt

Beställare
Sally Rederi Ab
Hamngatan 8

22100 MARIEHAMN

Enclosure 3.4.90

Godsmottagare

Leveransadress

Anbudet giltigt t.o.m.

Leveranssätt

Leveransvillkor

Leveranstid

Betalningsvillkor
14 d. netto
*)

Moms %
0

Märke
MS VIKING SALLY

Dockning 12-23.1.1987

Anbud WTKT1101/87

Vid betalning av fakturan ber vi Er notera a konto inbetalningar
FIM 650.000,- 20.2.87,
FIM 350.000,- 15.7.87

20449 specifikation	Mängd	Enhetspris	Totalpris
100 In- och utdockning av fartyget inkl. dockshyra 1 dygn.		23.886,-	
Dockshyra för de följande 10 dygnen.		107.490,-	
101 Extra omändring av dockningsbädd.		8.640,-	
100 Smältning av is från fören med hett vatten, 2 smältbilar med manskap i arbete.		10.000,-	
102 Anslutning av elkabel ombord 1 ggr.		560,-	
Anslutning av telefon 1 ggr.		305,-	
Telefonavgift 3088 impulser		1.853,-	
Hyra för värmefläktar.		3.140,-	
103 Anslutning av vattenslang 2 ggr.		1.120,-	
Leverans av kylvatten undr 10 dygn.		2.750,-	
Borttransport av avfall 7 ggr.		2.870,-	
104 Anslutning av brandslang 1 ggr.		560,-	
Brandvakt 18 arbetsskift.		11.310,-	
Till brandbekämpning 50 m2 aluminiumbekl. glasfiberväv.		2.830,-	

COPY

Postadress Telex Telefon Telecopier Bank Postgiro Oms
Wärtsilä Marinindustri Ab

MS VIKING SALLY

20449

300	Bultar förnyats till bogpropellerns tryckhuv. Borrning och gängning av hål.Löstagning av skyddsnuvan och maskinbearbetning av fördjupningar för låsbultar enl. ritning. Bultarna förnyats. Borrning samt gängning. Återmontering samt montering av låsningar. Ställningsarbete.	25.050,-
301	För reparation av SB och BB bottenventiler löstagits 2st NS300 rörkrökar. Ventilernas vridningsslider öppnats och förnyats kilar och stoppare. Kilarna svängts åt rätt håll och monterats på platsen. Täthet kontrollerats och ventilerna samt rören målats med Epoksifärg. Rörkrökarna återmonterats. 2st NS150 bordläggningsventiler översetts.	18.820,-
302	Mätning av spel i roder och propelleraxelar.	3.450,-
303	Propellerbladens ytor fyllts med keramisk Belzona metall samt Prestolith blandning. Bladens ytterkanter slipats jämna och stötta kanter på båda propellrarna avrundats.	13.500,-
	Båda propellrarnas bladytor polerats.	9.600,-
304	Propelleraxlarna Cederwall-skydd (SB och BB) löstagits, öppnats samt granskats Cederwall-tätningarnas ytor och utbytts Sempak-tätning. Fastsättningsbultarna kontrollerats samt skydden återmonterats och svetsats. Ställningsarbete.	16.160,-
305	Helikopterdäckets Plexi-glas, räck samt belysning löstagits. Räckena tapats med slipskiva. Räckena sandblästrats Sa 2,5 samt målats 2 ggr med beställarens färg. Glasen tvättats och monterats Räck med glas återmonterats. Svetsning, elmontering samt fläckmålning. Övertidsersättning.	62.500,-
400	Reparation av yorcalbrorör enl. beställarens numrering. I arbetet använts material enl. följande. Rör 1 ø159 yorcalbrorör L-1500 2st yorcalbrokrökar ø159 2st nav ø159 2st spännlinsar NS150.	5.300,-

10449

	Rör 17 ø323,9 yorcalbrorör 1-2000 1st yorcalbrokrök ø323,9 2st yorcalbrokrök ø323,9 2st spännfläns NS300 1st förgreningsstuts NS200 + fläns + nav NS200.	16.000,-
	Rör 17.A ø267 yorcalbrorör L-500 1st yorcalbronav ø267 1st spännfläns NS250	5.000,-
	Rör 18 ø76,1 yorcalbrorör L-500 2st yorcalbrokrök ø76,1 2st yorcalbronav ø76,1 2st spännfläns NS65 1st yorcalbronav NS40 1st spännfläns NS40.	3.020,-
401	Mellan crimtankar 13 och 14 monterats av beställaren levererad hydr. ventil. Erforderliga stålarbeten i mellanskott för montering av ventilen. Montering av ø12mm hydr.rör med Ermeto-koppling, 12m. Gamla grönsläggesbrytarnas kablar avlägsnats och monterats nya grönsläggesbrytare och nya kablar samt kabelrör.	36.000,-
402	Yorcalbrorör NS150 förnyats till EB isbrunn. Materialåtgång: 1200mm NS150 yorcalbrorör, 3st NS150 yorcalbrokrökar 2st NS150 yorcalbronav, 28st NS150 spännflänsar	4.830,-
500	Lager utbytts i maskinrumsfläktarnas elmotorer.	44.960,-
501-	Ombyggnadsarbeten i bogpropellerns motor. Materialåtgång: 36m kabel NJEM 1x70 2m Cu-skena 60x10 6m Cu-skena 80x10 kopplingsskor, skruvar och muttrar.	15.120,-
600	I matsalens mellanvägg gjorts öppning i garnerat stålskott 1050x500mm. Öppningen inramats och garnerats med mässingsplåt. Ramarna beställarens.	9.130,-
700	Värmisiretts och båda akterrampernas tätningar förnyats delvis, sammanl.22m.	14.110,-

MS VIKING SALLY

20449

Rör 2 ø180 yorcalbrorör L-1200 2st Yorcalbrokrökar ø180 2st " nav ø180 2st spännflänsar NS125	5.000,-
Rör 4 ø133 Yorcalbrorör L-2000 2st yorcalbro krökar ø133 2st " " ø133 2st spännflänsar NS125	6.000,-
Rör 5 ø180 yorcalbrorör L-2100 1st yorcalbronav ø180 1st spännfläns NS175 (gammal standard) 1st förgreningsstuts ø133 + krök ø133 + nav + fläns 1st förgreningsstuts ø88,9 + nav + spänn- fläns 1st förminskningskon ø180-ø159 + nav ø159 + fläns.	10.500,-
Rör 8 ø125 yorcalbrokrökar 2st förminskning ø125-100 2st flänsar + nav NS125 1st flänsar + nav NS100	7.000,-
Rör 10 ø267 yorcalbrorör L-1000 1st yorcalbronav ø267 1st spännfläns NS250 1st Straub koppling ø267	9.000,-
Rör 11 ø267 yorcalbrorör L-1000 1st yorcalbronav ø267 1st spännfläns NS250 1st Straub koppling	9.000,-
Rör 16 ø267 yorcalbrorör L-1000 1st yorcalbrokrök ø133 1st yorcalbronav ø133 1st yorcalbronav ø267 1st spännfläns NS250 1st spännfläns NS125 1st Straub koppling ø267 (röret har NS125 förgreningsstuts.	10.000,-

AS VIKING SALLY

20449

701	Rodrens bottenpluggar öppnats. För BB rodret förnyats plåtar 2st 500x250x20mm 1st 630x600x20mm, bockats För SB rodret förnyats plåtar 1st 450x250x20mm 1st 550x350x20mm 1st 1700x650x20mm, bockats Svetssömmarna påsvetsats samt frätta ställen fyllts med Belzona Prestolith massa.	52.370,-
702	Frätta svetssömmar i bottnen påsvetsats.	7.280,-
703	Bottensilar öppnats och fastsatts. Svetssömmar reparationssvetsats.	6.480,-
704	Förnyats zinkanoder a 10kg i brunnar 5st, i förpropellertunneln 6st.	3.190,-
707	Till köket tillverkats vask och dräneringsränna av plåt 900x560x5mm, djup 100mm med galler 900x560mm. (Taket nedanför rivits av fartyget)	5.470,-
708	Förliga inkörsbanans klarfars gångjärn reparerats, förnyats 2st gångjärn. Gångjärnen jämte gångjärnstappar 6st förnyats för täckplåtar mellan inkörsbanan och fartyget Ställningsarbete.	25.270,-
709	Rullklysen för- och akterut reparerats enl. anvisning med beställarens delar. Ovanför klysen monterats 18st knän 300x250x15mm. Målningsarbete. Arbetet utförs på yttre bordläggningen med hjälp av krankorg.	24.080,-
900	Fartygets flatbotten sandblästrats SA 2,5 samt målats med Inerta 160, 1450 m2. (Beställarens färg)	116.000,-
	Fartygets aktarliga och förliga delar fläck-sandblästrats SA 2,5 samt fläckmålats med Inerta 160 (Beställarens färg) Förliga delen 50 m2 akterliga delen 300 m2.	29.750,-

OJS SERIO-FSET

Nro Reparationsnummer

M/S VIKING FALLY

20449

901	Ramparnas och hyllornas vajrar samt block granskats visuellt.	810,-
903	Sötvattentank no 17 tvättats och rengjorts.	8.000,-
904	Smutsoljetankarna rengjorts och oljigt och fast avfall transporterats att förstöras.	42.000,-
905	Värmeväxlarens gavlar 4st sandblästrats SA 2,5 samt målats med Inerta 160.	2.000,-
	Saltvattenfilter 2st, brunnar 2st och rör 2st rengjorts samt målats 1 ggr med Antifouling.	6.620,-
907	Bottenbrunnarna rengjorts och målats 1 ggr med Antifouuling .	3.150,-
909	Täckning av fartygsbottnen och värmning på grund av Inerta målning.	120.000,-
919	Fartygets däck och utsidor tvättats med hett vatten före udockning.	32.810,-
	FIM	1.021.844,-

Tokl

2.11-87

Yliajosta veloitamme korkoa ... 16%
För dröjsmål debiteras ränta

WÄRTSILÄ MARINE
Åbo reparationsvarv
Avdelning | Handläggare

FAKTURA

Datum: 19.10.1987
nr: 24 1860

Köparens referens: Insp. T. Röblom
Säljarens referens: A2P/lt
Beställare

Godsmottagare

Sally Rederi Ab
Hamngatan 8

22100 MARIEHAMN

Leveransadress

Anbudet giltigt t.o.m.

Leveranssätt

Leveransvillkor

Leveranstid

Betalningsvillkor: 14 d. netto

Oms%: 0

Märke
MS VIKING SALLY

Dockning 12-23.1.1987

Anbud WTKT1101/37

20449 Specifikation	Mängd	Enhetspris	Totalpris
706 Spricka i yttre bordläggningen invid matsalen på BB-sida reparerats medels förnyande av skottplåt 830x300x12mm och däcksplåt 200x150x12mm samt svetsning, montering av garnerings- och inredningsskivor. Skyddande av golvet på inre sidan. - Ställningsarbete. Skydd på utsidan under reparationsarbetet.			17.620,-
104 Brandvakt på grund av haveriarbetet 2 arbetsskift.			1.740,-
		FIM	19.360,-

COPY

4.11.87
1670

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WÄRTSILÄ MARINE
Åbo reparationsvarv
Avdelning

Handläggare

FAKTURA

Datum: 19.10.1987

Nr: 24 1859

Köparens referens: Insp. Y. Röblom

Säljarens referens: ABP/lt

Beställare:
Sally Rederi Ab
Hamngatan 8

22100 MARIEHAMN

Godsmottagare

Leveransadress

Anbudet giltigt t.om.

Leveranssätt

Leveransvillkor

Leveranstid

Betalningsvillkor: 14 d. netto

Oms %

Märke
MS VIKING SALLY

Dockning 12-23.1.1987

Anbud WTKT1101/87

20449 specifikation	Mängd	Enhetspris	Totalpris
705 Fästöron 8st för huvudmotorernas avgasrörs ljuddämpare flyttats. Förnyats av beställaren levererade ljuddämpare. Ställningsarbete.		20.230,-	
104 Brandvakt på grund av haveriarbetet 3 arbetsskift.		2.610,-	
	FIM	22.840,-	

COPY

7.11.87

162

Postadress	Telex	Telefon	Telecopier	Bank	Postgiro	Oms
Wärtsilä Manmindustri Ab Åbo reparationsvarv		Nat (921) 359 500		FBF		

WÄRTSILÄ MARINE
Åbo reparationsvarv
Avdelning

Handläggare

FAKTURA

Datum: 7.10.1987

nr: 24 1800

Köparens referens: Insp. Röblom

Säljarens referens: AEP/lt

Godsmottagare

Beställare:
Sally Rederi Ab
Hamngatan 8

22100 MARIEHAMN

Enclosure 3.4.91

Leveransadress

Anbudet giltigt t.o.m.

Leveranssätt

Leveransvillkor

Leveranstid

Betalningsvillkor: 14 d. netto

Moms %

Märke

MS VIKING SALLY

20518

Dockning 6-8.4.1987

Pos. nr. specifikation	Mängd	Enhetspris	Totalpris
20518			
100 In- och utdockning av fartyget inkl. dockshyra för 1 dygn.		23.886,-	
Dockshyra för de följande 2 dygnen		21.498,-	
Bogseraasistans vid utdockning.		7.970,-	
101 Omändring av dockningsbädd. Avlägsnande av is från dockan.		11.340,-	
102 Anslutning av 2st telefoner.		610,-	
Telefonavgift, 772 impulser.		309,-	
103 Borttransport av fartygets avfall, 3 ggr.		1.230,-	
104 Anslutning av brandslang ombord.		560,-	
Brandvakt 5 arbetsskift.		4.350,-	
Torv för uppsamling av olja.		210,-	
300 Båda propelleraxlarnas Cederwall-skydd löstagits. BB- tätning utbytts (beställarens leverans). Gamla vitmetallringen maskinbearbetats. 800 l. spillolja tagits till vara. BB- propelleraxelspel mätts. BB akselns skyddsplåt 10x240x3500mm tillverkats och förnyats. Skydden återmonterats. Ställningsarbete.		31.320,-	

COPY

~~MS VIKING SALLY~~

20518

301	Loggens ventil 1st NS300 utbytts (beställarens). I förliga tankens tak gjorts öppning och genomgångsluckan förstorats. Fläns tillverkats och ventilen provtryckts från utsidan. Gjorda öppningar stängts.	12.580,-
303	Propellerblad på SB och BB propellrar utbytts 1 + 1 st. Beställaren levererat blad, tätningar och låsningar. Alla propellerblads låsningar granskats, 5st nya nya bladbultar samt låsningar (beställarens delar) monterats. Lösa pluggar i bladens lyfthål förnyats. Ställningsarbete.	28.640,-
700	Reparation av bordläggningen vid bogportens undre kant. - gamla plåtar avlägsnats genom skärbränning. - nya plåtar och profiler tillverkats, bockats, monterats och svetsats. 1st plåt 18x1280x4800mm 1770 kg 1st plåt 18x2900x3250mm 1357 kg P-stång 160x8 750kg Ställen med sprickor svetsats. Reparerat område maskinborstats på in- och utsida samt målats med beställarens färg. Kittning utförts med Prestoflex-massa. Visirets gummitätning förnyats.	137.070,-
701	SB slingerköl förnyats spt 84-95 material använts: - plåt 15x600x7300 mm 2st - plåt 15x600x2000 mm 2st - plåt 15x300x540mm 5st - rundjärn ø50 -9500mm 1st. Bordläggningsskada reparerats invid slingerkölen spt 91-92, 1st plåt 12x500x500mm förnyats. 7st anodzinkar a 10 kg monterats. Den förnyade slingerkölen maskinborstats och målats med varvets färg.	32.790,-
702	SB slingerköl förnyats spt 71-95 material använts: - plåt 15x600x1900mm 2st - plåt 15x600x2000mm 2st - plåt 15x300x540mm 15st rundjärn ø50 21000 mm 1st. 5st anodzinkar a 10 kg monterats. Reparationssvetsning samt fastsvetsning av mål för bottenplugg.(pluggen saknats) Den förnyade slingenrkölen maskinborstats samt målats med varvets färg.	71.140,-

mh-stenorset

WÄRTSILÄ MARINE

Åbo reparationsvarv

no

Sivu Sida Page 3

~~M. VI-EN? INGUE~~

30518

801 Sikt för SB bottenbrunn löstagits, riktats, spricka svetsats.
Förnyats och svetsats mellanspjälor och plattjärn vid kanten.
Återmonterats.

4.990,-

FIM 390.493,-

Lasku eräantu ... Pvm 22.10.87 ... 107.

050 SERIOFFSET

WÄRTSILÄ MARINE
Åbo reparationsvarv
Avdelning

Handläggare

FAKTURA

Datum: 7.10.1987

Nr: 24 1801

Köparens referens

Säljarens referens: Insp. Röblom

Beställare: AEP/lt

Godsmottagare

Sally Rederi Ab
Hamngatan 8

22100 MARIEHAMN

Leveransadress

Anbudet giltigt t.o.m.

Leveranssätt

Leveransvillkor

Leveranstid

Betalningsvillkor: 14 d. netto

Oms %: 0

Märke

MS VIKING SALLY

20518

Dockning 6-8.4.1987

Pos. nr. specifikation	Mängd	Enhetspris	Totalpris
20518			
302 Hissaxeln transporterats från fartyget till maskinverkstaden och demonterats. Lagerställen besprutats med metall och slipats. 2st lager 6018 förnyats. Axeln ihopmonterats och transp. ombord. Sätesring för ventil, ø315x300x30 tillverkats, maskinbearbetats av beställarens material. Ventiltallrikens tätningsytor maskinbearbetats ø315mm.			FIM 7.870,-

COPY

23.10 87

167

Postadress	Telex	Telefon	Telecopier	Bank	Postgiro	Oms
Wärtsilä Marinindustri Ab						

WÄRTSILÄ MARINE
Åbo reparationsvarv
Avdelning | Handläggare

FAKTURA
Datum: 12.12.1988
Nr: 24 4835

Köparens referens: Insp. Mickelsson
Säljarens referens: AEP/lt
Beställare

Enclosure 3.4.92

Godsmottagare

Sally Rederi Ab
Strandgatan 7

22100 MARIEHAMN

Leveransadress

Anbudet giltigt t.o.m.

Leveranssätt

Leveransvillkor

Leveranstid

Betalningsvillkor: 14 dgr netto

Oms %: 0

Märke

MS VIKING SALLY

Dockning: 12-16.9.1988

Pos. nr, specifikation	Mängd	Enhetspris	Totalpris
Anbud WMTR1066/88			
20706			
0010 In- och utdockning av fartyget inkl. 1 dygns dockshyra.			23.886,-
Dockshyra för de följande dygnen			42.996,-
0020 Omändring av dockningsbädd.			8.640,-
0030 Anslutning av el ombord , 1 ggr			560,-
Leverans av 44440 kWh elström.			26.664,-
Anslutning av telefon			305,-
Telefonsamtal 995 impulser			398,-
0040 Anslutning av brandslang 1ggr			560,-
Brandvakt 5 arbetsskift			4.350,-
0050 Borttransport av avfall 2 ggr.			820,-

COPY

Postadress | Telex | Telefon | Telecopier | Bank | Postgiro | Oms
Wärtsilä Marinindustri Ab

MS VIKING SALLY

20706

0060	Partygsbottnen högtrycksvattenspolats, 1000m2.	3.000,-
0070	Bottnen sandblästrats Sa2 och målats med lösningsmedelafri Inerta 160 620 m2. Beställarens färg.	55.800,-
	Bottnen lättsandblästrats och målats med lösningsmedelsfri Inerta 160 800 m2. Beställarens färg.	43.280,-
	Målning av djupgångsmärken.	2.600,-
	Skyddande av propellrar och rodertappar	2.880,-
0080	Frätta svetsfogar påsvetsats på rodret och i bogpropellertunneln. Ställningsarbete.	
	På rodren monterats och fastsvetsats plåt 20x180x180mm 1st, 20x350x480mm 1st.	20.000,-
0090	Zinkanoder a 90kg förnyats - i bogpropellertunneln 8st - på skrovet 18st - på rodren 8st - på roderstockarna 4st	11.020,-
	Läckande ställen på slingerkäl vid spt 85-86 BB-sida reparerats genom svetsning.	600,-
0100	Mätning av spetum i roder och i propelleraxelns lager. Mätningsprotokoll uppgjorts och levererats till fartyget.	3.450,-
0110	SB propelleraxels yttre Cederwallaxeltätning öppnats och ihopmonterats med beställarens delar.	10.800,-
	Gamla Cederwallaxeltätningen iståndsatts, ytorna maskinbearbetats, levererats ombord. Låsningar inspekterats och repererats samt nät avlägsnats från för- och akterpropellrar.	19.800,-
0120	Bottenbrunnarnas sikt öppnats och brunnarna rengjorts samt målats med Interspeed BLA110. Sikten återmonterats.	5.400,-
	Svetsömmar i bottensiktens galler utökats 4st	3.400,-
	Filterbrunnarna rengjorts, målats med Antifouling färg 3st.	11.250,-
	Snäckor bortskrapats från brunnarna.	5.400,-
	Färg från varvet: Interspeed BLA110 50 l.	1.675,-

0706

0130 SB akterligaste bottenventil NS250 öppnats och gummitätning levererad av beställaren förnyats. Rostfri kil tillverkats 12x50mm samt låsning ø50x100mm. Ventilen ihopmonterats och tätheten kontrollerats. 10.000,-

0140 Saltvattenrör mellan akterliga bottenventiler och filtren löstagits 3st NS250 och transporterats till rörverkstaden. Rören reparerats genom svetsning av flänsfogar och förnyande av förgreningar ø120x200x8mm, 3st. Rören målats på inre sidan med Antifouling färg och svetsfogarna med Galvex färg.
Transporterats till fartyget och monterats på platsen med nya packningar och bultar. 16.000,-

0150 I maskiarummet förnyats och reparerats yorcalbro-kylrör enl. anvisning.
NS175 yorcalbrorör 1m
NS175 " krök 1st
NS125 " " 2st
NS200/150 " förminskning 3st
NS150/175 " " 1st
NS175 fläns + nav 1st
NS125 " " 1st
NS200 yorcalbrorör 0,3m
NS200 " krök 1st
NS200 fläns + nav 3st
NS150 yorcalbrorör 0,1m
NS150 fläns + nav 1st
NS80 yorcalbrorör 1,5
NS80 " krök 9st
NS80 fläns + nav 15st
NS80 blindfläns 1st
NS100 galv.rör 0,3m
NS100 rörfläns 3st
Flänspackningar, bultar samt muttrar förnyats
Tillverkat och monterats 2st löödningsnipplar av brons
Viking koppling ø324 1st
" ø220 1st
vridventil NS150 2st
yorcalbromuff ¾" 2st. 40.000,-

0160 2st fjäderbelastade bordläggningsventiler löstagits och transporterats till verkstaden samt demonterats. Ventilhusen och tätlocken maskinbearbetats. Förnyade stödflänsar för fjäder samt O-ringar. Ventilerna slipats, ihopmonterats samt monterats på platsen. 10.000,-

0170 Plåtbeslagningar för HM avgaspannor 4st reparerats genom att jämna fogarna och monterats plåt på fogarna samt i botten och på hörnen i väggen, 8st L-järn 50x50 L=2100mm. Svetsningarna utförts. 32.830,-

	Avgasrören isvidats i pannorna med fiberskivor.	3.200,-
	Avgaspannan rengjorts (beställaren skött om öppnande och fastsättning av luckor.	9.150,-
0190	Spilloljetanken tömts med hjälp av tvätt-och sugbil samt högtrycks tvättats.	11.000,-
0200	Tillverkats enl. ritning samt avarvats 4st 6-kant skruvar och bultar 4st.	5.560,-
0210	Förliga hissens vajerhjul och axel transp. till verkstaden. Lagret utpressats från boet och från axeln. Axeln reparerats genom påsvetsning och slipats till angivet mått. Nya av beställaren levererade tätningar och lager monterats på axeln.	5.760,-
0220	Propellarbladens skadade och frätta kanter tillsats och frätningarna fyllts med Belzona. Frätningar på rodren och på axelbäraren fyllts med Praktolith massa. Beställningsarbete.	14.000,-
0230	Bilfäckets gångplattform på BB-sida invid maskinkapsel repererats genom förnyande av plåt 2x560x6050mm.	5.140,-
	FIM	472.224,-

27.12.86

167

WÄRTSILÄ MARINE
Åbo reparationsvarv
Avdelning

Handläggare

FAKTURA
Datum
22.6.1989

nr
24 6794

Köparens referens
L Janlöv

Säljarens referens
AEP/lt

Godsmottagare

Beställare

Rederi Ab Sally **Enclosure 3.4.93**
Hamngatan 8

Leveransadress

22100 MARIEHAMN

Anbudet giltigt t.o.m.

Levererasätt

Leveransvillkor

Leveranstid

Betalningsvillkor
14 d netto

0 Oms %

Marke

MS VIKING SALLY

Dockning 2.6.-3.6.1989

Art.nr/specifikation	Mängd	Enhetspris	Totalpris
7010 Intagning av fartyget i torra dock. Nedsänkning tekn. i dygn avra.			26.275,-
Dockavgifter i dygn.			11.943,-
7011 Omhändertagande av dockningsmedel.			6.100,-
3020 Anslutning av telefon.			305,-
3040 Anslutning av brandlarm.			560,-
3050 Byte av propellerskydd m.m. medel.			75.100,-
3060 Tillverkning av 4st vorenlöpare enligt modell från fartyget. Fartygets personal lösgjorde de gamla och monterade de nya rören. Materialåtgång:			
rör 133 x 2,5 CuZn29Al P33 DIN:17677 T	5,50	m	
" 133 x 2,5 " " " 17671 TT	,50	m	
" 219,1 x 3 " 17671	1,50	m	
sexkantstrut M16 x 8,dm pass 421.9.2.	30	st	
sexkantsmuttar M16 8 m pass. 452.9.2.	30	st	
rör 90 vorenlöpare 133 x 2,5 R=1,5xD	3	st	
" " " 219,1x3,0 "	1	st	

Postadress: Wärtsilä Maskinindustri Ab, Åbo reparationsvarv
Telex
Telefon: Nat (921) 359-600
Telecopier
Bank: FBF
Postgiro
Oms

MS VIKING SALLY

20784

	lösflänsar 200/219,1 DIN 2642 NP10 ST37-2	2 st	
	nav NS200/219,1 628.2.4. NP10 CuZn21Al	2 st	
	spännfläns NS125/133 628.9.2. NP10 ST/37-	4 st	
	" NS150/159 " "	2 st	
	nav NS125/133 628.2.4 NP10 CuZn21Al2	4 st	
	" NS150/159 " " "	2 st	24.396,-
0070	**Lösfagning och montering av axelskydd för mätning av spel i cederwall-tätningen på SB-sida.**		3.080,-
0080	Partyget använt kran och lyftkorg för målning av utsidor.		7.000,-
0100	1 man som hjälp åt Kamewa-montör för undersökning av läckage i OD-box.		1.600,-
0110	Tenfjord rodermaskinens läckor undersökta och reparerade tillsammans med tillverkarens representant.		8.251,-
0120	- Lyftöra svetsad på SB-sidan i bottenbord-lägenheten, lösd ca 1,5 m. - Läcka i BB rodret svetsats fast, ett hörn-nät lyftes med Prestolith - Zinkar monterade på slangerkslar SB och BB sammanl. 14st à 10 kg.		8.608,-
0130	Mätning av spelrum i roder och propellerskaft.		2.800,-
		FIM	176.018,-

6.7 t5

1676

Enclosure 3.4.94

TURUN
KORJAUSTELAKKA OY
Turku Repair Yard

F A K T U R A nr 229/90
2.10.1990

Beställare

Sally Line Ab
Hamngatan 8

22100 MARIEHAMN

Köparens ref
Lars Karlsson Order 09-9440
Säljarens ref
AEP/ta

Betalningsvillkor	Oms
per omgående	0 %
Förfallodag	
Försäningsränta	18 %

Märke

M/S VIKING SALLY

916
969

COPY

Pos. nr	Specifikation	Totalpris
	Raparationer, som utförts i samband med dockningen av M/S Viking Sally under tiden 30.4. - 7.5.1990 enligt tidigare överlämnad specifikation	
	TOTALT	1.420.000,- **********
	./. FÖRSKOTTSBETALNING	300.000,-
	ÅTERSTÅR TILL BETALNING	1.120.000,- **********

Postiosoite/ PL 430 20101 TURKU | Postal address P.O. Box 430 SF-20101 TURKU Finland | Puhelin/Telephone (921) 638711 Internat. +358 21 638711 | Telekopio/Telecopier (921) 6387250 Internat. +358 21 6387250 | Telex 62484 try sf | Pankki/Bank TYP 433110-19066 PSP Tu 227388 | Lvv Rek.

TURUN
KORJAUSTELAKKA OY
Turku Repair Yard

SPECIFIKATION AV DE REPARATIONER SOM UTFÖRTS UNDER DOCKNINGEN AV M/S VIKING SALLY 30.4 - 7.5.1990 TILL FAKTURA NR. 229/90 av den 9.8.1990

0010	Dockning och sjösättning av fartyget inkl. dockshyra för 1 dygn	26.275,-
0011	Ändringsarbeten i dockningsbädden	7.100,-
0010	Dockhyra för 7 dygn	83.601,-
0010	Kostnader för övertidsarbete i samband med dockningen	8.930,-
0012	Anslutning av 4 st elkablar	2.240,-
0013	Anslutning av 3 st. brandslangar	1.680,-
	Brandvakt 16 arbetsskift	13.920,-
0014	Anslutning av färskvattenslang 1 gång	560,-
	Levererats 175 m³ färskvatten	1.575,-
0015	Anslutning av telefon 1 st.	305,-
	Telefonsamtalsavgifter 3847 impulser	2.501,-
0016	Leverans av kylvatten till hjälpmaskiner 4 500 m³ färskvatten, till havsvattenspris à 3,- / m³	13.500,-
0017	Borttransport av fartygets avfall 18 ggr.	7.380,-
0018	- -	
0019	Lyftkranshyra för att lyfta CO2-flaskor	1.200,-
0021	Färskvattensköljning av utsidorna för att avlägsna salt. Kostnader för övertidsarbete.	9.680,-
0022	Sandblästring av bottnen SA 2,5 1800 m² och målning med INERTA 160 målfärg 1800 m²	270.000,-
0024	Rullmålning av Boottop området 1 ggr 1050 m² med beställarens målfärg INERTA-70. Kostnader för övertidsarbete.	15.090,-

0025	Målning av djupgångs- och fribords-märkena.	2.600,-
	Linjering av vattenlinjeområdet 300 m	2.700,-
0026	Lätt sandblästring av utsidorna samt blästring av rostiga ställen SA 2,5. Målning 3 ggr med beställarens färg. Målats 2 st. ca 1 m svarta ränder på utsidan.	130.000,-
	Breddning av ränderna från ca 1 m till 1,5 m.	3.120,-
0027	Slipning av rostiga ställen samt fläck-målning och övermålning av skorstenen, däcksbyggnadens skorsten, samt ställen på förskeppsskottet och kommandobryggan. Beställarens färg.	99.000,-
	Breddning av ränderna från ca 1 m till 1,5 m	432,-
0029	Utmärkning och målning av fartygets nya namn samt målning av Siljas logo på utsidorna. Beställarens färg.	63.000,-
	Namnet målat på två ställen på aktra bilporten.	1.640,-
0400	Utsidans sandblästring och målning 1 gång, slipning och fläckmålning av ställen där första strykningen flagat. Ställningsarbete	11.350,-
0410	Målning av Världsnaturfondens märken på SB- och BB-sidorna	10.830,-
	Målning av rederiets märke	2.040,-
	Bogportens insida, uppfartsbrons utsida och sidor samt avsatsen under uppfarts-bron rengjorts, avskärmats samt målats. Rengörning, avskärmning och målning av akterrampen samt röda områden som kommit i dager efter att rampen öppnats. Beställarens färger	53.540,-
	Sönderslipning av ytan samt övermålning av akterspegelns vita del 150 m². Beställarens färg.	4.290,-

	Extra övermålning av blå rand på SB-sidan 20 m, på BB-sidan 60 m Ställningsarbete Beställarens färg	10.820,-
0031	Avskärmning av propeller och rodertappar	4.500,-
0041	- -	
0050	Zinkanoder à 10 kg förnyats - i skrovet 7 st. - i förpropellertunneln 7 st. - i bottenbrunnarna 2 st.	4.880,-
0060	Mätts spelrum i propelleraxlarna, uppgjorts och levererats mätnings-protokoll.	2.450,-
	Kontrollmätning utförts	1.260,-
0070	Mätts spelrum i rodren, uppgjorts och levererats mätningsprotokoll	1.550,-
0080	- -	
0090	Öppning och rengörning av bottenbrunnarna 3 st. samt målning av brunnarna 1 ggr antifouling	7.560,-
	Skada förorsakad av vattenflöde i samband med behandlingen av bottenbrunnarna	3.810,-
0100 0370	Transport av 7 st. havsvattenfilter från fartyget till plåtverkstad, reparation av filtrens ramar genom att förnya plattorna.	

2 st ϕ 550 mm	10 mm platta
3 st ϕ 400 mm	10 mm platta
1 st ϕ 650 mm	10 mm platta
1 st ϕ 600 mm	3 mm rostfri platta

	Förnyats byglar 3 x 30 mm i plattstången. Förnyats siktens låsanordningar 20 st 10 x 70 x 100 mm Utförts fyllnadssvetsning av ramarna. Sandblästring och målning av filtren med INERTA 160 målfärg Installerats 6 st zinkanoder à 5,5 kg	26.130,-
0110	Reparation av Yorcalbro kylvattenrören enl. pos. 1-9 i specifikationen (beställaren lossar och monterar rören på plats.)	91.500,-

0360 Utöver offerten har Turun korjaustelakka Oy assisterat vid löstagningen av rören samt levererat 1 st. STRAUB-koppling 219,1. Därutöver har reparerats 3 st av beställaren löstagna Yorcalbro-rör, som ej ingått i offerten.

Material som använts vid reparationen:

1 m	Calbro-rör	NS 250
1 st	Calbro-nav	NS 250
1 st	Calbro-nav	NS 100
1 st	Calbro-krök	NS 100
0,3 m	Calbro-rör	NS 100
2 st	spännfläns	NS 250
1 st	spännfläns	NS 100
0,5 m	Calbro-rör	NS 250
2 st	Calbro-krok	NS 250
2 st	Calbro- nav	NS 250
2 st	spännfläns	NS 250
1 st	svetsupphöjning	1/2 "
3 st	Calbro-nav	NS 50
3 st	spännfläns	NS 50
4 st	Calbro-krok	NS 50
1 m	Calbro-rör	ϕ 57
1 st	tapp	2 "
1 st	förminskningskon	NS 50-40

55.610,-

0120 Tömning och rengörning av spillolje-tanken 6.800,-

Kostnader för behandling av 14 m³ spillolja 29.120,-

0160 Byte av 2 st BB-propellerblad 16.560,-

Reparation av fartygets felaktiga bladbultsnyckel samt vridning av propellern med hjälp av talja 8.800,-

0170 SB-rodermaskins distansstång löstagits från hjärtstocken och fraktats till verkstad.
Lager hålet gjorts större och mellanhylsa ϕ 120 x 60 mm tillverkats samt nytt av beställaren levererat lager monterats.
Montering på plats och provkörning utförts. 16.770,-

0190 Ventilationskanalernas alla galler på utsidan löstagits, sandblästrats samt målats med beställarens färg. 38.000,-

0200	Utmärkning och målning av skorstenens nya märke	20.200,-
	Avlägsning av det gamla rederimärket från skorstenen.	12.540,-
0210	Avlägsning medelst skärbränning av namnet "Viking Sally" 4 st, samt utjämning av spåren	24.000,-
0220	Övertäckning av fartygsbottnen akterifrån 3/4 av längden, samt uppvärmingskostnader. Brännolja för uppvärmning 7950 l från varvet.	98.050,-
0250	Avlägsning av gamla landgångsfästen 8 st. samt tillverkning av 4 st. nya fästen på båda sidorna av fartyget. Ställningsarbete.	33.990,-
0260	Avlägsning av E3-skyltarna från fartygets båda sidor	3.520,-
0270	Högtryckstvätt och tvätt med upplösnings medel av oljiga fläckar på fartygets båda sidor	8.870,-
0280	Mätning av kompressionen i Cederwall-boxarna i SB- och BB-propelleraxlarna, uppgjorts och levererats mätningsprotokoll. Skydden lösgjorts och monterats på plats.	10.830,-
0290	Ändringsarbete på landgångarna på passagerardäck. Borttagning av ledstängerna samt breddning enligt instruktionerna.	6.580,-
0300	- -	
0310	Assisterat vid monteringsarbete av lysrör	11.230,-
0320	Reparation av läckage i rodren och roderkonsolerna genom att förnya en plåt 12 x 450 x 900 och svetsa korroderade ställen. Ställningsarbete.	24.510,-
0330	Reparerats läckage i SB-propellerns stävrör. Löstagits skyddskon och packring. Förnyats o-ringbandet ϕ 16 mm 1,9 m. Delarna monterade på plats.	25.660,-

0340	Utlånats gascentral och brännskärnings-aggregat för fartygsmanskapets bruk.	800,-
0350	- -	
0360	- -	
0370	- -	
0380	Uppsugning av oljeavfall från diesel-dagtanken samt rengöring av tanken	13.100,-
0390	Svetsning av bunkerluckans öra	880,-
0410	Skaffats billyftkran till varvet för att få allt extra arbete slutfört föröver.	40.445,-

Totalt: mk 1.511.404,-
****

Enclosure 3.4.95

TURUN KORJAUSTELAKKA OY
TURKU REPAIR YARD LTD

F A K T U R A nr 30014
1.2.1991

Beställare
Vaasanlaivat-Vasabåtarna Oy Ab
C. Rickhardsson
PL 213

65101 VASA

Köparens ref

Säljarens ref
ARP/SeR/TA

Betalningsvillkor
14 dagar netto

Oms
0 %

Förfallodag 15.2.1991
Försåningsränta 18 %

Märke

M/S WASA KING

107

Pos. nr	Specifikation	Totalpris
	Reparationer, som utförts i samband med dockningen av M/S Wasa King under tiden 20.11. - 23.11.1990 enligt bifogad specifikation	
	Totalt	mk 846.769,-
		**********

Postiosoite/
PL 430
20101 TURKU

Puhelin
(921) 638711

Telefax
(921) 6387250

Telex
62484 try sf

Pankki
TYP 433110-19066
PSP Tu 227388

Lvv
Rek.

TURUN KORJAUSTELAKKA OY
TURKU REPAIR YARD LTD

M/S WASA KING

SPECIFIKATION FÖR REPARATIONER UTFÖRDA UNDER DOCKNINGEN I NÅDENDAL

Indockining 20.11.90
Utdockning 23.11.90
Avfärd från kajen 5.12.90

0100		
1.	In och utdockningen inkl. dockshyra för ett dygn	26.300,00
1.1.	Omändring av dockningsbädden	12.000,00
2.	Dockshyra för 3 dygn	35.850,00
	Kostnader för övertidsarbete i samband med indockningen	10.010,00
	Kostnader för övertidsarbete i samband med utdockningen	12.936,00
0120		
7.	Till och frånkoppling av telefon 2 ggr	610,00
7.1.	Samtalsavgifter 3.870 impulser	2.516,00
0130		
4.	Anslutning av kylvatten en gång	600,00
4.1.	Leverans av kylvatten för hjälpmaskiner 3 dygn	825,00
0140		
5.	Till och frånkoppling av brandslang 3 ggr	1.800,00
8.	Brandvakt 27 arbetsskift	26.190,00
	50 m² glasfibertyg med AL-yta för skyddning	2.940,00
0150		
6.	Anslutning av dricksvatten 2 ggr	1.200,00
6.1.	Leverans av färskvatten 109,4 m³	1.094,00
0160		
9.	Borttransport av avfall 14 ggr	5.740,00
0170		
10.	-	
0180		
15.	Färskvattenspolning av utsidorna, 780 m² BB 240 m² och SB 540 m²	4.680,00

Postiosoite/ PL 430 20101 TURKU
Puhelin (921) 638711
Telefax (921) 6387250
Telex 62484 try sf
Pankki TYP 433110-19066 PSP Tu 227388
Lvv Rek.

0190 15.	Lätt sandblästring av sidorna	4.800,00
	Fläckning 2 x 210 m²	2.940,00
	Målning 2 ggr 2 x 210 m²	1.890,00
	Märkning och målning av logo	63.000,00
	Rederiets färg	
	Kostnader för kranbil	11.070,00
	Sandblästring av bordläggningsöpningarnas kanter på utsidan, SA 2,5, samt målning med zinksilikatfärg och med ytfärg 2 ggr.	
	Rederiets färger	2.360,00
0200 16.	-	
0210 17.	Högtryckstvätt av skorsten med tvätt-medel.	
	Kostnader för övertidsarbete	5.650,00
	Skorstenens gamla målyta slipats med handslipmaskin. Nya blåa ränder har linjerats, märkts samt målats 2ggr. Det gamla sälmärket har övermålats med vit färg. Tillverkning av schablon för rederi-logon. Logon märkts och målats på båda sidorna av skorstenen.	48.780,00
	Kostnader för kranbil	18.680,00
0220 18.	Målning av EFFJOHN-logo på ena sidan av fartyget. Rederiets färg	2.500,00
	Målning av ramar runt EFFJOHN-logo på SB-sidan	2.250,00
0230 19.	Slipning av Panda-logons kantbitar och målning med vit ytfärg 2 ggr.	1.320,00
	Övermålning av Panda-logon med beställarens blå ytfärg 2 ggr.	800,00
	Kostnader för kranbil	1.150,00
0240 20.	Bortskärning av "Mariehamn" på båda sidorna i aktern	12.500,00

0250 21.	Märkning och målning av nytt namn "Wasa King" och hemort "Wasa". Tillverking av 3 st schabloner.	4.600,-
	Förutom i offerten nämnda arbeten har gamla namn bortslipatas med handslipmaskin samt ytorna målats 2 ggr med vit ytfärg.	7.850,00
	Två namn märkta och målade under akterkanten.	1.640,00
	Kostnader för kranbil	2.180,00
0260 22.	Avikerlisten	
	Avikerlistens övre del sandblästrad, SA 2,5 och nedre delen lättsandblästrad. Listen ca 80 m² målats 4 ggr med rederiets färg.	8.800,00
	Kostnader för kranbil	6.540,00
0270 23.	-	
0280 24.	-	
0290 31.	Mätning av propelleraxelspel	2.700,00
0300 32.	Mätning av roderspel	2.100,00
0310 33.	-	
320 34.	Förnyande av zinkanoder 10 kg Roder 2 + 2 st Bottenbrunnar 12 st	4.880,00
0330 35.	Bottenbrunnar öppnats, rengjorts och målats med antifouling 4 st	10.080,00
0340 36.	Byte av 2 st propellerblad BB sida	16.500,00
	I samband med byte av bladen har tätningsringar av brons lösmonterats och lyfts ut, 6 st lyftskruvar har tillverkats. O-ringarna förnyade. Hopmontering.	1.600,00

0350 41.	Reparation av 12 st yorcalbrorör.	79.900,00
	Tillverkning av delar till rör NS 175 av gammal standard och ihoppassning med rör NS 200.	2.160,00
0360 42.	Rengöring av slamtank, 20 m³ och bilgevattentank 22 m³	12.700,00
	Transport av oljeavfall till Ekokem och behandlingskostnader, 21.000 kg	46.430,00
0370 43.	Rören för djupgångsmätarna, 2 st ϕ 50 x 6 m, borrats öppna och krassats rena. Rören blindats och fyllts med Antifouling-färg, däreter avtappats. 20 l Antifouling-färg från varvet.	16.360,00
0380 51.	De gamla plastnamnen har avlägsnats genom uppvärmning och bortslipning. Namnskyltarna slipats och målats med ytfärg 2 ggr. Tillverkning av schablon för namnet samt märkning och målning av det nya namnet. Vid arbetet utförande har en saxhiss använts.	12.820,00
0390 52.	Löstagning av landgångsfästena på båda sidorna genom brännskärning och förflyttning till däck nr 4 enligt skiss. Rengöring och målning 3 ggr.	21.580,00
	Kostnader för kranbil	1.120,00
0400 53.	Reparation av bordläggningsskada spanter 122-140 för och akter i randningen enligt offert inkl. arbetena, plåttjocklek 10 mm, 2900 kg	147.370,00

Förnyade bordläggningsplåtarna,
tjocklek 10 mm:

spt 119 - 131	18 m²	1440 kg
spt 131 - 142	23,1 m²	1848 kg
spt 142 - 146,5	4,75 m²	380 kg
P-220 stång 4 x 2 m + 4 x 3 m		456 kg

Spant -5--7		
bordläggningsplåtar	2,12 m²	170 kg
däcksplåtar	0,46 m²	37 kg
balkbricka	0,08 m²	6 kg
sammanlagt		4.337 kg

Debitering för extra kilon inkl.
ställningsarbetena
(4337 kg - 2900 kg) x 27,50 — 39.518,00

Sandblästring av utsidan av skadade områden SA 2,5 samt målning med zinksilikatfärg och grundfärg samt ytfärg 2 ggr. Insidan rengjord och grundmålad 2 ggr. — 37.860,00

0410 Öppning och påsvetsning av frätta svetssömmar på SB och BB rodren.

Dubleringsplåt 500 x 1200 x 23 mm
monterats på BB-rodern.
Ställningsarbete — 17.980,00

0420 Nedre delen av BB propelleraxelskyddet löstagits och fisknät borttagits runtom propelleraxeln. Skyddet fastsatt.
Ställningsarbete — 2.640,00

0430 Slipning av BB propellerblad 2 st
Ställningsarbete — 4.830,00

0440 Skyddsrör och platta under SB sidoporten borttagna genom skärbrännning. — 880,00

0450 Skyddsjärn för avrinningsrör på bildäcket tillverkad av rundstång och monterats på plats. — 640,00

0460 Leverans och lyftning av asetylen- och syre-behållarepaket ombord på fartyget nära skorstenen för reparationer av pannor. — 4.670,00

0470 Loss och fast av bottenpluggar 8 st.
Montering och svetsning av en ny
3/4" muff och 1 st messingplugg. — 2.860,00

Totalt — 846.769,00
****

25. 9. 1992

Enclosure 3.4.96

PELAKONT TURKUSSA

M/S "VAASA KING"

1.	In och utdockningen inkl. en dag i docka	26.300,-
1.1.	Omändring av dockningsbådden	12.000,-
2.	Stående i docka, dockshyra/dygn	11.950,-/dygn
3.	Anslutning av el-kabel	660,-/anslutning
3.1.	Leverans av el-ström 1200 A, 18000,- +10% MÄÄRÄNTÄLESSÄ	0,60/kWh
4.	Anslutning av brandslang	660,-/anslutning
5.	Anslutning av dricksvatten	660,-/anslutning
5.1.	Leverans av dricksvatten	11,-/m³
6.	Anslutning av telefon	405,-/kabel
6.1.	Samtalsavgifter	0,65/impuls
7.	Brandvakt	1.320,-/8 h skift
8.	Borttransport av avfall 150 l	410,-/gång
9.	Anslutning av kylvatten för hjälpmotorer	660,-/anslutning
9.1.	Leverans av kylvatten	275,-/dygn
10.	Anslutning av tryckluft	660,-/anslutning
10.1	Leverans av tryckluft 7 kp/cm²	450,-/ arbetsskift

Målning

1122	Täckning av fartygsbottnet Uppvärmning	- INDIKAATIOHINTA - LÄMMITYSÖLJY FAKTAN MUKAAN	200 000,-
1222	Sandblästring fläckvis	HINTA KOSKEE YLI 500 m² MAALATTAVAA ALAA	145,-/m²
1322	Målning med Inerta	ALLE 500 m² LASKETTYNÄ	
1422	B.B. avvisarlist blästras och målas med Galvosil Hempel 1570, 127 m.		15500,-
1522	Ankarklys och ankaren blästras och målas med Galvosil		5900,-
1622	Färskvattentanken 4A och 4B ca 75 m³ vardera samt 5, 145 m³ rengöres och målas ca 10 - 20 % .		79200,-

- LASKETTU MAALAUS LAAJUUS 20 %
- KORKEAPAINEVESIPESU KAKO TANKKI
- MAALATTAVAT ALUEET Sa 2.5

1722	Ballasttanken TK 1, 175 m³ ; TK 2, 300 m³ ; TK 13 och TK 14, 183 m³ vardera; TK 54, 54 m³ ; TK 58, 220 m³. Rengöres och målas 10 - 20 % .	178400,-

- LASKETTU MAALAUS LAAJUUS 20%
- KORKEAPAINEVESIPESU KAKO TANKKI
- MAALATTAVAT ALUEET KÄYTTÖKIELLÄ PUHALLUS

1822	Förliga rampan, sidorna, blästras och målas ca 24 m².	3900,-
1922	Akterliga ramperna, sidorna, blästras och målas 2 x 12 m².	3900,-

VARUSTAMO TOIMITTAA MAALIT.

Bottenarbeten

31.28	Mätning av propelleraxelspel	2700,–
32.28	Cedervall tätningarna yttre / inre läcker olja. reparera	39500,–/AKSE-
	– TILAAJAN VARAUSAT	
	– TELINEET JA SUOJAN IRROITUS/ASENNUS	
	LASKETTU POSITIOON 33.28	
33.28	Partiell axeldragning "klassning"	49000,–/
	SUORITETAAN MODIFIOITU AKSELINVETO	/AKSELI
34.28	Lyftning av propellerblad, byte av tätningar / blad	8250,–/LAPA
35.22	Mätning av roderspel	2100,–
36.22	Lyftning av roder (rodren har ett skrikande oljud när man svänger med dem, troligen är smörjrören till lagret stockade.	28600,–
	EHDOTUS TYÖN SUORITTAMISESTA:	
	– VIRTAUS LEUYUEN POISTO /ASENNUS	
	– ALATAPIN IRROITUS JA TARKASTUS	
	– ALALAAKERIN TARKASTUS	
	– ALALAAKERIN RASVAUSPUTKEN TOIMINNAN TARKASTUS JA PUHDISTUS.	
	– PERÄSIMEN ALASOTTO LISÄHINTA 25000,–	
37.28	Täckning av propellrar och rodertappar	4500,–
38.22	Förnyande av zinkanoder 10 kg / st	325,–/KPL.
39.22	Bottenbrunnar upp och fast rengöres, målas.	3500,–/KPL.
40.22	Ankare med kätting firas ut, klassas.	7000/KETJU 2kpl

Sinkel

Maskinrumsarbeten

51.26 Bottenventiler överkalas
DN 100, 9 st; DN 125, 3 st; DN 150, 2 st;
DN 200, 6 st; DN 250, 5 st; DN 300, 2 st;
DN 450, 1 st.
Samtliga ventiler fjädermanövrerade. 37200,—

52.26 Aktra SW filterhusen förnyas 2 st.
diam 700, längd 800. 36500,—

53.26 Övrig filterhus rengöres och målas, 4 st. 7100,—

PESU, HARJAUS JA MAALAUS

54.26 Filterkorgar till dito filterhus förnyas eller repareras, om så behöves 5400,-/kpl.

LASKETTU UUSIMINEN

55.26 SW-kylvattenrör förnyas och repareras i maskin.

- PUTKET LASKETTU OHEISTEN SKISSIEN MUKAAN
- HINNAT SISÄLTÄVÄT POSITIOISSA MAINITUT STRAUB-LIITTIMET
- MATERIAALI VORCALBRO
- HINNAT EIVÄT SISÄLLÄ MAHDOLLISIA OHEIS JA LUOKSEPÄÄSY TÖITÄ
- HINNAT POSITIOITTAIN SKISSEISSÄ

56.26 HJM FW kylvattenrörsystem förnyas och repareras.

- PUTKET LASKETTU OHEISTEN SKISSIEN MUKAAN
- HINTA SISÄLTÄÄ SKISSISSÄ № 4 OLEVAT VENTTIILIT
- MATERIAALI = TERÄSPUTKI
- HINNAT EIVÄT SISÄLLÄ MAHDOLLISIA OHEIS JA LUOKSEPÄÄSY TÖITÄ
- HINNAT POSITIOITTAIN SKISSEISSÄ

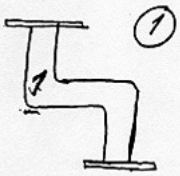
57.26 HJM FW Expansionstanken förnyas och flyttas upp till samma nivå som HUM expansionstankar.
Tanken 700 x 1220 x h 1220. 2 st rör L 15 m,
diam 60 mm, tillop och overflow.

INDIKAATIO HINTA 50000,—

Dockningsspec 1992

55.26
1/5

55.26
1) Dubbel krok vid ~~inlopp~~ avlopp till HM. 4 F.W kylare.



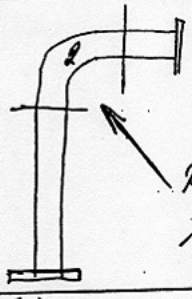
(1)

Yϕ 175

L ca 1000

HINTA 8550,-

) Krok på rör vid inlopp till HM 4 F.W kylare.



(2)

Yϕ 175

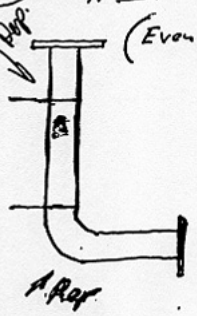
Repl ca 600

Ny krok 90°

HINTA 5490,-

(3) Avlopp Jn till HM 3 F.W kylk

(Eventuellt gör ett rör.



Yϕ 135

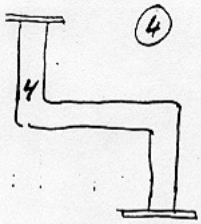
L ca 1700.

HINTA 5890,-

Dubbel krok vid HH 3
FW. kylare.

55.26
2/5

(4)



yp 175
L ca 1000

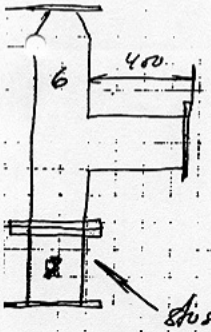
HINTA 8550,-

(5) Grova rör efter, mixad sea water vech på STB. sida på hyllan

Borde gå att separera.

HINTA TARKASTUKSEN JÄLKEEN

(6+7) T-stycke i stos i BR HH. 4 SKO. 6



yp 160.
L ca 1400.

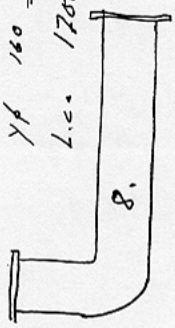
stuss. under dork.

HINTA 11990,-

Slam ladning på STB. hylla (7+6)

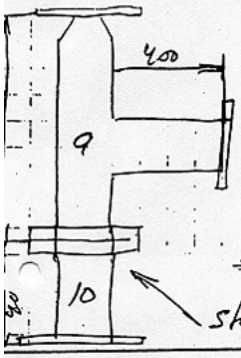
(8)

yp 160 HINTA 8780,-
L ca 1700.



55.26
3/5

(9+10) T-stycke i Stuss. i HII HM i SHO. kyl



Yp 160
L ca 1400.

HINTA 11990:-

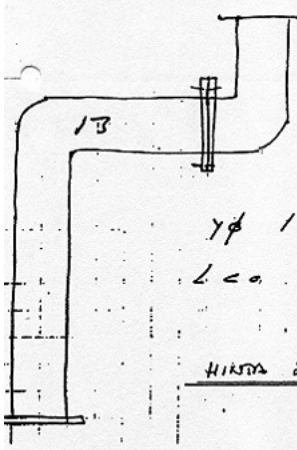
Stuss under dok.

(11) Stoss mellan HM i spolluftkylare och vent.

Yp 135 — 1
L ca 200

HINTA 3870:-

(13) Rör för uppvärmning av bottenförvaren på BR. sida HM. rum.



Rör med lugg

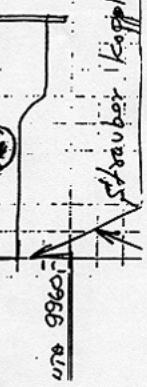
Straubor koppling

Yp 160
L ca 4.200

HINTA 20460:-

Ångledning ovan Yp BR. växel.

(12)



Yp 160
L ca 1200

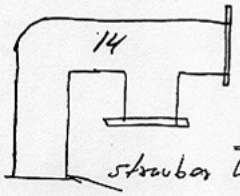
Straubor koppling

Ångledning ovan Yp BR. sida

HINTA 9960:-

55.26
4/5

(14) Rör för uppvärmning av bottenbunnen på STB. sida HH. rummet.



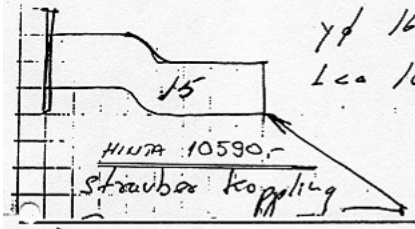
yϕ 160

L ca 1350

HINTA 13470,-

Straubar koppling

(15) Stamledning ovan för STB. växel



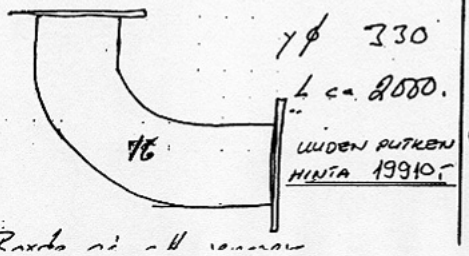
yϕ 160

L ca 1600.

HINTA 10590,-

Straubar koppling

(16) Sugsida HH. äldre salt vatten pump. STB. s.



yϕ 330

L ca 2000.

UTAN RUTKEN
HINTA 19910,-

Borde gå att separera.

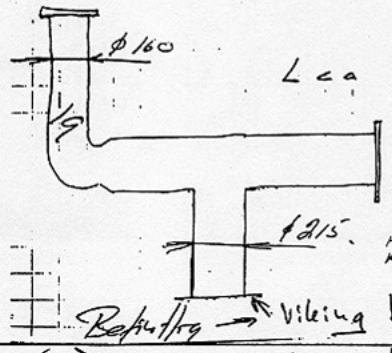
(17) Gamla rör ϕ 330 ovan för HH. kylvatten pump vuxet hyllan. STB. sida.

Borde gå att separera

(18) Gamla rör ϕ 330 ovan HH. kylvatten pump STB. sida vuxet hyllan.

Borde gå att separera.

(19) Stam ledning för Hjälp kylare. 55.26 5/5



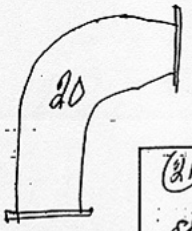
L ca 3000.

HINTA 17370,-

HINTA EI SISÄLLÄ VIKING KOPLINKAR.

Beställ → Viking koppling

(20) Krok för förliga Hjälp saltvattenpump

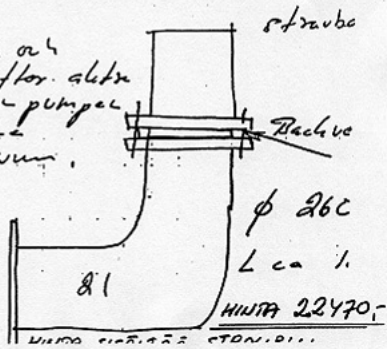


ϕ 315

L ca 1000

HINTA 17770,-

(21) krok och stos efter alla kylvattenpumpar BB. sida M.. rum.



ϕ 260

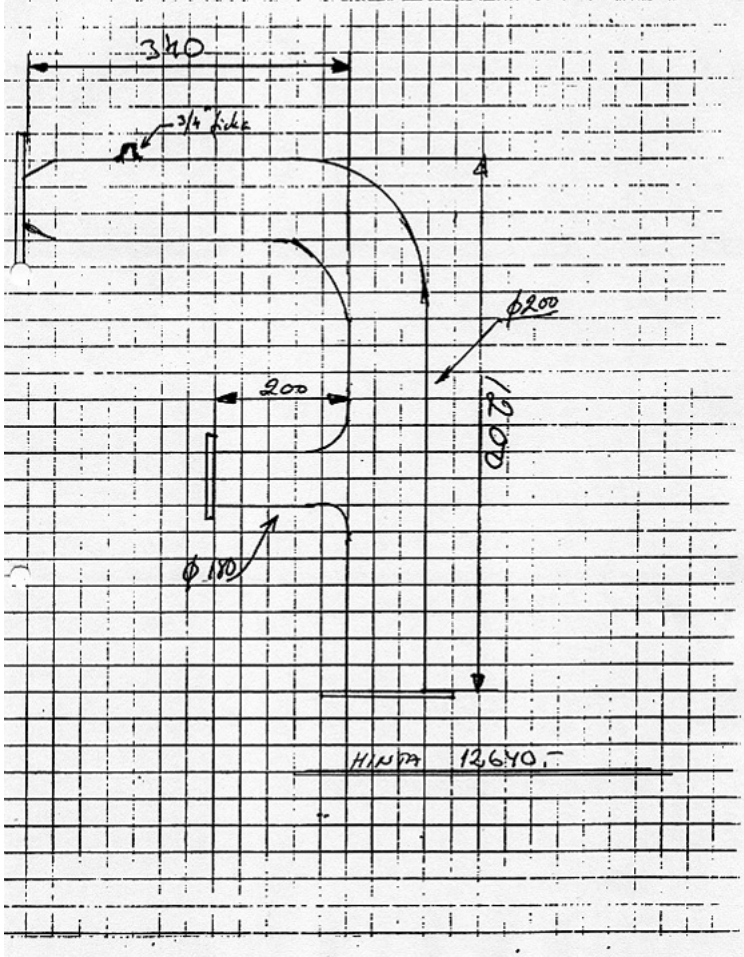
L ca 1.

HINTA 22470,-

5626
1/5

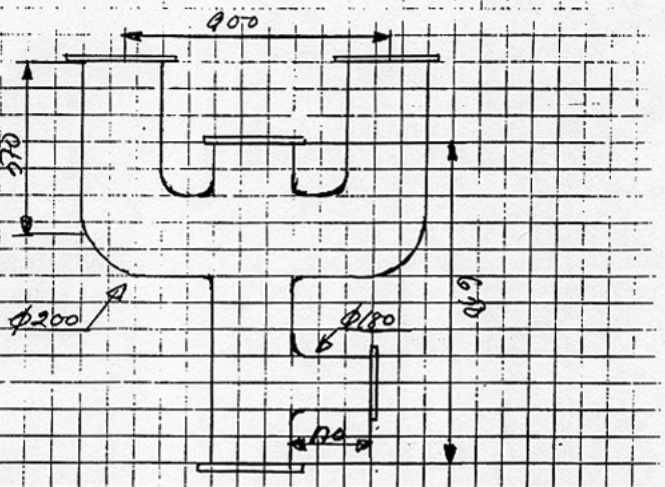
RÖR Nº 1 Hjm kylv. syst FW

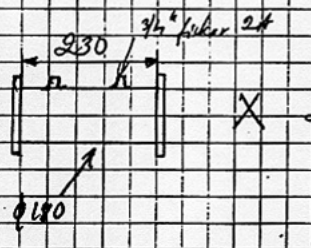
Drakt c. på [illegible]



HINTA 12640.-

RÖR Nº 2 Hfm kylv. syst. PW 6626 2/5

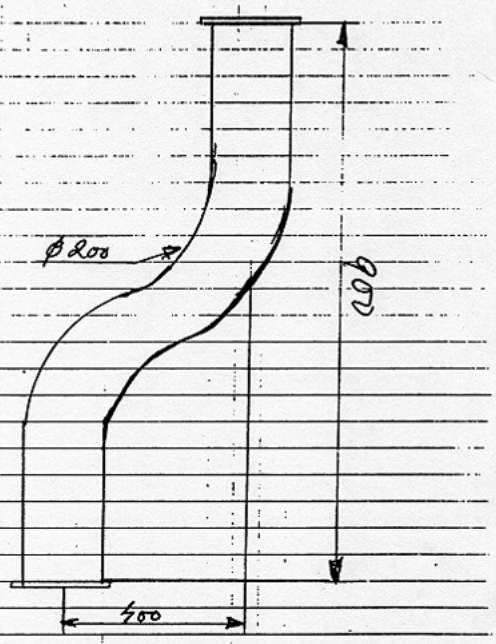




X 2

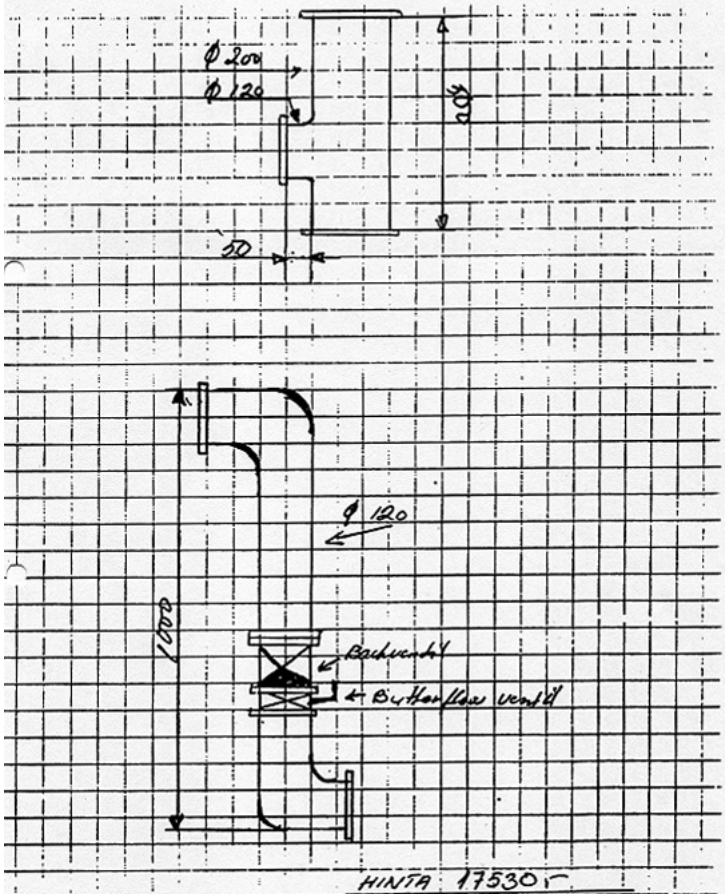
Hinta 24800:-

RÖR Nº 3 1½" kylv.sept FW 5626 3/5



HINTA 7700,-

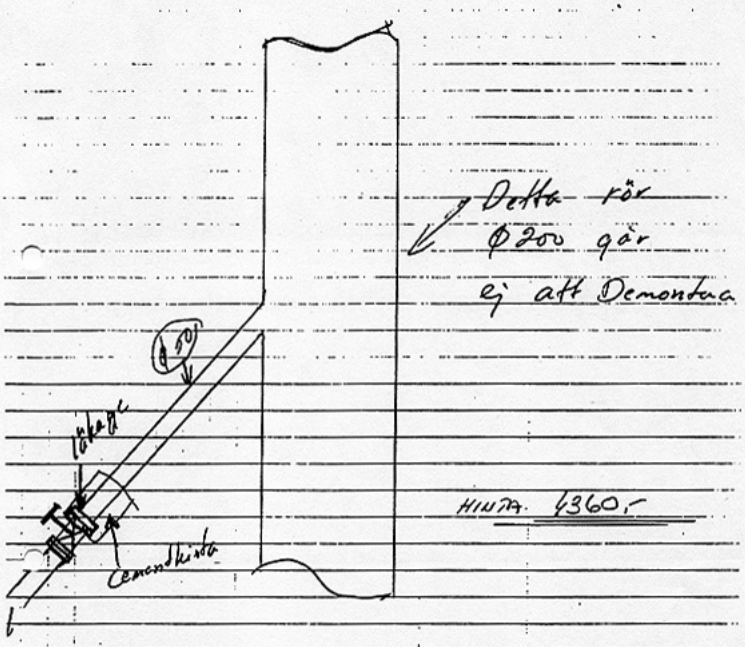
RÖQ Nº4 H/M kylv. syst. FW 5626 4/5



HINTA 17530:-

56.26

RÖR Nº 5 H/M kylv. syst 7W 5/5



HINTA 4360,-

U tank 22

58.26 Röret mellan fettavskiljningstanken i spritförrådet och gråvattentanken i separatorummet förnyas. Diam 110 mm, L 12 m, 4 st krökar 90° samt flänsar.

INDIKAATIO HINTA 37000,-

59.26 Bilgevattentank no 33, 22 m³, rengöring. 12700,-

60.26 Smutsoljetank no 42, 13 m³, rengöring. 8500

JÄTEÖLJYN MÄÄRITYS FAKTAN MUKAAN

61.26 Sludgetank no 44, 25 m³, rengöring.

HINTA TARKASTUKSEN JÄLKEEN

62.26 HJM Avgaspannor 4 st, Sanea 65 m² reparation, förnyande av bottnet.

INDIKAATIO HINTA 200000,-

63.26 Hisschakten på 2 provianthissar, skotten riktas, avståndet för stort till hisskorgen

HINNOITELLAAN KUN TYÖN LAAJUUS ON MÄÄRITELTY

64.26 Flexibel tryckslang med stålväv, diam 50 mm, längd 200 mm, 150°C, 8 st insättes i HUM H.O.fuel tryck och returrör.

65.26 Expansionstankar i HUM kylsystem rengöres och målas 2 st x 1,5 m³. 7000,-

Övrigt

70.22 Akterramperna, skalkningarna service samt förstärkningar 5200,-/kal.

71.22 Akterramperna, gångjärn överhalas, nya bussningar. 46600,-

72.22 Förramp och visir skalkningar ögnas förstärkes.

HINTA TARKASTUKSEN JÄLKEEN

73.22 Förramp, gångjärn överhalas eventuellt nya bussningar. 23300,-

74.22 Visir 15 m och ramp-packningar 10 m förnyas 18600,-

75.22 Vajerbyten på bildäckshyllorna (12 VAIJERIA) 54600,-

M/S Wasa King
Dockningsspecifikation 1993

Particulars
Passengership

LOA	157.00	Bureau Veritas	
LPP	137.40	DWT	3345
B.extr.	24.2	Gross	15598
Draft	5.55	Net	8394

Allmän del

01 Indockning, utdockning, 1 dag dockstående

02 Dockstående / dygn

03 Anslutning av elkablar
Leverans av el 1200 A, 380 V, 50 Hz

04 Anslutning av brandslangar

05 Anslutning av dricksvatten
Leverans av dricksvatten

06 Anslutning av telefon
Samtalsavgifter

07 Brandvakt

08 Avfall

Målning

1122 Täckning av fartygsbottnet
Uppvärmning

1222 Sandblästring fläckvis

1322 Målning med Inerta

1422 B.B. avvisarlist blästras och målas med Galvosil
Hempel 1570, 127 m.

1522 Ankarklys och ankaren blästras och målas med
Galvosil

1622 Färskvattentanken 4A och 4B ca 75 m^3 vardera
samt 5, 145 m^3 rengöres och målas ca 10 - 20 % .

1722 Ballasttanken TK 1, 175 m^3 ; TK 2, 300 m^3 ;
TK 13 och TK 14, 183 m^3 vardera; TK 54, 54 m^3 ;
TK 58, 220 m^3. Rengöres och målas 10 - 20 % .

1822 Förliga rampen, sidorna, blästras och målas
ca 24 m^2.

1922 Akterliga ramperna, sidorna, blästras och målas
2 x 12 m^2.

Bottenarbeten

31.28 Mätning av propelleraxelspel

32.28 Cedervall tätningarna yttre / inre läcker olja repareras

33.28 Partiell axeldragning "klassning"

34.28 Lyftning av propellerblad, byte av tätningar / blad

35.22 Mätning av roderspel

36.22 Lyftning av roder (rodren har ett skrikande oljud när man svänger med dem, troligen är smörjrören till lagret stockade.

37.28 Täckning av propellrar och rodertappar

38.22 Förnyande av zinkanoder 10 kg / st

39.22 Bottenbrunnar upp och fast rengöres, målas.

40.22 Ankare med kätting firas ut, klassas.

Maskinrumsarbeten

51.26 Bottenventiler överhalas
DN 100, 9 st; DN 125, 3 st; DN 150, 2 st;
DN 200, 6 st; DN 250, 5 st; DN 300, 2 st;
DN 450, 1 st.
Samtliga ventiler fjädermanövrerade.

52.26 Aktra SW filterhusen förnyas 2 st.
diam 700, längd 800.

53.26 Övrig filterhus rengöres och målas, 4 st.

54.26 Filterkorgar till dito filterhus förnyas eller repareras, om så behöves

55.26 SW-kylvattenrör förnyas och repareras i maskin.

56.26 HJM FW kylvattenrörsystem förnyas och repareras.

57.26 HJM FW Expansionstanken förnyas och flyttas upp till samma nivå som HUM expansionstankar.
Tanken 700 x 1220 x h 1220. 2 st rör L 15 m ,
diam 60 mm, tillop och overflow.

58.26 Röret mellan fettavskiljningstanken i spritförrådet och gråvattentanken i separatorummet förnyas. Diam 110 mm, L 12 m, 4 st krökar 90° samt flänsar.

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61.26 Sludgetank no 44, 25 m^3, rengöring.

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Övrigt

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71.22 Akterramperna, gångjärn överhalas, nya bussningar.

72.22 Förramp och Visir skalkningar överses förstärkes.

73.22 Förramp, gångjärn överhalas eventuellt nya bussningar.

74.22 Visir 15 m och ramp-packningar 10 m förnyas

75.22 Vajerbyten på bildäckshyllorna

TURKU REPAIR YARD LTD
SF-20101 TURKU, FINLAND
Box 430
Tel. +358 21 638711 Telex 62484 try sf

TELECOPIER WORK ORDER

Telecopier No. +358 21 638 7250
638 7251 prod.

To: VAASANLAIVAT OY
Date: 25.9.1992
No: 961-3260199
Ref:
Attn: C. RICKHARDSSON
No. of pages including cover sheet: 16
From: B. KUJALA

IF NOT CORRECTLY RECEIVED PLEASE REPORT IMMEDIATELY

Subject: M/S "WASA KING"

OHEISENA LÄHETÄMME TYÖ-
KAPPALEEN TARJOUKSESTAMME
KOSKIEN 18.9 PÄIVÄTTYÄ ERITTELYÄ
ALUKSELLA SUORITETTAVISTA TÖISTÄ
TAMMIKUUSSA -93.
PUHTAAKSIKIRJOITETUN TARJOUKSEN
LÄHETÄMME VIIKKO 40 ALUSSA.

YSTÄVÄLLISIN TERVEISIN

TURKUN KORJAUSTELAKKA OY
MYYNTIOSASTO
Boris Kujala

LÄHETETÄÄN!

EI TARVITSE PUHTAAKSI KIRJOITETUA

PUH. kesk. AS. klo 11.40

JOLLA TAAN PUUKALA-
... KULKEESSA
... ASIAAN!

Enclosure 3.4.98

Office Translation:

MacGREGOR-NAVIRE (FIN) Oy / No. / Date 22.9.92 / Our ref. T. Mäki / page 1/1
To: Turku Repair Yard, attn: Boris Kujala / Ref: M/S Wasa King, Offer

OFFER

Referring to your fax request for a tender, dated 19.9.92 we hereby offer spare parts and repair works as follows:

Pos 70.22 Stern ramps, service and strengthening of locking devices.

Price: Work FIM 3,500 / locking device, VAT 0%
Materials FIM 500 / locking device, VAT 0%

Pos 71.22 Stern ramps, exchange of end hinge bushings and hinge axles.

Price: Work FIM 33,000 / vessel, VAT 0%
Materials FIM 2,800 / vessel, VAT 0%

Pos 72.22 Bow ramp, exchange of end hinge bushings and hinge axles.

Price: Work FIM 16,500 / vessel, VAT 0%
Materials FIM 1,400 / vessel, VAT 0%

Pos 73.22 Bow visor, exchange of 15 metres and bow ramp 10 metres rubber sealing gasket.

Price: Work FIM 6,300 / 25 metres, VAT 0%
Materials FIM 8,000 / 25 metres, VAT 0%

Pos 74.22 Exchange of car deck wires.

Price: Work FIM 3,000 / wire, VAT 0%
Materials FIM 500 / wire, VAT 0%

Delivery time for: Work 1 week
Materials: 2 weeks from ordering

Delivery terms: Free Turku - 93
Payment terms: 30 days net
Other terms: NLM 84

Best regards

signed
Tomi Mäki

MacGREGOR NAVIRE MacGREGOR-NAVIRE (FIN) Oy Marine Services Unit	No.	Date 22.9-92	Our ref. T.MÄKI	Page 1/1

TO: TURKU REPAIR YARD
ATTN: BORIS KUJALA

REF: M/S WASA KING
TARJOUS

IF NOT CORRECTLY RECEIVED, PLEASE INFORM US.
TELEPHONE: +358-21-892111 TELEX: 62112, 62382 mgnfi sf
TELEFAX: +358-21-892517

TELEFAX

TARJOUS

VIITATEN TARJOUSPYYNTÖÖNNE FAX 19.9-92 TARJOAMME TEILLE EM. ALUKSEN VARAOSIA JA KORJAUSTYÖTÄ SEURAAVASTI:

POS. 70.22 PERÄRAMPPIEN LUKITUSLAITTEIDEN HUOLTO JA VAHVISTUS.

HINTA TYÖLLE : FIM 3500,-/LUKITUSLAITE, LVV 0%
HINTA MATERIAALILLE : FIM 500,-/LUKITUSLAITE, LVV 0%

POS. 71.22 PERÄRAMPIT, PÄÄTYSARANOIDEN LAAKERIN JA SARANATAPIN VAIHTO

HINTA TYÖLLE : FIM 33.000,-/ALUS, LVV 0%
HINTA MATERIAALILLE : FIM 2800,-/ALUS, LVV 0%

POS. 72.22 KEULARAMPIN PÄÄTYSARANOIDEN LAAKERIN JA SARANATAPPIEN VAIHTO

HINTA TYÖLLE : FIM 16.500,-/ALUS, LVV 0%
HINTA MATERIAALILLE : FIM 1400,-/ALUS, LVV 0%

POS. 73.22 KEULAVISIRIN 15M JA KEULARAMPIN 10M TIIVISTEKUMIN VAIHTO

HINTA TYÖLLE : FIM 6.300,-/25, LVV 0%
HINTA MATERIAALILLE : FIM 8.000,-/25M. LVV 0%

M/S WASA KING - TARJOUS 2/2

POS. 74.22 AUTOKANNEN VAUERIEN VAIHTO

HINTA TYÖLLE : FIM 3000,- /VAUERI, LVV 0%
HINTA MATERIAALILLE : FIM 500,- / VAUERI, LVV 0%

TOIMITUSAIKA TYÖLLE : 1 VIIKKO
— " — MATERIAALILLE : 2 VIIKKOA TILAUKSESTA

TOIMITUSEHTO: VAPAASTI TURKU -93
MAKSUEHTO : 30 PV NETTO
MUUT EHDOT : NLM 84 MUKAAN

YST. TERVESIN

Tom Juhl

Office Translation

To: Vasanlaivat Oy, no: 961 - 3260199, attn: C. Rickhardsson, date 25.9.92
Fm: Turku Repair Yard, Boris Kujala
Telecopier Work Order

Subject: M/S Wasa King

Attached please find a draft of our offer regarding the specification dated 18.9 for works to be performed on the vessel in January -93.

We shall mail you a final offer at the beginning of week 40.

Best regards

Turku Repair Yard Oy
Sales Department

signed
Boris Kujala

Added text: Final version not necessary. Phone conference at 1140 on 25th September. Revert to the business in a months time.

TURKU REPAIR YARD LTD
SF-20101 TURKU, FINLAND
Box 430
Tel. +358 21 638711 Telex 62484 try sf

TELECOPIER WORK ORDER

Telecopier No. +358 21 638 7250
638 7251 prod.

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Attn: C. RICKHARDSSON
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TAMMIKUUSSA -93.
PUHTAAKSIKIRJOITETUN TARJOUKSEN
LÄHETÄMME VIIKKO 40 ALUSSA.

YSTÄVÄLLISIN TERVEISIN

TURUN KORJAMOTELAKKA OY
MYYNTIOSASTO
Boris Kujala

LÄHETETTÄ PUHTAAKSI KIRJOITETUN TARVITSE EI PUH. kesk. 25.9 klo 11.40 ALKUPERÄISTÄ KUITENKAAN ASIAAN!

SCHIFFBAU

SCHIFFSMASCHINENBAU
SCHIFFAHRTSTECHNIK

Die »Hansa« ist das Organ:
Germanischer Lloyd
Verband der Deutschen Schiffbauindustrie e.V.
Normenausschuß Schiffbau (HNA) im DIN

Auto-und Passagierfähre „Viking Sally"

Erbaut von Jos. L. Meyer, Papenburg, für die Reederei AB Sally, Mariehamn

Am 29. Juni 1980 wurde von der Schiffswerft Jos. L. Meyer in Papenburg die Auto- und Passagierfähre „Viking Sally", Bau-Nr. 590, an die Reederei AB Sally, Mariehamn, übergeben. Die Reederei hat dieses Schiff im Rahmen der Viking-Line im Verkehr zwischen Finnland und Schweden eingesetzt, wobei auch die Aaland-Inseln bedient werden. Die finnische Reederei AB Sally betreibt zusammen mit der schwedischen Reederei AB Slite und der finnischen Reederei SF-Line die Viking-Line.

Die Werft Jos. L. Meyer lieferte von 1970 bis 1974 bereits sechs Auto-/Passagierschiffe an die Viking-Line ab, von denen vier für die Reederei AB Sally bestimmt waren und zwei für die Reederei AB Slite. Für diese Reederei wurde im Juni 1979 auch die „Diana II" abgeliefert.

Das durch die gute Zusammenarbeit entstandene Vertrauen war ausschlaggebend dafür, daß die Reederei am 11. September 1979 den Vertrag für das hochmoderne und technisch komplizierte Schiff unterzeichnete. Trotz scharfer und teilweise staatlich unterstützter Konkurrenz konnte die Werft wegen der kurzen Lieferzeit, wegen des von der Werft ausgearbeiteten interessanten Entwurfs und der hohen Flexibilität der Werft gegenüber den Wünschen der Reederei diesen Auftrag buchen.

Ein Dank ist auch an dieser Stelle an das Land Niedersachsen zu richten. Durch eine gewährte Landesbürgschaft konnte die Finanzierung dieses Projektes erst abgesichert werden.

Die Konstruktions- und Bauzeit von nur ca. neun Monaten war ein entscheidender Moment für die Reederei, dieses Schiff in Papenburg zu bestellen. Die Liefertreue war durch die sieben Vorbauten bewiesen worden, die auch bei ähnlich kurzen Lieferzeiten vertragsgemäß pünktlich abgeliefert wurden.

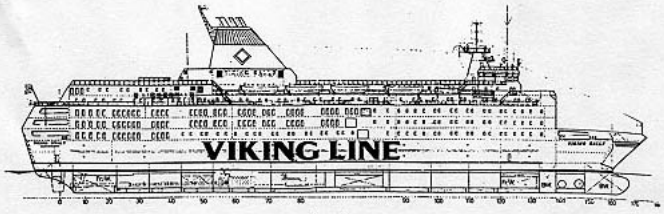
Welcher Arbeitsaufwand in einer solchen Großfähre steckt, beweisen folgende Fakten:

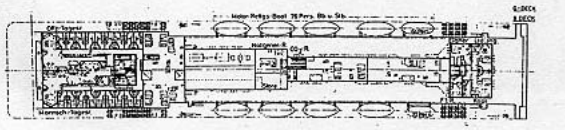
— Es wurden ca. 280 km Kabel eingebaut, d. h. 1,6 km Kabel pro Meter Schiff.
— Es wurden ca. 30 000 m² Flächen isoliert, soviel wie sechs Fußballfelder oder ein kleiner Bauernhof.
— Das Schiff faßt 460 Pkw, was einer 2,1 km langen Autoschlange entspricht.
— Es wurden 1300 Betten und über 1500 Türen eingebaut.
— Das Schiff ist 44,5 m hoch, mit seinen 11 Decks höher als manches Hochhaus oder mancher Kirchturm.
— Neben der Hauptmaschinenleistung von 17 600 kW wurden 4416 kW Generatorleistung eingebaut. Damit ist eine Stadt von rund 8000 Einwohnern leicht zu versorgen.

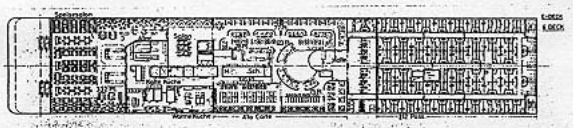
Zusammenfassend kann gesagt werden, dieses Schiff ist Hotel, Tiefgarage, Kraftwerk, Fortbewegungsmittel, Kanalisation, Kaufhaus und Vergnügungszentrum in einem.

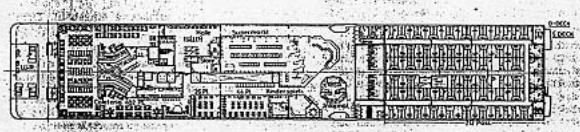
Hauptabmessungen:

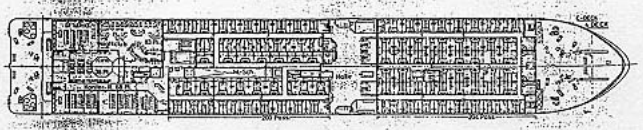
Länge über alles	155,40 m
Länge zwischen den Loten	127,40 m
Breite im Wagendeck	24,20 m
Breite in der Wasserlinie	22,60 m
Höhe bis Wagendeck	7,65 m
Tiefgang	5,55 m
Tragfähigkeit	2 800 t
Vermessung	15 500 BRT 8 350 NRT
Geschwindigkeit	21,20 kn
Maschinenleistung (4×4400 PS)	4×4 400 kW
Ladefähigkeit	52 Lkw à 18 m, oder 460 Pkw einschl. auf Hängedecks

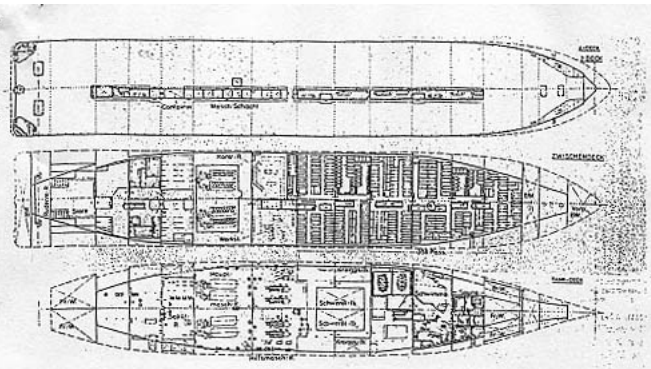












Wagendeckeinrichtung:

Wagendeckbelastung	Achslast 18 t
Freie Höhe unter hochgezogenem Hängedeck	4,70 m

1 Bugvisier, 1 Bugrampe, 2 Heckrampen

Passagiere und Besatzung:

Insgesamt	2060 Personen
in Doppel-Kabinen mit Naßzelle	164 Personen
in 4-Mann-Kabinen mit Naßzelle	124 Personen
in 2-Mann-Kabinen	128 Personen
in 4-Mann-Kabinen mit gemeinsamen Wasch- und WC-Räumen	232 Personen
	1108 Personen in Kabinen
Offiziere und Mannschaften	110 Personen

Öffentliche Räume:

Speisesalon	232 Sitzplätze
Cafeteria mit Grillraum	402 Sitzplätze
Tanzsalon	276 Sitzplätze
Konferenzräume, Nightclub	235 Sitzplätze
A-La-Carte-Raum	100 Sitzplätze
Lounge	30 Sitzplätze
Schlafsesselraum	70 Sitzplätze
Hallen und Arkaden	128 Sitzplätze
Swimming-Pool, Bar	40 Sitzplätze
Konferenzraum	27 Sitzplätze

Supermarkt, Sauna, Kinderspielraum.

Maschinenanlage:

4 Hauptmotore M.A.N., Type 8 L 40/45, mit je 4400 kW (6000 PS) bei 600 U/min = total 24 000 PS
4 Diesel-Drehstrombordaggregate, Type B & W, mit je 1104 kW (1500 PS), Generatorleistung 1040 kW/1311 kVA
1 Notaggregat von 300 kW.

Nachfolgend wird das Schiff beschrieben, und zwar vom „Maschinenraum unten bis oben zum Schornstein".

Maschinenräume

Die gesamte Maschinenanlage ist konzipiert für wachfreien Betrieb. Sie ist aufgeteilt in fünf Räume. Im Hauptmaschinenraum befinden sich vier M.A.N.-Motore der Type 8 L 40/45 mit je 4400 kW (6000 PS) bei 600 U/min. Je zwei Motore werden über ein Untersetzungsgetriebe der Firma Renk auf eine Wellenleitung zusammengefaßt, so daß max. 12 000 PS auf jeden der zwei Verstellpropeller abgegeben werden. Die Verstellpropelleranlage wurde von der Firma KaMeWa als scew-back-Propeller geliefert, um die Schwingungen vom Propeller zu minimieren, was mit Erfolg erreicht wurde. Die max. Geschwindigkeit des Schiffes liegt bei 21,2 Knoten. Im Hilfsmaschinenraum befinden sich vier Diesel-Drehstromaggregate mit je 1050 kW der Firma B & W. Die erzeugte Spannung beträgt 380/220 V bei 50 Hz. Die gesamte E-Anlage wurde von der Firma Siemens geliefert und von werfteigenen Monteuren installiert. Das Notstromaggregat, das von der Firma Rolf Jansen, Aurich, geliefert wurde, erzeugt 300 kW und ist auf

Maschinen-Kontrollraum mit Hauptfahrpult

Hauptmaschinenraum (M.A.N.-Maschine, 4400 kW)

Steuerbordseite Wagendeck, im Vordergrund Containerlift zu den Storerräumen

Luxus-4-Bett-Kabine

dem G-Deck angeordnet. Im Separatorenraum werden das Schweröl, Dieselöl und Schmieröl in acht Separatoren der Firma Alfa-Laval aufbereitet. Die Hauptmotore und die Hilfsdiesel sind für Schweröl von max. IF 180 konzipiert. Die Wärmeversorgung des Schiffes und die Beheizung der Schweröltanks erfolgen über eine Thermalölanlage. Das Thermalöl wird durch die Abgase der Hauptmotore in vier Abgaskesseln und in vier Abgaskesseln durch die Abgase der Hilfsdiesel und in zwei automatischen, ölgefeuerten Kesseln der Firma Sanea erhitzt. Die drei Hochdruckkompressoren für die Steuerluft wurden von der Firma Jos. L. Meyer selbst hergestellt. Die gesamten Abwässer des Schiffes werden in zwei biologisch arbeitenden Abwasseranlagen der Firma Format-Chemie aufbereitet. Die Vakuumtoiletten lieferte die Firma Evak. Die hohe Manövrierfähigkeit des Schiffes wird garantiert durch die zwei Halbschweberuder achtern und zwei Bugstrahlruder der Firma KaMeWa mit 1 × 10 und 1 × 12 t Schub im Vorschiff. Die Rudermaschinen wurden von der Firma Tenfjord geliefert.

Versorgung

Zur Belieferung der Proviantstoreräume im Zwischendeck wurde am hinteren Ende des Mittelschachtes auf dem Wagendeck ein großer Lift angeordnet, um Proviantcontainer zum Zwischendeck zu befördern. Zwei Versorgungslifte verbinden die Storeräume auf dem Zwischendeck mit der Küche auf dem E-Deck und dem Supermarkt auf dem D-Deck. Je ein Personenlift befindet sich im Mittschiffsbereich (Hallen) sowie vorne im Kabinenbereich. Zu den Storeräumen auf dem Zwischendeck gehören auch große Proviantkühlräume, damit ausreichend Getränke und Nahrungsmittel gelagert werden können.

Wagendeck

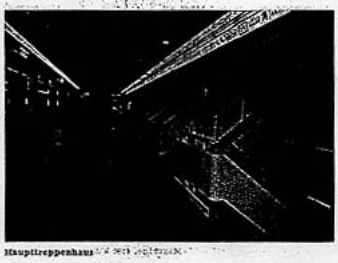
Das Hauptdeck kann 52 Lkw zu je 18 m Länge fassen. Statt Lkw können auch in zwei Lagen Pkw auf dem Wagendeck geladen werden, so daß die Gesamt-Pkw-Kapazität bei 460 Pkw liegt. Zwei Spuren sind aber ausschließlich für Lkw vorbehalten. Die Roll-on/Roll-off-Einrichtung besteht aus einer wasserdichten Bugklappe, einer Bugrampe und zwei wasserdichten Heckrampen mit hydraulischer Betätigung. Die gesamte Hydraulik der Hängedecks und der Roll-on/Roll-off-Einrichtung wurde von der Firma von Tell geliefert. Die Stahlarbeiten wurden von der Werft ausgeführt. Alle Wagendecks sind durch eine Wassersprühflutanlage zur Feuerbekämpfung ausgerüstet.

Kabinen

In 352 Kabinen mit Naßzelle für zwei Personen und 31 Kabinen mit Naßzelle für vier Personen sowie 63 Kabinen für zwei Personen und 58 Kabinen für vier Personen mit gemeinsamen Wasch- und WC-Räumen können insgesamt 1186 Personen untergebracht werden. Alle Kabinen ohne eigene Naßzelle befinden sich im Zwischendeck. Die Kabinen mit Naßzelle wurden auf dem C-, D- und E-Deck im vorderen Bereich des Schiffes angeordnet. Für die Besatzung und für das Bedienungspersonal sind Außenkabinen, alle mit Naßzelle, für 110 Personen vorgesehen.

Öffentliche Räume

Die öffentlichen Räume wurden im hinteren Bereich des Schiffes, verteilt auf drei Decks, angeordnet. Auf dem C-Deck befindet sich ein Mehrzweckraum für insgesamt 235 Personen. Durch den Einbau von Schiebewänden wurde dieser Raum sehr variabel gestaltet und kann aufgeteilt



Haupttreppenhaus

5. Deck, Selbstbedienungsstraße der Cafeteria

werden in Nightclub, Kino mit Vorführraum und mehrere kleine und große Konferenzräume. Die Cafeteria mit Selbstbedienungseinrichtung sowie Grillraum für insgesamt 402 Passagiere wurde auf dem D-Deck eingerichtet. Im Speisesalon auf dem E-Deck mit Sitzplätzen für 332 Passagiere wird ein skandinavisches Buffet serviert. Wer nach einer individuellen Speisekarte essen möchte, kann dieses in dem A-La-Carte-Restaurant tun, wo 100 Personen Platz finden. Die Küche auf dem E-Deck ist aufgeteilt in kalte und warme Küche und Spülküche. Ausreichend Provianträume befinden sich auch im Bereich der Küche. Auf dem E-Deck kann der Passagier sich in dem Barsalon mit Tanzfläche und 276 Sitzplätzen amüsieren. Natürlich befinden sich an Bord ein Mutter-und-Kind-Raum und ein Spielzimmer. Neben der Empfangshalle auf dem D-Deck befindet sich ein großer Supermarkt. Auf der Tankdecke wurde ein Swimming-Pool mit Bar (40 Sitzplätze), drei Saunas sowie ein Konferenzraum mit 27 Sitzplätzen vorgesehen.

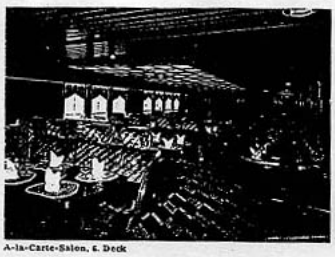
Klimaanlage

Auf dem D-, F- und G-Deck befinden sich die Räume für die Klima- und Lüftungsanlage der Firma Hi-Press. Mit dieser Anlage werden alle Räume des Schiffes voll klimatisiert. In jeder Kabine kann die Anlage entsprechend den Wünschen des Passagiers individuell über einen Thermostat reguliert werden.

Brücke

Auf dem H-Deck befinden sich die sehr großzügig angelegte Brücke mit ausgebauten und überdachten Nokken. An nautischer Ausrüstung wurde vorgesehen:

1 Magnetkompaß	1 Geschwindigkeitslog
1 Kreiselkompaß	1 Tiefgangsmeßanlage (vorne und hinten)
1 Selbststeueranlage	1 Funkpeiler
3 Radargeräte TM	1 FT-Anlage
1 Echolot	



A-la-Carte-Salon, E. Deck

Vorschriften

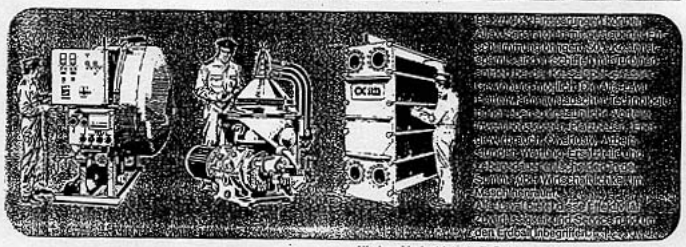
Das Schiff und die Maschinenanlage wurden gebaut nach den Vorschriften und unter Aufsicht von Bureau Veritas für das Klassenzeichen I 3/3 E + Deep Sea Ice Class IA Car/Passenger Ferry.

Ferner wurden folgende Vorschriften erfüllt:

1. SOLAS 1974 für kurze internationale Fahrt (2-Abteilungs-Status).
2. Internationale Vorschriften zur Vermeidung von Kollisionen auf See — 1972.
3. Internationale Freibordkonvention von 1966.
4. Internationale Vermessungsvorschriften.
5. Internationale Konvention zur Vermeidung von Umweltverschmutzung durch Schiffe 1973 (Annex I, IV und V).
6. Internationale Konvention zur Vermeidung von Umweltverschmutzung der See durch Öl 1954, einschließlich Änderungen von 1969 und 1971.

ALFA-LAVAL

Kostensenken im Maschinenraum



ALFA-LAVAL

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Enclosure 6.3.116

MINISTRY OF COMMUNICATIONS

REPORT

on maritime safety work by the
Marine Surveying Department

Report by specially-appointed Government Investigator
Magnus Sjöberg

To the Government

By its decision of 3 October 1994, the Government commissioned former Justice of the Supreme Court Magnus Sjöberg, as its special investigator, *inter alia* to produce an account of reporting routines and certain other matters relating to the maritime safety work of the Marine Surveying Department.

An account of the assignment is attached.

Stockholm, March 1995

Magnus Sjöberg

/Björn Hansen

1 Introduction

The assignment here described has been defined by the government decision of 3 October 1994 as follows:

> On 28 September 1994, the passenger ferry Estonia foundered south-west of Utö in Finland en route from Tallinn to Stockholm. The vessel was flying the Estonian flag.
> On 29 September 1994, the Government commissioned the Board of Accident Investigation to assist in the accident inquiry. A joint accident board was then formed, with representatives from the Estonian , Finnish and Swedish authorities. One of the main functions of this board is to establish the reason for the accident.
> Survivors of this maritime disaster have stated that the vessel's bow "visor" was torn away, which is supposed to have been an important cause of the sinking.
> Information has since emerged to the effect that incidents and problems with bow doors had arisen previously with ferries of the same type as the Estonia. A high standard of safety at sea demands that the necessary conclusions are regularly drawn from incidents and accidents that occur. In addition to the investigation now being carried out by the joint accident board, other matters should be dealt with, including the reporting routines within the Marine Surveying Department.
> The Government commissions former Justice of the Supreme Court Magnus Sjöberg to carry out such a survey. As part of this, the investigator is to examine how information relevant to maritime safety is analysed and promulgated within the Department, and where necessary put forward proposals for improvements. The investigator is also to look at the options for and the frequency of exchange of relevant maritime safety information between maritime safety authorities and other bodies that have important functions in the field of maritime safety, such as classification societies, insurers and shipowners' associations. Finally, the investigator should examine how such information exchange takes place between marine surveying departments or corresponding bodies within our local region, and where necessary put forward proposals as to how this might be improved.
> The investigator shall carry out his work in contact with the international accident inquiry and in co-operation with the special committee on increased maritime safety for ferry services that the Government will be setting up.
> The Government authorises the Minister of Communications to appoint a secretary or other assistant to the investigator.
> The work of the investigation shall be completed with the utmost dispatch.

There follows an account of national legal regulations in the field of maritime safety (section 2) and of international organisations and agreements of interest in this context (section 3). Next comes a description of the Marine Surveying Department's organisation and functions (section 4). This is followed by a section about the organisation of the Nordic countries in the same field (section 5) and one concerning the activities of the international classification societies (section 6). Then come the deliberations and proposals of the investigator (section 7), followed by a special section dealing with roll-on roll-off vessels (section 8) and a summary (section 9).

During the work of the assignment, viewpoints have been taken from various members of staff of the Marine Surveying Department, on visits to the three marine surveying areas

(Stockholm, Gothenburg and Malmö) and the office in Rotterdam, and on visits to the central authority. The investigator has also met representatives of the Swedish Mercantile Marine Officers' Association, the Swedish Seamen's Union, the Swedish Shipowners' Association, the Swedish Steamship Assurance Club and the classification society Det Norske Veritas Classification AS. Consultation has also taken place with experts appointed by the Government to aid relatives of those lost in the M/S Estonia disaster, representatives of the National Accounting and Audit Bureau, the international accident investigation board and the committee appointed with the brief of creating a plan of action to improve maritime safety.

2 Maritime Safety Legislation

2.1 Introduction

The following presentation concerns itself chiefly with such regulations as may affect the flow of information within the work of maritime safety. This means that otherwise central parts of the legislation dealing purely with safety issues must here make way for matters of reporting duty and various forms of authorisation.

2.2 The Seamen's Act (1994:1009)

The Seamen's Act (1994:1009), which came into force on 1 October 1994, contains the basic provisions relating to the safety of vessels and the responsibility of owners and masters for such safety. Therefore Chapter 1 Section 9 subsection 1 prescribes that a vessel being operated must be seaworthy, which means that it must have the devices needed to prevent ill health and accident, be properly manned, adequately provisioned and equipped and so loaded or ballasted that the safety of the vessel, life or goods is not endangered.

The second paragraph of the same subsection points out that special provisions exist governing safety on vessels (see below for the Safety of Shipping Act).

As compared with the terminology of the previous Seamen's Act (1891:35 p.1) the concept of seaworthiness has been expanded. In the old Act, this expression referred only to a vessel's seaworthiness in its technical or restricted sense. It therefore did not include particular elements relevant to a vessel's condition such as crewing and victualling ("voyageworthiness") or the capacity of the hold to carry cargo ("cargoworthiness"). Instead, the "due condition" of a vessel was used as a blanket term. In Danish and Norwegian terminology, on the other hand, the concept of seaworthiness does include voyage- and cargoworthiness. With the aim of rendering the Nordic Seamen's Acts as similar in content as possible, the seaworthiness concept was therefore adapted to that used in Denmark and Norway. Indeed, all of the new maritime legislation has been arrived at in co-operation with Denmark, Finland and Norway. The concept of seaworthiness is therefore no longer absolute, but is, in the sense used in the Seamen's Act, relative, and must be determined by the context, so that it may involve the internal safety of the vessel as well as its voyage- and cargoworthiness. However, the new terminology results in no material change in terms of the shipowner's duty to keep his vessel in a seaworthy condition (prop. 1993/94:195 p. 166).

Chapter 6 Section 1 subsection 1 of the Seamen's Act also states that it is the master who must ensure that the vessel is seaworthy before a voyage commences. The master is also to see that the vessel is kept in a seaworthy state during the voyage and be responsible for its propulsion and handling in a manner consistent with good seamanship.

The penal provisions in Chapter 20 of the Seamen's Act state *inter alia* that, if a master fails to ensure that the vessel is seaworthy as above, he may be sentenced to fines or imprisonment. The same penalty applies in the case of an owner who fails to remedy faults or deficiencies in seaworthiness, if he knew, or ought to have known, of such faults or deficiencies.

If an owner should fail, despite having had the option, to prevent a vessel going to sea when an imminent voyage, because of a fault or deficiency in seaworthiness, may involve grave danger to those on board, he may be sentenced to fines or imprisonment. A master may also be sentenced to fines if he fails to inform the owner of a fault or deficiency in seaworthiness.

The Seamen's Act also contains regulations carrying penalties in respect of masters' duty to report events that are of importance for maritime safety (Chapter 6 Section 14). The equivalent rule in the previous Seamen's Act was Section 70, so that it has been customary to speak of "Section 70 reports". Under Chapter 6 Section 14 of the Seamen's Act, the master of a Swedish merchant, fishing or government vessel must immediately report, to the authority prescribed by the Government, when

1. someone has, or may be assumed to have died or suffered severe physical injury in connection with the operation of the vessel,
2. someone performing other duties on board has, or may be assumed to have died or suffered severe physical injury,
3. someone otherwise than as specified in 1 or 2 has or may be assumed to have drowned from the vessel or died on board and been buried at sea,
4. serious poisoning has or may have taken place on board,
5. the vessel has collided with another vessel or run aground,
6. the vessel has been abandoned at sea,
7. the vessel, its cargo or property outside the vessel has or may be assumed to have suffered serious damage in connection with the operation of the vessel, or
8. the cargo has been significantly displaced.

Under the second paragraph of the subsection referred to, the Government may prescribe that events of importance to maritime safety are to be reported in cases additional to those listed above. The third paragraph states that the master shall notify the National Administration of Shipping and Navigation when a maritime declaration is to take place under Chapter 18 Section 7 as a result of an event that has, or may be assumed to have occurred in connection with the vessel's operation. Further provisions governing the master's duties in the event of a maritime declaration are dealt with in Chapter 18.

A maritime declaration is a court procedure that aims to clarify an event – e.g. a grounding – and its causes. Other than in certain situations more precisely defined in the Act, a maritime declaration, in the case of a Swedish vessel, may be held as a result of an event that has or may be assumed to have occurred in connection with the vessel's operation, if the National Administration of Shipping and Navigation so orders or if other parties, e.g. the owner or master, think it called for (see Chapter 18 Section 7).

In Chapter 18 Section 20 it is pointed out that provisions exist for the investigation from a safety perspective of maritime accidents and other events that affect shipping in the Accident Investigation Act (1990:712), see below.

2.3 The Safety of Shipping Act (1988:49, most recently amended by 1995:69) etc.

The Safety of Shipping Act, like the previous Act (1965:719) concerning safety on vessels, is very much a skeleton law containing rather broad provisions and authority for the Government and other authorities to issue more detailed regulations. The Act was reworked primarily in order to bring legislation on the working environment at sea up to the level that

applies to the working environment on land. Its character as a skeleton law has also been enhanced (prop. 1987/88:3 p. 49 ff.). The Safety of Shipping Ordinance was issued at the same time (1988:594).

The marked international character of navigation is reflected *inter alia* by the large number of international agreements that exist in this field (see also below). This applies not least to questions dealt with in the Safety of Shipping Act and its predecessors. These often highly-detailed international regulations are not, however, referred to in the Safety of Shipping Act, but they are normally found in implementing regulations issued by various bodies, chiefly the National Administration of Shipping and Navigation.

The Safety of Shipping Act contains more detailed provisions governing vessels' seaworthiness, certification, manning, loading, passenger vessels, working environment, protective work, superintendence, rules dealing with legal restrictions on the use of vessels and liability provisions.

The introductory provisions of the Act make it clear that the main rule governing application is that all vessels within Swedish territory should be covered, and Swedish vessels also when outside that territory.

There are rules in Chapter 2 of the Safety of Shipping Act for determining the seaworthiness requirements that are generally discussed in the Seamen's Act. Thus in Chapter 2 Section 1 it is stated that a vessel is seaworthy only if it is so designed, built, equipped and maintained that it offers satisfactory safety from accidents in the context of its purpose and the trade in which it is used or intended to be used. Chapter 2 Section 5 also confers on the Government, or the authority appointed by the Government, authorisation to issue regulations as to how a vessel shall be designed, built, equipped and maintained in order to be considered seaworthy under Chapter 2 Section 1.

The Safety of Shipping Act also contains provisions on the certification of vessels. The certificates here referred to are trading certificates, freeboard certificates and passenger vessel certificates. Authority is also conferred on the Government, or the authority appointed by the government, to determine the appropriateness of a certificate relating to a particular circumstance governed by the Act or by regulations issued in pursuance of the Act, over and above the certificates specified by the Act. Certificates may therefore be of several kinds, and may, for example, constitute proof that a vessel has been found seaworthy on inspection, that the freeboard marks have been properly applied, or that the vessel has been found suitable to carry passengers, and of the maximum number of passengers that the vessel may carry. The definition of each certificate also states which vessels, e.g. in terms of size, the certificates shall be issued for. Certificates are issued by the National Administration of Shipping and Navigation, unless otherwise prescribed by the Government. However, Chapter 1 Section 6 subsection 1 of the Act directly transfers certification duties to a number of named classification societies, always provided that the state and the society in question have entered into an agreement for the issue of certificates for Swedish vessels. The classification societies so named are the American Bureau of Shipping, Bureau Veritas, Det Norske Veritas, Germanischer Lloyd, Lloyd's Register of Shipping, Registro Italiano Navale and the classification society of the Union of Soviet Socialist Republics (Register of Shipping of the USSR). A more detailed account of the work of the classification societies and the agreements entered into by the National Administration of Shipping and Navigation with the different societies will be presented in a later section. However, it is worth quoting at this point from what was said by the Secretary of State on the introduction of this provision. "The activities of the classification society and its confirmation of vessel condition have long been used as the basis for assessing a vessel. In terms of the practical work of inspection, this means that the classification society's activities and assessments as regards hull and machinery do not undergo additional checking by the National Administration of Shipping and Navigation. The supervision exercised by the Administration in these respects consists in

practice of issuing the official certificates that a vessel is to have on the basis of a report from the society" (prop. 1987/88:3 p. 58). Concerning the classification societies listed in Chapter 1 Section 6 subsection 1, the Secretary of State also noted that these all had good reputations and the required expertise in the field. "However, the circumstances may change. It is therefore important that the Swedish authority that is most directly responsible, the National Administration of Shipping and Navigation, is given the opportunity regularly to monitor the operations of the societies, in order to check that adequate quality levels are adhered to. Matters affecting such a monitoring function must be adjusted by agreement with the societies. Certain other questions should also be decided by agreements, e.g. liability in the event of error or neglect by the societies" (prop. 1987/88:3 p. 59). Which questions should be decided by agreement in this manner is therefore a matter left to the judgement of the Administration. The areas left open for agreement delegation to the societies are inspection, issue of certificates and establishment of minimum permitted freeboard (Safety of Shipping Ordinance Chapter 1 Section 4, Chapter 3 Section 1 and Chapter 7 Section 10).

This skeleton law character is also clearly evident in the section on inspection in Chapter 10. The previous Safety of Shipping Act contained a large number of detailed provisions as to when inspection proceedings should take place and what they should include. Since these regulations to a greater and greater extent reflect the content of international conventions, which are revised relatively often, and since the rules also deal mostly with the kind of matters with which it would hardly be appropriate for parliament to concern itself on each occasion, the Secretary of State felt that these provisions might with advantage be incorporated in statutes of a lower level (prop. 1987/88,3 p. 102). It is therefore assumed that more detailed provisions as to how the inspection of vessels etc. shall take place in the future are mainly to be issued through supplementary regulations. The principal responsibility for inspection rests with the National Administration of Shipping and Navigation. However, in matters that affect the working environment, such inspection shall take place in co-operation with the National Board of Occupational Safety and Health.

In connection with what has been stated concerning duty to report under Chapter 6 Section 14 of the Seamen's Act, the National Administration of Shipping and Navigation, through Chapter 13 Section 5 subsection 2 of the Safety of Shipping Act, cf. Safety of Shipping Ordinance Chapter 9 Section 2, been authorised to prescribe duty on the part of owners and masters not only to report accidents, incidents or cases of sickness over and above what is stated in the Seamen's Act, but also damage that has occurred or measures that have been taken that are of importance for a vessel's seaworthiness. Statutory duty to report to the National Administration of Shipping and Navigation is also incumbent on other staff. Under Chapter 6 Section 1 of the Safety of Shipping Ordinance, the employer must therefore submit a report if an accident or any injurious effect of work has led to death or severe personal injury, or simultaneously affected several persons working on board a ship. The same applies to incidents that have involved a serious danger to life or health. Under Chapter 6 Section 2 of the same Ordinance, it is incumbent on a doctor who in the practice of his profession becomes aware of diseases that may have a connection with work on board ship to report this to the National Administration of Shipping and Navigation. Should a vessel cease to be classified by any of the classification societies listed in Chapter 1 Section 6 subsection 1 of the Safety of Shipping Act, the owner shall immediately, under Chapter 7 Section 7 of the Safety of Shipping Ordinance, report this to the National Administration of Shipping and Navigation or, if the vessel is abroad, to the Administration or to the Swedish foreign authority in the port at which it is estimated that the vessel will next call.

At present, a proposal is being circulated for consideration to the bodies concerned for a change in maritime safety legislation in order to implement the new international provisions of the International Safety Management Code (ISM).

2.4 The ISM Code

Most of the regulations and provisions that have been drawn up, both international and national, have traditionally been of a technical nature. However, various studies have shown that accidents are caused by "the human factor" in 70 to 80 percent of cases. This circumstance has attracted more and more attention. It is against this background that operative checks have been considered more and more important. The well-known accident with fire on board the vessel Scandinavian Star in April 1990 threw the matter into relief, and the development work within IMO was intensified, in particular through initiatives by the Nordic navigation authorities. This work has led to the production of the so-called ISM code - the International Management Code for Safety, Operation and Pollution Prevention. Another reason for the introduction of this code is that the shipowners thereby gain a tool for checking on the achievement of objectives as regards safety. This type of quality assurance work has a long tradition in industrial and institutional arenas, for example the ISO 9 000 system. Similar questions have also been dealt with in the past, e.g. in the safety legislation on air traffic and nuclear power. The regulations of the ISM code are based on an aggregate view - and co-operation between - shipowners, shore personnel, vessel and crew. The code stresses the owners' responsibility for the best possible safety organisation on board. There must be a safety officer at management level. Requirements are also posed for the shipping company to have a safety system, a safety policy and an anomaly reporting system in which accidents and incidents are documented and reported within the organisation. Requirements therefore exist for incident reporting over and above that which follows from Chapter 6 Section 14 of the Seamen's Act. There are also requirements for procedures to prevent the occurrence of emergency situations, for emergency situations that have already arisen, and for internal safety audits to be carried out. When a shipping company has introduced provisions in accordance with the ISM code, the National Administration of Shipping and Navigation - or following delegation, a classification society - shall check and verify that the work, both on the shipping company premises and on its vessels, takes place in accordance with the intentions of the ISM code. When this has been checked and approved, the supervising authority or classification society shall issue a "Document of Compliance" to the shipping company and a "Safety Management Certificate" for each individual vessel within that company. The Convention becomes internationally binding in 1998, with a staged implementation for different types of vessel up to 2002. In the case of Swedish shipping companies and vessels, and of certain foreign shipping companies having vessels that operate regularly in Swedish ports, it is however intended that these provisions shall become effective as from 1 July 1995.

2.5 The Accident Investigation Act (1990:712), most recently amended by 1995:77) etc.

In the Act and in the Ordinance on the investigation of accidents (1990:717) issued in association with it, there are regulations governing the investigation of accidents and near-accidents from a safety standpoint.

Among the accidents that are to be investigated under the Act are mentioned maritime accidents. These are defined in Section 2, subsection 2 (2) of the act as accidents in the use of merchant vessels, fishing vessels or government vessels, the result of which has been that

a) several persons have died or been seriously injured,
b) the vessel or property not carried by the vessel has been comprehensively damaged, or extensive damage has occurred to the environment, or

c) the vessel has disappeared or been abandoned at sea.

Under Section 2 paragraph 2, near-accidents of the kind just mentioned are to be investigated, if the incident involved serious danger of an accident, or if the incident suggest a substantial defect in the vessel, or other substantial defects in terms of safety. Under Section 3, the Government may prescribe, or decide in individual cases, that an investigation under the Act shall be carried out even if an accident or incident is not of such a serious nature as that referred to in Section 2, but an investigation is still called for from the safety standpoint. One explicit aim of an investigation under the Act - in addition to clarifying the course of events and the cause - is to obtain data for deciding on measures intended to prevent a recurrence of the event, or to limit the effect of similar events (Section 6, 2).

Investigation under the Accident Investigation Act is carried out by the authority appointed by the Government. The Government may also prescribe that the authority may appoint someone else to carry out the investigation. In the Accident Investigation Ordinance, the Government has prescribed that investigations of accidents and near-accidents under Section 2 of the Accident Investigation Act shall be carried out by the Board of Accident Investigation. Under the Ordinance, the Board of Accident Investigation also enjoys the right of delegation for events where a safety investigation is called for under the Act, but which are not of the kind referred to in Section 2 of the Act. In the case of events that affect shipping other than military shipping, such an investigation shall, under the Ordinance, be carried out by the National Administration of Shipping and Navigation. The Ordinance prescribes that the Board of Accident Investigation shall deliver a report of its investigation to the supervisory authority whose area of responsibility is affected by the event. However, it is the National Administration of Shipping and Navigation that is responsible for reporting to IMO under provisions governing the investigation of accidents in those international agreements to which Sweden is party. Section 20 subsection 1 of the Ordinance prescribes that "Section 70 reports" must be communicated to the supervisory authority at once. From Section 20 subsection 2 it follows that a master shall, at the request of the supervisory authority, also report in cases other than those referred to by the first subsection, if an event has occurred or may be assumed to have occurred that may be of importance for maritime safety. It is also stated in Section 20 subsection 3 that more detailed regulations on reporting under the first or second subsections may be issued by the supervisory authority following consultation with the Board of Accident Investigation. Persons who intentionally or through lack of care infringe subsections 1 or 2 of Section 20 or regulations issued in pursuance of subsection 3 of Section 20 will be sentenced to fines, unless such infringement is to be regarded as trivial (Section 27). Under Section 21 of the Ordinance, the police authority, customs authority and coastguard must inform the supervisory authority immediately on becoming aware of accidents such as those referred to in Section 2 subsection 1 of the Accident Investigation Act. A duty is also imposed on the same authorities to inform the National Administration of Shipping and Navigation of accidents to pleasure vessels, if such accidents have involved death or severe physical injury. In the case of events involving Swedish vessels abroad, Section 23 of the Ordinance imposes on salaried Swedish foreign authorities the duty to report to the supervisory authority, where appropriate. Where foreign vessels founder inside Swedish maritime territory, the National Administration of Shipping and Navigation shall immediately inform the nearest consulate of the foreign state or, if a consulate does not exist, its diplomatic representation. In the case of events referred to in Section 2 subsection 1 (1-3) of the Accident Investigation Act, the supervising authority shall also satisfy itself that the event is known to the police authority, and see that the police authority is informed as to who is investigating the event. The supervising authority shall also inform the Board of Accident Inspection of such events. If the Board so decides, the authority shall also inform the Board of other events that might be considered to be of importance to maritime safety.

In pursuance of Section 20 subsection 3 of the Accident Investigation Ordinance, the National Administration of Shipping and Navigation has issued a decree containing regulations governing the reporting of maritime accidents and notice of maritime declaration (SJOFS 1991:5).

In one of its service regulations (3/92), the Marine Surveying Department has also issued instructions for investigation and reporting of maritime accidents by the National Administration of Shipping and Navigation.

According to the decree, reporting is to take place of events under Section 70 of the Seamen's Act (now Chapter 6 Section 14 of the 1994 Seamen's Act), and in certain other cases specified in the decree. Such a report shall immediately, in the most rapid and convenient manner, be delivered to the nearest marine surveying department area, or to the marine surveying department area within which the vessel has its home port. Where vessels find themselves on the other side of a certain line, the report may instead be delivered to the Head Office, Investigation Section, of the National Administration of Shipping and Navigation. Following the first report, a written report shall be sent to the Head Office, Investigation Section of the Administration as quickly as possible. This report shall be drawn up using a special form. Annexes to the decree contain various forms, together with instructions as to how they are to be completed.

Service regulation 3/92 provides a large number of supplementary provisions on reporting and investigation. Under this regulation, the Board of Accident Investigation and the National Administration of Shipping and Navigation have reached an agreement in which the expressions "several persons" and "extensive damage" in the Accident Investigation Act are defined as "c. 5" and "a value greater than 20 Mkr.". This is in order to provide a rule of thumb for which of the authorities would normally be responsible for investigation.

Of special interest for this investigation are also those sections in service regulation 3/92 called *Examination and analysis*, section 5, *Creation of investigation reports*, section 9, and *Prosecution of decisions*, section 12.

Section 5 states *inter alia* that the Investigation Section shall examine and analyse investigation material received from a maritime safety standpoint. The section's investigating officers shall draw up an investigation report that is to include a description of events, relevant facts relating to vessels, persons and external circumstances involved, analyses of factors important to the event, probable courses, which provisions and norms have been infringed, measures taken and proposals for action arising from the accident.

One of the consequences of part 9 is that the investigation report is created by Director of Marine Safety, or following delegation, by the head of the Investigation Section. Investigation reports from the Board of Accident Investigation and other important reports shall be delivered at a meeting with the section heads of the Marine Surveying Department (safety meeting). Such a safety meeting shall also be attended by representatives of the departments within the National Administration of Shipping and Navigation that may be affected, or be capable of throwing more light on the matter. The individual who drew up the report or took part in the Board of Accident Investigation inquiry will deliver the report. Safety meetings shall also be held in order to check up on what measures have been taken arising from the recommendations of previous investigation reports.

Safety meetings will be called by the head of the Investigation Section.

Under part 12, the head of the Investigation Section will be responsible for following up recommendations etc. in reports, and decisions taken at the safety meetings, unless otherwise agreed at the meetings. The head of the Investigation Section is also responsible for following up matters passed to the prosecuting authority for possible action. The Director of Marine Safety shall be informed of the results.

3 International Organisations and Agreements

3.1 Introduction

By its very nature, navigation as such poses requirements for international provisions in matters such as maritime safety and prevention of marine pollution. International work is carried on chiefly by two bodies, namely the International Maritime Organisation (IMO) and the International Labour Organisation (ILO).

3.2 The International Maritime Organisation (IMO)

The decision to form IMO had been taken as early as 1948, but the first meeting of the Organisation was not held until 1959. Originally it was known as IMCO. IMO has its headquarters in London, and consists today of 149 member states. Its supreme decision-making body is its Assembly, which meets every other year. Between these Assembly meetings, the Council meets three times a year. 32 countries are elected to this Council and Sweden is a member for the sixth year in a row. There are a number of committees subordinate to the Council, two of the most important of which are the Maritime Safety Committee (MSC) and the Marine Environment Committee (MEPC). MSC deals with various technical aspects of navigation and its work is in turn subdivided between several sub-committees, e.g. those dealing with life-saving, stability and safety matters. It may also be mentioned that MSC has recently appointed a special expert panel to review the maritime safety of roll-on roll-off ferries (ro-ros). This work is to be presented at the meeting of the Maritime Safety Committee in May 1995. It is the brief of MEPC to co-ordinate IMO's activities in respect of preventive measures and checks on oil emissions and other emissions at sea. Agreements within IMO are reached via conventions and resolutions. IMO has no powers of sanction, but all member countries that ratify a convention undertake to incorporate it into their national codes. This may take place either through a direct implementation of the convention or through separate regulations. Sweden uses the latter solution almost exclusively. In certain IMO conventions, ratification also involves a commitment that all vessels flying the flag of the country are to comply with the rules stipulated by the convention in question. Since 1959, IMO has approved more than 40 conventions and 700 resolutions. The most important conventions are SOLAS (International Convention for the Safety of Life at Sea, 1974), MARPOL (International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto), COLREG (Convention on the International Regulation for Preventing Collisions at Sea, 1972), LOADLINE (International Convention on Load Lines, 1966) and STCW (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978). SOLAS deals with such matters as vessel design, outfitting and certification from a safety standpoint. SOLAS also includes the new ISM (International Safety Management) code. This code, which is dealt with in more detail above, aims to provide an international standard for safe management and operation of vessels and for protecting the environment. A draft bill on this matter has just been circulated for consideration, and it is expected that a government bill will

come before parliament proposing amendments to the Safety of Shipping Act at the end of March 1995. MARPOL deals with various forms of marine pollution, while COLREG concerns itself with rules governing sea traffic (rules of the road at sea). LOADLINE regulates load-line provisions (freeboard) and STCW contains norms for training, certification and watch-keeping for seamen. Sweden has adopted all the above conventions. The decisive work of formulating proposals and regulation texts is carried out in the various member countries. As an example, we may mention that the work of the ISM code was to a great extent done by the Nordic navigation authorities. A problem today is that many countries fall short as regards incorporation of and compliance with ratified conventions. MSC has a sub-committee that works exclusively on questions of how the conventions passed by IMO might better be complied with and incorporated into the legislation of the various countries. These deficiencies have in fact led to certain countries, which required stricter regulations, introducing their own special provisions, e.g. USA, Great Britain and the Nordic countries.

3.3 International Labour Organisation (ILO)

The UN body ILO has its headquarters in Geneva. In ILO, matters dealt with include the social conditions of persons employed on board ships, which is, of course, of great importance to maritime safety. The most important convention in this respect is No. 147 (Convention concerning Minimum Standards in Merchant Ships). This convention prescribes a number of minimum norms for merchant vessels relating to such matters as dwelling standards, hygiene and health protection. Sweden has adopted this convention. It became effective on 28 November 1981. At present, work is going on within ILO on matters including working hours and the importance of the fatigue factor in accidents.

3.4 EU

The fact that matters of navigation (and primarily those that affect safety and environmental protection) are given a high priority by the EU is illustrated *inter alia* by a document dated 24 February 1993, "A common policy on Safe Seas" (COM93/66). This refers to the EU's dependence on reliable, cost-effective and safe navigation, for which reason its maritime transport policy must ensure that such services are carried out at a minimum level of risk for everyone directly or indirectly involved and for the marine environment. To this end, the EU has produced a programme of measures:

- measures to establish a uniform implementation of existing international rules within the EU,
- measures towards a tougher and more effective port control system, including a uniform enforcement of the international provisions - for all vessels, irrespective of flag - by the coastal states in respect of navigation in EU waters,
- measures to promote a coherent and harmonised development of navigation systems and traffic superintendence, in order to bring maritime safety into the electronic age, with special reference to traffic measures in environmentally sensitive areas,
- measures to support international organisations in order to reinforce their primary role as legislators at an international level.

Just as important are measures to improve the training and qualifications of crews in order to tackle the human error problem, which remains the main cause of accidents. An intensive research programme can also contribute to the general aim of greater maritime safety.

The EU Council of Ministers has also reached a decision on a regulation for the coasting trade, under which it will become successively easier for member state' vessels to transport goods by sea within the EU. The Council of Ministers has also adopted a resolution on measures that should be taken to increase the safety of ro-ro ferries. One of the recommendations of this resolution is that member states should intensify the work of IMO in a number of fields. Many of the current EU Commission proposals are concerned with maritime safety matters.

3.5 Organisation for Economic Co-operation and Development (OECD)

As late as 24 May 1994, OECD issued a statement to the effect that its member states wished to maintain an open market for international shipping based on the principles of free and just competition. One of the conditions of this was said to be that vessels must comply with internationally agreed rules and provisions affecting safety on ships, persons on board and protection of the marine environment. It was also stated that the operation of vessels that do not comply with the above provisions might involve inappropriate favouritism and thereby an unacceptable competitive distortion.

3.6 Regional co-operation

One example of international co-operation at regional level is that of the Helsinki Commission (HELCOM). Part of the Commission's work deals with the prevention of marine pollution by vessels in the Baltic. The Convention was applied by Sweden in Swedish maritime territory from the beginning of 1977.

3.7 Port state control

As one of several European countries, Sweden in 1982 signed the "Paris Memorandum of Understanding on Port State Control", which is a port state control agreement. This co-operation includes the maritime authorities of Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden and Great Britain. Representatives and observers from the IMO, IMO, EU and the maritime authorities of the USA and Canada also take part.

This agreement arises from the fact that the parties to it had noticed that certain flag states (i.e. states in which vessels were registered) were flouting their obligations in terms of inspecting the vessels registered in those countries.

Through the agreement, the participating countries have undertaken to check foreign vessels frequenting their ports by "port state control". The objective is .hat 25% of the foreign vessels calling at the port state during the course of the year are to be inspected. The primary purpose of the checking is to discover whether vessels comply with the requirements of a number of conventions, e.g. SOLAS, which constitute internationally accepted safety standards. Checking includes verification of whether the vessel has valid certificates. If such

is not the case, or there are other reasons for believing that the vessel substantially fails to comply with standard requirements, a more detailed inspection is carried out. If deficiencies or faults are discovered, this may result in an injunction to carry out measures within a certain time, or use of the vessel will be prohibited. The checks carried out, together with any remarks, are reported in code form to a central computer in St. Malo, France. The countries participating in port state control have access to the information in the data system.

In 1991, the IMO adopted a resolution in which, with reference to the "Paris Memorandum", states in other parts of the world are encouraged to enter into corresponding agreements. Such accords now exist in Latin America, the Asia/Pacific region and in the Caribbean. The resolution (682) states that implementation is primarily the responsibility of the flag states, but in certain cases it may be difficult for the flag states to exercise full and regular control over certain vessels that fly their flag, e.g. such vessels as do not regularly call at the ports of the flag state.

As a consequence of the ISM code, the IMO has also adopted resolution A.742(18), Procedures for the Control of Operational Requirements Related to the Safety of Ships and Pollution Prevention, under which operative checks on the capacity of the crew to maintain satisfactory safety standards on board is also to be checked by means of port state control.

Since 1998, operative checks have been carried out on all passenger vessels that regularly serve Swedish ports. These checks are carried out both by agreement and entirely without warning. At a conference of ministers in Copenhagen in September 1994 on port state control co-operation, it was stressed that port state control must be intensified to weed out inferior vessels. However, the point was underlined that the responsibility for the fulfilment of maritime safety requirements by a vessel is, and remains, that of the flag state.

4 Organisation and functions

4.1 The National Administration of Shipping and Navigation

The forerunner of the National Administration of Shipping and Navigation, the National Board of Shipping and Navigation, was set up in 1956 through an amalgamation of the then National Administration of Pilotage, Lighthouses and Buoys and the National Hydrographic Office. The new authority was also given certain areas of jurisdiction that had formerly been the province of the Swedish Board of Commerce and the then National Road Board. The National Administration of Shipping and Navigation, which was given its existing name in 1969, was converted into a public utility in 1987 and was re-organised in 1988. Since 1975, its central administration has been located in Norrköping, where some 400 of the Administration's c. 1,400 staff now work. The Administration forms part of the total defence system and is the authority responsible for preparedness planning in the field of maritime transport.

The National Administration of Shipping and Navigation is managed by a board that includes the Director General of the Administration. In addition to certain staff bodies, the Administration has six departments, namely the Marine Traffic Department, the Hydrographic Department, the Ice-breaking Department, the Marine Surveying Department, the Technical Department and the Financial/Administrative Department (see also chart A).

In regional terms, the country is divided into 13 marine traffic areas, which have pilot stations and other installations, and three marine surveying areas. There is also a Marine Survey Department office in Rotterdam.

Under its current brief (1988:14, most recently amended 1994:1349), the Administration is to concentrate its work primarily on merchant shipping, but it is also to consider the interests of fishing, the Navy and pleasure boat traffic. Sources of finance for its activities include charges levied on shipping.

One of the Administration's tasks is to be responsible for the superintendence of maritime safety. As we saw in the previous section, this activity is regulated primarily by the Safety of Shipping Act and the Safety of Shipping Ordinance issued in association with it, by the Accident Investigation Act and by the brief of the Administration. Legislation on the carriage of dangerous goods and on measures to deal with water pollution from shipping also plays a part. The inherently international nature of shipping means that safety at sea is also regulated through international accords and through the Administration's participation in international organisations concerned with navigation questions.

4.2 The Marine Surveying Department

As stated above, the Marine Surveying Department is one of six departments of the National Administration of Shipping and Navigation. In terms of organisation, the Department is answerable to the Administration's Director General. However, the Director of Marine Safety, who is head of the Department has, through a number of Acts and decrees, been given a range of decision-making powers, and the Department therefore has, to a great extent, an independent status, in particular within the work of maritime safety.

The Director of Marine Safety is appointed by the Government on the recommendation of the board of the Administration. Authority to deputise for the Director of Marine Safety is also conferred by the Government at the suggestion of the board.

The Marine Surveying Department carries on its activities at its head office in Norrköping, in the three regional surveying areas and at the Rotterdam office. The staff number about 120, of which 60 or so work at the Head Office and about the same number divided between the different surveying areas. The marine surveying areas have area offices in Stockholm, Gothenburg and Malmö.

The Marine Surveying Department is centrally organised in sections with varying areas of responsibility. These are the Planning Section, the Marine Technology Section, the Marine Operation Section and the Investigation Section (see also chart B). The Department also has an international secretariat that is responsible for international questions relating to vessel safety and environmental protection, and contacts with international organisations, e.g. IMO. Although the operation is divided into sections in organisational terms, the intention is that much of the work is to take place through co-operation between officers with differing expertise from different sections.

At present, the sections of the Marine Surveying Department have the following areas of responsibility. The Planning Section is responsible for operational planning, budget, personnel, organisation, jurisprudence, ADP and tonnage measurement of ships. The area of responsibility of the Marine Technology Section relates to the safety design, outfitting and maintenance of vessels, including stability, freeboard, strength, fire protection, accommodation, supplies storage, life-saving and navigation equipment and the carriage of hazardous goods and industrial safety. The Marine Operation Section deals with questions of manning, the rights of those employed on board, crew roster and working environment matters. Finally, the area of responsibility of the Investigation Section is investigation of maritime accidents and personal injuries suffered in the course of service on board, accident statistics and matters relating to suspicion of infringements of safety and environmental protection regulations.

According to investigations, new general service regulations for operations by the Marine Surveying Department are being drawn up. The organisation and areas of responsibility may be modified in some respects.

The brief of the National Administration Of Shipping and Navigation prescribes that the Director of Marine Safety shall be responsible for and determine questions involving the establishment of technical safety standards for vessels, life-saving organisation standards on board vessels and safety standards for the sailing arrangements of the Administration and others for which the Administration is responsible.

This also applies to questions of superintendence of compliance with established safety standards, and the matters concerned with maritime accident investigation for which the Administration is responsible.

The brief also permits the Director of Marine safety to delegate his right of decision to other officers of the Administration to be degree that is appropriate.

The National Administration of Shipping and Navigation working programme (approved on 20 December 1989) prescribes that the organisation of the Administration shall be based on a system of far-reaching decentralisation and delegation, *inter alia* in order to achieve the Abstraction's objectives as a safety authority. The Working programme also contains more detailed regulations dealing with the area of responsibility of the Marine Surveying Department. It is thus prescribed that the following matters are the responsibility of the Department.

- Issue of regulations in pursuance of the maritime safety, water pollution, manning and seamen's social legislation

- Inspection of vessels under the above legislation
- Type testing of pleasure boats
- International matters, to the extent that these are not the responsibility of another department or staff
- The Seamen's Register
- Questions of authority
- Crewing regulations for pleasure vessels
- Tonnage measurement of ships
- Investigation of maritime accidents
- Safety standards for channels and sailing arrangements
- Superintendence of compliance with the regulations on the reporting of maritime accidents and ordering of maritime declarations
- Infringement of Acts or other statutes on safety at sea
- Examination, analysis and statistics of maritime accidents that have taken place and cases of accident in seamanship.

The working programme also draws attention to the powers of decision specially vested in the post of Director of Marine Safety under the Safety of Shipping Act, the brief of the Administration and the Act (1980:424) dealing with water pollution by vessels.

5 Scandinavian Relations

5.1 Introduction

Against the background of that part of the present assignment that deals with examination of how the exchange of information takes place between marine surveying departments or corresponding bodies in the field of maritime safety in our local region, we here present brief details of the organisation and operation of the Nordic maritime authorities in those contexts that may be relevant in the present context.

5.2 Finland

The organisation of the Finnish Board of Shipping is very similar to that of its Swedish opposite number. The organisation of the Finnish Board of Shipping may be seen in chart C. As this indicates, the Board comes under the Ministry Of Traffic. One of the five operational departments of the Board - the Marine Department - includes the Marine Surveying Office. At regional level, there are four independently-functioning maritime districts. These districts are also divided into sectors, one of which carries on inspection activities (the Marine Surveying Sector). However, unlike the situation in Sweden, the districts are not subordinate to the Marine Department, but are directly answerable to the Director General.

Inspection of newly-built or newly-registered shipping takes place centrally through a basic survey team appointed by the Board of Shipping. However, the periodic surveys and all port state control are carried out by the regional bodies. Deficiencies revealed during these checks are normally reported to the central body only if they are so serious that the use of the vessel is prohibited. Relevant remarks are also entered in a data register, which may also be accessed by the central authority. All certificates are issued by the central authority on the basis of the regional bodies' survey reports.

Agreements have been concluded or are in the process of being concluded with the five large classification societies for various kinds of survey. The Board of Shipping has made it a requirement that the societies sign a liability clause before the right to carry out official assignments is conferred on them. The Board also poses certain minimum requirements of the societies in accordance with a resolution adopted by IMO. Thus, a certain number of vessels must have been classified by the society. Furthermore, the society shall have a worldwide organisation, with "exclusive surveyors", and the society shall draw up its own technical regulations.

5.3 Denmark

The organisation of the Danish Board of Shipping may be seen in chart D. The Board is subject to the Ministry of Industry and Co-ordination and is - primarily through various councils and committees - considerably more closely connected with the Ministry than any of the other Nordic equivalents. In regional terms, there are two districts, East and West, with a total of nine local offices, one in the Faroes and one in Greenland.

The Board of Shipping directs its work towards five different principal objectives, namely safety, working environment, ship registration, training and preparedness. In 1993, training activities accounted for nearly 60 percent of the Board's financial resources. The figure for safety work was c. 20 percent.

Broadly speaking, activities at the Head Office of the Board of Shipping are organised as follows. The *Regulations Office* draws up and develops rules and technical regulations, and produces directions to help with the interpretation of various technical regulations. The Office also monitors the co-operative agreements with the recognised classification societies. Much of the regulations work takes place through IMO and EU, but the Office also follows up observations made in the course of its own inspection work. The *Technical Office* organises the surveying of newly-built and newly-registered vessels of a gross registered tonnage greater than 20. Surveys are carried out by the regional offices, but the Technical Office might, for example, undertake a survey abroad. The Technical Office also organises the port state control carried out by the regional offices. The Office also monitors compliance with current technical regulations, and deals with the type approval of safety devices etc. The *Legal Office* provides the Board with legal and general advice. If necessary, the Office can also assist the prosecuting authorities in matters of prosecution. In addition, the Office prepares legislation and deals with co-ordination with EU regulations and other international undertakings.

The Office is also responsible for general directions, and provides interpretation advice on various matters. The *Register of Shipping* comprises two registers, one general and one international. The *Training Office*, which organises training at a large number of marine training institutions and superintends a small number of private schools of navigation, issues seaworthiness certificates and lays down minimum crew requirements, though only from the safety standpoint. There is also a special crew committee competent to examine these questions.

The *Nautical Office* is responsible for such matters as rules of the road at sea, upkeep of training ships and ice-breaking service. The unit that is perhaps of most interest for this investigation is the *Detection and Control Unit*. This unit, made up of some eight persons, is wholly independent within the Board of Shipping, and directly answerable to the Director of Marine Safety. The Unit's area of responsibility includes investigating and dealing with maritime accident cases, management of maritime declarations and maritime accident statistics and recommendations for new rules or directions. The Unit is also responsible for the internal quality control of the Board of Shipping. In the investigation of maritime accidents and incidents, the Unit functions almost like an accident investigation board, collecting on its own initiative such information from authorities and others as may be of interest in the work of investigations. The investigation work of the Unit is intended to clarify what has happened, how it happened and why it happened. The Unit must also reach an opinion as to what can be done to prevent similar events, e.g. through some form of regulation amendment. The investigation work is carried out by the Unit's inspectors, who act independently of other control operations. The Unit is entitled to take part in maritime declarations and put questions. The Unit participated during most of the 85 maritime declarations that took place in 1993. In recent years, there has been an increase in the number of accidents investigated. This may be to some extent due to the fact that the Unit has begun to take a more active role, partly through routine checking of the accident details published in Lloyd's List. If a crime is suspected, the matter is passed to the legal department. In addition to a description and explanation of the event in question, the Unit's shipwreck reports contain pointers and recommendations, and it is these that may lead to new regulations or give rise to new directions, e.g. to the local surveying offices. An important part of the Unit's work is to ensure that the recommendations issued are put into practice, e.g. in the case of introduction of a rule amendment or implementation of checks. Under Danish law, maritime accidents

shall be reported by shipowners and masters. Other sources of information are the press, the police and the military frontier guard. In order to obtain information - e.g. through the trade unions - the Board of Shipping always seeks to protect the anonymity of its sources. There is a contact person in each union on both the employer and the employee side, and these are obligated to observe secrecy. Every accident investigated receives a special heading in the Board of Shipping "News from the Board of Shipping", which is published four times a year. The accident reports are also used as teaching material at the schools of navigation. Since the Unit also functions as an internal control body for alleged abuses within the entire area of work of the Board of Shipping, its free and independent position is extremely important.

Approved classification societies may issue most types of certificate, e.g. for hulls, machinery and loadlines. At present, six societies have been approved: the five that are generally recognised and the Japanese Nippon Kaiji Kyokai. The requirements regularly posed for approval are that the society should have offices in the country and maintain at least one exclusive surveyor. In addition, a Danish vessel shall have been classified with the society, and the Board of Shipping shall have a seat on the society's technical committee. The Board carries out an annual review of the approved societies and if necessary one or more societies may be summoned to attend special meetings.

5.4 Norway

From 1994, the Norwegian Directorate of Shipping and Navigation was reorganised, as shown in diagram form in chart D.

Since 1988, the Directorate has been under the control of the Ministry of Foreign Affairs. In matters affecting the prevention of marine pollution by vessels and the protection of the marine environment, the Directorate is also responsible to the Department of the Environment. Actual monitoring of vessels takes place through the regional organisation, consisting of 18 ship control stations divided into six districts. There are also ship control offices in Rotterdam, Miami and St. Nazaire.

The Head Office of the Directorate is organised as follows. The Director General has a staff at his disposal. There is also a separate quality chief, who is responsible for internal quality control, including audits and follow-ups. Then there is an Administrative Department and a Seamen's Department dealing *inter alia* with matters affecting certification and training.

The Inspection Department, with its operative and strategic units, administers and co-ordinates port state control and inspection of the fleet registered in the Norwegian international register of shipping (the NIS Fleet), draws up checklists, develops methods of monitoring, creates statistics and follows up the inspection reports. Otherwise, the new structure has departed from a traditional form of organisation divided by profession and instead - partly as a result of experience gained from the Alexander Kjelland accident - created departments each of which are responsible for a particular vessel category, namely fishing vessels, cargo vessels, passenger vessels and offshore units.

Much as in Denmark, the marine surveyors - who investigate maritime accidents etc. - have an independent position directly under the Director General. These inspectors, who are seven in number and located at six centres have, for the exercise of their authority, been given both police powers and the right to initiate prosecutions. As in Denmark, Norway also has an international register of shipping (NIS). When the register was introduced in 1987, discussion took place as to the extent to which delegation to the classification societies was desirable. The Directorate has a right prescribed in law to make use of personnel from recognised classification societies for its superintendence, and it also follows from the legislation that the

superintendence exercised by classification personnel in place of the Directorate is carried out under the same responsibility as for a government officer. This development has led to all surveying and certification being delegated to the five recognised societies for cargo vessels of a gross registered tonnage over 500 and registered in NIS. The sole exception is the fixing of safe manning levels, which is carried out by the Directorate. Since the authority considers that it has neither the resources nor the expertise to replace the classification societies, it has been thought a better solution to exercise control by quality assurance of the societies and by carrying out spot checks on vessels. The Directorate has a right fixed by agreement to superintendence in all circumstances that affect the societies' performance of the official checks delegated to them. The Directorate carries out annual, unannounced inspections on 25 percent of all NIS vessels, and the classification societies are also audited annually in one area or another, sometimes at the Head Office and sometimes at one of the regional offices.

For example, twenty or so system audits were carried out during 1993. The Directorate has agreed with the societies that only so-called negative information, which means reports of faults and deficiencies and other anomaly reports, need be submitted to the authority. This selection has been applied so that the authority is not swamped with documents. The Directorate also has an online connection with Det Norske Veritas.

The agreement with the classification societies has been updated, and from April 1994 includes extra requirements, e.g. that the societies must have a system of quality assurance, such as ISO 9,000 or equivalent. The Directorate summons the classifications societies to a joint annual review, at which past and current events and experiences are discussed.

6 The Classification Societies

In recent years, the classification societies have been subjected to increased criticism, and the integrity and quality of their inspection work in particular. The question of the role of the classification societies in matters of maritime safety as such is outside the frame of reference of the present investigation assignment. But since it may be of importance as a source of information in the work of maritime safety within the Swedish National Administration of Shipping and Navigation, reasons can nevertheless be found for giving some account of the background to the societies and their chief functions.

The breakthrough of industrialism and world trade during the liberalism of the 19th century led to maritime safety, as in the case of much technical and financial development, being left mainly to commercial forces. The seaworthiness of vessels was therefore a matter for shipping's financial interests, such as owners, shippers, cargo owners and insurers. The insurers more than anyone else needed an independent and technically competent organisation objectively to assess a vessel's seaworthiness and thereby to assist in estimating the risks of commercial ventures.

The oldest classification society, Lloyd's Register of Shipping, was formed as early as 1760, and most of the other large societies were established during the nineteenth century. The activities of the societies have been successively expanded, and other areas of work have been added, e.g. offshore operations. Certain societies have long been active in equipment and structural testing and approval, as well as in certain sectors of manufacturing industry and road transport. Nowadays, the societies also concern themselves with quality assurance work and risk analyses. There are now more than 40 different societies. Eleven of these form an international body, the International Association of Classification Societies (IACS) which has, *inter alia*, observer status within IMO. A quality assurance programme for the societies that are members of the co-operative organisation has also been implemented through IACS. Among IACS members are the five societies considered acceptable by all shipping nations, namely the American Bureau of Shipping, Bureau Veritas, Det Norske Veritas, Germanischer Lloyd and Lloyd's Register of Shipping.

The classification societies are often run in the form of foundations, etc. and it is also characteristic that there are no requirements for the operation to be profit-making.

The classification societies carry on their operations by agreement with the owners. A vessel is classified in accordance with its area of use and the trade for which it is intended. In these respects, the vessel shall comply with the requirements in such matters as hull and propulsion machinery as the classification society concerned may require. It is the function of the societies to check that vessels are built and fitted out in accordance with these requirements, and that the standard so determined is maintained during the vessel's use in accordance with the classification.

The rules of the societies - which to a great extent mirror the convention regulations and recommendations drawn up within IMO - are continually updated in accordance with experience gained and developments in terms of technology and materials. A more detailed account of the activities of the international classification societies may be found in reports such as *Samordnad säkerhetstillsyn av fartyg* ["Co-ordinated safety inspection of vessels"] (Ds K 1981:17) and *Tillsyn av fartyg* ["Inspection of vessels"] (Ds K 1984:4).

The large societies have more than adequate resources for their technical safety work, and their research and development departments are highly qualified. In addition, they have

access to experience from a worldwide survey organisation. It is against the background of this "superfluity" of resources as compared to the national superintendence authorities that the societies' calculations, measures and confirmations of a vessel's condition are regularly accepted and used as a basis for the assessment of a classified vessel. In practical terms, this means that the societies' assessments, primarily as regards hull and machinery, are normally subject to no further checking by the national authorities responsible for superintendence.

Many countries, including those that lack an independently-functioning navigation authority, have given up all vessel superintendence to the classification societies.

The National Administration of Shipping and Navigation has entered into agreements with all the five recognised societies with respect to certain international conventions.

These agreements deal with survey and inspection in accordance with MARPOL, Loadline and SOLAS, and the issue of international oil protection certificates, national freeboard certificates and structural safety certificates. The agreements ensure that the Administration is provided with such facilities as access to all relevant information that is used as a basis for the society's work under the agreement.

7 Deliberations and proposals

7.1 Introduction

Against the background of serious maritime accidents in our local region, maritime safety has lately become an issue. The Government's decision to commission this report is an expression of this.

Maritime safety is regulated by a comprehensive body of statutes. In addition to the Seamen's Act, we may mention the Safety of Shipping Act and the Safety of Shipping Ordinance issued in association with it, the Accident Investigation Act and the Ordinance on the same subject. The safety regulations, which are often based on international conventions, concern themselves with requirements and standards in respect of vessels' design and outfitting, and requirements dealing with the competence of maritime personnel etc. The Safety of Shipping Act and the Safety of Shipping Ordinance also contain rules concerned with the working environment at sea, which is an important factor in good maritime safety. Much of the regulatory system is also concerned with monitoring compliance with maritime safety rules.

In recent years, greater and greater attention has also been paid to the integration of matters that affect the technical design and outfitting of vessels on the one hand with matters affecting the competence and working conditions of crews and shipping company organisation and general policy in safety matters on the other. The best illustration of this - an integration of human factors, technology and organisation - is the development and introduction of the international ISM code for general guidance in safety work. It is expected that proposals for amendments to the Safety of Shipping Act in this respect will be put before parliament during spring 1995.

However, the maintenance of good maritime safety demands more than a comprehensive system of regulations and monitoring devices. Essential for successful safety work are sound organisation of the bodies that deal with maritime safety questions, access to a satisfactory and varied body of information, and appropriate use of such information. In this respect, this assignment itself has a bearing on maritime safety work. But it is worth pointing out once again that actual safety questions are outside its scope. In order to arrive at a co-ordinated strategy for Swedish action, *inter alia* within IMO, and to throw light on safety questions of special interest for the traffic in our local region, the Government has set up a special maritime safety committee (dir. 1994:154). Part of the Committee's brief is to draw up a plan of action for improved maritime safety with special reference to carriage by passenger ferries. According to its directives, the committee is expected to report on the results of its work not later than 1 November 1995. The Government also intends commissioning a review of the present organisation of inspection activities by such bodies as the National Administration of Shipping and Navigation (prop. 1994/95:100 Annex 7 p. 59).

In this context we may also mention the work of the international shipwreck investigation arising from the loss of M/S Estonia, and the committee appointed on 24 November 1994 with the aim of establishing a long-term navigation policy (dir. 1994, 132).

By their very nature, navigation activities are extraordinarily strongly influenced by international rules and conventions. The importance of dealing with maritime safety questions through international co-operation has also become clearer and clearer. National regulatory systems with too many special provisions tend to impede navigation, which in its turn tends to result in negative effects for international trade. One of the most important

platforms for intentional maritime safety work is the UN's navigation organisation, the International Maritime Organisation (IMO). IMO, with its 149 member states, draws up standards for vessel safety and environmental protection. Agreements are adopted in the form of conventions or recommendations. Rules that are drawn up by IMO are normally regarded as internationally accepted even if they are only recommendations. The most important conventions for maritime safety, which undergo constant renewal, are the SOLAS Convention, which regulates vessel building and outfitting and which now also contains regulations for monitoring shipping companies' safety organisation, the so-called ISM code, the Loadline Convention (regulating the freeboard of vessels) and the MARPOL Convention (including regulations to reduce the negative environmental effects of shipping).

Inter-nordic co-operation is also intensive and widespread. This will be dealt with in more detail below.

The international navigation market has many actors, authorities, organisations and other institutions, with functions that have been developed over long periods and that may also play a part in safety at sea. Although most of these actors represent various special interests, there is a degree of co-operation on several levels and in various respects. The groups and associations most important here - apart from the authorities - are owners, insurers, shippers, classification societies and professional organisations. When we come to more formal co-operation, anything of this nature - as far as Sweden is concerned - takes place only between the National Administration of Shipping and Navigation and certain of the classification societies. This co-operation is based on agreements. Mention of co-operation between authorities should include the Administration's co-operation with the Waterguard Branch of Customs. For example, the Administration has reached agreement with the Branch as regards this authority's co-operation in certain kinds of vessel inspection. Under the Safety of Shipping Act, the superintendence of the Administration, in matters that affect the working environment, shall be exercised in co-operation with the National Board of Occupational Safety and Health.

7.2 The Marine Surveying Department and its activities

By statute, the overall responsibility for the superintendence of maritime safety devolves upon the National Administration of Shipping and Navigation. This superintendence takes place through the Marine Surveying Department, which has a central administration, three inspection areas and an office in Rotterdam. As far as the central administration is concerned, the Investigation Section is of particular interest in the present context. Activities within the Departments are markedly decentralised. This is entirely in accordance with the guidelines that have been issued in the working programme of the Administration. These state *inter alia* that the organisation of the Administration is based on the principles of far-reaching decentralisation and delegation in order that the Administration's objectives as a public utility and a safety authority may be achieved.

In the Administration's three-year plan for activities during the period 1995-1997, it is stated concerning the Marine Surveying Department that the Department's overall operation is aimed at ensuring that the requirements for vessel safety and protection against water pollution by vessels are complied with in respect of international standards in developed countries.

The Department's overall objectives are stated as to minimise the risk of accidents and, should accidents occur, minimise the consequences and prevent a recurrence. The Department is therefore to carry out safety checks and verify the safety organisation of

shipping companies and various other interests that have influence on vessels, including their operation.

That part of the duties of the National Administration of Shipping and Navigation that involves ensuring, through a system of checks, that satisfactory maritime safety is maintained is composed of varied and complex work. This is due both to the international character of navigation, and its increased complexity. As an example of the latter, we may mention the large number of interests that influence operations to varying degrees, e.g. classification societies, professional organisations and industrial organisations. At the same time, vessels as objects of inspection are becoming more and more technically complicated. Unlike in other parts of the transport sector, e.g. road and air traffic, each vessel is usually individually designed; even so called sister vessels display many individual differences. This means that general conclusions based on technical faults or deficiencies in a particular object of inspection are more difficult to draw in the case of vessels than where other means of transport are concerned. Overall, requirements are more stringent both for a good selection of objects of control and correct judgments in the work of control itself.

Pure maritime safety assessments and questions relating to trends in operation are outside the scope of this assignment. However, it is fairly clear that, as vessels become more and more sophisticated in terms of design and technology, it becomes more difficult to maintain the quality of control operations with available resources. In its turn, this has led to a gradual movement in the direction of checks on totalities instead of individualities, and checks on operations and organisations instead of on individual vessels and employees. Through the introduction of the ISM code, shipping companies are also required to carry out their own control procedures. The intention of this quality assurance is to induce the shipping companies to formulate and document what is involved in their own monitoring work, and to clarify their responsibility for maritime safety. The trend of inspection is therefore in the direction of more "audits" of the shipping companies and operative checks on crews of vessels. This trend, like that of continued development of ADP systems for information management in connection with the superintendence of vessels, forms part - as already stated - of the Administration's three-year plan for operations 1995 - 1997.

7.3 Information available and monitoring activities

An efficient control system for the purposes of an adequate level of maritime safety requires good access to information.

The necessary information may be obtained in various ways. For example the areas and offices gain some of their information in the course of observations during surveys and inspections, and in the near future will also do so through the ISM code's requirements for anomaly reporting. The Head Office obtains information *inter alia* via reports under Chapter 6 Section 14 of the Seamen's Act, and through conclusions drawn from incidents and accidents. These sources of information may all be regarded as "internal" or statutory. However there are also a number of "external" actors processing information that may be of great interest in a maritime safety context. Part of the present assignment is to investigate the incidence of exchange of relevant maritime safety information between maritime safety authorities and other bodies having important functions in the field of maritime safety. Selected for special mention in this context have been classification societies, insurers and associations of owners.

The role of the classification societies is so special, partly because of the fact that in some respects they exercise public authority, that they are examined in more detail in a separate section. In the case of associations of owners, the Department has arrived at the view that

while owners as a class vary widely, the Swedish owners are essentially serious and safety-conscious. In addition to the fact that the individual owners act as administrative/legal counterparts in various matters dealt with by the Department, through which the Department obtains certain information, there is an annual meeting with the technical committee of the Swedish Shipowners' Association. There is also a degree of exchange with the Swedish Shipowners' Association for Small Passenger Vessels (SWEREF). The underwriters (insurers) and shippers are now regarded as more active than in the past, and their activities include their own vessel inspections. Most of the shippers that pose requirements are oil companies. However, there is no organised co-operation directly between the Department and the underwriters or shippers.

The Maritime Fire Protection Committee is a co-operative organisation for owners, seagoing personnel, underwriters, coastal fire services and the Department. Its main functions are training of seagoing personnel in fire protection and research prioritisation, but other maritime questions are also dealt with. We may also mention the Maritime Working Environment Board, which is the co-operative body of the parties to the labour market, and to which the Department is co-opted.

In addition to the bodies just referred to, there are, of course, many other potential sources of information which - to different degrees in different areas or centrally – play, or ought to play a large role in providing the Department with relevant information. These might include the marine traffic areas, the Waterguard Branch of Customs, the police, pilots, personnel organisations, Nordic colleagues, seagoing personnel, the mass media and private persons.

A standard argument against a more formalised and regulated duty to provide information that was expressed during the work of this assignment is that the market actors are made up of such a restricted group that much of the information exchange, at different levels, takes place via personal contacts. There is no reason to suppose that such is not the case, and through such contacts much reliable knowledge concerning individual events or circumstances may certainly be obtained.

Although the Department must be said to have an extremely good general knowledge of its field, the lack of routines for documentation, reporting paths and monitoring of external information flows may mean that this body of information is not fully utilised. The Department should formulate a policy for the guidance of staff as to how such documentation and reporting is to take place.

In addition, the Department should consider providing the interests involved with some form of feedback, in order to reinforce the inclination to submit information, e.g. through information sheets containing accounts of current shipwreck investigations, details of ongoing inspection campaigns, news concerning trends or other analysis results. The Department might consider entering into agreements on information exchange, for example with organisations representing influential shippers. In the same way, the Department might also consider entering into agreements with other possible "information bearers", for example with organisations representing seagoing personnel, owners and underwriters. It would probably be possible to suggest a number of other ways - e.g. through mutual agreement or via seminars, practical discussions and other open forums - of finding new paths to fruitful maritime safety co-operation.

A particular problem is the disinclination of seagoing personnel, and others directly affected, to report incidents in navigation. The estimates given to the investigator indicate a volume of reporting to the Department amounting to one report per hundred actual incidents. Allowing for possible exaggeration, the fact remains is that the will to report is strikingly low. One explanation put forward during the investigation was the suggestion that it is felt that incidents that take place largely lack significance for general conclusions, *inter alia* because all vessels are so different from each other. However, one undoubted reason for the lack of inclination to report incidents is that those inherently qualified to do so do not wish to

expose themselves to the risk of action on the part of employers or authorities. There would, therefore, be a natural reluctance to provide information, if for example an incident were due to one's own mistake, or that of a workmate. Another reason for the lack of will to report put forward from several quarters is the lack of "feedback" from the Department. It has been seen as extremely important that some form of reaction or follow-up take place if it is to be considered worthwhile to report irregularities that are observed. This view has been expressed both by those under obligation to report events under various regulations and by others. In this context, it is worth mentioning that special requirements to ensure anomaly and incident reporting will be set up through the introduction of the ISM code. A special system for disruption reporting has long been in use in air traffic.

This lack of incident reporting must be considered to constitute a problem for the maritime safety work of the Department. The basis for risk analysis is insufficient, which means that this means of monitoring cannot be used to the extent that would otherwise be possible. However, great hopes of improvements are attached to the introduction of the ISM code. The investigator will refer where appropriate to what has been stated above regarding the possibility of increasing information from external sources. Nevertheless, the Department should also consider other methods of encouraging the will to report. It may be worth considering trying out an anonymous reporting system.

A particular form of lack of follow-up on information provided that was pointed out during the course of the investigation by representatives of both the Department and several of the trade associations, is that legal measures are seldom undertaken against what are considered clear breaches of maritime safety. It is said that this lack of action spreads the idea that there is no point in reporting abuses, since nothing happens. The view is also held that there has been a marked decline in the number of prosecutions brought since the days when there was a special maritime prosecutor. This official was originally an officer of the Swedish Board of Commerce, then of the Board of Shipping and finally in the then Stockholm prosecution district, with the official title of First Maritime Prosecutor. The job of the maritime prosecutor was to investigate, and institute legal proceedings against infringements of regulations affecting maritime safety etc. The special maritime prosecutor scheme has now been abolished. It is said that it is now extremely difficult, even in cases that are considered unambiguous, to induce prosecutors to bring actions in various kinds of maritime safety infringements. This in its turn is considered to arise from the fact that these cases are now divided between a large number of prosecutors, each of whom receives only individual instances. Because of this, and of the fact that maritime safety is hedged about by a relatively extensive, and not always easy-to-understand regulatory system, the prosecutor may experience difficulties. During the investigation, cases have emerged that do not conflict with the conclusions drawn above. In view of the lack of testing in the courts, and the inhibition of the will to report abuses, it is the opinion of the investigator that it should be considered whether criminal cases that affect the Accident Investigation Act in those parts that relate to navigation - as is now the case with infringements of the Seamen's Act and the Safety of Shipping Act - should also be dealt with exclusively by the prosecuting authorities in places where courts of maritime law exist, in order thereby to concentrate and promote knowledge and experience. In any event, some form of in-depth training in this field should be made available to prosecutors and police.

7.4 Viewpoints and proposals on regional operation

7.4.1 Introduction

The work of the areas and office are strongly characterised by the authority's policy, referred to above, of decentralisation and deregulation. All survey execution and all certification therefore takes place regionally, where such matters have not been delegated to the classification societies. The three areas are also responsible for port state control.

7.4.2 The vessel survey system (FTS)

Starting in the first half of 1993, a computer-based vessel survey system (FTS) has been introduced in stages. This system is intended to simplify access to vessel data and rationalise routines for procedures and invoicing. A system objectives description states *inter alia* that it is intended to make easier staff functions such as planning, statistics, documentation and reporting in connection with vessel procedures, and to improve procedure documentation for both external and internal use. The planning of survey work will also be made easier and the need for manual vessel dossiers reduced through access to factual information in the system.

The inspection reports that were previously available only via the relevant regional authority will now, through the FTS system, become available to everyone within the organisation. So far, the system is entirely vessel-based, in the same way as the vessel dossiers. But the intention is that the FTS system should also facilitate access to vessel data using parameters other than the vessel name.

Since the actual monitoring work in the form of surveys and inspections takes place via the different areas and the office, the actions of these authorities are extremely important for the development of safety work. Rulings in certification questions or regarding the detention of a vessel may also have large-scale financial consequences. It is therefore very important to maintain the requirements in terms of professionalism, knowledge and experience that this work demands. The activities also pose requirements in terms of professional and impartial exercise of authority, and it is very important that the checks are carried out and recorded in a uniform manner in the different districts. Uniform control increases reliability and means that the probability of deficiencies being detected is the same wherever the vessel calls. Uniform documentation is also a prerequisite for using the report for an effective analysis and follow-up work. If the same kind of procedure in different areas produces a different scope and content, this also results in differences in fee debiting, which may be considered unjust and reduces confidence in the operations of the authority.

7.4.3 Investigator's observations and assessment

Internationally speaking, maritime safety in that part of navigation that is under the superintendence of Swedish authorities would seem to be of extremely high standard. This may be considered to be the case both technically and operatively. In recent years, maritime safety work has been based on a comprehensive view, as expressed in the ISM code. Together with other Nordic maritime authorities, the National Administration of Shipping and Navigation has - in particular through its Marine Surveying Department - been particularly active in an international context.

However, what has just been stated does not mean that present operations, as seen by the investigator, do not suffer from certain deficiencies in various respects. This applies chiefly to the management and control of practical survey activities in the areas and the office, the procurement and promulgation of information of interest for maritime safety and centrally - in addition to the control function - to the processing and analyses of available information material, and follow-up of measures that have been decided on.

Certain of these deficiencies have already been noted by the Department, *inter alia* through the results of an audit of administrative routines in the different inspection areas that was carried out in spring 1994. A number of working parties are looking at these problems in depth. In this context we may specifically mention the important work of integrating documentation with (and further developing the area of use of) the computerised FTS system, and a working party for the design of common checklists.

As we have already seen more than once, regional operations are characterised by decentralisation and independence. There is little to object to in such a policy, but decentralisation and independence must not lead to activities that are carried out regionally displaying great variations between the regions, less still between different officials in one and the same regional authority. This does not merely create legal uncertainty, but may also affect maritime safety itself. The results of this investigation work indicate that practical survey activities are essentially dealt with by the areas at their own discretion. The areas have therefore expressed the view that the methods used in exercising superintendence, and the assessments, vary a good deal from inspector to inspector. The areas have also stated that there is a lack of information and interpretation directions from the Head Office. Further observations indicate the proliferation of a plethora of forms, checklists and types of documentation, and that only one area has a functioning routine for reminders and some form of result follow-up. According to the information received, centrally-initiated specific inspections, directed towards a particular question or area, take place rarely or not at all.

The unwarranted differences in scope and content between the exercise of authority by the areas has led the investigator to the view that substantially stricter control by the central authority is called for. There is a need for definite directions, for example by using checklists for direct monitoring and protocol rules or equivalent documentation of survey procedures. Unevenness in survey activities between different regions may, as already suggested, erode confidence in the operation as such. The investigator would therefore strongly recommend that the scheme using checklists etc. should, as far as practically possible, be resumed as soon as possible, and that the survey procedures be recorded so that observations and comments made, and measures taken, are documented uniformly and clearly. In this context it should be noted that an expanded FTS system may, to no inconsiderable extent, come to influence survey operations towards greater uniformity, and compel a clearer and more comprehensive documentation. As the investigator sees it, implementation of the planned expansion of the FTS system is therefore especially appropriate.

The need for follow-up and evaluation of the Department's monitoring activities as a whole is great. At present, there is no systematic reporting to the central authority or follow-up by that authority of the areas' monitoring activities. As a result, the Department does not obtain a clear picture of the scope and direction of these activities, nor of the deficiencies noted during the procedures, all of which renders effective control more difficult.

The conclusion must be that the areas' monitoring activities are not effectively utilised in long-term safety work. The lack of a coherent picture of what emerges during monitoring activities therefore makes it difficult to direct these operations to the areas in which monitoring may be expected to be of greatest importance. This also restricts the options for efficient use of resources. Ongoing follow-up and assessment of the work carried out "in the field" should therefore be initiated.

Another observation made by the investigator in visiting the regional bodies is that the comments on deficiencies in the objects of survey made during a procedure and dealt with before departure of the vessel are not documented in any way. This too would be a valuable source of information, e.g. in revealing common technical deficiencies, lack of maintenance or other neglect on the part of owners. The investigator is well aware that we should not create a system in which the central authority ends up "drowning in reports", but with the help of the FTS system and with centrally issued directions, based on an ongoing dialogue with the officials at area level, a reasonable compromise should be possible. In any event, it should be feasible to create access to information through which various trends might be detected, to the benefit of maritime safety.

What has been stated concerning deficiencies in documentation of survey procedures may also be considered to apply to continual follow-up of new vessel construction. Comments leading to subsequent measures are not recorded here either. As in the case of survey procedures, important ongoing observations made during the building of a vessel should be noted and passed to the central authority.

Effective control requires both control instruments and the follow-up of operations. Forms of control may be of several different kinds. At present, chief inspectors' meetings take place with some regularity, and these involve a degree of follow-up, co-ordination and uniformity between the areas in their work. Other possible means of control are advisory policy decisions and other standards creation. The Department carries out comprehensive and important work through its international commitments. This may be another reason why policy and standards creation have been neglected. A joint effort towards the creation of the implementing regulations, interpretation information and common routines in general sought by the areas would, however, contribute towards reducing the unevenness between them.

Another way of improving available information for safety and analysis work - and one which may also be seen as a function of information already obtained - would be to make more extensive use of inspections for particular purposes, or other examinations on particular themes, in order to reveal where the weak points are. The survey procedures must, of course, cover certain basic areas, but this should not prevent special attention, in some situations, being paid to particular questions or areas. In particular in the case of inspections, which are a form of extraordinary survey, these are often carried out "on instinct" rather than following systematic considerations. With close and ongoing contacts between the central authority and the areas, the former ought to be able to find out about such trends as relate to maritime safety deficiencies that merit special attention as part of survey activities. The investigator feels that routines for such a co-ordination between the central authority and the regional authorities should be created. There should also be regular contact between these bodies for the interpretation of and information about relevant provisions in the field of maritime safety.

In his visits to the areas, the investigator has also noted that the imposition of fines is not used as part of the procedures. In reply to questions about this he has been informed that this action is regarded as awkward and alien.

Although most of those affected have great respect for the safety work carried out by the Department and the areas, and are therefore happy to take action on the comments made, any form of superintendence does require access to some form of compulsion in order to give it "teeth", if only for preventive purposes. Options available to the Department include revoking or refusing to renew the certificate, handing over the case for possible prosecution, and restricting the right of use of the vessel. The last of these also includes the power to impose fines, cf. Chapter 11 Sections 1 and 6 of the Safety of Shipping Act. The most potent form of compulsion used is prohibition of use in the form of vessel detention. Such a ruling, which must be referred to the Director of Marine Safety, is certainly very effective, but it is probably much too powerful a measure for many small infringements and deficiencies. In other contexts, the imposition of fines is a highly effective measure, so that it is rather

surprising that it is so seldom resorted to by the Department. If the option of imposing fines is not invoked at all, there may be a risk that the more severe form of compulsion will be used where it is not needed, or that a form of compulsion that is justified in itself is not used at all. In any event, as the legislator intended, there should be a degree of latitude in the imposition of fines with reference to Swedish vessels.

In order to dispel the uncertainty that clearly exists in the areas in the matter of when to impose fines, the Department should consider developing a policy governing the use of different sanctions in various situations. Development by the Department at central level of some form of application guidelines or directions for the management of fine matters would also be appropriate.

The investigator will return to the organisational proposals to which the views expressed in this section may give rise.

7.5 Viewpoints and proposals on the activities of the Investigation Section

7.5.1 The work of the Investigation Section

The area of responsibility of the Investigation Section covers investigation of maritime accidents and personal injuries suffered in service on board, accident statistics and suspected infringements of safety and environmental provisions. Only two investigators are attached to the investigation department, but in both theory and practice there is also a regular dialogue with various experts in the other Head Office sections, e.g. with shipbuilders in matters of stability. All reports under Chapter 6 Section 14 of the Seamen's Act are examined by the section, and every year the section also deals with 10 or so maritime accidents, for which authority is delegated by the Board of Accident Investigation under the Accident Investigation Act. The maritime accidents delegated in this way usually concern fishing boats. In 1993, a total of 359 cases was referred to the Investigation Section. These vessel cases are filed in a dossier for each vessel, and the dossier is marked with the vessel's name. When a case has been closed, the dossier is bound and filed in day-book number order or in chronological order. As we have already seen, service regulation 3/92 of the Department contains more detailed rules governing the contents of an investigation report. Under these, a report shall include a description of the event, analysis of factors important to the event, probable causes, measures taken and proposed measures arising from the accident. The investigation report is approved by the Director of Marine Safety or, through delegation, by the head of the Investigation Section. The more important reports are to be presented at a "safety meeting", to which the section heads of the Department, and representatives of the other affected departments of the National Administration of Shipping and Navigation are summoned. Safety meetings are also to be held to monitor the measures taken on the basis of recommendations made in previous investigation reports. For assistance in the work of finding events that have not been reported under Chapter 6 Section 14 of the Seamen's Act, the investigation subscribes to the periodical Lloyd's List, and to a fax service dealing with Swedish or Swedish-owned vessels called Lloyd's press. A Swedish press information service is also used.

7.5.2 Investigator's observations and assessment

An extremely important prerequisite for good maritime safety it is that accidents or incidents that occur should be regularly investigated, analysed and followed up. The job of dealing with such activities devolves primarily upon the Investigation Section. The cases of the Investigation Section come into being mainly through reporting under various statutes (primarily the Seamen's Act) and through the section's own monitoring of various sources of information. Some information may also be gained through the FTS and DAMA systems, as well as through announcements or notices from, so to speak, external quarters such as authorities, organisations, institutes and individuals.

The number of cases received by the Investigation Section is substantial, and the section has a very heavy workload. Despite this the investigations, as far as the investigator can determine, are dealt with in a manner that is in itself highly creditable.

As regards the way in which cases come to the attention of the section and the way its tasks are structured, it is natural that the investigations have concentrated mainly on individual instances and the analyses and recommendations associated with them. The case management of the Investigation Section is therefore more a matter of dealing with individual cases than with taking an overall comparative view. In other words, the results of a previous investigation are not automatically considered in the investigation and assessment of the next event. This is obviously a failing in the system, which will be illuminated to some extent in the following account of certain accidents and incidents with ro-ro vessels. Methods of record creation and filing of past investigations may also be considered to contribute to this deficiency. This is because the only way of finding a correlation or parallel with a particular accident or incident is that the individual investigator or other person - for example an official working at area level - has knowledge of the previous event and of which vessel was involved in it. In this context we may also note that the dossiers of the various vessels are in some respects difficult to follow as regards the presentation of material received or created, ongoing case management and decisions taken. For example, day-book pages are not used, nor are the documents appended as annexes.

As stated above, the more important reports are to be presented at safety meetings. Such safety meetings are also to be held to monitor recommendations made in investigation reports.

According to information gained when visiting the Investigation Section, such meetings have not been held since the reorganisation that was carried out in 1988. The information section has also stated that there is no real feedback on the part of the management to the section as regards the section's work.

In the opinion of the investigator, the analysis and follow-up functions should be developed and strengthened substantially within the Department. Under the present system, the investigation results and analyses that emanate from the Investigation Section are not fully taken into account. Nor, with the extremely limited resources presently at the disposal of the section, is it reasonable that the section should carry out a more extensive analysis function and an ongoing comprehensive follow-up of recommendations that have been made. In any case, it might be questioned whether such tasks are appropriate for the Investigation Section which, were this to come about, would have to receive extra resources. The investigator's view is that it would be more natural that these tasks, which are very closely associated with the management and control functions that should devolve upon the head of the Department, should be entrusted to a staff body associated with him. Only in such a way would it seem likely that systematic and comprehensive processing can take place of all the information material that is supplied, or may be supplied to the Department with respect to accidents and incidents that have taken place, or that originate from observations reported.

Such a staff body might also, as already suggested, systematically and regularly follow up the decisions or recommendations made in connection with material such as the reports of the Investigation Section. The investigator would therefore suggest that an organisation consistent with this be considered. Such an organisation would, of course, require the necessary ADP support.

Finally in this context the investigator would recommend - at any rate while the present organisation continues - that the "safety meetings" be resumed, and that the management should provide regular feedback to the Investigation Section on its work. The routines for management and presentation of investigation material created or acquired should also be improved, and the principles of documentation for measures taken and decisions made should be reviewed so that existing material and the development of the case are presented clearly and unambiguously. Nor does record creation based only on vessel names seem satisfactory. It seems appropriate to consider record creation in more detail when the FTS system is expanded in connection with existing plans.

7.6 Co-operation with the classification societies

7.6.1 General information

The current system with the classification societies as superintendents of vessel building and exercisers of regular monitoring of classified vessels during their period of use is one of ancient authority. The societies' own structural requirements are not infrequently the same as those of SOLAS and other conventions. The areas traditionally dealt with by classification are hull, machinery and other means of propulsion. The societies listed in the Safety of Shipping Act are highly comprehensive organisations with massive resources and a broad operational base. They have considerable technical resources, large research and development departments and often worldwide survey organisations. In view of the societies' broad range of knowledge and well-developed monitoring apparatus, it is not difficult to understand why the national supervisory authorities have long regularly accepted the societies' requirement specifications and survey work. The Swedish Marine Surveying Department is privy to the work of the societies by virtue of the fact that the Director of Marine Safety sits on the Nordic technical committees of the American Bureau of Shipping, Bureau Veritas and Det Norske Veritas. All amendments in classification rules are submitted to such committees for consideration.

Through the Marine Surveying Department, the National Administration of Shipping and Navigation has reached the following agreements with the classification societies.

MARPOL, IOPPC

Agreements on survey and inspection under the international oil protection convention (MARPOL) and on entitlement to issue international oil protection certificates (IOPPC) have been reached with the American Bureau of Shipping (ABS), Bureau Veritas (BV), Det Norske Veritas (DNV), Germanischer Lloyd (GL) and Lloyd's Register of Shipping (LR). These agreements were signed and became effective during the period June-October 1989.

Load Line, ILLC

Agreements on survey and inspection in accordance with the international load line convention and protocol ("Load Line") and on entitlement to issue national freeboard certificates (ILLC) have been reached with BV, DNV, GL and LR. The agreements with BV, DNV and LR were signed in December 1992 and became effective on 1 January 1993. The agreement with GL was reached and became effective on 1 March 1994.

SOLAS, KC

Agreements regarding survey and inspection in accordance with SOLAS and on entitlement to issue structural safety certificates have been entered into with ABS, BV, DNV, GL and LR. These agreements were reached during the period March-September 1994 and became effective during the period May-November 1994. The agreements in respect of SOLAS have been drawn up using a template recommended by IMO.

Since the societies are authorised through agreements to exercise official authority, the agreements include liability clauses for the exercise of authority involved in classification survey and certification entitlement. The Department has also been given entitlement to view all the documents used by the societies for their work under the agreements, and the societies' internal instructions, circulars and directions are also to be available to the Department. Under the SOLAS agreements, the authority's superintendence shall be directed towards the societies' organisation and routines, and the Department shall, either under its own auspices or through another body, carry out classification audits.

7.6.2 Investigator's observations and assessment

The draft bill for the 1988 Safety of Shipping Act (prop. 1987/88:3) would seem to indicate that parliament and the Government were working on the assumption that the classification societies listed in the Act would continue to be entrusted with essential monitoring functions and that the measures and assessments of these societies, at any rate as regards hulls and machinery, would normally be acceptable without more detailed checking by the Marine Surveying Department. At the same time, it was pointed out that circumstances may change in relation to the societies in question, so that it is important to keep abreast of and monitor their activities regularly. Subsequent events should be seen against the background of the debate that has taken place is in recent years concerning the relationship of the Marine Surveying Department to the classification societies.

It seems to the investigator completely unrealistic that the Department should take over all the services currently offered by the classification societies. The Department has neither the personnel, technical or administrative resources to take over these tasks. The role of the Department in this context must be seen against this background. However, what has just been said does not mean that the Marine Surveying Department does not have essential functions in this context. After all, the Department bears the ultimate responsibility for the monitoring of maritime safety and therefore a responsibility to ensure that all aspects of maritime safety are properly served and monitored in the work carried out by the classification societies. In addition, as noted already, it is assumed by the Government that the Department will monitor the societies are an ongoing basis.

In both Denmark and Norway, the relevant supervisory authority organises annual meetings between the authority and the classification societies. Events of interest are reviewed at these meetings, and if the authority finds that abuses are taking place in any

respect, it draws attention to these abuses. In Norway, an audit of the societies actually already takes place.

Unlike the situation in Denmark and Norway with their extremely comprehensive international registers, there are only a small number of Swedish-registered vessels that are classified. They number some 300 vessels. The Swedish Marine Surveying Department has therefore chosen a method of monitoring the classification societies different from the auditing method used in Denmark and Norway. In the Department's recently issued service regulation 3/1995, dated 1 February 1995, directions are given for the performance of integrated inspection with respect to Swedish classified vessels. To put it briefly, this integrated inspection may be said to involve a combination of operative checking, on-board audits, visual survey and checking of the vessel's documents. The Department's monitoring to a great extent duplicates the tasks that the societies are expected to carry out. However, this is a conscious strategy on the part of the Department. Firstly, the Department does not wish to relinquish any part of operative monitoring to the societies, and secondly there are few enough Swedish classified vessels to make is a reasonable proposition to monitor the societies' work by inspecting every one of the classified vessels.

The present organisation of the Department's survey activities, and its access to technical and personal resources must, in the view of the investigator, be seen against the background of the system that has hitherto existed, namely that the classification societies' measures and assessments as regards (primarily) hull and machinery are normally accepted without further checking. Future developments must show whether the Marine Surveying Department, instead of going down its present road - or in addition - should exercise an ongoing and systematic monitoring of the societies' activities in the same way as in Denmark and Norway. But in any case, the system now prescribed for scrutiny of the classification societies must include routines for systematic and uniform reporting from the areas, and above all a centrally actuated analysis and follow-up of the information material that should be accessible in this way. Without this, the classification societies' activities and place in the maritime safety system will not, in accordance with the intentions of the Government when the 1988 Safety of Shipping Act came into being, be susceptible of overall evaluation. If in accordance with what is recommended above a special staff body is created under the Director of Marine Safety, it would seem natural that the analysis and follow-up function just referred to should be dealt with by this body.

7.7 Nordic co-operation

7.7.1 Various forms of co-operation

Inter-nordic co-operation as regards maritime safety rules and practical work is of an extremely wide extent. In the descriptions of this co-operation provided by representatives of the maritime safety authorities in Denmark, Finland, Norway and Sweden, it was stated that informal contacts take place on a more or less daily basis between marine surveying department officers with various responsibilities. A number of concrete and continual co-operation projects are also proceeding in survey activities, e.g. an agreement for the operational monitoring of passenger ferries between Sweden and Finland. Under this agreement, the Finnish authority is responsible for operational monitoring of the Swedish ferries, and the Swedish authority carries out corresponding monitoring of the Finnish-registered ferries. An annual meeting is the Nordic marine safety directors' meeting, which deals with common questions of a general character. Several more informal meetings take

place between these annual meetings. Generally speaking, the Nordic Directors of Marine Safety normally act jointly in both international maritime safety work and in the introduction of specifically Nordic regulations. Prior to IMO assemblies, joint preliminary meetings are often held, at which Nordic representatives of owners, seagoing personnel, insurers, other authorities etc. may take part.

7.7.2 DAMA

Since 1990, a special Nordic co-operation project has also existed, known as DAMA. This involves a common data system for the reporting of maritime accidents and statistical compilation. The common Nordic database of incidents and maritime accidents has been prepared in co-operation with Det Norske Veritas and the Norwegian Waterguard Branch of Customs.

Technically, the system is based on a Norwegian database program, FICS, which is an integrated programme comprising database, spreadsheet, report generator and word processor. The reports are sent on diskette to the Norwegian Directorate of Shipping and Navigation by the central navigation authorities of the other Nordic countries. In Norway on the other hand, a network version of DAMA is used, making it possible to feed in data directly from the Norwegian navigation areas. DAMA includes coded information, e.g. details of vessel type and weather conditions, but the system also accepts fully written out text in free form. The coded information makes it relatively easy to draw up common Nordic statistics.

The view has been expressed in several quarters that the DAMA system is rather a "blunt instrument" and not particularly suited to its purpose. An example of this is criticism of the composition of the codes, where a desire for a clearer focus on the effects of the human factor has been expressed. There has also been criticism of the system's software and compatibility. Nevertheless, all the critics agree on the importance of a common database for following up maritime accidents, not least because a statistical database for each individual country might be too small to be used as the basis for any meaningful analysis. It should also be mentioned that development work is going on in IMO on an international "Ship Casualty Database". This work will certainly affect the development of regional and national maritime accident databases.

7.7.3 Investigator's observations and assessment

Other than the annual meeting of the Directors of Marine Safety and DAMA, there is no organised co-operation for the exchange of information between the Nordic countries. However, as we have seen, there is an extremely close informal co-operation between the Nordic countries in the field of maritime safety. This takes place at both central and regional level, and between both authorities as such and individual officers. This co-operation relates not only to direct survey activities and questions of information exchange and the development of rules but also, not least, to international questions, primarily those dealt with inside the framework of the IMO. This informal Nordic co-operation seems to function smoothly and efficiently. To formalise information exchange by special conventions or otherwise seems neither necessary nor practical. Such a scheme would also lead to complications in international work in general. According to what has emerged in conversation with representatives of the inspection authorities in Denmark, Finland and Norway, the general view amongst them is that the existing co-operation, broadly speaking, functions exceptionally well and that any formalisation of information exchange is neither necessary nor appropriate.

The investigator therefore finds no reason to propose that the information exchange between the inspection authorities of the Nordic countries should be crystallised by formal agreements. It should therefore continue to depend on the authorities in question to determine in more detail the thrust and scope of their information exchange.

In this context, it should finally be pointed out that an expansion of the Swedish FTS system for vessel survey may open up further options for information exchange. Similar computer systems are under construction in the other Nordic countries, e.g. the KATJA register in Finland. If these data registers are made compatible, the options for revealing trends and correlations in relevant respects - *inter alia* on the basis of the increased amount of data available - should therefore increase in the same way as for the common accident register, DAMA.

8 Specifically about ro-ro vessels

8.1 Introduction

For many years now, transport systems have been in a process of rapid development. Increased requirements for capacity and efficiency have led to the introduction of new cargo carriers, cargo handling systems etc. In the field of maritime transport, one way of meeting these needs has been the introduction of the so-called roll-on roll-off vessels (ro-ro). However, experience of ro-ro services has shown that, although in itself the concept represents a modern and effective maritime transport system, it suffers from certain weaknesses from the safety angle. For example, the occurrence of free liquid surfaces on the large cargo decks of ro-ro vessels involves risks of reduced stability. Furthermore, difficulties in securing vehicles and containers - in particular if the loads in such carriers are not themselves satisfactorily secured - involves a risk of cargo displacement.

Following the loss of M/S Estonia, there have been allegations that incidents and problems with bow doors had occurred previously on ferries of the same type as M/S Estonia. Since these allegations are an underlying reason for this investigation assignment, the investigator has made certain inquiries concerning accidents or incidents with ro-ro vessels. Because of the fact that the Marine Surveying Department's files and registers for accidents are entirely vessel-based, the job of tracing a particular type of previous accident or incident has been a difficult one, and the results have been unavoidably incomplete. Nevertheless, during his work the investigator has obtained certain details through what has been recalled by individual officers concerning vessels or events. Their follows (a) some brief accounts of certain previous accidents and incidents of special interest in the present context and (b) a similarly brief resume of how matters were dealt by the Marine Surveying Department.

8.2 Visby

8.2.1 Sequence of events

The passenger ferry Visby was built in 1972 and had a gross tonnage of 6,665 registered tonnes. On 12 November 1973 on its ordinary run between Nynäshamn and Visby, the forebody of the ship was struck by some heavy seas. The result was that the foreword bow door was opened and water was shipped on the vehicle deck. The master therefore decided to turn the vessel back to Nynäshamn. This event took place after the vessel had come out into the open sea. There was a high wind and heavy sea at the time.

8.2.2 Damage

On survey of the damage, it was found that both of the locking hooks of the bow door had been broken off and impressions left on the door. As a provisional measure, the foreword bow door and cargo ramp were welded to the hull. After the repair had been water-tested and surveyed by the relevant classification society, Lloyds Register of Shipping, the vessel received temporary permission to continue voyaging until the next yard inspection. In February 1974, a permanent repair was carried out, in which the bow door received new

locking hooks of heavier gauge than previously, and the locking device was further reinforced by shroud screws with lashing attachments.

8.2.3 Cause

The Department's conclusion about the course of the accident, as stated in the investigation report dated 1 November 1974, was that the bow door locking devices were of too slight a construction.

8.2.4 Procedure by the Department

Once the investigation department had become aware of the accident, presumably through its press services, a "Section 70" report was requested. This was received at the end of January 1974. The Department wrote to the shipping company in February 1974 to demand a maritime declaration, on grounds including the following.

"The National Administration of Shipping and Navigation takes the view that shell plating doors must be as strong as the plating in which they are fitted, and regards weather damage to bow doors in a serious light. From the maritime safety viewpoint, it is therefore essential that the course of such accidents is investigated as fully as possible. A maritime declaration should accordingly be held."

In the investigation material, there were also statements from the master to the effect that the locking device had failed on a previous occasion, and there were also allegations that another Gotland ferry, Thjelvar (formerly Gotland), had suffered a similar mishap during severe weather some years previously.

The Department also sent a memorandum to Lloyd's Register of Shipping arising from the event involving the Visby and a similar event involving the passenger vessel Svea Star (see below). This memorandum includes the following. In introduction, it is mentioned that the National Administration of Shipping and Navigation had approved the classification society's check on strength and tightness for shell plating doors, but that the Administration had examined and carried out inspections of the door hoist devices, since this was not covered by the society's survey. The Department then pointed out that a general reduction in the number of battening-down devices had been observed, and queried this development from a maritime safety viewpoint. For example, it was pointed out that if one fitting were to break, the increase in stress on the remainder would become so great that these too would be at risk of failure. In view of the maritime accidents involving the Visby and Svea Star, the Department finally queried a number of the assumptions of load that the classification society had used as a basis for its requirements for the gauge of battening-down devices, e.g. the way in which wind and sea were calculated to exert stress on the door.

Lloyd's Register of Shipping replied in May 1974, and it was revealed *inter alia* that an internal investigation was in progress, but that the strength requirements had been temporarily almost tripled, and that new locking devices would soon be fitted. It was further stated that the dimensioning for Visby and Svea Star was of the same order of size as for other ferries. The society therefore raised the question of whether these vessels' rapidly declining bows, together with their high degree of flare, had had a disadvantageous effect.

On 17 July 1974, a maritime declaration was held at Stockholm City of Court. In the investigation report of November 1974, in which the Department stated that the cause of the accident was the insufficiently-strong locking devices of the bow door, it was noted that the classification societies had been informed of the need for locking devices of heavier gauge, and that the Department, in its future safety work, should carry out a review of the classification societies' rules governing bow doors etc.

On 17 December 1974, a joint memorandum was drawn up dealing with the events involving Visby, Stena Sailer (see below) and Svea Star. This includes the following statement.

"In view of the fact that accidents at sea took place during autumn/spring 1973/74 to the foreword bow doors on a number of Swedish passenger vessels, in which battening-down devices were broken and the bow doors of the above vessels torn open, the Safety Section finds compelling reason to question whether the standards applied to such equipment - in particular the battening-down devices - are satisfactory from a maritime safety viewpoint.

It may be remarked that, in addition to the accidents referred to above, other cases of such accidents have come to the attention of the National Administration of Shipping and Navigation.

The Safety Section finds these accidents to be of such a nature as to call into question the principles of certification for trading areas, possibly leading to the reassessment of certificates already issued, in particular for vessels holding North Sea and ocean-going certificates."

It was intended to deal with this matter at a chief inspectors' meeting, and in addition to reports that had been drawn up and existing correspondence, a compilation was appended to the memorandum of viewpoints on safety in certain vessels of the ro-ro type. It was also intended to discuss at the meeting whether the rules of IMCO (as the IMO was then called) governing doors should be reviewed. It should also be ascertained whether responsibility for monitoring and survey of battening-down and locking devices etc. was satisfactorily regulated between the Department and the classification societies.

From the compilation concerning certain ro-ro vessels appended to the memorandum, the following may be quoted. "Door tightness testing is carried out in a scarcely realistic manner by spraying water on a door that is not under stress. Substantial forces would presumably be acting on the door in heavy seas. These forces seem not to have been estimated or calculated."

The Visby case was closed, it appears from the documents, on 20 March 1975 with the following official annotation: "The report on this case was presented at a chief inspectors' meeting on 18.03.75 in Stockholm, when certain decisions were reached. Regarding these and other measures, see 'Svea Star' 33.21-2512/74 and 'Stena Sailer' 3321-452/74".

8.3 Stena Sailer

8.3.1 Sequence of events

The dry-cargo ship Stena Sailer was built in 1973 and had a gross registered tonnage of 2,872. On a voyage between Zeebrügge and Dover on 16 January 1974 with a cargo of trailers and transport lorries, the vessel encountered heavy weather with increasing opposing seas. The vessel reduced its speed, but the strong sea broke apart the locking devices of the foreword bow door, and lifted it out of closed position. The space between the bow door and the bow ramp was filled with water. The ramp was therefore secured using six chains. In order to avoid additional damage, the vessel put about and sought emergency harbour in Rotterdam, where a temporary repair was also carried out.

8.3.2 Damage

The locking mechanism and hoisting arms of the bow door had been damaged, and the port-side ramp operating hydraulics had become unusable after the failure of the operating rod attachment.

8.3.3 Cause

The investigation report dated 12 December 1974 stated that the cause of the accident was that the ramp and bow door closing devices were of too slight a construction.

8.3.4 Procedure by the Department

Having had access to the "Section 70 report", received on 24 January 1974, the Department realised that this was the sort of damage that, under the rules, should have led to an immediate report. The Department also demanded that a maritime declaration should be held.

A maritime declaration was held on 13 February 1974 on board Stena Sailer in Zeebrügge.

On 2 May 1974, a report was received from the Gothenburg marine surveying area of a meeting dealing with examination of bow door locking devices. From this report it emerged that Stena Sailer's bow door had come open during a previous voyage. It also appeared that the bow door of Stena Sailer's sister ship, the Union Wellington under the New Zealand flag, despite having been reinforced, had been opened during heavy weather. Another sister ship, the Sea Trader, had crossed the Atlantic in bad weather, but on this vessel the bow door had been welded closed. The following may also be found in the report.

"During the meeting, it emerged that very little is known about the forces that affect the bow door. However, through the trials conducted by G.L. (note by Germanischer Lloyd investigator), some slight understanding of this has been gained. It appeared that more or less all the locking devices on existing vessels with bow doors are of too slight a construction.

That matters have gone as well as they have so far is due to the fact that vessels with bow doors are for the most part used in more confined waters, where they do not normally meet such heavy weather.

I propose that the Administration investigate how locking devices on bow doors ought to be placed, designed and constructed, and that there should then be a check on the locking devices of existing vessels.

This presumably will not be done by the classification institutions, since after all these have already approved existing locking devices."

On 8 May 1974, the Department wrote to Bureau Veritas, with which Stena Sailer was classified, and sent the society the same memorandum and questions as had formerly been submitted to Lloyd's Register of Shipping in connection with Visby and Svea Star. Bureau Veritas was given the chance to respond to the questions in the memorandum and to put its views on the accident in question. It was then asked what maritime safety measures Bureau Veritas intended to undertake in connection with the bow door accidents that had happened.

Bureau Veritas replied at the end of July 1974, and this response indicated *inter alia* that the society intended to make its requirements for bow door locking devices stricter.

The summarising memorandum mentioned in connection with the Visby and dated 17 December 1974 also covered Stena Sailer.

The final annotation is from 25 June 1975, and this states that a journal had been drawn up and passed to "affected parties". An official had also been commissioned to do further work and refer the safety problem with bow doors to IMCO, in order to put this on their agenda.

8.4 Svea Star

8.4.1 Sequence of events

Svea Star, a passenger vessel built in 1968 with a gross registered tonnage of 9,963, was registered with Lloyd's Register of Shipping. Between Travemünde and Helsingborg on 5 May 1974, the vessel encountered heavy weather and rising seas. A particularly heavy sea struck the vessel, tearing lose the foreword locking devices and extra battening and lifting up the bow door. Water collected between the forward door and the flap. The vessel returned to Travemünde so that the damage could be inspected.

8.4.2 Damage

All three hydraulic battening-down device guides were completely demolished, and even the extra battening with two 2-inch shroud screws had been torn apart. No damage was evident to the actual door or flap. The locking device was stored temporarily and surveyed two days later in Helsingborg by both the classification society and the Department.

8.4.3 Cause

The investigation report dated 12 December 1974 states that the opinion of the master, classification society and Department was that the accident was due to the too-slight construction of the bow door battening-down devices.

8.4.4 Procedure by the Department

It appears from the documents that the Department found out about the accident through a press cutting and then instituted a "Section 70 report". This report was received on 14 May 1974.

A letter was sent to Lloyd's Register of Shipping, with an inquiry concerning its dimensioning policy in the same way as had previously taken place with the Visby accident. On 28 May 1974, the society replied as specified in more detail in the Visby case; it was stated that the requirements were to become stricter, and that the flare design of the bow had been a contributory cause.

The summarising memorandum mentioned in connection with the Visby case and dated 17 December 1974 also related to Svea Star.

In a letter received on 3 April 1975, Lloyd's Register of Shipping sent its rule proposal on the dimensioning of bow doors, which involved a tripling of the locking device strength requirements. The society also stated that to the best of its knowledge, these were the first official rules for the dimensioning of bow door locking devices.

The Svea Star case was concluded with an official annotation dated 9 April 1975. It emerges from this annotation *inter alia* that the case had been presented at a chief inspectors' meeting on 18 March 1975, where one of the decisions taken was that an official should monitor the handling of the case (cf. the Visby case). It was also pointed out that the relevant classification society had submitted its new rules to the Administration regarding bow door dimensioning on 4 April 1975, so that the matter required no further action by the Department.

8.5 Saga Star

8.5.1 Sequence of events

The cargo and passenger vessel Saga Star, with a gross registered tonnage of 8,226, was built in 1981. On 6 May 1982 the vessel was about to sail from Travemünde to Helsingborg. The weather was calm. When the bow visor was being shut, the hinge on the port side snapped, so that the port side of the visor fell down four meters. The fluid-power lines broke and oil leaked out. Immediately afterwards the starboard hinge snapped too and the entire visor fell downwards. Having been surveyed by Lloyd's Register of Shipping, the vessel was given a permit to proceed to Helsingborg – via Malmö – without its bow visor.

8.5.2 Damage

Damage to the visor and its attachments to the hull, and plate damage to the hull between ramp and visor.

8.5.3 Cause

It was stated in the investigation report that the accident was probably due to the visor hinges being of insufficient dimensions.

8.5.4 Procedure by the Department

After a survey and decision by the chief inspector of the Malmö marine surveying district on 17 May 1982, Saga Star was given permission to sail without the bow visor until the end of May, provided that the weather was good, that the voyages were undertaken at reduced speed, that due attention was paid to the other factors that might affect the seaworthiness of the vessel and that log extracts were submitted to the Department of Marine Surveying after each voyage.

It was further decided that complete drawings, together with calculation material for "bow door", hinges and fluid-power arrangements should immediately be submitted to the Department of Marine Surveying. Following survey on 17 May 1982, Lloyd's Register of Shipping awarded an interim classification certificate in accordance with the Department's decision.

A new bow visor was surveyed and approved on 14 June 1982.

The classification society submitted the requested calculation material, and the then Safety Section drew up its own highly comprehensive memorandum with computation sheets. This memorandum is dated 14 July 1982 and was intended to form the basis of discussions at a safety meeting. The memorandum proposes that the Administration should determine how various forces are to be calculated. There are also references to the accidents referred to above, and the fact that these led to changes in the rules of the classification societies. It was alleged also that the calculations submitted by the societies indicated inadequate engineer input on the calculation and design side, and it was said to that the classification society did not monitor this aspect sufficiently. In example, it was mentioned that the bow doors on both the Visby and a vessel named Wasa Star had had to be subsequently strengthened. The author of the memorandum expressed a desire for further classification society and yard calculation material, and proposed that the Administration should take measures to prevent further accidents of the kind in question.

As far as is indicated by the documents, processing was completed when the then acting Director of Marine Safety wrote to Lloyd's Register of Shipping on 21 September 1982, including in his letter criticism of the society's calculations and superintendence. This letter concludes as follows. "The Administration requests that you test the suggestions made regarding the present version and indicate the reinforcements that you consider necessary. In view of the fact that the bow visor battening-down devices were forced open in bad weather on a number of vessels, the Administration also requests that you provide an account of the dimensioning of the battening-down devices on this vessel."

8.6 Stena Jutlandica

8.6.1 Sequence of events

The passenger ferry Stena Jutlandica was built in 1983, with a gross registered tonnage of 15,811. On 12 October 1984, Stena Jutlandica lay by the quay in Fredrikshamn. When the bow door was opened, the hinge attachment of the port bow door snapped, and the bow door fell downwards about 2 metres. Having been lifted back into position, the door was welded in place. A permanent repair was carried out on a later occasion.

8.6.2 Damage

When the bow door was inspected, cracks were found in the hinge attachment welds. The attachment plate was also partly split.

8.6.3 Cause

The reason for the downward fall of the bow door given in the investigation report was that the welding of the hinge attachment was inferior, resulting in crack formation.

8.6.4 Procedure by the Department

In a letter dated 15 October 1984, the shipping company reported on the accident to Stena Jutlandica to the Gothenburg marine surveying district, which in its turn passed on the report to the Safety Section (now the Investigation Section). Further details indicated by the report were that the repair work was continually monitored by Det Norske Veritas, and that reinforcement work on the other hinges had also been carried out on a sister ship, Stena Danica.

After repair had been carried out, the bow door was surveyed by Det Norske Veritas on 30 October 1984. According to the society's "Survey Report", the results were satisfactory.

On 11 February 1985, the Gothenburg marine surveying area inspected the bow door, which was found to function without complaint.

On 27 February 1985, the case was concluded with the annotation that the reinforcement work on the hinges of Stena Jutlandica's - and also Stena Danica's - bow doors had been carried out and checked without complaint.

8.7 Zenobia

8.7.1 Sequence of events

The ro-ro vessel Zenobia was built in 1979 with a gross registered tonnage of c. 8,920. The vessel was classified by Det Norske Veritas. After an accident at sea on 2 June 1980, a severe heeling that led to a list, the vessel foundered on the roads outside Larnaca, Cyprus on 7 June 1980. On 12 June 1980, the Government appointed a special investigation Commission to investigate this event and its causes. The Commission submitted its investigation report in July 1981. The sequence of events and the cause of the accident are complex. The following account does not claim to provide anything other than a resume of the investigation.

8.7.2 The Board of Accident Investigation

The Board stated that the Zenobia's heeling on 2 June 1980 was caused by the fact that the vessel did not possess sufficient stability, so that during a rapid yaw it heeled and cargo displacement took place. Contributory causes referred to were that the shipping company had not sufficiently informed the officers in charge of the small safety margins in loading and ballasting, and that a directive to the master concerning the economic operation of the vessel had been in conflict with safe propulsion from a stability standpoint. Furthermore, it was considered that a previous accident to Zenobia, on 14 February 1980, had not been satisfactorily investigated, so that measures to prevent a repetition had not been taken.

As regards the foundering of the ship on 7 June 1980, the Board stated that this was caused by the port pilot door being kept open after the vessel's wing tanks had been counter-filled with water to bring it onto an even keel. Certain contributory causes were considered to be relevant to this also. For example, it was stated that ballast filling had not been commenced in the double-bottom tanks and subject to continual stability checking, and that during counter-filling of the wing tanks on the starboard side, attention had not been paid to the fact that the reliability of the connecting valve would be tested.

8.7.3 The recommendations of the Board

The Board stated that ro-ro vessels, as a matter of experience, suffer from certain weaknesses and that they require careful handling, *inter alia* because the safety margins are often not the same as those of earlier general cargo vessels. Training questions were considered to be particularly important. The Board stressed the risk of the occurrence of free liquid surfaces on the large cargo decks of ro-ro vessels, with consequent risks of deterioration in stability. The Board considered that the unfavourable international accident statistics of ro-ro vessels, together with certain incidents involving damage to cargo, including some in the North Sea, showed that measures needed to be taken to improve the safety of transport using these vessels. Using the 1981 statistics, the Board found that during the three most recent years there had been 91 accidents, with 38 total losses involving ro-ro vessels.

The Board recommended the following:

A safety committee for ro-ro vessels including representatives of the National Administration of Shipping and Navigation, owners, yards, classification institutions, insurers and seagoing personnel should be created as soon as possible to examine the options of

a. improving the design, building and outfitting of ro-ro vessels
b. improving the training and drilling of ro-ro vessel crews with reference to cargo handling, stability and safety questions in general

c. intensifying research and development for the securing of both vehicles and vehicle loads etc.

It was considered that the results of this work might with advantage be disseminated to interested parties and used as a basis for Swedish proposals to the IMCO maritime safety committee. The Board saw a model for the proposed safety committees in a tank operation committee administered by the Administration, which came into being as a result of tank explosions in large tanker vessels at the end of 1969 and beginning of 1970.

8.7.4 Procedure by the Department

After IMCO had expressed a wish to the Government to be informed of the Board of Accident Investigation report, and this request had been passed on to the Administration, the then acting Director of Marine Safety, in a letter to the Ministry of Communications dated 3 December 1981, stated that the Administration considered that the Board's report should be furnished with certain additions and viewpoints before it was used as the basis of any measures. A brief summary of the report, with the additions and viewpoints referred to, was attached to the letter.

On 22 September 1983, a meeting was held at the Department of Marine Surveying for the purpose of co-ordinating measures taken as a result of the Board of Accident Investigation's recommendations arising from the Zenobia accident. It was noted in the minutes that the question of safety and ro-ro vessels was now attracting much attention. The classification societies were said to be considering this question as part of their rule development work, a quoted example of this being a project description from Det Norske Veritas. Regarding work with direct Swedish connections, a project called the TFD Project, dealing with buoyancy, leakage stability and safety criteria for General Cargo vessels, was mentioned. The objective of this project was stated to be the formulation of guidelines for the assessment of reasonable safety measures applicable to all dry-cargo ships.

The project work was broken down under five headings:

1. Listing of currently-applied safety criteria or regulations.
2. Studies intended to illuminate the relevance of various parameters for vessel survival.
3. Statistical assessment of survival safety from the viewpoint of the effect of environmental parameters.
4. Further processing of existing statistical material intended to clarify design reasons for foundering.
5. Compilation of guidelines for technical processing of assessments of structural vessel design, with a view to arriving at survival criteria in terms of buoyancy and stability properties.

As regards training, the Administration considered that the existing ship's officers training was adequate for cargo handling etc. on ro-ro vessels. In-service training courses in ro-ro handling were said to be available for previously-trained personnel. It was noted that these courses would be run as long as there were pupils to take them.

In relation to the securing of goods vehicles on vessels, reference was made to a research report generated by the TFD Project, "Safe Stowage and Securing of Cargo on board Ships". The project was stated to be undergoing monitoring, with preparation of mathematical models for calculation of stresses on trailer lashings in vessels. It was also stated that project work was going on for the manufacture of trailers better adapted to maritime transport.

Reference was also made to a project for the drawing-up of directions for the securing of loads in transport with trailers.

It was also stated that the National Administration of Shipping and Navigation had taken part in reference groups for all the projects just referred to, and that it was carrying on a goal-directed work within IMO aimed at an improved international standard in this field. This section referred to an IMO resolution A. 489 (VII) "Safe Stowage and Securing of Cargo Units and other Entities in Ships other than Cellular Container Ships", which was said to be based on a Swedish proposal.

The minutes closed by stating that the Administration, taking into account what has been noted above, considered that the Board of Accident Investigation report on the Zenobia had been finally dealt with.

8.8 Certain other accidents to vessels

16 March 1987, the British ro-ro ferry Herald of Free Enterprise sailed from Zeebrügge. As the vessel passed the outer mole, both the inner and outer bow doors were open. When the vessel yawed, it rapidly shipped water on the vehicle deck. The free liquid service affected the vessel's stability so that it capsized, ending up in a position with one side of the hull above the surface of the water.

150 passengers and 38 crew perished in this accident.

The decisive cause of the accident was attributable to the human factor.

The accident involving Herald of Free Enterprise led the Department of Marine Surveying immediately to carry out a review of all Swedish-flagged ferries from the stability angle. Letters were also written to the owners with questions about such matters as their routines for operation and checking of bow and stern doors.

During this investigation assignment, details have also been obtained of previous bow door damage to Finnish passenger ferries. For example, it has been stated that the Finnish vessel Finlandia received damage to its bow in 1981 which also led to a structural alterations of its sister ship Silvia Regina, later Stena Saga. It has also been revealed that the Finnish vessel Mariella suffered bow door damage in 1986. On this occasion also, the damage was of such a nature that a structural alterations was carried out on a sister ship, Olympia, that was still being built. Concerning this event, it has been stated that the fault was that the bow design had too much flare, which had resulted in extreme bow stresses.

As a result of the disaster involving M/S Estonia, one of the actions taken in autumn 1994 was a specific inspection of passenger ferry bow visors by the Gothenburg marine surveying area. Of twelve ships examined within the Gothenburg area, eleven showed deficiencies. These ranged from the formation of cracks in locking devices to operating system deficiencies. One vessel, the Lion Prince, was prohibited from use, while certain other vessels were made subject to heavy weather restrictions. Since then, the owners and classification societies have been required to submit complete documentation relating to vessel bow designs and operating control programmes.

Finally, the following should be noted in this context. Information has emerged in the mass media to the effect that M/S Estonia's sister ship Diana II came near to losing its bow visor while voyaging between Trelleborg and Rostock on the same stormy night in January

1993 as the Polish ferry Jan Hewelusz had foundered. However, no section 76 report, in accordance with current rules, has been submitted to the Department's Investigation Section. Nor was this event, so far as is known, brought to the attention of the central authority in any other way until after the loss of M/S Estonia. The Department subsequently submitted the

question of the master's conduct for possible prosecution, but the prosecutor has decided not to bring an action.

8.9 Investigator's assessment

It is worth emphasising once more that the account here presented of accidents that have taken place is not the result of a complete or systematic review of the archives of the Department of Marine Surveying. In view of the system of document and file storage in use, this has not been possible, nor has it been considered necessary for the carrying out of the assignment. In relating the above cases, no claim is therefore made to present a complete picture of accidents involving bow visors etc. that may have been reported to the Department. The material presented here should be seen rather as a following-up of information recalled by individual officers in conversation with the investigator.

However, the account presented does indicate that an accident register based entirely on vessel names is not serviceable as a point of departure for retrospective investigations concerning causes. Nor does it appear serviceable as a basis for an ongoing forward-looking analysis work in which new events could be compared with incidents or accidents that have already taken place.

Technically speaking, it seems clear from the cases presented that the "concept" of the ro-ro vessel suffers from many weak points, not least the fixing and locking devices for bow doors and bow visors, and that this had been noticed as early as the beginning of the 1970s in various contexts. Attempts at more general analyses may be found in the documents. On the other hand, it does not appear from these documents, or from other information that the investigator has managed to obtain, that the reported events led to a more systematic examination of ro-ro vessels, for example in the form of orders to regional bodies for specific inspections. However, it should be pointed out that, immediately following the Herald of Free Enterprise accident, the Department acted at central level to implement a review of Swedish-flagged passenger ferries from the stability angle, and that the then Stockholm maritime district, by application to some of the larger ferry owners within the district, informed itself about routines involving such matters as ballasting and trimming, the opening and closing of doors and the securing of these. But the investigator has not been able to find that the measures decided on in the form of representations to classification societies involved, or to IMO, were systematically followed up. Generally speaking, superintendence seems to have been based on the specific rather than the general.

What has just been said about the lack of systematic follow-up might also be applied to the treatment of the report submitted to the Government (Ministry of Communications) in 1981 concerning the foundering of the ro-ro vessel Zenobia. This took up the question of the reliability of ro-ro vessels as regards maritime safety in its entirety, and voiced a large number of additional considerations, together with general and forward-looking measures. As far as the Ministry was concerned, the case seems to have been concluded by a decision to file the papers on 17 October 1983. In the case of the Department of Marine Surveying, the report seems not to have led to any systematic review of - and connection with - events reported to the Department.

9. Summary

Swedish maritime safety work and maritime safety within that part of navigation that falls under the superintendence of Swedish authorities may essentially be claimed to maintain an extremely high quality. This is probably even more the case when seen from an international perspective.

However, this does not mean to say that present operations, as the investigator sees it, are not subject to certain deficiencies in various respects. This applies both to the regional and central activities in themselves, as well as to co-operation between them.

In the view of the investigator, these deficiencies are primarily associated with the management and control of practical survey operations by the areas and the office, procurement and promulgation of information of interest for maritime safety and, centrally - in addition to the control function - the processing and analysis of available material or such material as ought to be made available, and follow-up of measures decided on.

One feature of regional operations is that unjustified differences occur between the areas - and individual inspectors - as regards the scope and content of their exercise of authority. This may be assumed to be due to shortcomings in management and control of practical survey activities at area and office level. To combat this, it is recommended that there should be definite directions, e.g. through checklists for direct control operations and rules for how protocols or equivalent documentation of survey procedures are to be drawn up.

The checking activities of the areas are not communicated systematically to the central authority, which still carries out no follow-up or evaluation of those activities. The central authority therefore lacks a coherent picture of what has taken place during checking work, which restricts the options for achieving an effective use of resources and of directing checking activities towards those areas where they may be expected to produce maximum results. An ongoing evaluation of the work carried out "in the field" should be brought about.

Matters to which attention is drawn during various procedures at area level that are dealt with before the vessel sails are not documented. This material too might provide important information. Forms should therefore be created to facilitate the preservation and passing on to the central authority of important observations during procedures and in the monitoring of new construction.

In order to promote the submission of reports on events that may be of interest from the maritime safety standpoint, the investigator recommends that the Department considers setting up a discussion with certain organisations concerning various measures aimed at stimulating their members to provide such information.

Implementing regulations and interpretation directions may also help to provide guidance in operations at area level. This is something that the areas are calling for.

The investigator also proposes that specific inspections or other theme-based examinations should be made greater use of.

In order to dispel the uncertainty that the investigator found in the areas as regards the imposition of fines, the Department should consider developing a policy to determine the situations in which various sanctions would normally apply. The Department should also draw up implementing directions for dealing with matters relating to fines.

The investigator also recommends that all criminal cases that affect maritime safety should be referred to the maritime courts.

As far as the work of the Investigation Section is concerned, this is carried out - as far as the investigator can determine - in a manner that is in itself highly creditable. As regards the

In terms of information exchange at Nordic level, the investigator has found that an extremely close informal co-operation is already taking place. It would also seem to be the general understanding of representatives of the superintending authorities of Denmark, Norway and Finland that this co-operation functions exceptionally well and that formalisation of information exchange is neither necessary nor appropriate. The investigator accordingly finds no grounds for proposing that Nordic information exchange should be crystallised through formal agreements. It should therefore continue to be a matter for the authorities concerned to determine in more detail the thrust and scope of information exchange.

The information in the report regarding events involving certain ro-ro vessels shows, in the view of the investigator, whose brief was not to examine questions dealing purely with safety, that analysis, assessment and follow-up should be essential ingredients of the activities of the Department of Marine Surveying.

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Charts A-E

Chart A

Organisation of National Administration of Shipping and Navigation

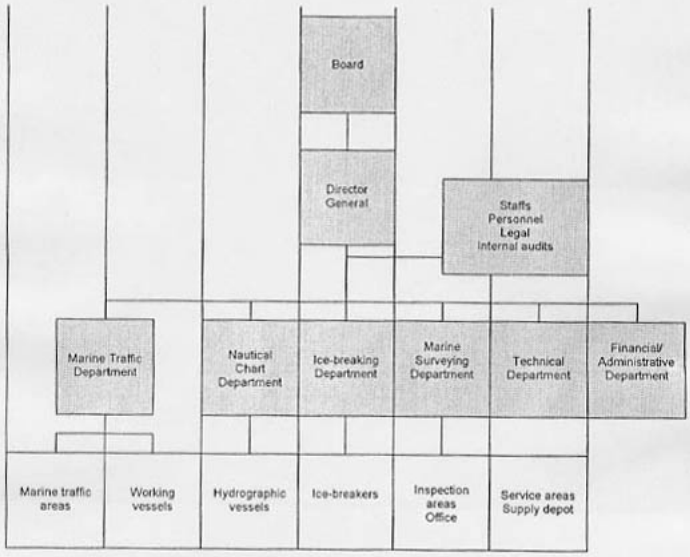
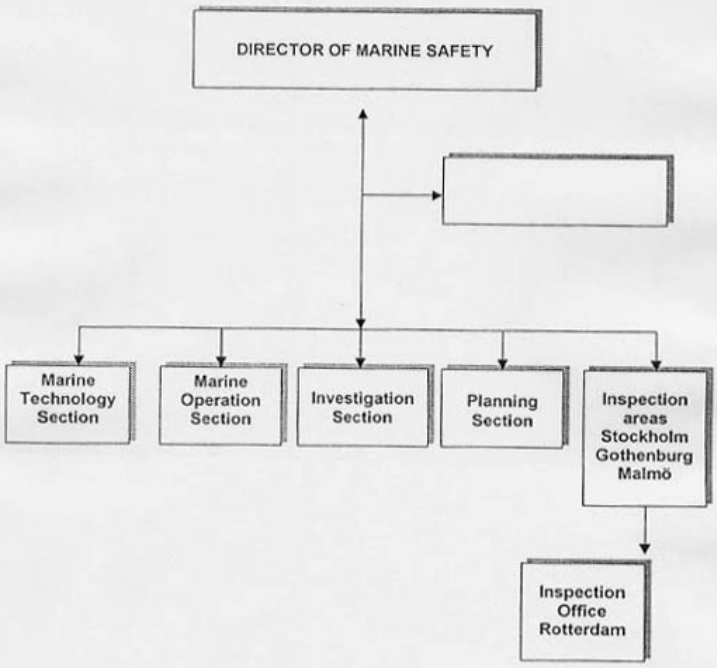


Chart B

NATIONAL ADMINISTRATION OF SHIPPING AND NAVIGATION
MARINE SURVEYING DEPARTMENT



BOARD OF SHIPPING ORGANISATION

Chart C

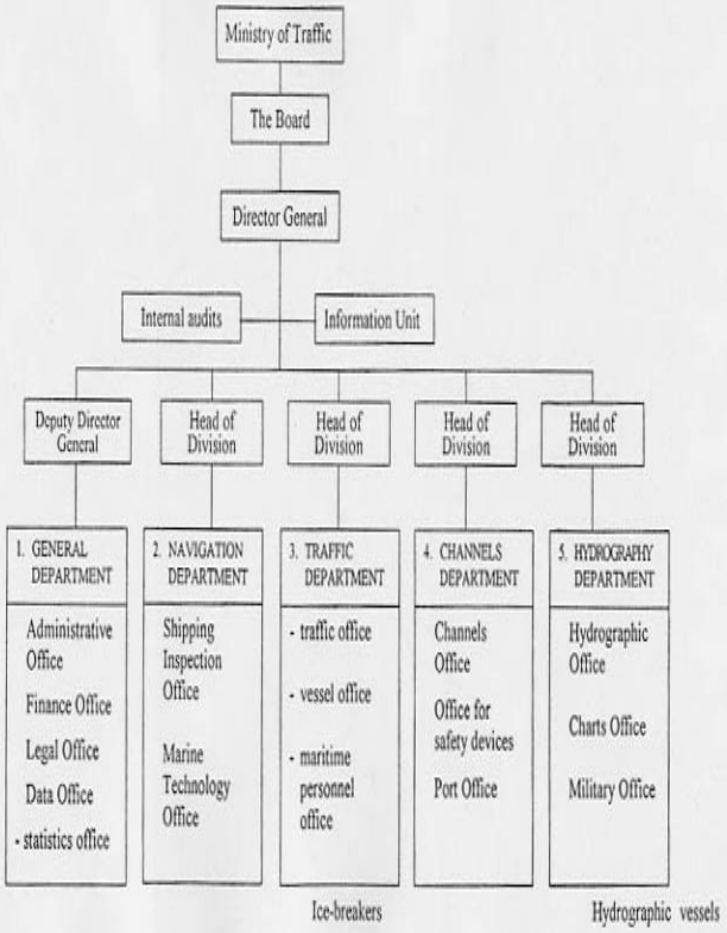
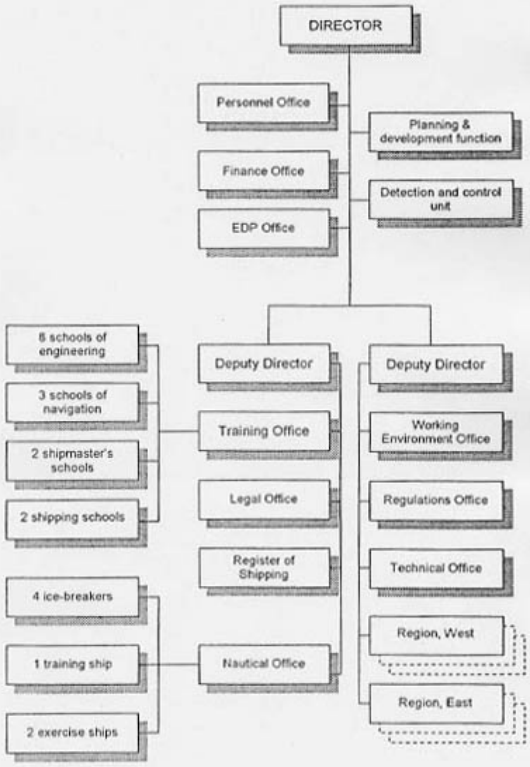


Chart D

Board of Shipping Organisation Plan



Enclosure 9.1.134

Polismyndigheten i Stockholms län
City polismästardistrikt
Våldsroteln.

ÅKLAGARMYNDIGHETEN
STOCKHOLM
1998-02-12
Dnr. 15-1-3978-98

Förhör hållet med Lars -Olof Ålander 310204-7812, Fogdevägen 31, 152 40 Södertälje.
Förhöret hållet i Ålanders bostad den 1998-02-03 med början klockan 10.40. Färhörsledare krkom Bo Wide. Med vid förhöret var Cå Tomas Lindstrand. Förhöret avsåg Ålanders befattning med fartyget samt hans kännedom om eventuellt begärda kostnadsförslag på reparationer eller förstärkningar på M/S Estonia innan fartyget flaggades över till Estland.

Ålander berättade, att han varit anställd av Bureau Veritas med befattning som principal surveyor. Han hade uppgiften att vara klassman för fartyget från och med den tid som fartyget togs i bruk och fram tills dess att fartyget övergick i Estlands ägo.

Ålander tillfrågades om han under sin tid som klassman fick någon kännedom om att fartygets ägare begärt kostnadsförslag för förstärkning av visirlåsningarna. Ålander svarar omedelbart att det inte är någonting som han känner till.

Skulle det ha varit något fel som åtgärdats eller som skulle åtgärdas skulle klassen ha fått reda på det. Har rent allmänt något kostnadsförslag begärts in borde maskinchefen Lasse Karlsson vid Sallyrederiet veta om det.

Enligt Ålander är det mycket viktigt att Visiret håller tätt mot fartyget i övrigt och att inget vatten tränger in. Vatten i visiret kan komma i rörelse av fartygets rörelser i sjön varvid visiret påverkas inifrån av de krafter som blir när vattnet rör sig framåt i visiret. Visiret är en vågbrytare medan rampen är den del av fartyget berättade Ålander.

Vid en hamnstsadskontroll skall fartyget kontrolleras och eventuella brister noteras på därför avsedd handling/handlingar. Bristerna åsätts en kod. Vilken kod som sätts beror på vad som måste göras med bristen. Ålander överlämnade en fotostatkopia på en kodlista med förklaringar om vad koderna innebär. Han sade att Estonia hade brister med kod 17 men att fartyget ändå avlöpte från hamnen utan att bristerna var åtgärdade. Listan med bristerna skulle finnas hos sjöfartsverket i Malmö. Ålander trodde också att listan skulle finnas hos internationella haverikommissionen.

Kodlistan bifogas som bilaga.

Förhöret utskrivet efter gjorda anteckningar och översänds till Ålander för godkännande.

Mottagen av Lars-Olof
Åhlander 980203
i Södertälje. /TL

C8-1-392-98

codes for actions taken

ÅKLAGARMYNDIGHETEN
STOCKHOLM
1998-02-04
Dnr.....

00	no action taken
10	deficiency rectified
12	all deficiencies rectified
15	rectify deficiency at next port
16	rectify deficiency within 14 days
17	master instructed to rectify deficiency before departure
20	grounds for delay
25	ship allowed to sail after delay
30	grounds for detension
35	ship allowed to sail after detension
36	ship allowed to sail after follow-up detention
40	next port informed
45	next port informed to re-detain
50	flag state/consul informed
55	flag state consulted
60	region state informed
70	classification society informed
80	temporary substitution of equipment
85	investigation of contravention of discharge provisions (MARPOL)
95	letter of warning issued
96	letter of warning withdrawn
99	other (specify in clear text)

1994-11-23

ESTONIA-olyckan

Väderförhållandena 27 och 28 september 1994

ALLMÄNT

Väderförhållandena den 27 september dominerades av ett kraftigt och omfattande lågtrycksområde med flera dellågtryck som täckte norra Skandinavien och Norska havet. Se väderkartan för Europa i bilaga 1 från kl 12 UTC den 27 september.

Ett av dessa mindre lågtryck fördjupades den 27:e och rörde sig snabbt österut via södra Norge och östra Svealand till södra Finland. Lågtrycket blev relativt kraftigt och hade den 27/9 kl 12 UTC sitt centrum nära Oslo med djup 995 HPA, 28/9 kl 00 UTC över sydostligaste delen av Bottenhavet med djup 980 HPA och 28/9 kl 12 UTC över östra Finland med djup 985 HPA. En tillhörande varmfront med kortvarigt regn passerade under kvällen den 27:e snabbt österut över norra Östersjön. Syd och sydväst om lågtrycket följde en vindvridning från SW till W och den västliga vinden blev mycket byig.

VÄDRET PÅ NORRA ÖSTERSJÖN/FINSKA VIKEN DEN 27 SEPTEMBER

Vädret kan beskrivas enligt en "analyskarta" med observationerna från olika platser plottade. I bilaga 2-6 visas analyskartor för den aktuella perioden.

Observationer utförs i samtliga länder var 3:e timma med början kl 00 UTC. Svensk vintertid är lika med UTC-tid plus 1 timma.

Finsk och estnisk vintertid är lika med UTC-tid plus 2 timmar.

I fortsättningen används endast svensk vintertid. Observera att i en del av bilagorna används tidsbegreppet z-tid, dvs det gamla uttrycket för UTC-tid. På dessa tider skall alltså läggas till 1 timma för att få svensk vintertid.

Vindarna på kartan beskrivs med en pil som visar varifrån det blåser tillsammans med långa eller korta tvärstreck som visar hur mycket det blåser. Ett kort streck motsvarar 2,5 m/s, ett långt streck motsvarar 5 m/s.

T ex visar följande symboler:

SW (sydväst) 12.5 m/s

W (väst) 20.0 m/s

Sveriges meteorologiska och hydrologiska institut
601 76 Norrköping. Tel 011-158000. Telex 64400 smhi s.

I bilaga 7 visas en karta med ett antal utvalda väderobservationsplatser som funnits lämpliga för att verifiera förhållandena på norra Östersjön. Dessa platser är Söderarm, Svenska Högarna, Bogskär, Utö, Russarö, Bagaskär och Ristna.

Observationer utförs även i Tallinn men dessa observationer ger ej representativa värden p.g.a stora läeffekter. T ex rapporterades från Tallinn aldrig vindstyrkor på mer än 7 m/s under den mycket blåsiga perioden som rådde den 27-28/9.

I bilaga 8 presenteras observationerna från de utvalda platserna i tabellform för var 3:e timma under den aktuella perioden.

Definition av vind

Internationell standard som används av alla länder för att ange vinden är den medelvind som registreras under de 10 minuter som föregår själva observationstillfället. Vinden mäts i de flesta fall med en vindgivare som kalls anemometer och skall gälla på 10 m höjd över jordytan. I Sverige noterar vi även den maximala medelvind som rätt sedan föregående observationstillfälle 3 timmar tidigare. På den finska fyren Bogskär finns en meteorologisk automatstation som även registrerar maximala medelvinden samt byvindarna.

Även på den estniska observationsplatsen Ristna mäts den maximala medelvinden samt byvindarna. Se tabellen i bilaga 8.

För att visa vindens variation timma för timma bifogas även kopior på orginalregistreringarna av vinden från Söderarm och Svenska Högarna. Se bilaga 9 och 10. Tidsskalan här avser UTC-tid, dvs för att få svensk tid, lägg till 1 timma. Här syns tydligt att de maximala vindarna först inträffade efter förlisningen mellan kl 02 och 04.

Kommentar till tabellen

Vindobservationerna från de angivna platserna är relativt representativa för det öppna havsområdet men vinden bromsas alltid upp något även vid en fyr i kustbandet. Vid vissa fyrplatser råder det dessutom stor läeffekt vid vissa vindriktningar. Observationerna från Bogskär och Ristna bedöms i denna vädersituation som de mest representativa.

För att eliminera läeffekterna används på SMHI en datorbaserad tolkningsmodell där hänsyn tas till samtliga observationer plus den olikartade uppbromsningen som blir av vinden över land, vid kustbandet och över hav. I modellen tas även hänsyn till vilken luftmassa som är aktuell plus ytvattentemperaturen. Dessa fysikaliska samband är väl kända och på detta sätt kan man få en bättre representativ bild av hur det blåser vid ett bestämt tillfälle över olika delar av havsområdet. I bilaga 11, 12, 13 och 14 visas sådana datorbaserade tolkningskartor från kl 19, 22, 01 och 04 den 27-28/9.

VÅGOR

Definition av vågor

Med våghöjden menas avståndet från dal till topp. Internationell standard är att mäta och beskriva vågorna som signifikant våghöjd eller som maximala vågor. Med signifikant våghöjd menas medelvärdet av högsta tredjedelen av vågorna. Detta begrepp har införts för att få en bättre jämförelse

mellan uppmätta vågor med instrument och manuellt uppskattade vågor. Det visar sig nämligen att ett mänskligt öga alltid överskattar "medelvåghöjden" och med begreppet signifikant våghöjd erhåller man en bättre överensstämmelse mellan manuella och instrumentellt utförda observationer.

Begreppet maximal våghöjd har införts därför att vågorna på grund av interferens relativt regelbundet skapar enstaka vågor som blir betydligt högre än de signifikanta våghöjderna.

Statistiskt sett blir mellan var 500:e och var 1000:e våg en markant högre våg, oftast 70-80 % högre men i extremfall 100 % högre. I det här fallet skulle detta inträffa mellan varannan och var tredje timma.

Om vågorna passerar grundbankar så ökar frekvensen av detta interferensfenomen. Detsamma gäller då en markant vindkantring på mer än 45 grader har skett som medför att vågorna korsar varandra och att den nya vindriktningen varat minst ett par timmar.

Vågmätningar saknades vid det aktuella tillfället i norra Östersjön. Den enda vågmätning som görs operativt i detta område är vid Almagrundet. Observationerna därifrån har tyvärr saknats en längre period på grund av tekniska problem. I det här aktuella fallet är heller ej vågobservationer från Almagrundet representativa för det aktuella området från Finska vikens mynning till syd om Finska Utö, särskilt inte med vindar mellan syd och sydväst följt av västliga.

För de dagliga vågprognoserna som SMHI utför används en numerisk vågmodell där vågorna beräknas utifrån vindens styrka, riktning och varaktighet samt havsdjupet. Dessa fysikaliska samband är väl kända och vågmodellen är verifierad mot mätningar både i svenska och tyska farvatten med mycket gott resultat. Beräkningarna från vågmodellen görs i form av signifikant våghöjd.

För att beskriva vågförhållandena på ett så korrekt sätt som möjligt har SMHI i efterhand låtit den datorbaserade tolkningsmodellen för vädret initialt även ligga till grund för beräkningar i vågmodellen. På så sätt får man en beräkning av vågorna baserat på de vindar som bör ha förekommit under 27-28 september i det aktuella området och angränsande havsområden.

I bilaga 15, 16 och 17 visas de beräknade vågorna kl 19, 01 och kl 07 baserat på tolkningsmodellen för vädret.

I denna utredning bifogas i bilaga 18 även en teoretisk studie av våghöjderna för detta aktuella fall samt en bedömning av sannolikheten för att några extremt höga vågor kan ha förekommit.

LUFTTEMPERATUR

Lufttemperaturen till sjöss varierade mellan 11 och 13 grader på dagen den 27:e. Bakom den smala fronten som passerade österut under kvällen sjönk temperaturen till 10-11 grader, efter vindkantringen till W från efternatten till 8-9 grader.

YTVATTENTEMPERATURER

Ytvattentemperaturen i våra omgivande hav kartläggs varje dag på SMHI utifrån mätningar från färjor och handelsfartyg samt beräkningar från den infraröda kanalen ombord på vädersatelliterna.

I det aktuella området uppmättes fram till natten mellan 27-28:e ytvattentemperaturer på 12-13 grader. Från den 28:e sjönk vattentemperaturen till 10-11 grader. Se bilaga 19.

STRÖMMAR

Strömmar mäts ej regelbundet i Östersjön. Däremot körs dagligen på SMHI en numerisk modell som beräknar strömmarna, vilka framförallt används för oljedriftsberäkningar eller vid beräkningar vid sjöräddningsinsatser. Eftersom det är väderförhållandena som helt styr strömmarna, kan man liksom för vågorna, även erhålla bra och användbara teoretiska beräkningar av strömmarna baserade på SMHIs vädermodell.

De beräkningar av strömmarna som är utförda för 5 meters djup i det här aktuella fallet visar att under början av kvällen förekom inga kraftiga strömmar på Estonias rutt.

Från strax före midnatt beräknas strömmarna ha tilltagit till ca 0.5 knop och med en riktning mellan ost- och nordostgående, från omkring kl 02-03 vridande till sydostgående och fortfarande omkring 0.5 knop.

RAPPORTER FRÅN ÖGONVITTNEN

Information om vind och vågor har inhämtats från:

* Färjorna Silja Europa och Mariella som nästan gick parallellt med Estonia och anlände till haveriplatsen kort efter förlisningen.
* Färjan Finnjet som låg ca 25 nm bakom Estonia som anlände till haveriplatsen kl 02.20.
* Färjorna Silja Symphony och Isabella som gick från Stockholm mot Helsingfors och bör ha nått olycksområdet 2-3 timmar efter förlisningen.
* De båda svenska handelsfartygen Westön och Ingrid Gorthon som nådde olycksområdet 3-4 timmar efter förlisningen.
* Flygvapnets och Marinens räddningshelikoptrar som deltog i räddningsarbetet och nådde haveriplatsen 3-5 timmar efter förlisningen.

Vind och vågor

Fartyg

Samtliga fartyg angav medelvinden under början av kvällen till först omkr S 10-15 m/s, senare ytterligare ökande till S 15-20 m/s, 2-3 timmar före midnatt vridande till omkring SW 15-20 m/s. Från efternatten, dvs efter förlisningen, omkring W 20-25 m/s, i byarna 26-30 m/s. Fram på morgonen avtagande W till ca 20 m/s, på f.m. ca 15 m/s.

Vågorna har bedömts till 4-5 m med enstaka maxvågor på 6-7 m före förlisningen och 5-6 m med enstaka vågor upp till 7-8 m efter förlisningen.

Vindmätarna ombord på färjorna är placerade på mellan 40-50 meters höjd men värdena reduceras för att gälla på 10 meters höjd. Befälet ombord på färjorna anser att de efter många års erfarenhet och jämförelse att denna reducering är riktig och mycket väl överensstämmer med verkligheten.

Handelsfartygen har alltid observerat vind och vågor genom att uppskatta dessa. Kaptenerna ombord på dessa framhöll att det enligt deras erfarenhet ej var mer än högst 5-6 m höga vågor, jämfört med de 6-10 m som förekommit i pressen.

Helikoptrar

De svenska helikoptrarna från Flygvapnet respektive Marinen som anlände till haveriplatsen mellan kl 02.50 och 05.00 har gjort följande uppskattningar:

Vind omkring W 25 m/s, byar upp till 30 m/s. En helikopter angav 40 m/s i byarna.

Vad gäller vågorna har bedömningarna från helikoptrarna varierat mer än vinduppgifterna. Majoriteten har angivit 5-6 m eller 6-8 m, en helikopter angav 6-9 m, en annan 6-10 m.

En helikopterrapport talar till och med om en jättevåg på 12 m.

Kommentar till observationerna från fartyg och helikoptrar

De vind- och vågförhållanden som är intressanta i det här fallet är de som inträffade före förlisningen. Här råder det stor samstämmighet mellan informationen från de meteorologiska observationsplatserna, observationer från fartyg samt beräknade vindar och vågor baserat på den numeriska tolknings-modellen. Detsamma gäller förhållandena efter förlisningen bortsett från de vågobservationer som gjorts av helikoptrarna. Det kan vara svårt att värdera de olika iakttagelserna, men SMHI vill ändå kommentera dessa eftersom det förekommit spekulationer om mycket extrema förhållanden i pressen.

Vind

Före förlisningen föreligger endast rapporter om vinden från färjor och handelsfartyg. Här råder samstämmig uppfattning om att vinden var omkring SW 15-20 m/s, vilket även stöds av observationer från observationsplatserna samt beräkningar gjorda i den ovan beskrivna tolkningsmodellen.

Efter förlisningen, dvs under efternatten och morgonen är både fartyg och helikoptrar i stort sett överrens om att vinden var omkring W 20-25 m/s med byar upp mot 30 m/s.

En helikopter avviker genom att ange byar upp till 40 m/s.

Även dessa uppgifter stämmer i stort sett med de väderobservationer som utförts samt de beräkningar som erhållits från den sk tolkningsmodellen, där beräkningen av byarna ger upp till 30-34 m/s.

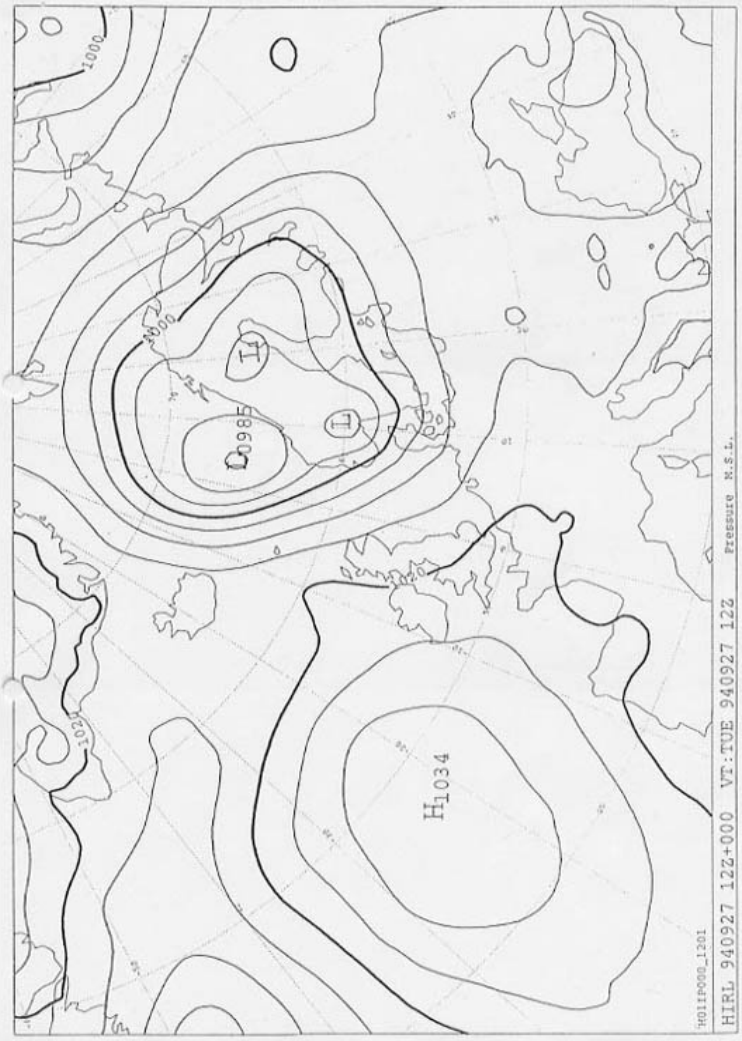
Signifikant våghöjd

Vad gäller vågorna råder samstämmighet för tiden före förlisningen mellan observationer och beräkningar på 3.5-4.5 m. För tiden efter förlisningen så råder den markanta skillnaden att samtliga fartyg anger 5-6 m medan helikoptrarna anger allt från 5-6 m till 6-10 m.

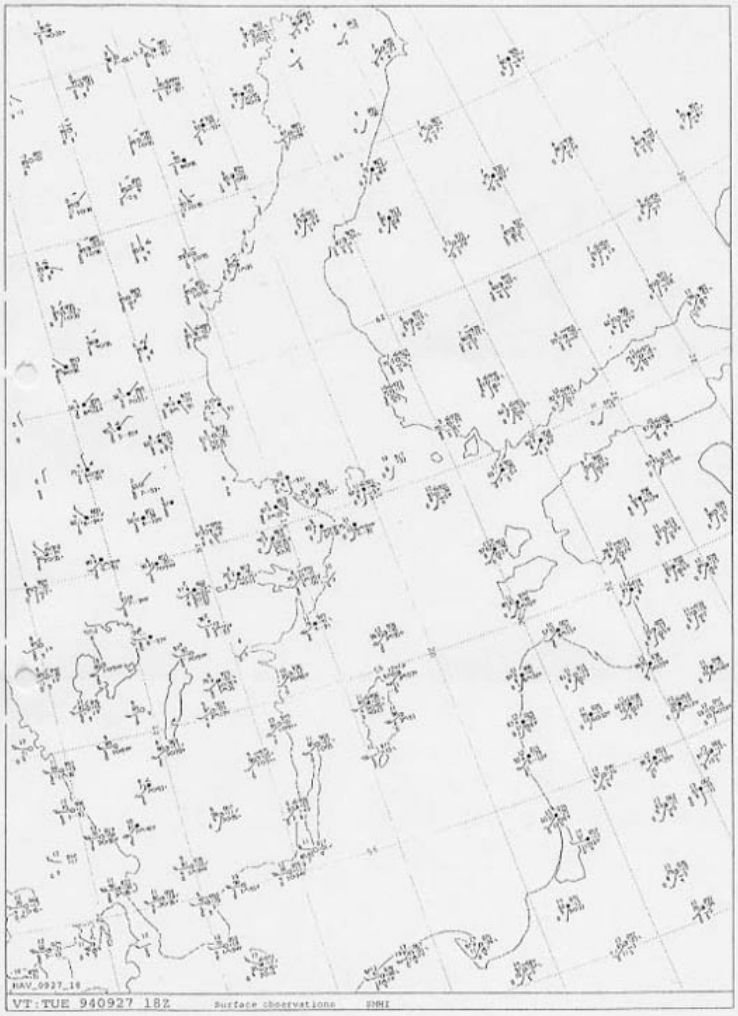
Man får utgå från att helikoptrarna ej särskiljer mellan signifikant och maximal våghöjd och därmed spänner deras rapporter över stora intervall.

Eftersom observationerna av signifikant våghöjd från färjor och handelsfartyg efter förlisningen väl sammanfaller med de numeriskt beräknade våghöjderna samt den teoretiska studien som utförts, finner SMHI det som mest troligt att signifikanta våghöjden före förlisningen varit 3.5-4.5 m och först ökat ytterligare 2-3 timmar efter förlisningen till 5.0-6.0 m.

Bilaga 1.


1000
1000
1024
H
L
L 985
H 1034
HIRL 940927 12Z+000 VT:TUE 940927 12Z Pressure M.S.L.
H011P000_1201

Bilaga 2.



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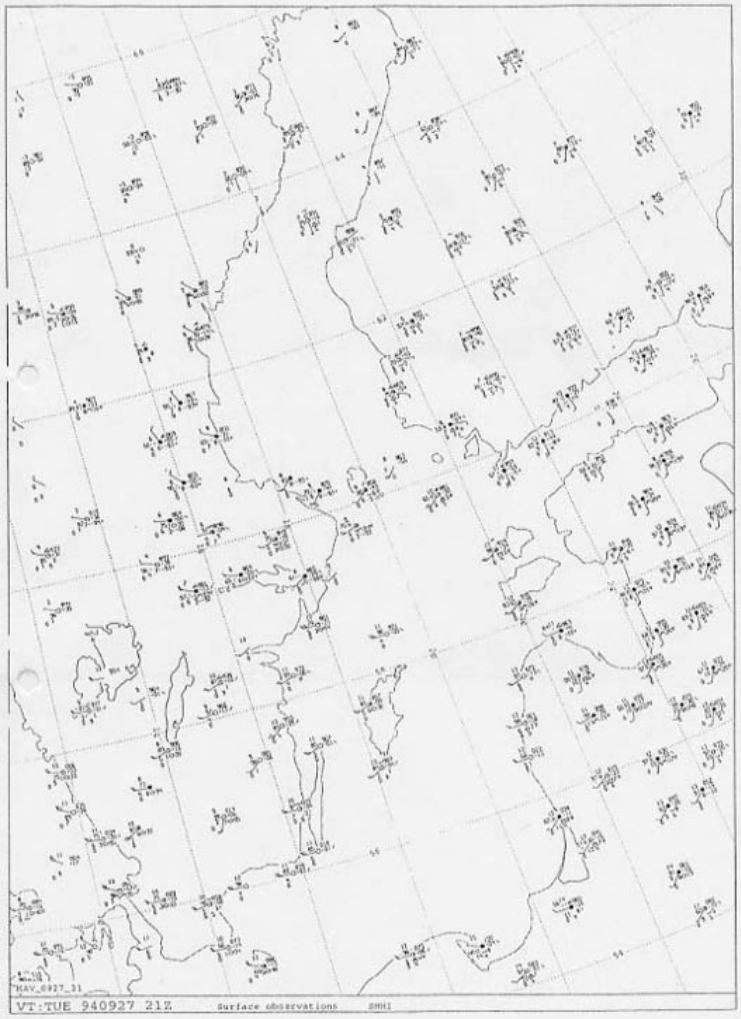
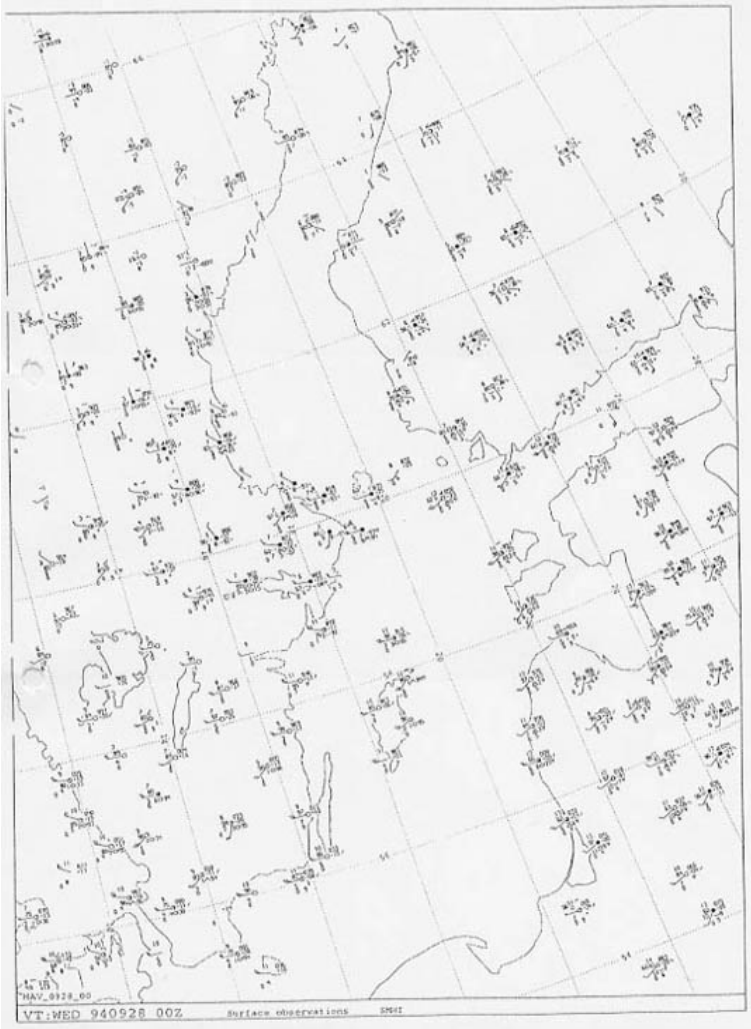


Bilaga 4.



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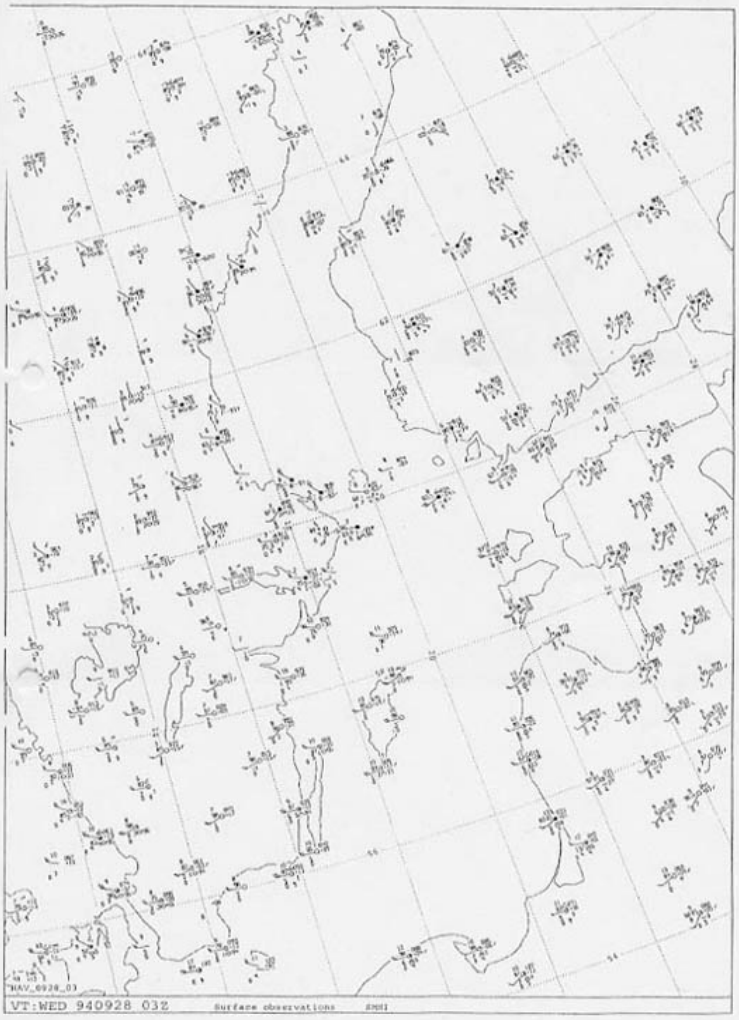
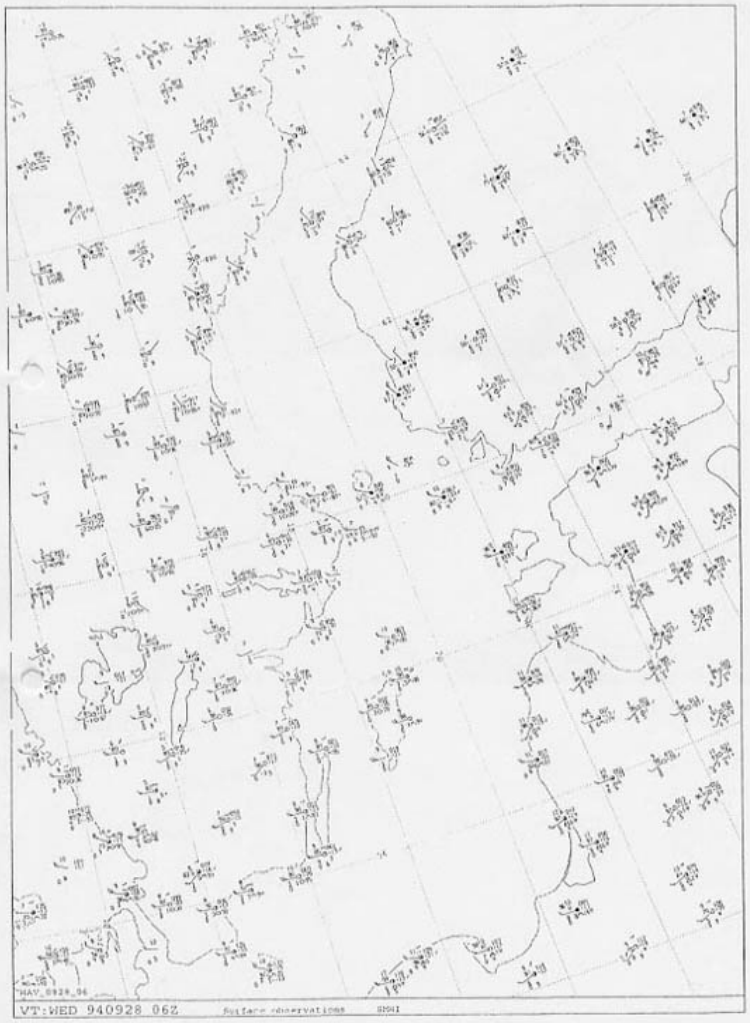
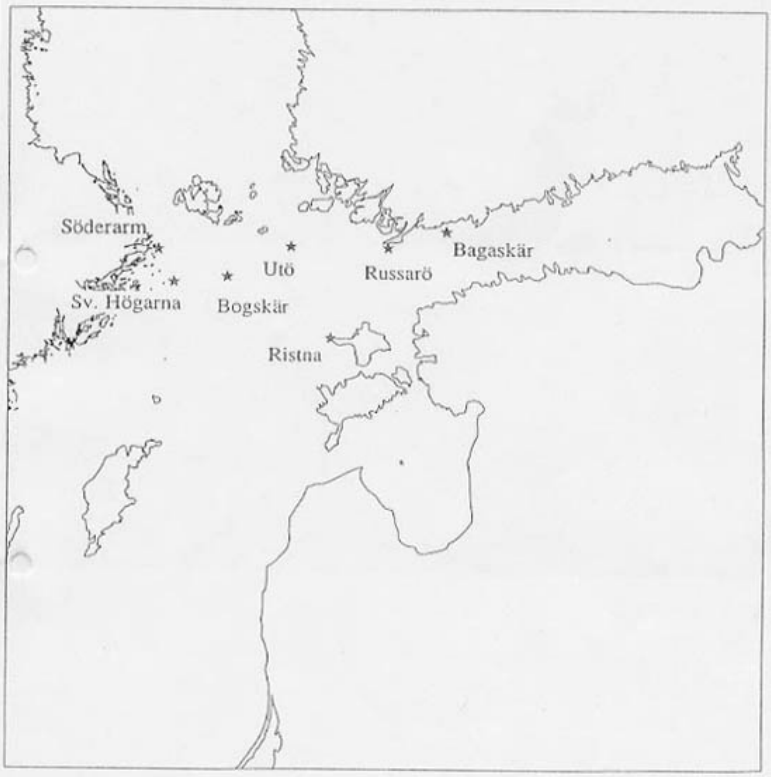


Bilaga 6.




Söderarm
Utö
Russarö
Bagaskär
Sv. Högarna
Bogskär
Ristna

OBSERVATIONER

Nedan visas de observationer av medelvind till riktning respektive hastighet som noterades 27-28 september.
Endast de svenska stationerna plus den finländska automatstationen Bogskär anger vilka maximala medelvindar man noterat sedan förra observationen, 3 timmar tidigare. Notera att man aldrig mäter vindhastigheten i byarna vid någon av dessa stationer förutom vid Bogskär och Ristna.
Tiden är svensk vintertid.

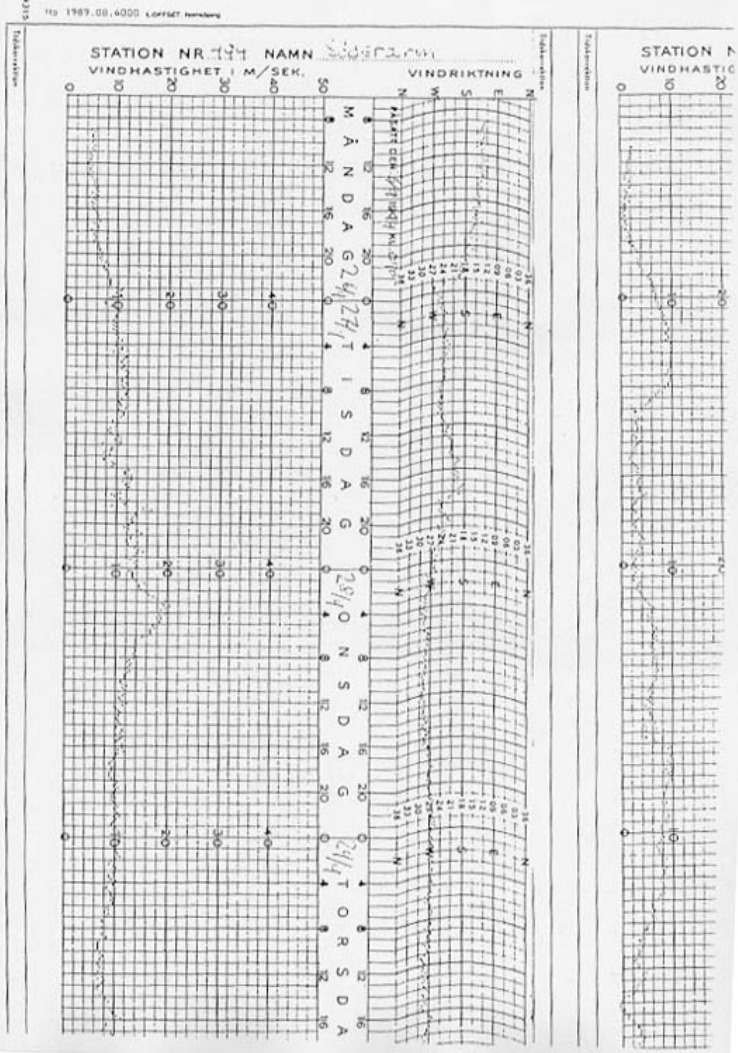
Dag/ kl	Söderarm riktning medel/max (m/s)	Svenska Högarna	Bogskär byvindar, se Not.	Utö	Russarö	Ristna / bymax	Bagaskär
27/kl 16	SW 09 /12	SW 12 /14	SW 13 /14	SW 09	WSW 09	SW 08 /12	SW 12
27/kl 19	SW 11 /13	SSW 14 /16	S 14 /17	SSW 13	SW 08	SSW 08 /14	SW 09
27/kl 22	S 13 /17	SW 16 /18	SW 17 /18	SW 15	S 16	WSW 16 /21	S 15
28/kl 01	SW 14 /15	W 17 /18	SW 20 /21	SW 15	SW 12	WSW 15 /22	SW 16
28/kl 04	W 20 /20	WNW 24 /24	W 19 /22	WSW 15	WSW 12	W 18 /29	SW 18
28/kl 07	WNW 17 /20	WNW 18 /25	WNW 21 /24	WNW 13	WNW 09	W 17 /26	W 04
28/kl 09	WNW 12 /17	WNW 14 /18		W 15	WNW 11	W 12	W 10

Not.
Bogskär uppmätte de högsta byvindarna:
27 september kl 22.46 till 24.6 m/s.
28 september kl 06.25 till 27.7 m/s.

Däremellan var bymax betydligt lägre.

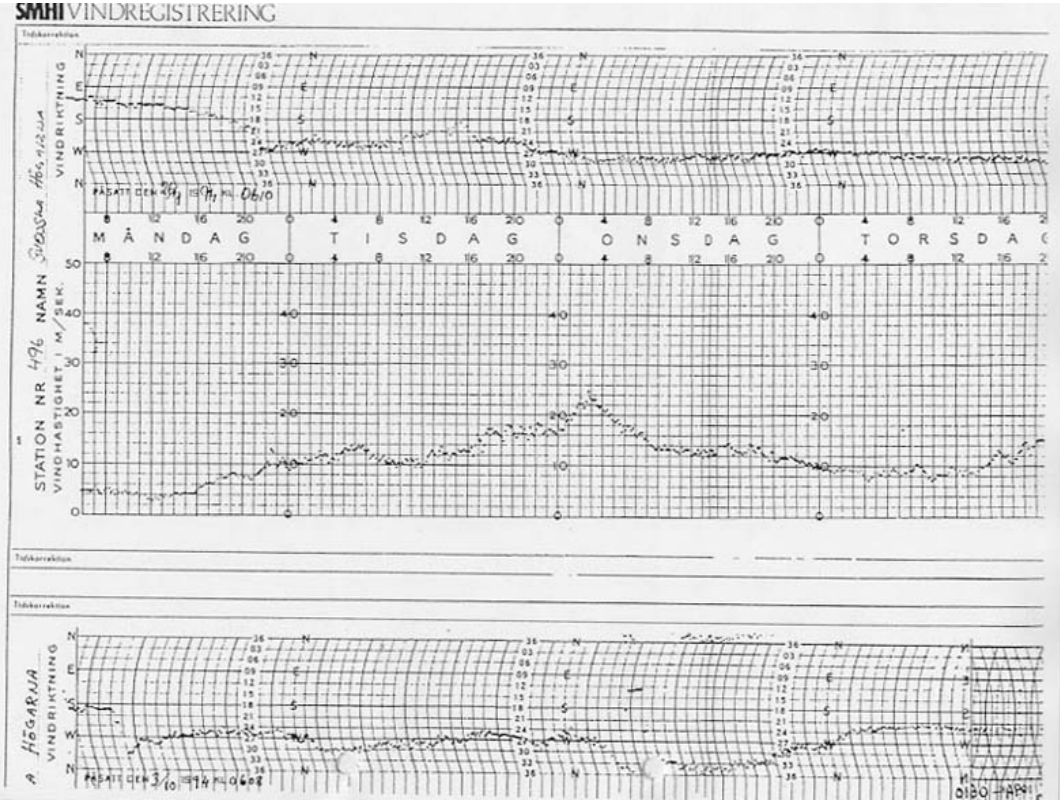
Bilaga 9.

SÖDERARM

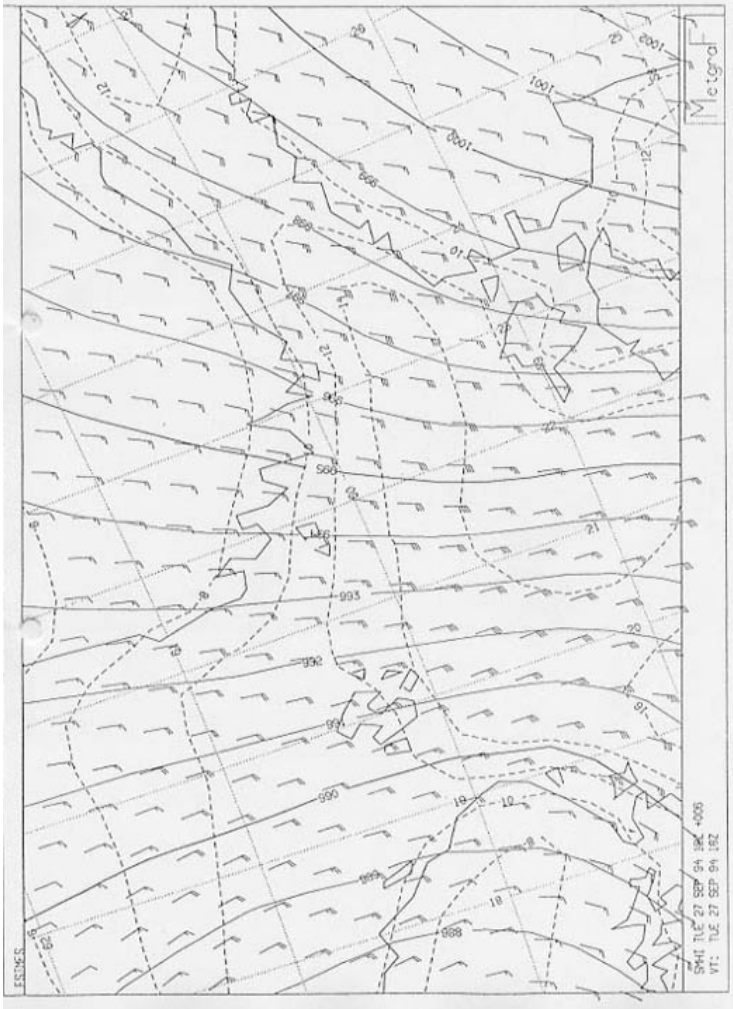


Bilaga 10.

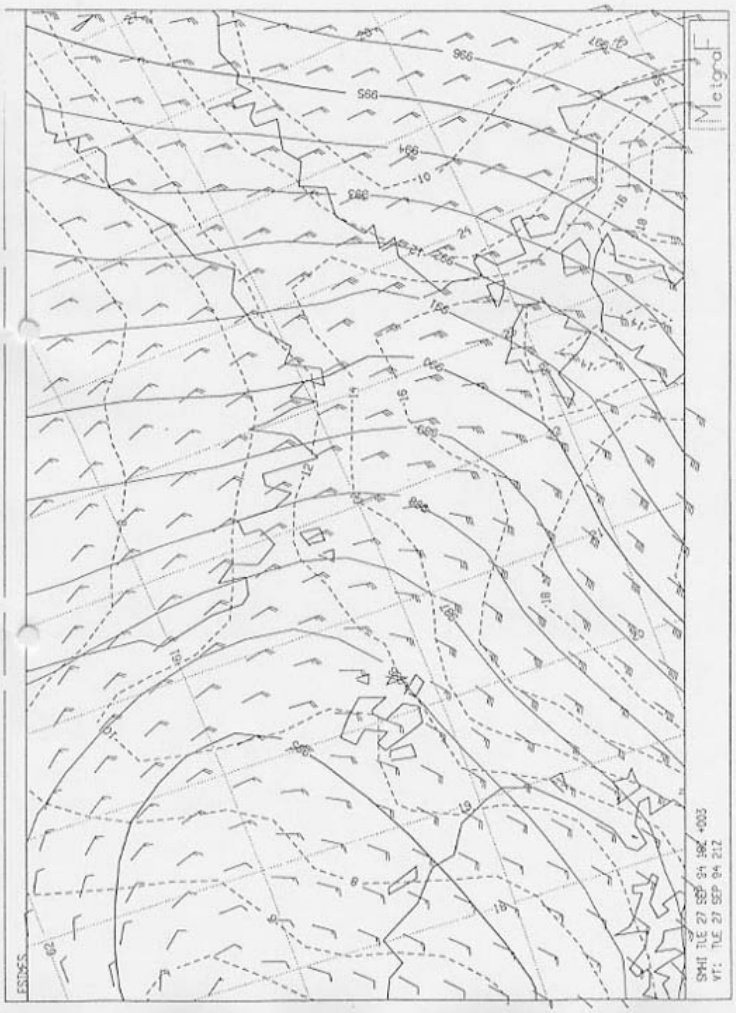
SVENSKA HÖGARNA

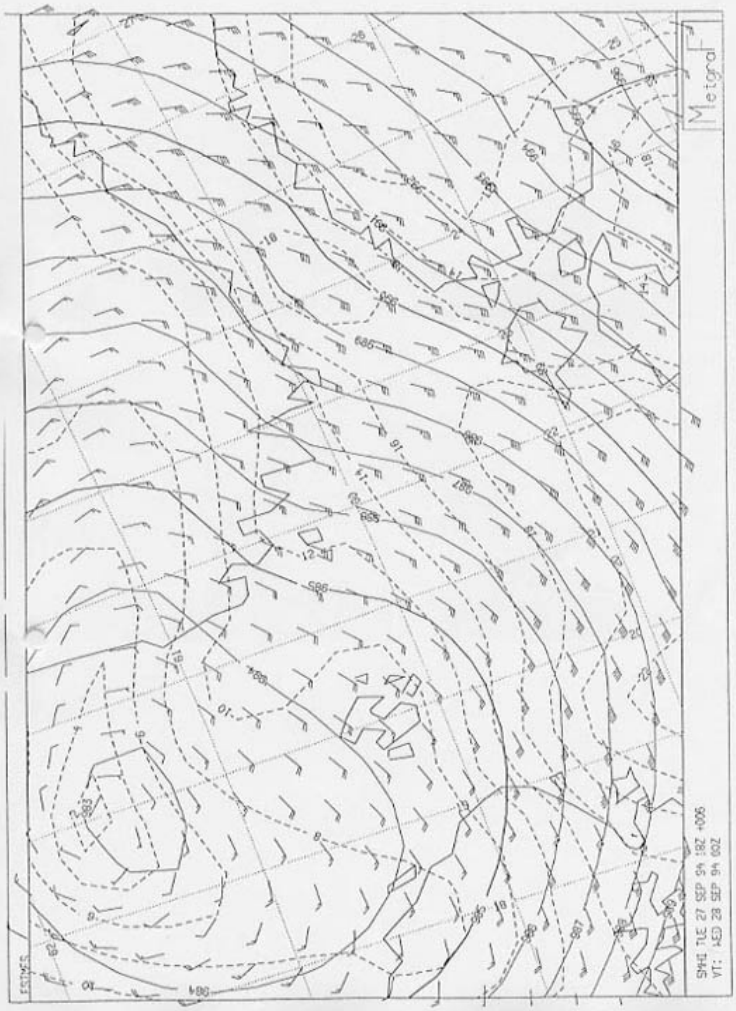


Datorbaserad tolkningsmodell kl 19.

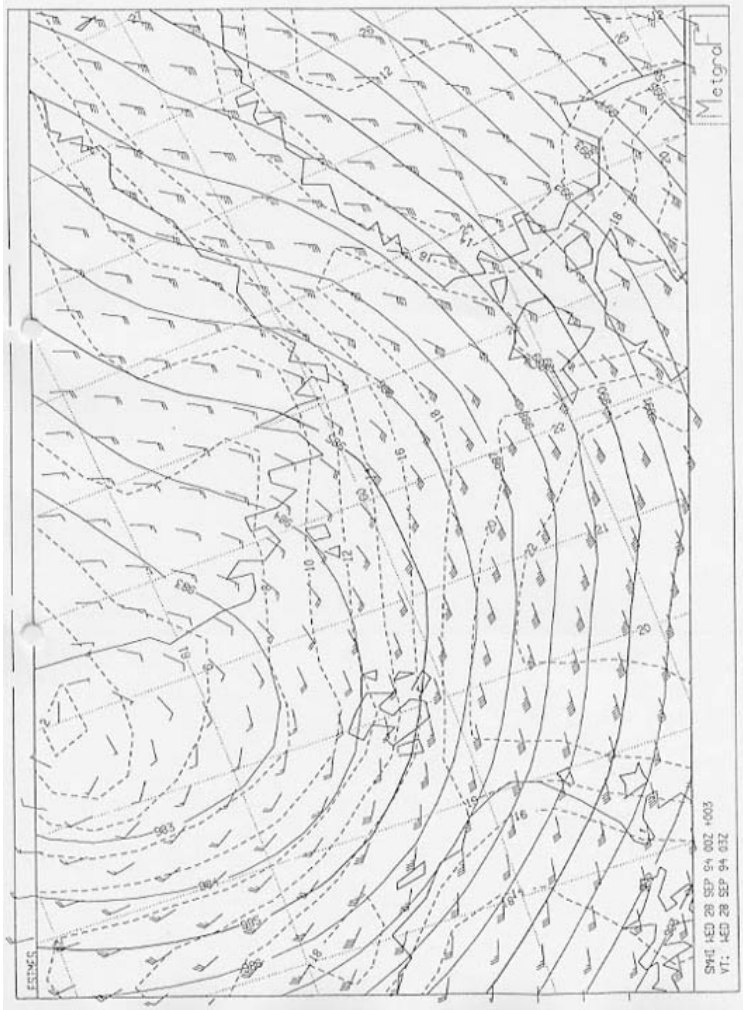


Bilaga 12.




Meteorologi
SMHI TUE 27 SEP 94 18Z +006
VT: WED 28 SEP 94 00Z

Bilaga 14.



Bilaga 15.

Bilaga 16.

SMHI TUE 27 SEP 94 06z + 18
VT: TUE 27 SEP 94 24z

Bilaga 17.

SMHI TUE 27 SEP 94 06z + 24
VT: WED 28 SEP 94 06z

Office Translation

Wave Conditions in the Northern Baltic at S-SW wind 15-20 m/s

Definitions

Wave height and wave length are determined by the wind speed, however, to a similar extent by the duration the wind is blowing and the fetch, i.e. the area of free water exposed to the wind on which the waves are built up. The wave length under discussion is the distance from wave crest to wave crest. Wave height is defined by the distance from wave crest to wave trough. In the following it is meant that "wave height" is the average height of the highest 1/3 of the waves (significant wave height). Wave period is the time between two wave crests.

Wave Heights and Wave Length in the Northern Baltic
at Wind Speed 17-18 m/s.

When the wind speed is 18 m/s, the wave height can reach 5 - 5.5 m in free water. It takes, however, more than 24 hours of this high wind speed and requires a fetch of more than 1000 km. If the fetch is only 300 km (distance from East of Hoburgen to Gotland) and the wind speed is 17 m/s the wind has to blow more than 10 hours to create a wave height of 4 m. In the Northern Baltic there are frequently blowing times which restrict the wave height when the wind is blowing strongly from southerly direction. This means also that the long, high waves can have affect after 6-8 hours only from one wind direction or after an increase of wind speed.

The short, steep waves can therefore overlap a swell from a different direction, which creates an uncomfortable seastate for smaller craft.

When it is blowing with 17 m/s and the wave height is 4 m in the Northern Baltic, then the wave period should be about 8 s and the wave length about 100 m according to SMHI's recordings, tables and literature.

Wave fields at sea are not regular waves with long crests. Wave fields from different directions meet and create the chaotic seastate with short wave crests which we experience at sea. Due to the meeting of different wave directions, from time to time extremely high waves can be created. Single waves might reach double the significant wave height, whilst wave period and wave length do not change. Waves of the different wave trains are normally more or less similar in height and wave length. When two waves meet and create an extremely high wave there is a high probability that the next two following waves in the wave trains will also meet and several extreme waves will follow.

At certain locations it becomes very clear that in case of a change in wave direction, chaotic waves with extremely high waves shall be created. Upon passing over a shallow substantially higher waves can be met compared to the other waves in the surrounding.

It is of particular interest that the waves might be affected by the shallows that are South of the Stockholm archipelago and the Åland archipelago.

Which Ground Can Affect Storm Waves?

At a water depth of less than ¼ of the wave length the waves can be felt at the bottom. The most important factor, however, is that the speed of the waves is reduced. The waves passing the shallow do have a higher speed than those moving over the shallows, the wave fronts which become slower and break over the shallows and the wave heights become larger leeward of the shallow.

When waves with wave length of 100 m come in from S-SW on the shallows South of Åland, the waves are influenced and create a chaotic seastate with extremely high waves when the wave front is passing over the area of the shallows where the depth is below 100/4, i.e. 25 m.

... / 2

Theoretical Estimation of Waves at "Estonia's" Casualty Position

At the casualty position of "Estonia" 59° 23,9' N, 21° 42,4' E, the depth according to the seachart is substantially larger than a depth which could affect the wave height. The waves should theoretically be ca. 4 m high with single waves of more than 8 m height, i.e. wave height which one has to expect to meet in the whole Northern Baltic with southerly winds of 15-20 m/s.

During the night of 28.9.94 at 01.00 hrs. Swedish time (00.00 UTC) the wind altered to west and increased to 24 m/s. After 1 hour the wind-sea from West with a wave height of 1.5 m can overlap the SW-ly swell with heights of up to 4 m. After 3 hours (04.00 hrs. Swedish time) the W-ly seas are theoretically 3.5 m high. Then the SW-ly sea has decreased substantially in wave height. In the morning the wind decreased in strength.

At a prevailing significant wave height of 4 m it has statistically to be expected that a vessel proceeding against headseas shall meet a wave of ca. 6.5 m height every 10 minutes. Waves of ca. 8 m height shall be met statistically every 3rd hour (2 hours 40 minutes).

5-10 nm North of the position the depth at several places is stated to be 20-30 m. In this area North of the casualty position were at the particular time more irregular seas with larger wave heights due to the waves having been influenced by the bottom topography.

Theoretical Estimation of Waves on "Estonia's" Route

On the route directly from Tallinn to the casualty position there are no shallow areas which could cause extreme wave conditions. At the beginning the waves were small due to lee side of the mainland and subsequently Dagö (Hiiumaa). Thereafter the vessel met waves from West and SW which were breaking around the shallow areas before Dagö. Finally they came out in the open sea from South and SW outside Dagö.

... / 3

Vågförhållanden i N Östersjön vid S-SW vind 15-20 m/s

Definitioner

Avgörande för våghöjd och våglängd är vindhastigheten men i lika hög grad blåstiden och blåslängden (den sträcka med fritt vatten över vilken vågfältet byggs upp). Den våglängd som vi här talar om är avståndet från vågtopp till vågtopp. Våghöjden definieras som höjden från dal till topp. I fortsättningen avses med "våghöjd" medelhöjden av den högsta 1/3 av vågorna (den signifikanta våghöjden). Vågperiod är tiden mellan två vågtoppar.

Våghöjder och våglängder i N Östersjön vid vindhastigheten 17-18 m/s

Om vindhastigheten är 18 m/s kan våghöjden bli 5 - 5.5 m på fritt vatten. Det tar emellertid över 24 timmar med denna höga vindstyrka och kräver en fri blåslängd på över 1000 km. Om blåslängden är 300 km (sträckan från öster om Hoburgen på Gotland) och vindhastigheten är 17 m/s måste vinden blåsa över 10 timmar för att skapa 4 m höga vågor. I N Östersjön, med kraftiga, sydliga vindar är det ofta blåstiden som begränsar våghöjden. Detta betyder alltså att de långa, höga vågorna först efter 6-8 timmar påverkas av en vindvridning eller vindökning.

Den korta, krabba sjön kan däremot snabbt överlagras en dyning från annat håll vid en vindvridning, vilket skapar en obehaglig sjögång för mindre båtar.

Om det blåser 17 m/s och våghöjderna är 4 m i N Östersjön är, enligt SMHIs mätningar och tabeller ur litteraturen, vågperioden omkring 8 s och våglängden omkring 100 m.

Samverkan mellan olika vågfält

Vågfält på havet är inte jämna vågor med långa kammar. Vågfält från olika håll samverkar och ger den kaotiska sjögång, med korta vågkammar som vi upplever till sjöss. Genom samverkan mellan olika vågtåg får man då och då extremt höga vågor. Våghöjden kan för enstaka vågor vare den dubbla signifikanta våghöjden, vågperioden och våglängden ändras inte. Vågorna i de olika vågtågen är vanligen ganska lika i höjd och våglängd. Om två vågor samverkar och ger en extremt hög våg är sannolikheten hög att nästföljande två vågor i de två vågtågen också samverkar; flera extremvågor kommer i följd.

På vissa platser blir det extra tydligt att vågriktningen ändras och skapar kaotiska vågor med extremt höga våghöjder. Vid passage av en uppgrundning böjer vågorna av runt grundet och samverkar i lä om grundet där det ständigt kan vara betydligt högre vågor än i området i övrigt. Det är speciellt intressant att teoretiskt uppskatta hur vågor kan påverkas av de uppgrundningar som finns söder om Skärgårdshavet och Ålands Skärgård.

Vilka grund kan påverka stormvågor?

Om djupet är mindre än 1/4 av våglängden påverkas vågen märkbart av botten. Det viktigaste som sker är att vågens hastighet minskar. Den del av vågen som passerar på sidorna om ett grund har större hastighet än den del som passerar över grundet, vågfronten fördröjs och böjer av över grundet och våghöjden blir större i lä om grundet (se fig).

Om vågor med våglängden är 100 m kommer in från S -SW mot uppgrundningen S om Åland bör vågorna påverkas och skapa ett kaotiskt mönster med extremt höga vågor när vågfronten passerar över områden där djupet understiger 100/4 m d.v.s 25 m.

Teoretisk uppskattning av vågorna vid Estonias förlisningsplats

På den position där Estonia förliste 59° 23,9', 21° 42,4'är djupet enligt sjökort betydligt större än det djup som skulle kunna medföra förändringar av djupvattenvåghöjderna. Vågorna skulle teoretiskt vara omkring 4 m höga med enstaka vågor på över 8 m höjd d.v.s samma våghöjder som man får räkna med att möta över hela N Östersjön vid sydlig vind på 15 - 20 m/s.

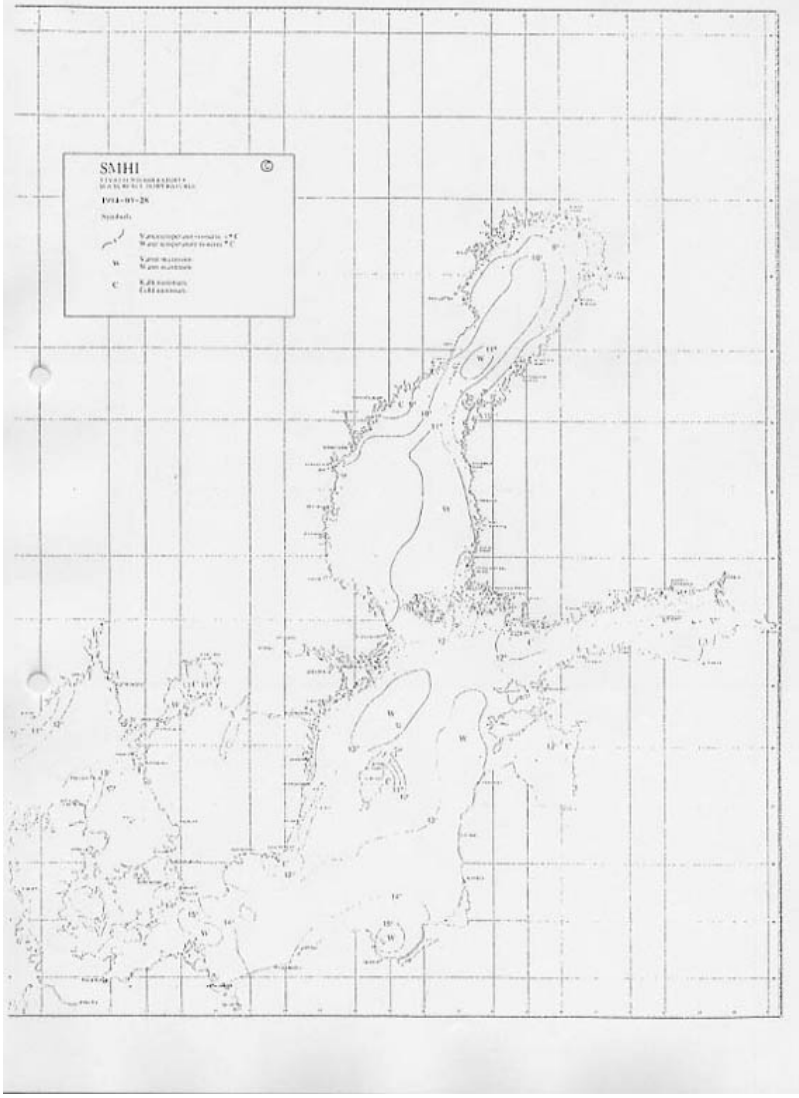
På natten 28/9 kl 01 svensk tid (kl 00 UTC) vred vinden till väst och ökade till 24 m/s. Efter 1 timma kan vågor från väst med en våghöjd på 1.5 m överlagras den sydvästliga "dyningen" med höjden upp mot 4 m. Efter 3 timmar (kl 04 svensk tid) är den västliga sjön enligt teorin 3.5 m hög. Den sydvästliga sjön bedöms då ha avtagit betydligt i våghöjd. Framåt morgonen avtog vinden i styrka.

Om signifikant våghöjd är 4 m kan man statistiskt räkna med att fartyget med sin fart snett mot vågorna träffas av en våg som är omkring 6.5 m hög var 10 minut. Vågor med omkring 8 m höjd bör statistiskt träffa fartyget en gång varannan/var tredje timma (2 tim 40 min).

5-10 distansminuter norr om positionen är djupet på flera ställen angivet till 20-30 m. I detta område norr om förlisningsplatsen bör det vid tillfället varit mera oregelbunden sjö med högre våghöjder på grund av vågornas samverkan med bottentopografin.

Teoretisk uppskattning av vågorna på Estonias färdväg

Om kursen satts direkt från Tallinn mot positionen där förlisningen skedde, passeras inga grundområden som kan förorsaka extremt vågtillstånd. Vågorna bör från starten ha varit små i lä av land och i lä av Dagö. Därefter mötte fartyget vågor från väst och sydväst som böjts av runt grundområdet utanför Dagö. Slutligen kom man ut i öppen sjö från syd och sydväst utanför Dagö.


SMHI
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1914-09-28
Symbols
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Prognostiker	Uppläsare	Datum	Sändningstid
Gu	LF	94-09-27	8:05

VÄDERÖVERSIKT

Storm- och kulingvarning är utfärdad för
SKAGERACK, KATTEGATT, VÄNERN, ÖRESUND OCH BÄLTEN, HELA ÖSTERSJÖN, ÅLANDSHAV OCH SKÄRGÅRDSHAVET.

Utsikter till Onsdag morgon

SKAGERACK:	Byig väst kuling 14-18 ökande, i ~~kväll~~ 18-22, i natt långsamt avtagande.
KATTEGATT, VÄNERN, ÖRESUND OCH BÄLTEN, SYDVÄSTRA ÖSTERSJÖN, SÖDRA ÖSTERSJÖN:	Byig väst 12-kuling 16, på Kattegatt i eftermiddag och i kväll upp till 20. I natt långsamt avtagande.
SYDÖSTRA ÖSTERSJÖN, MELLERSTA ÖSTERSJÖN, NORRA ÖSTERSJÖN, ÅLANDSHAV OCH SKÄRGÅRDSHAVET:	Ökande sydväst, från i eftermiddag kuling 14-17, i natt byig väst 18-22, på norra och mellersta Östersjön storm 25.
BOTTENHAVET, NORRA KVARKEN:	Syd eller sydväst 8-12.
BOTTENVIKEN:	Sydost 9-13, i eftermiddag syd och något avtagande.

STORM- OCH KULINGVARNING FÖR
SKAGERACK: Väst 14-18 m/s, i kväll 18-22, i natt långsamt avtagande.
KATTEGATT, VÄNERN, ÖRESUND OCH BÄLTEN, SYDVÄSTRA ÖSTERSJÖN, SÖDRA ÖSTERSJÖN: Väst 14-18, på Kattegatt i em. och i kväll ca 20.
SYDÖSTRA ÖSTERSJÖN, MELLERSTA ÖSTERSJÖN, NORRA ÖSTERSJÖN, ÅLANDSHAV OCH SKÄRGÅRDSHAVET: Från eftermiddagen sydväst 14-17, i kväll ytterligare ökande, i natt ca 20, på MELLERSTA och NORRA ÖSTERSJÖN STORM 25 m/s.

(Ingen nedisningsvarning)

SMHI NORRKOPING - 1994-09-27 06:56 UTC

WOSN40 ESWI 270700
SWEDISH GALEWARNINGS 0700 UTC

SKAGERRAK:
WESTERLY 14-18 M/S. THIS EVENING 18-22. TONIGHT SLOWLY DECREASING.

KATTEGAT, LAKE VAENERN, THE SOUND AND THE BELTS, WESTERN BALTIC,
SOUTHERN BALTIC:
WESTERLY 14-18. IN KATTEGAT THIS AFTERNOON AND EVENING 20.

SOUTHEASTERN BALTIC, CENTRAL BALTIC, NORTHERN BALTIC, SEA OF ÅALAND
AND ÅALAND ARCHIPELAGO:
FROM AFTERNOON SOUTHWESTERLY 14-17. THIS EVENING FURTHER INCREASING.
TONIGHT 20. IN CENTRAL AND NORTHERN BALTIC 25 M/S.

REMAINING AREAS NIL.

FPSN72 ESWI 271400

Prognostiker	Uppläsare	Datum	Sändningstid
Ha	EVA	94-09-27	15:55

~~VÄDERSITUATIONEN~~
Ett intensivt lågtryck - med centrum över Värmland - rör sig nästan rakt österut. I morgon drar det bort över Finland.

~~Storm- och kulingvarning~~ är utfärdad för
STORMVARNING för mellersta och norra Östersjön.
KULINGVARNING för övriga delar av Götalands farvatten, Svealands farvatten och sydligaste Bottenhavet.

Utsikter till Onsdag kväll

FLADEN, DOGGER:	Nordväst 12 till kuling 15 m/s, något avtagande, i morgon sydväst. Måttlig till god sikt.
TYSKA BUKTEN, FISKEBANKARNA, SYD UTSIRA:	Nordväst kuling 16-22, i natt avtagande, på dagen sydväst 8-13. Måttlig sikt, till en början regnskurar, i morgon övergående regn.
SKAGERACK, NORRA KATTEGATT:	Väst eller nordväst kuling 17-23, i morgon avtagande till 8-13 och efterhand sydväst. Måttlig till god sikt.
SÖDRA KATTEGATT, ÖRESUND och BÄLTEN, SYDVÄSTRA ÖSTERSJÖN:	Omkring väst 13 till kuling 17, i morgon på dagen 7-12. Mest god sikt.
VÄNERN:	Nordväst 13 till kuling 17, i morgon väst och avtagande till 7-10. Måttlig till god sikt.
SÖDRA, SYDÖSTRA, MELLERSTA och NORRA ÖSTERSJÖN:	Sydväst 10-13, ökande till kuling 17-22, i natt väst, på mellersta och norra Östersjön STORM 25, under dagen avtagande. Måttlig sikt, övergående regn, därefter regnskurar.
ÅLANDSHAV och SKÄRGÅRDSHAVET, SYDLIGASTE BOTTENHAVET:	Sydväst 6-10, i kväll tillfälligt växlande, därefter nordväst 13 till kuling 18, senare under dagen något avtagande. Måttlig sikt, regn eller regnskurar.
NORRA BOTTENHAVET, NORRA KVARKEN:	Tillfälligt växlande 3-6, i morgon väst eller nordväst och ökande till 10-13. God sikt.
BOTTENVIKEN:	Omkring sydväst 4-8 m/s, i morgon något ökande. Måttlig sikt.

STORM- OCH KULINGVARNING FÖR
SKAGERACK, NORRA KATTEGATT: Omkring väst 17-23 m/s, i morgon avtagande.
NORRA KATTEGATT, ÖRESUND OCH BÄLTEN, SYDVÄSTRA ÖSTERSJÖN: Väst 14-17, i morgon avtagande.

Prognostiker	Upplasare	Datum	Sändningstid
AE	EVA	94-09-27	21:50

~~VÄDERÖVERSIKT~~
Ett djupt lågtryck över inre Svealand fortsätter österut. Ett annat lågtryck söder om Island rör sig snabbt mot sydligaste Skandinavien, men blir inte lika intensivt som dagens lågtryck. Ett tredje lågtryck förskjuts åt nordväst över nordligaste Skandinavien.

~~Storm- och kulingvarning~~ är utfärdad för
STORMVARNING för mellersta och norra Östersjön.
KULINGVARNING för övriga delar av Götalands och Svealands farvatten och för sydligaste Bottenhavet.

Utsikter till Onsdag kväll

FLADEN, FISKEBANKARNA, SYD UTSIRA,	Omkring väst 10-kuling 15 m/s, tillfälligt avtagande till 6-10, i de norra farvattnen sent under onsdagen växlande. God sikt, under dagen tidvis regn.
DOGGER, TYSKA BUKTEN,	Omkring väst 7-12, från middagen ökande till 10-kuling 15. Måttlig eller god sikt.
SKAGERACK, NORRA KATTEGATT:	Omkring väst kuling 15-20, långsamt avtagande till 5-10, onsdag kväll möjligen växlande. Mest god sikt.
SÖDRA KATTEGATT, ÖRESUND och BÄLTEN, SYDVÄSTRA ÖSTERSJÖN:	Omkring väst 10-kuling 15, på dagen 7-12. Mest god sikt, sent i morgon regn.
VÄNERN:	Väst 12-kuling 17, under dagen avtagande till 4-8. Mest god sikt.
SÖDRA OCH SYDÖSTRA ÖSTERSJÖN,	Väst kuling 15-20, under dagen avtagande till ca 10. Mest god sikt.
MELLERSTA ÖSTERSJÖN, NORRA ÖSTERSJÖN,	Omkring väst kuling 17-storm 25, under dagen långsamt avtagande till 8-13. God sikt.
ÅLANDSHAV och SKÄRGÅRDSHAVET, SYDLIGASTE BOTTENHAVET,	Omslag till väst eller nordväst, ökande till 13-kuling 20, blåsigast i södra farvattnen, under dagen långsamt till ca 10. Förbättring till god sikt men någon regnskur.
BOTTENHAVET UTOM DEN SYDLIGASTE DELEN, NORRA KVARKEN:	Växlande 5-12, från morgonen väst 9-13. Mest god sikt.
BOTTENVIKEN:	Syd 4-8 m/s, i morgon väst eller nordväst och något ökande. God sikt.

Vindutsikter för Torsdagen

I samtliga farvatten vind mellan väst och nordväst, på många håll kuling.

SMHI NORRKOPING - 1994-09-27 18:56 UTC

WASN42 ESWI 271900
SWEDISH GALEWARNINGS 1900 UTC

NEW:
SOUTHERNMOST PART OF BOTHNIA

SKAGERRAK,NORTHERN KATTEGAT:
AROUND WEST 15-20 M/S. SLOWLY DECREASING .

LAKE VAENERN:
WESTERLY OR NORTHWESTERLY 14-17. DURING THE DAY DECREASING.

SOUTHERN KATTEGAT, THE SOUND AND THE BELTS,WESTERN BALTIC:
WESTERLY, AT FIRST 15.

SOUTHERN BALTIC, SOUTHEASTERN BALTIC:
AROUND WEST 15-20. DURING WEDNESDAY DECREASING.

CENTRAL BALTIC, NORTHERN BALTIC:
AROUND WEST, TONIGHT 17-25. LATER DECREASING.

SEA OF ÅALAND AND ÅALAND ARCHIPELAGO, SOUTHERNMOST PART OF SEA OF BOTHNIA:
FROM LATE TONIGHT WESTERLY OR NORTHWESTERLY 14-20 M/S. TOMORROW DECREASING.

REMAINING AREAS NIL.

SLUTKOMMENTAR

Väder- och sjöförhållandena

Ovanstående bedömning anger att de hårdaste vindarna med vindkantring till västlig storm och grov sjö inträffade först 1-2 timmar efter förlisningen och pågick sedan 3-5 timmar fram till morgonen.

Det väder som inträffade var ej extremt på något sätt utan en relativt "normal" höststorm som brukar inträffa ett antal gånger varje höst- och vinterperiod, statistiskt sett 5-15 gånger per år.

Prognoser

Vad gäller prognoserna så anser SMHI att de allmänna sjörapporterna som sändes ut via P1, Kustradio och NAVTEX i god tid fångat och väl har beskrivit de vindförhållandena som inträffade under kvällen och natten 27-28:e på norra Östersjön. Likaså måste specialprognosen av vind och vågor som sändes och kvitterades per fax till m/s Estonia anses ha uppfyllt de kvalitetskrav man kan ställa på denna typ av prognoser, bortsett från att vågorna var något underskattade, särskilt maxvågorna.

Våghöjden fram till förlisningen angavs i prognosen som 2.5-3.5 m, max 5.5 m. I analysen som utförts i denna utredning får fram att våghöjden i stället bör ha varit 3.5-4.5 m, max 7.0, före förlisningen.

SMHI finner inga fysikaliska eller topografiska förhållanden i havet som kan ha skapat några extremvågor över 7 m före förlisningen.

Förhållandena efter förlisningen med vågor på 5.0-6.0 m, max 8-9 m, som inträffade 2-6 timmar fram på morgonen den 28:e hade ju aldrig m/s Estonia upplevt om hon fortsatt västerut med 14-16 knop, eftersom hon då hamnat mer i "sjölä" för den W-liga stormen.

Därmed angavs det i SMHIs specialprognos kl 04-07 (svensk tid kl 03-06) avtagande vågor trots att vindprognosen angav ökning till W 18-25 m/s.

SMHI anser att prognoserna i detta fall bör ej ha upplevts som "avskräckande" för befälet på m/s Estonia eftersom denna typ av väder upplever man ett flertal gånger varje år på norra Östersjön, några gånger till och med värre.

Förutom en detaljerad vindprognos för olika delsträckor anges i denna även en prognos på våghöjden som är beräknad utifrån den ovan beskrivna vågmodellen.

Prognosunderlag

Det underlag som SMHI använder för prognoserna upp till 72 timmar är en numerisk (datorbaserad) vädermodell som körs i en stordator 4 gånger per dygn. För de längre prognoserna upp till 10 dygn används en sam-europeisk numerisk vädermodell som körs 2 gånger per dygn och har lite grövre upplösning i tid och rum.

För att ha beredskap mot tekniska problem samt för jämförelse med de egna slutsatserna erhåller SMI dagligen även numeriska vädermodeller från Storbrittanien, Tyskland och USA.

Samtliga observationerna som finns tillgängliga från jordytan, atmosfären och satelliter matas kontinuerligt in i dessa vädermodeller. Dessa data presenteras kontinuerligt även för vakthavande meteorolog på skärm eller i kartform, som på så sätt övervakar och följer väderutvecklingen.

Väderutvecklingen den 27-28 september var väl fångad av SMHIs numeriska vädermodell, likaså av d utländska numeriska vädermodellerna. Vakthavande meteorologer som tjänstgjorde på SMHI under måndag-tisdag den 27-28 september hade därmed ett mycket bra underlag och stormvarning utfärdade redan tisdag morgon för kommande natt på norra Östersjön.

Vågmodellen, som initialiseras av vindarna från SMHIs numeriska vädermodell och som används som underlag för vågprognoserna, var relativt bra men hade något underskattat våghöjderna.

S M H I
Sjöfart Tel 011-17 01 02 (kl 08-16)

To: m/s ESTONIA
Att: MASTER

Fax: 010 - 261 98 08
CC: 08-666 60 52 ATT: BENGT BRYUNGS

Issued: 1994-09-27 1311 LT

TALLINN - STOCKHOLM

Stretch	Time (Gmt/Lt)	Mean wind speed on 10 m level m/s		Prob. for mean wind >15 m/s in %	Wave height sign (m)	max (m)	Remarks
Naisaar-N Osmusaar	(18-21) 20-22	S-SW	10-15	20	1,0-2,0	3,0	
N Osmusaar-S Bogskär	(21-03) 22-04	SW-W	15-20	70	2,5-3,5	5,5	
S Bogskär-Sandhamn	(03-06) 04-07	W-NW	18-25	90	3,5-2,0	5,5	

COMMENTS: INTENSE LOW NEAR OSLO MOVING E-WARD VIA SOUTHERN SEA OF BOTHNIA TO SUOTHERN FINLAND. IT WILL CAUSE INCREASING SW- LATER W-NW. FROM TO NIGHT GUSTY WIND. AT DEP. RAIN WITH MOD VIS. LATER SOME SHORT SHOWERS.

BEST REGARDS/