



**Bundesstelle für Seeunfalluntersuchung**  
**Federal Bureau of Maritime Casualty Investigation**  
Federal Higher Authority subordinated to the Ministry of Transport,  
Building and Urban Affairs

Investigation Report 164/06

**Serious marine casualty**

**Accident involving personal  
injury on board the Traditional Vessel  
LISA VON LÜBECK  
in the port of Hel/Danzig  
on 19 April 2006**

1 March 2007

The investigation was conducted in conformity with the law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law - SUG) of 16 June 200.

According to this the sole objective of the investigation is to prevent future accidents and malfunctions. The investigation does not serve to ascertain fault, liability or claims.

The German text shall prevail in the interpretation of the Investigation Report.

This report is not to be used in court proceedings or proceedings of the maritime court investigation. Reference is made to § 19 Paragraph 4 SUG.

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## **1 Summary of the marine casualty**

On 19 April 2006 an accident involving personal injury occurred on board the Traditional Vessel LISA VON LÜBECK during berthing in the port of Hel/Danzig (Poland). While the vessel was being berthed, the engine transmission that was in the forward gear position could not be uncoupled due to a technical defect.

When a crew member tried to throw a line over the bollard, his leg was caught by the end of the mooring line and he had to be treated in hospital for a broken ankle.

## 2 Scene of the accident

Type of event : Serious marine casualty, injured person  
 Date/time: 19 April 2006 approx. 14:30 Uhr CEST<sup>1</sup>  
 Location: Hel/Danzig  
 Latitude/Longitude:  $\phi$  54°36,08'N  $\lambda$  018°48,06'E

Section from Chart 3022, Sheet 4 Federal Maritime and Hydrographic Agency

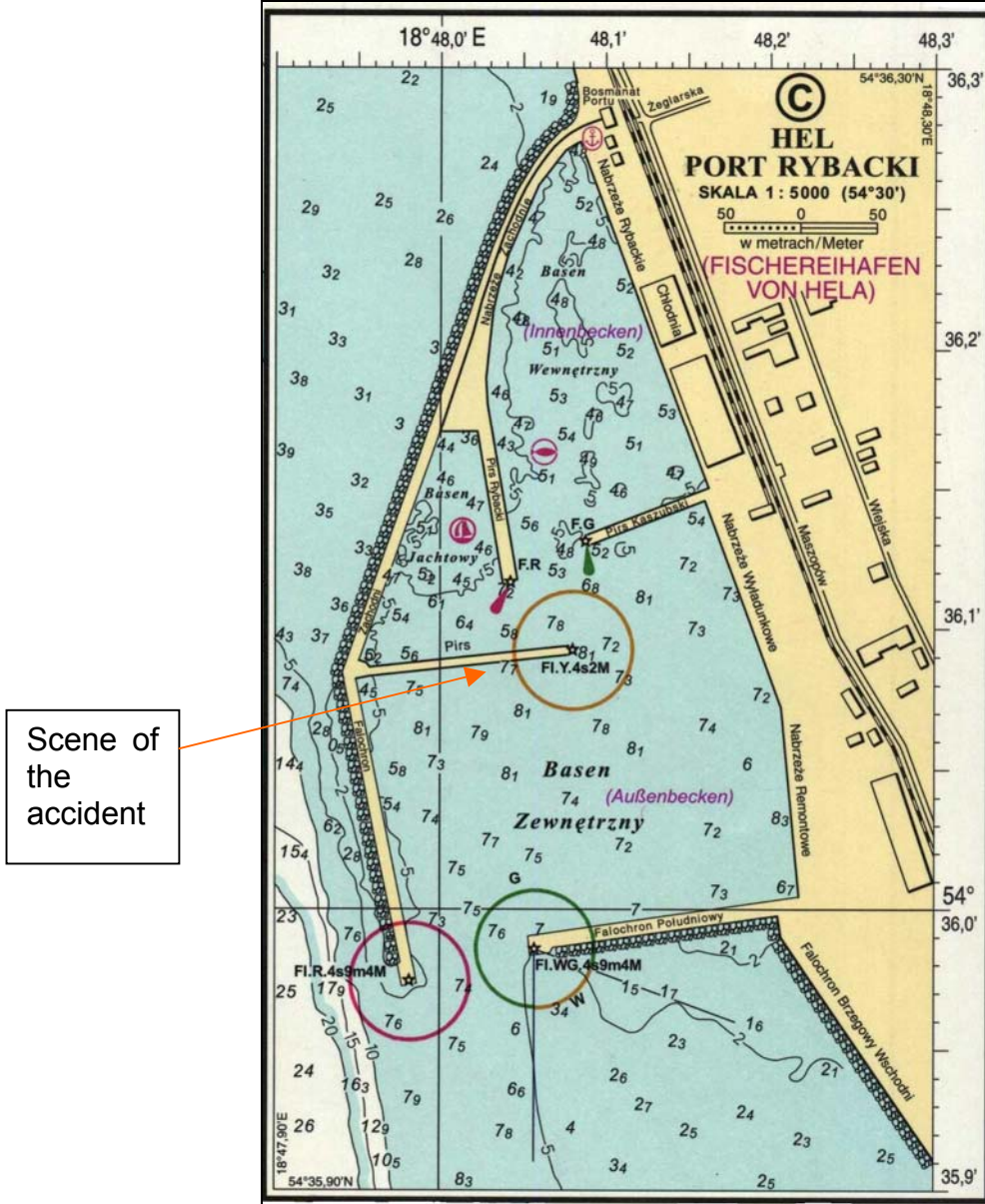


Figure 1: Chart

<sup>1</sup> All times in CEST = Central European Summer Time

### 3 Vessel particulars

#### 3.1 Photo LISA VON LÜBECK



Figure 2: LISA VON LÜBECK

#### 3.2 Particulars

Name of vessel:	LISA VON LÜBECK
Type of vessel:	Traditional Vessel/Caravel/Hansa ship
Nationality/Flag:	Germany
Port of Registry:	Lübeck
Year built:	2004
Building yard/building location	Hanseschiffwerft (owner-built) Lübeck
Length over all:	35.90 m
Length of hull <sup>2</sup> :	24.31 m
Length between perpendiculars:	24.31 m
Width of hull:	8.30 m
Width over wales:	9.30 m
Draft at the time of the accident:	aft: 2.90 m, forward 2.60 m
Displacement:	approx. 198 t
Engine rating:	255 kW (347 hp)
Main engine:	Volvo Penta, Diesel
Bow thruster:	hydraulic, 35 kW
Total sail area:	277 m <sup>2</sup>
Hull material	wood
Number of persons admitted on board:	15, for day trips subject to conditions: 79 persons

<sup>2</sup> Hull length according to entry in Safety Certificate

## 4 Course of the accident

### 4.1 Crew

There were 14 persons on board LISA VON LÜBECK on the 44<sup>th</sup> voyage, a crew training trip to Danzig. The vessel was under the command of a 66-year-old crew member, holder of the International Certificate for Operators of Pleasure Craft in all Coastal Waters and the Certificate of Competence AG. A crew member holding the International Certificate for Operators of Pleasure Craft in Coastal Waters and C-Certificate was deployed as helmsman. The vessel was crewed with sufficiently qualified deck hands.

### 4.2 Course of the accident according to statements by the crew members

The berth intended for LISA VON LÜBECK in the port of Hel, Danzig (Poland), was in the middle of the cross pier in the outer basin. The vessel was turned „astern“ in front of the pier with the aid of the bow thruster and the engine at about 14:15 h on 19 April 2006 and brought up to the pier at very slow speed, also using the bow thruster, with the starboard side against the offshore wind.

Since no assistance from shore was visible for mooring, one crew member jumped ashore to bring the fore spring line over a bollard. With a residual speed of approx. 1 - 2 kn, the control lever was set to "half astern" to stop the vessel. Despite this lever position of the control and coupling lever, the speed of the vessel was not reduced but instead even increased. It was not possible to stop the ship with a second astern manoeuvre either. The engine could no longer be uncoupled and the propeller continued to run ahead at idling speed. As it later turned out, the control wire to the gear had become unhooked in the forward position, and the manoeuvre "more speed astern" simply meant that the speed ahead was increased. The ship could only be stopped by switching off the main engine and hard bouncing in the fore spring line.

During the manoeuvre the 53-year-old accident victim was alone on the aft ship. He was busy with the aft line on the starboard side behind the Master's control position. The accident victim succeeded in placing the spliced loop of the aft line over a bollard on shore and winding this twice around the cross bollard on the after-castle. As a result of the forward speed, however, the line ran out quickly and although he moved away from the bollard, the end of the line hit his left leg. Initially the accident did not look so bad, but as the ankle started to swell the injured crew member was taken to a hospital by way of precaution. A fracture of the inner ankle on the left leg was ascertained.



## 5 Investigation

After the vessel returned to Lübeck on 26 April 2006 the BSU was notified of the accident by the Water Police (WSP) Lübeck. The BSU inspected the vessel for the first time in Hamburg on 5 May 2006.

### 5.1 Crew

At the time of the accident the crew possessed all the necessary qualifications and experience and the degree of training was sufficient. According to the information supplied by the Master, no alcohol is offered during the voyage but instead only after mooring in the ports. The manning of the manoeuvre stations for mooring and casting off and for all other sailing manoeuvres is stipulated in accordance with a form for the respected voyage.

The injured deck hand holds the the Motorbootführerschein-Binnen (Motor Boat Licence Inland) and the Sportbootführerschein-See (Pleasure Craft Skipper's Licence – Coastal Navigation) and a Certificate of Competence of the See-BG (Marine Insurance and Safety Association) as lifeboat man and fireman. He has been sailing since 1970 and had served as an engine fitter and deck hand on board LISA VON LÜBECK on approx. 20 voyages.

### 5.2 Licensing

In accordance with Paragraph 1.1 of the Safety Directive for Traditional Vessels (German acronym SiRi), the vessel has a Safety Certificate for Traditional Vessels valid up to 30 September 2009. This certificate is issued for the vessel group C with a licensed number of persons (15 persons on board and for the voyage area in "coastal waters"). Furthermore, LISA VON LÜBECK has an additional permit for day trips for a maximum of 79 persons on board, valid up to 30 September 2009. This permit is linked to appropriate conditions.

A safety expertise for traditional vessels was issued by an expert for traditional vessels for the first licensing in September 2004.

### 5.3 Ship's history

The new building LISA VON LÜBECK is a reconstruction of a caravel from the 15<sup>th</sup> century. Comparable earlier vessels are no longer in service. The vessel was built without construction supervision by a classification society within the sphere of individual responsibility of an association.

The line drawings and stability calculations and the design features were worked out at the Technical University Berlin (TU Berlin) on the basis of oil paintings and contemporary chroniclers. The keel was laid on 31 July 1999. The Haneschiff-Werft yard in Lübeck was established specially to build the vessel. Over 350 staff, mainly personnel working on an 'ABM' (job creation scheme), were engaged in building the vessel over a period of five years. The caravel was launched in the water with a launching lift on 27 March 2004 and the maiden voyage was sailed in April 2005.

## 5.4 Inspection of the vessel

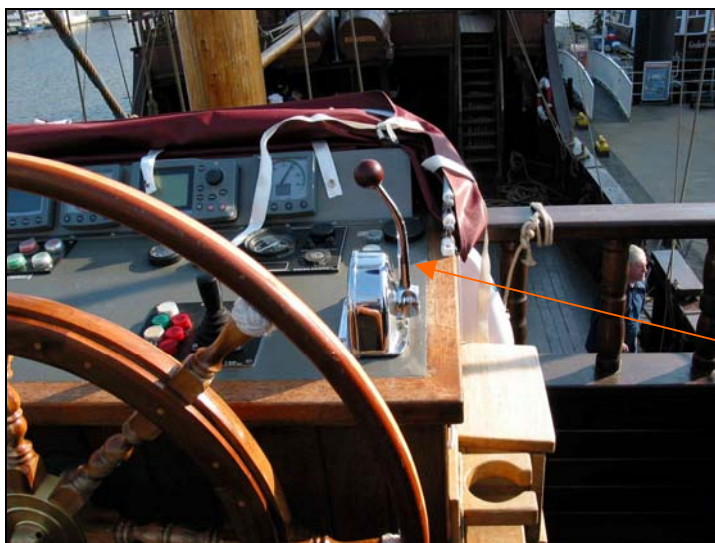
LISA VON LÜBECK was inspected by three staff members of the Federal Bureau of Maritime Casualty Investigation (BSU) in Hamburg on 5 May 2006. The vessel was in a very good general condition and cleared. The scene of the accident (aft deck) is clear and visible in all directions.



Figure 3: Bollard aft

### 5.4.1 Engine control

The engine installation is run with a single lever switching with just one gear shift lever from the control position on the aft deck. The lid of the control console at the control position can be folded up completely and can also be opened and closed constantly during ship's operation.



Gear shift  
lever

Figure 4: Control position

This single lever switching is operated with a gear shift lever using an operating and control wire that regulates the engine speed by changes in the injection pump ("fuel

cable") and a second operating and control cable that switches the gear lever to ahead, neutral or reverse ("gear cable").

After the accident the crew quickly identified the cause of the technical failure of the main engine reversing control. When the lever was pulled aft, the control cable for controlling the gear lever became unhooked; however, the gear was still coupled in the "ahead" position. When the lever was switched to „astern“ the transmission was no longer switched over and „more speed astern“ ultimately meant that the vessel only picked up more speed forward.



Figure 5: Control wires with lid folded up

The operating and gear shift cables on board LISA VON LÜBECK are highly flexible pressure control cables from Messrs. Remote Control Systems GmbH (RCS). These cables are characterised by very high load capacities and a very small radius of bending if properly fitted and laid. The assembly instructions of the manufacturer state the end parts are to be secured safely so that they cannot move or even twist under load. To secure them safely, a cable clamp with base (clamp assy) that engages in a groove in the forced draught cable is used.

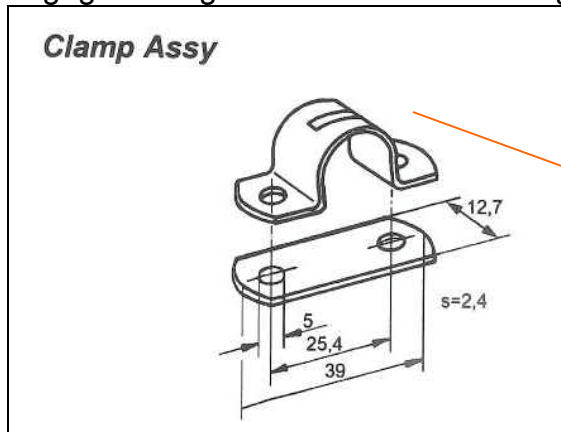


Figure 6: Clamp assembly

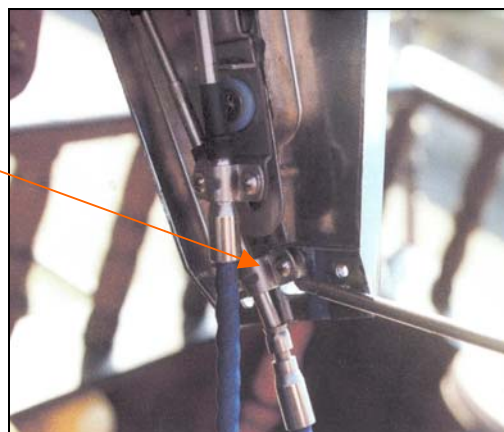


Figure 7: Gear control wire unhooked

The two M5 screws of the clamp fastening had evidently come loose during operation on board. While the gear was switched in the forward position, the control cable slipped out of its fastening. As the control cable was loose, it was no longer possible to uncouple the gear or switch over to "reverse".

After the technical defect was identified, the crew tightened the screws again and secured them additionally with a bonding agent.

#### **5.4.2 Stability**

During a routine study of the ship's papers the BSU ascertained that there were no stability documents and documents concerning the sail-carrying ability. According to the statement made by the Master, the TU Berlin had conducted theoretical calculations, such as sheets of hydrostatic curves and cross-curves of stability in the planning phase. No yard heel tests or a rolling time experiment to determine the centres of gravity of the vessel and the vessel weight had been carried out.

The expert for traditional vessels stated to the BSU that the Safety Directive for Traditional Vessels (SiRi) in its present version does not provide for an inspection of the stability by experts for traditional vessels. However, within the scope of his consultancy activity he drew attention to a leaflet published by the GSHW on stability issues. The theoretical stability calculations were presented to the expert and he advised the operator to have these calculations checked with an operating heeling test.

According to the Safety Directive, the owners/operators are obliged to ensure that there is always sufficient stability during the voyage.

No provision is made for checking of stability documents by other agencies.

#### **5.4.3 Ship's length**

In the Safety Certificate the "hull length" according to SiRi is stated as 24.31 m. During the inspection on board the vessel the "hull length" according to SiRi over deck from the aft edge of the aft post to approx. the forward edge of the forward post was measured in the presence of a master boat-builder and the Master, using a measuring tape, and found to be 25.70 m.

The expert stated in this connection that the hull length of 24.31 m had been selected in agreement with the operator. This length was taken from the Ship's Measuring Certificate and reportedly roughly corresponds to the "hull length" according to SiRi.

Within the framework of the issue of a Ship's Measuring Certificate and entry in the Sea Shipping Register in accordance with Article 2 (8) of the International Ship Measuring Convention of 1969, the BSH measured a length of 24.31 m on board. This measuring operation is in no way connected with the licensing procedure as traditional vessel and the expert opinion drawn up by the expert, and the length is distinctly shorter than the "hull length" according to SiRi.

On a notice plate on board the vessel and on the association's website, the hull length is stated as 30.12 m and the length over all as 35.90 m.

## **5.5 Wind and sea**

On behalf of the BSU Germany's National Meteorological Service (DWD) issued an expert opinion on the weather and sea conditions in the sea area in the Bay of Danzig. In the sea area under consideration there was initially a westerly wind and later a north-easterly wind with a maximum mean force of 3 to 4 Bft. The significant wave height of the sea will have been between 0.5 and 1.0 m.

## 6 Analysis

The serious marine casualty with an injured person on board LISA VON LÜBECK is attributable to a technical defect. The vessel was crewed with sufficient and adequately trained persons.

### 6.1 Berthing manoeuvre

*"The berthing manoeuvre may only be executed with the speed necessary to maintain steerability.*

*If conditions do not make it possible to slow down in time, the berthing manoeuvre must be discontinued and a renewed "approach without speed" is to be made. (If possible, sail past, turn, and start a new manoeuvre.)*

*The speed must always be so slow that the vessel can be brought to a stop in the space available by "slow astern" or "half astern".<sup>3</sup>*

Before the start of the berthing manoeuvre the vessel was stopped in the harbour basin of Hel with "half astern" and turned with the aid of the bow thruster and engine manoeuvres. The single lever transmission operated soundly here. It was only during the berthing manoeuvre that the transmission control cable became unhooked. When the Master noticed that the gear could no longer be reversed, LISA VON LÜBECK had just sufficient speed at approx. 1 kn to retain steerability. The decision to berth despite this technical defect and the immediate announcement to the crew not to interrupt the berthing manoeuvre is plausible against the background of the long pier with sufficient run-out and the well functioning crew, specifically trained for this training voyage. The manoeuvre was in fact successful without any harm to vessel and pier. Bouncing in the lines to stop the vessel when it has only very low residual speed is certainly a standard manoeuvre. The fact that one crew member would be hit by the end of a line "racing out" was not foreseeable. Despite this, such bouncing in the lines always involves the risk of rupture or racing out of a line or ripping off of a bollard. That is why line management must be conducted with elevated care and caution. In so far it would have been forward-looking seamanship to crew the manoeuvre stations on the after-castle with more than just one person. More than one person would have been necessary to operate the throw lines as well as the aft line and aft spring line. Altogether 14 persons were available to crew the manoeuvre stations and they should have been deployed better under the special conditions of this berthing manoeuvre and the insufficiently functioning drive installation.

The injured crew member had sufficient qualifications and experience with ropes and lines on board vessels. On recognising the dangerous situation the subsequent accident victim tried to move himself away from the danger zone.

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<sup>3</sup> Manövrieren im Hafen, auf See und bei Eis (Kapt. Koch/Kluge), Selbstverlag

## 6.2 Engine and engine control

LISA VON LÜBECK has an engine with a drive rating of 255 kW, an auxiliary diesel engine with 25 kW, a hydraulic bow thruster, an electrical anchor windlass, a hydraulic steering gear as well as sewage disposal installation and heating in dimensions such as are encountered on small passenger vessels. This main and auxiliary engine system and other system components have not been tested and accepted by any classification society or by the expert for traditional vessels, because such acceptance tests for newbuildings of traditional vessels are not provided for under SiRi. By contrast with former commercial vessels that have been converted to traditional vessels, and were generally built under the supervision and testing of a classification society, there was no examination of drawings and systems or parallel construction supervision by a third independent party for this newbuilding. No responsible persons outside the association charged with planning and construction supervision could be named. The Safety Directive for Traditional Vessels only provides for checking of installations, fittings, and equipment for fire protection by a recognised expert for traditional vessels in Annex 2 (Fire protection for the engine room and the engine system). The expert for traditional vessels does not examine the nature and technical concept of engine systems, especially not the gear levers and the systems and components for control purposes. The selection and installation of these lie within the sphere of responsibility of the owner/operator, who must take into account the state of the art and the competence of the persons involved to a reasonable extent.

The serious marine casualty is attributable to the fact that the pressure control cable for the gear transmission had come loose and the gear remained coupled in the "forward" position. This was evidently caused by the fact that the screws of the clamp assembly were not correctly tightened or secured. The loosening of this connection was probably also promoted by the fact that the lid of the control position with the single lever control could be opened and closed during ship's operations. Thus contrary to the instructions for use issued by the manufacturer, a torque/bending movement acted on the end of the pressure control cable.

When correctly installed, the pressure control cables are maintenance-free and lubricated for life. Subsequent lubricating or any other kind of maintenance is not necessary.

## 6.3 Stability

On the occasion of the investigation into the very serious marine casualty (No. 49/02) "Sinking of the GOTLAND" and into the serious marine casualty (No. 293/05) "Stranding of the Traditional Vessel ATLANTIC", the BSU pointed out the necessity of stability documents for traditional vessels.

Stability issues were not the cause of the accident in this serious marine casualty, nor did they promote it. From the point of view of the BSU, however, for a new building for which there are no longer any comparable vessels in existence, the actual stability should be carried out by a compulsory yard heeling test. The production of stability documents and sail instructions, especially against the background of day trips with a maximum of 79 persons on board, is considered to be urgently necessary.

## 6.4 Ship's length

For the crewing and equipment of traditional vessels SiRi states three "hull length" limits of 15 m, 25 m and 55 m. However, this "hull length" is evidently not checked by anybody.

According to the written statement by the expert for traditional vessels, the survey length was taken as measured length ("hull length") from the ship's measuring certificate in agreement with the operator, because this is the only officially fixed length measurement and because it roughly corresponds to the hull length.

According to SiRi the "hull length" is the "*horizontal distance between the extreme points of the forward post and the aft post*". In the case of vessels with wide overhangs at the stern, the stern post is well away from the stern and with otherwise equally long deck lengths and dimensions of the vessels, this can lead to great differences.

Possibilities of comparing vessels with each other more precisely exist if the hull length ( $L_h$ ) is measured in accordance with DIN EN ISO 8666, such as is the case for example in the comparison of length in the following sketch of a licensed traditional vessel with a "SiRi" hull length of 32.90 m:

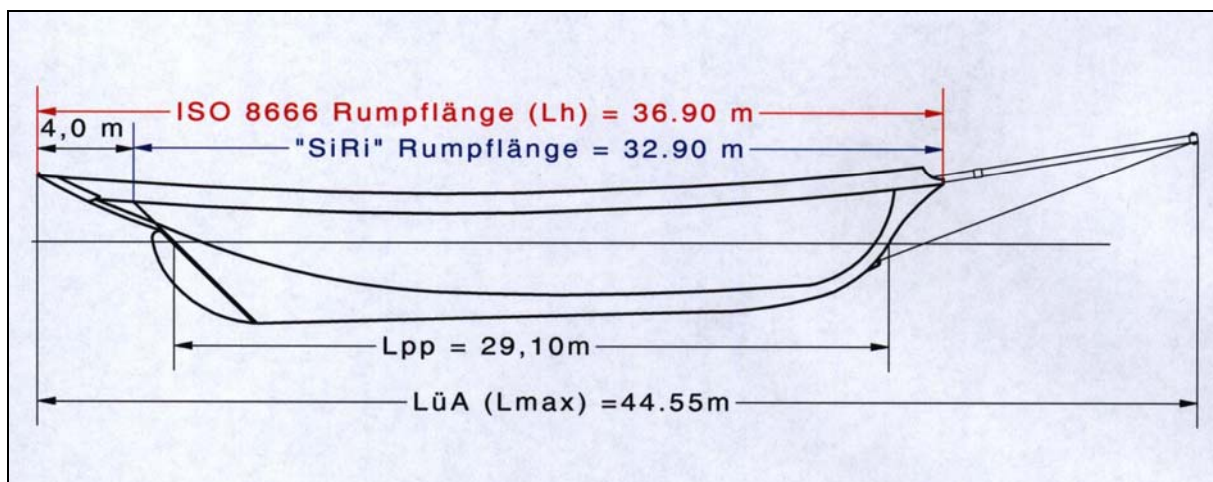


Figure 8: Survey lengths

[Rumpflänge = Hull length]

When measuring the "hull length" in accordance with SiRi, the 4 m overhang at the stern is not included in the length.

The measurement of the hull length in accordance with DIN EN ISO 8666 only provides for applications on vessels up to a length of 24 m, however. Yet it is to be recommended that this method should be introduced for all traditional vessels as a binding, easily verifiable and comparable measuring length. The hull length ( $L_h$ ) in accordance with DIN EN ISO 8666 "*comprises all structural or integrated constituents of the water craft, e.g. forward post and aft post made of wood, plastic or metal, bulwark and hull/deck connection. Parts that can be removed without destruction and without impairing the structural integrity of the water craft such as spars, jib boom,*



*bowsprit, pulpit and pushpit, stern fitting, rudder, Z-drives, outboard engines and their brackets, also diving and bathing platforms, rubbing strakes and fenders are not included in the measurements."*

With this length measurement according to DIN EN ISO 8666, the long, permanently installed overhangs forward and aft, known as castles, on LISA VON LÜBECK would be included too. If this measuring method is applied, a hull length of 30.12 m would result.

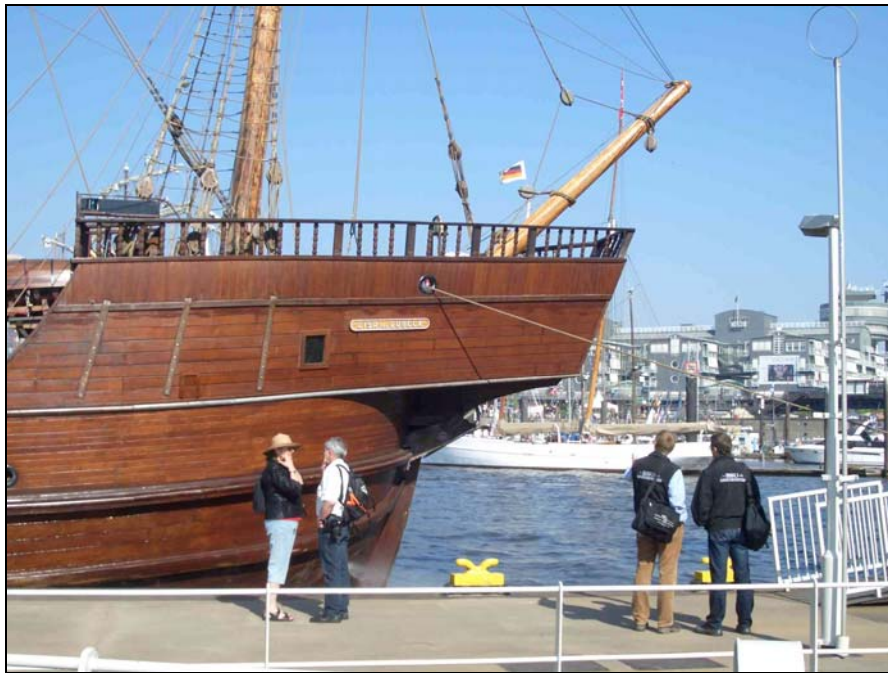


Figure 9: Projection forward

Independently of the measuring method, LISA VON LÜBECK has a hull length of over 25 m. The statement of 24.31 m in the safety expertise by the expert for traditional vessels and the Safety Certificate for Traditional Vessels issued on this basis by the See-BG (Marine Insurance and Safety Association) with the "selected hull length" are wrong.

The consequence of exceeding the 25 m limit is that it is no longer sufficient for the regular crewing of the vessel to consist only of an owner with the minimal qualification of an International Certificate for Operators of Pleasure Craft in Coastal Waters. Two holders of an International Certificate for Operators of Pleasure Craft in Coastal Waters with the additional entry "Skipper of Traditional Vessels" and in addition a holder of a "Certificate to operate the engine (motor/steam) on Traditional Vessels" must also be on board.

## 7 Safety recommendations

### 7.1 Standard-maker, See-BG (Marine Insurance and Safety Association) and GSHW

The Federal Bureau of Maritime Casualty Investigation (BSU) recommends that the following be included in the currently forthcoming revision of the Safety Directive for Traditional Vessels (SiRi):

1. Copies of historical water-craft and conversions to form traditional vessels should be executed under the drawing inspection and construction supervision of a classification society or a recognised expert.
2. The recommendations of the BSU from the Investigation Reports 49/02 "Sinking of the GOTLAND", 293/05 "Stranding of the Traditional Vessel ATLANTIC", and the analysis of this investigation report on stability documents are to be observed.
3. The measuring of the ship's length/hull length should be executed on the basis of a clearly defined and easily verifiable procedure, e.g. in accordance with DIN EN ISO 8666, by a recognised surveyor and be checked on first issue of a safety expertise by an expert for traditional vessels.

### 7.2 Owners and operators

The BSU recommends that the owners and operators of the Traditional Vessel LISA VON LÜBECK should check the securing of the pressure control cables at regular intervals. The control lever at the control position is to be installed firmly and separately from the lid of the control panel to avoid crushing or bending movement of the pressure control cables when the lid of the control panel is opened and closed.

The owners and operators of LISA VON LÜBECK are called upon to observe the rulings of the International Certificate for Operators of Pleasure Craft in Coastal Waters (with a distance limit) Regulation on crewing the vessel and on deploying regular crew holding the navigational and technical certificates of competence that are necessary according to SiRi, depending on the area sailed and for vessels with a hull length of over 25 m.

The manoeuvre stations are to be crewed with sufficient crew members during berthing and casting off.

## 8 Sources

- Investigations by the Waterway Police (WSP)
- Statements by witnesses
- Chart of the Federal Maritime and Hydrographic Agency (BSH)
- Documents of the classification societies
- Documents of the See-BG (Marine Insurance and Safety Association)
- Documents of the Joint Commission for Historical Water Craft (GSHW) e.V.
- Weather expertise of Germany's National Meteorological Service (DWD)
- "Manövrieren im Hafen, auf See und bei Eis"  
Authors: Masters Koch/Kluge, Selbstverlag Wilhelm Koch 1966